



Miniature Safety Edges ...

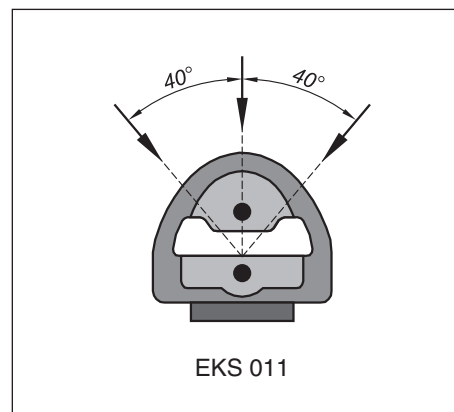
... inside values

Miniature Safety Edges (EKS) – the "invisible" protection against trapping and nipping

Tiny dimensions, enormous reliability.

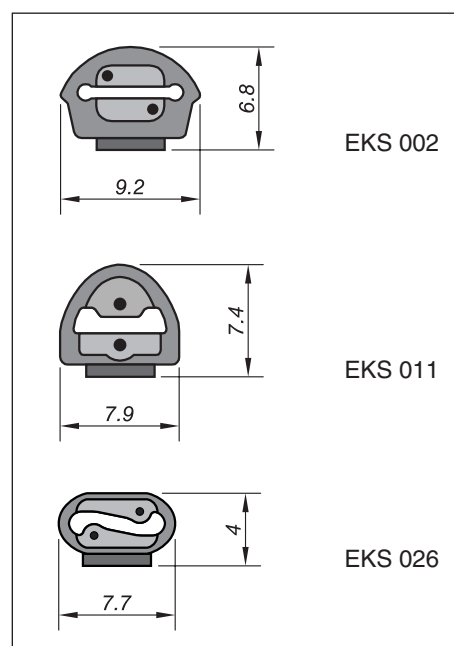
The Miniature Safety Edges are the result of consistent further development and miniaturisation of our Safety Edges which are well known for their reliability in safety applications. Endowed with the same safety and reliability features, the Miniature Safety Edges also have a visual advantage: absolutely tiny and the profile comes in almost any shape and size.

- The heart of the Miniature Safety Edges is the switching chamber which is integrated in the profile. A small amount of pressure to the Miniature Safety Edge suffices to short-circuit two conductive areas which are separated from each other. A sure signal for the evaluating unit connected up.
- Electrically, the Miniature Safety Edge works on the closed circuit principle, i.e. a break in connection is recognized, the danger-bringing movement is brought to a halt.



... outside values

- In addition to the three standard shapes depicted we can also provide customized profiles.
- The design of the Miniature Safety Edge can be practically effortlessly adapted to suit the surroundings.
- The Miniature Safety Edge is in its element in places where only very short overtravel distances are possible.
- Thanks to the minimal dimensions (see to the right) the Miniature Safety Edge can be integrated into its surroundings in an optimal way.





Product Information Miniature Safety Edges

Miniature Safety Edges (EKS) – the "invisible" protection against trapping and nipping

... diverse uses

Medical Technology

- Diagnostic equipment
- Radiation apparatus
- Electrically adjustable tables/chairs
- Movable protective hoods
- Rehabilitation equipment (Sports Medicine)

Elevator doors

Bus doors and electric roof lights (finger protection)

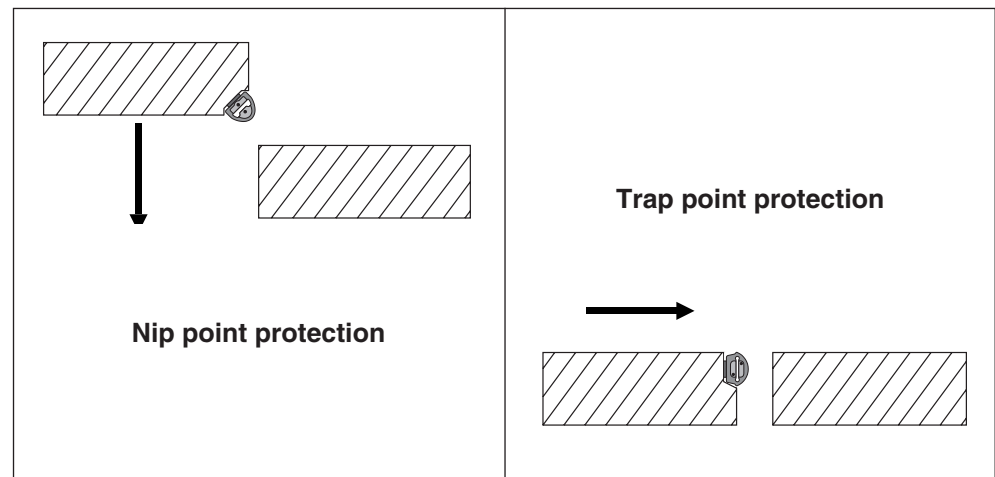
Electrically operated screens

- Cash dispensers
- Skylights
- Glass sliding doors

Electrically adjustable furniture

- Computer tables
- Recliners
- Electrically operated writing boards

... sure performance



... technical details

Distinctive features

- thermoplastic elastomer
- customized TPE-covering
- environment-friendly
- can be recycled

Electrical operating conditions

- max. voltage 24 V DC
- max. current 10 mA

Protection class

- IP65

Operating characteristics

- Response angle: $> 90^\circ$
(depends on shape of profile!)
- Actuating distance: $\leq 1,0 \text{ mm}$
- Actuating force: $< 25 \text{ N}$
(Test piece: $\varnothing 200 \text{ mm}$)
- Actuating force: $< 15 \text{ N}$
(Test piece: $\varnothing 4 \text{ mm}$)

Application temperatures

- 40°C to $+ 80^\circ \text{C}$
(short-time exposure to temperatures up to $+ 95^\circ \text{C}$ also possible)

Technical Data

Miniature Safety Edge consisting of sensor type EKS 0XX TPE

Miniature Safety Edges

(Illustration scale 1:1)

1 Protection class IP65

2 Switching operations

Test piece Ø 10 mm / F=100 N > 100,000

3 Actuating force, actuating distance and response angle

	EKS 002		EKS 011		EKS 026	
3.1 Actuating force	23 °C	- 25 °C	23 °C	- 25 °C	23 °C	- 25 °C
$v_{\text{test}} = 50 \text{ mm/min}$						
Test piece Ø 4 mm	< 10 N	< 15 N	< 15 N	< 30 N	< 10 N	< 20 N
Test piece Ø 200 mm	< 20 N	< 25 N	< 25 N	< 50 N	< 15 N	< 35 N
3.2 Actuating distance						
$v_{\text{test}} = 50 \text{ mm/min}$	23 °C		23 °C		23 °C	
Test piece Ø 80 mm cyl.	< 1.5 mm		< 2 mm		< 1 mm	
3.3 Response angle	< 60°		< 80°		< 80°	

4 Mechanical operating and application conditions

4.1 Sensor length (min./max.)	70 mm / 150 m	70 mm / 150 m	70 mm / 150 m
4.2 Bending radii			
Convex profile curvature	> 50 mm	> 120 mm	> 80 mm
Concave profile curvature	> 80 mm	> 150 mm	> 50 mm
Across the profile axis	> 120 mm	> 20 mm	> 120 mm
4.3 Tensile load, cable	max. 60 N	max. 50 N	max. 20 N
4.4 Working temperature	-25 °C to +80 °C	-25 °C to +80 °C	-25 °C to +80 °C
Permissible short term exposure	-40 °C to +100 °C	-40 °C to +100 °C	-40 °C to +100 °C

5 Electric operating conditions

5.1 End resistor (standard)	1.2 kΩ ±1%	1.2 kΩ ±1%	1.2 kΩ ±1%
Performance	max. 250 mW	max. 250 mW	max. 250 mW
5.2 Transition resistance	< 400 Ω (under load)	< 400 Ω (under load)	< 400 Ω (under load)
5.3 Electric rating	without end resistor	without end resistor	without end resistor
Voltage	max. 24 V DC	max. 24 V DC	max. 24 V DC
Current	max. 10 mA	max. 10 mA	max. 10 mA
	min. 1 mA	min. 1 mA	min. 1 mA
5.3 Connecting cable	Ø 3.7 mm	Ø 3.4 mm	Ø 1,4 mm per strand
	2x 0.25 mm²	2x 0.25 mm²	2x 0.35 mm²
Class according to IEC 60228	5	6	-

6 Application using acrylic-foam-adhesive tape

Peel strength	15 N/cm	
Applied to:	using promoter	without promoter
ABS	+	-
Aluminium	+	+
Aluminium, anodised	+	-
Wood: native	-	-
Wood: varnished, veneer or laminated	+	-
PA6	+	-
PA66	+	+
PE, HDPE	-	-
PMMA	+	+
PP	+	-
PS, CAB	-	-
PVC	+	+
SAN	+	-
Steel, stainless steel	+	+

Tests carried out at 23 °C (room temperature).

Note: check with adhesion tests before serial use whether bonding is possible on the selected installation surface.

Key to symbols:

+ = OK

- = not OK

Miniature Safety Edges

7 Behaviour in fire

According to DIN 75200
Compliance with

40 mm/min
StVZO, TA 29, BMW N601 21.0

8. Dimensions tolerances

length according to DIN ISO 3302 L2
section according to DIN ISO 3302 E2

9. Chemical resistance

Miniature Safety Edge EKS	TPE
Material characteristics	
Shore A hardness	55 ±5
Chemical resistance	
Acetone	-
Formic acid	-
Armor All	+
Carwash agent	+
Fuel	-
Brake fluid	±
Buraton	+
Butanol	-
Chlorinated bleaching lye	-
Disinfectant 1 %	+
Diesel	-
Acetic acid 10 %	-
Ethyl alcohol	+
Ethyl acetate	-
Ethylene glycol	+
Greases	±
Antifreeze	+
Skin cream	+
Icidin	+
Incidin	+
Incidin plus	+
Cooling lubricants	-
Plastics cleaning agent	+
Lyso FD 10	+
Metal processing oil	-
Microbac	+
Microbac forte	+
Minutil	+
Saline solution 5 %	+
Spirit (ethyl alcohol)	+
Terralin	+
UV-resistance	+
Centering oil	-

Tests carried out at 23 °C (room temperature).

Key to symbols

+ = resistant
± = limited resistance
- = not resistant

The data given are results of tests which were carried out in our laboratory to the best of our knowledge and belief. We cannot accept any obligations being deduced from them. You must always test the suitability of our products for your special application purpose under practical conditions.

Subject to technical modifications.

Technical Data

Miniature Safety Edge consisting of sensor type EKS 01X TPE

Miniature Safety Edges

1. **Protection class** IP65

2. **Switching operations**

Test piece Ø 10 mm / F=100 N > 100.000

3. **Actuating force, actuating distance and response angle**

3.1 Actuating force

Test speed v_{test}

Test temperature

Testing basis:

74/60/EWG and FMVSS118

Test piece Ø 200 mm

Test piece Ø 4 mm

Testing basis:

EN 1760-2

Test piece 1 Ø 80 mm cyl.

Test piece 3 Ø 20 mm

3.2 Actuating distance

Test speed v_{test}

Test temperature

Test piece 1 Ø 80 mm cyl.

3.3 Response angle

EKS 014

50 mm/min

23 °C

-25 °C

< 25 N

< 50 N

< 15 N

< 30 N

—

—

—

—

50 mm/min

23 °C

< 2 mm

< 80°



EKS 015

100 mm/min

23 °C

-25 °C

—

—

—

—

< 25 N

<110N

< 15 N

< 25 N

100 mm/min

23 °C

2 mm

< 40°



4. **Mechanical operating and application conditions**

4.1 Sensor length (min./max.)

70 mm / 150 m

70 mm / 150 m

4.2 Bending radii

Convex profile curvature

> 120 mm

> 800 mm

Concave profile curvature

> 150 mm

> 1000 mm

Across the profile axis

> 20 mm

> 200 mm

4.3 Working temperature

- 40 °C to + 80 °C

- 40 °C to + 80 °C

Permissible short term exposure

- 40 °C to +100 °C

- 40 °C to +100 °C

5. **Electric operating conditions**

5.1 End resistor (standard)

1.2 kΩ ±1%

1.2 kΩ ±1%

Performance

max. 250 mW

max. 250 mW

5.2 Transition resistance

< 400 Ω (under load)

< 400 Ω (under load)

5.3 Electric rating

without end resistor

without end resistor

Voltage

max. 24 V DC

max. 24 V DC

Current

max. 20 mA

max. 20 mA

min. 1 mA

min. 1 mA

5.4 Connecting cable

Ø 3.4 mm

Ø 3.7 mm

2x 0.25 mm²

2x 0.25 mm²

Class according to VDE 0295

6

5

6. **Application with clip-in foot**

Clip-in foot width

3.5 mm

7 mm

Al-rail type

C10

C15

7. **Dimensions tolerances**

Length according to ISO 3302 L2

Cross section according to ISO 3302 E2

Miniature Safety Edges

8. Chemical resistance

Miniature Safety Edge EKS 01X	TPE
Material characteristics	
Shore A hardness	55 ±5
Chemical resistance	
Acetone	-
Formic acid	-
Armor All	+
Carwash agent	+
Fuel	-
Brake fluid	±
Buraton	+
Butanol	-
Chlorinated bleaching lye	-
Disinfectant 1 %	+
Diesel	-
Acetic acid 10 %	-
Ethyl alcohol	+
Ethyl acetate	-
Ethylene glycol	+
Greases	±
Antifreeze	+
Skin cream	+
Icidin	+
Incidin	+
Incidin plus	+
Cooling lubricants	-
Plastics cleaning agent	+
Lyso FD 10	+
Metal processing oil	-
Microbac	+
Microbac forte	+
Minutil	+
Saline solution 5 %	+
Spirit (ethyl alcohol)	+
Terralin	+
UV-resistance	+
Centering oil	-

Tests carried out at 23 °C (room temperature).

Key to symbols:

+ = resistant

± = limited resistance

- = not resistant

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Subject to technical modifications.

Technical Data

Miniature Safety Edge consisting of sensor type EKS 030 TPE

1 Protection class IP65

2 Switching operations

Test piece Ø 10 mm / F=100 N > 100 000

3 Actuating force, actuating distance and response angle

3.1 Actuating force	EKS 030	
$v_{\text{test}} = 50 \text{ mm/min}$	23 °C	-25 °C
Test piece Ø 4 mm	< 15 N	< 25 N
Test piece Ø 200 mm	< 20 N	< 40 N

3.2 Actuating distance

$v_{\text{test}} = 50 \text{ mm/min}$	23 °C
Test piece Ø 80 mm	< 2,0 mm

3.3 Response angle < 100°

4 Mechanical operating and application conditions

4.1 Sensor length (min./max.) 70 mm / 150 m

4.2 Bending radii, minimum
A / B / C / D 60 / 70 / 60 / 60 mm

4.3 Tensile load, cable max. 40 N

4.4 Working temperature -25 °C to +80 °C
Permissible short term exposure -40 °C to +100 °C

5 Electric operating conditions

5.1 End resistor (standard) 1.2 kΩ ±1%
Performance max. 250 mW

5.2 Transition resistance < 400 Ω (under load)

5.3 Electric rating without end resistor
Voltage max. 24 V DC
Current max. 10 mA
min. 1 mA

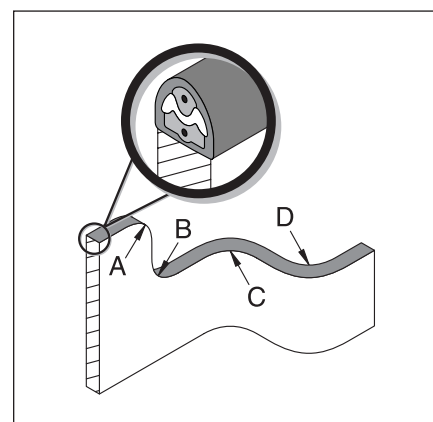
5.4 Connecting cable Ø 4.1 mm
2× 0.35 mm²

6 Application using acrylic-foam-adhesive tape

Peel strength	15 N/cm	
Applied to:	using promoter	without promoter
ABS	+	-
Aluminium	+	+
Aluminium: anodised	+	-
Wood: native	-	-
Wood: varnished, veneer or laminated	+	-
PA6	+	-
PA66	+	+
PE, HDPE	-	-
PMMA	+	+
PP, SAN	+	-
PS, CAB	-	-
PVC	+	+
Steel, stainless steel	+	+

Miniature Safety Edges

Bending radii:



Tests carried out at 23 °C (room temperature).

Note: check with adhesion tests before serial use whether bonding is possible on the selected installation surface.

Key to symbols:

+ = OK

- = not OK

Miniature Safety Edges

7 Behaviour in fire

According to DIN 75200
Compliance with

40 mm/min
StVZO, TA 29, BMW N601 21.0

8 Dimensions tolerances

length according to ISO 3302 L2
section according to ISO 3302 E2

9 Chemical resistance

Miniature Safety Edge EKS	TPE
Material characteristics	
Shore A hardness	52 ±5
Chemical resistance	
Acetone	-
Formic acid	-
Armor All	+
Carwash agent	+
Fuel	-
Brake fluid	±
Buraton	+
Butanol	-
Chlorinated bleaching lye	-
Disinfectant 1 %	+
Diesel	-
Acetic acid 10 %	-
Ethyl alcohol	+
Ethyl acetate	-
Ethylene glycol	+
Greases	±
Antifreeze	+
Skin cream	+
Icidin	+
Incidin	+
Incidin plus	+
Cooling lubricants	-
Plastics cleaning agent	+
Lyso FD 10	+
Metal processing oil	-
Microbac	+
Microbac forte	+
Minutil	+
Saline solution 5 %	+
Spirit (ethyl alcohol)	+
Terralin	+
UV-resistance	+
Centering oil	-

Tests carried out at 23 °C (room temperature).

Key to symbols:

+ = resistant
± = limited resistance
- = not resistant

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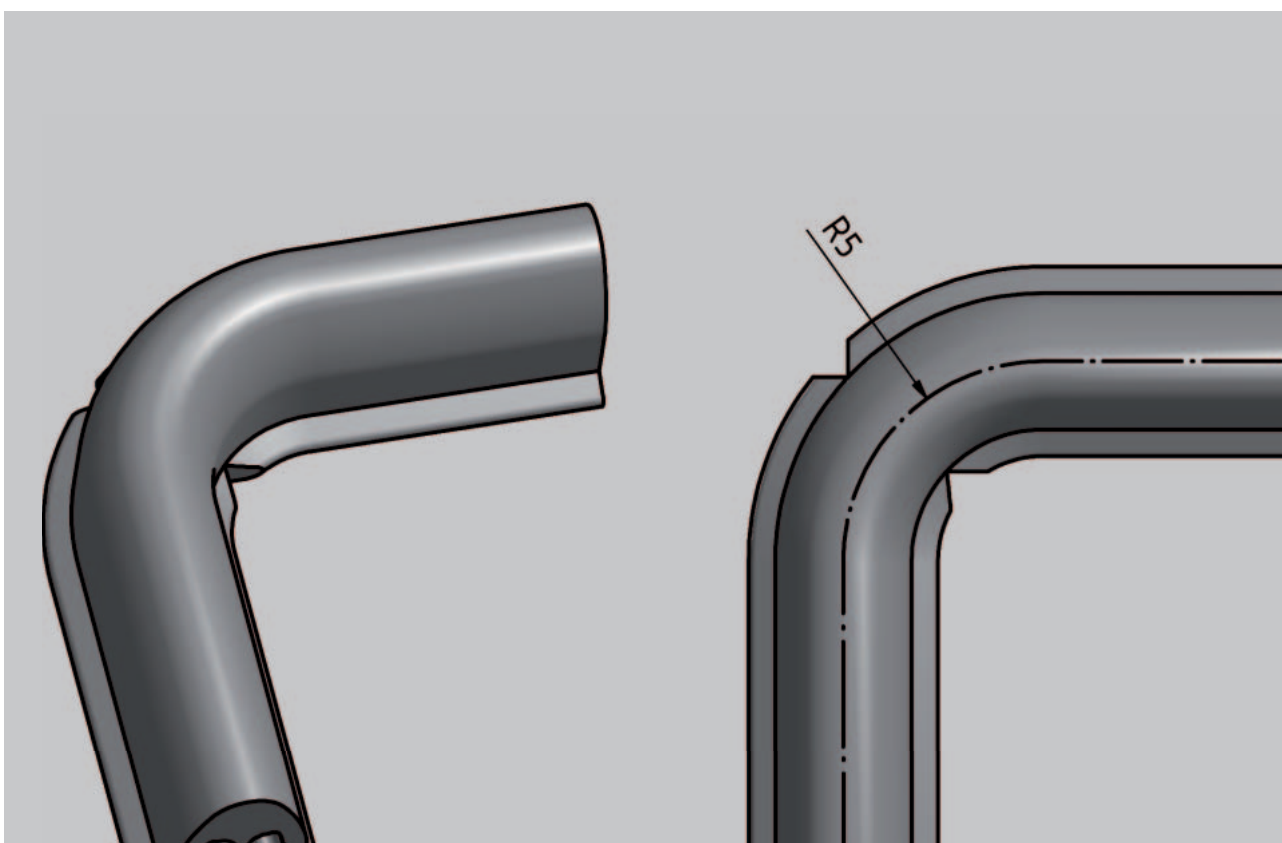
Subject to technical modifications.

MAYSER®

Polymer Electric



Product Information



Miniature Safety Edge EKS 038

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010916 v1.3

Definitions

Miniature Safety Edges are sensors for tactile protective devices.
A suitable Control Unit is required for evaluation of the signals.

Intended use

A Miniature Safety Edge detects a person or part of the body when pressure is applied to the actuation area. It is part of a linear tripping device. The task of the protective device is to avoid potential hazardous situations for a person within a danger zone such as shearing or pinching edges. Typical application areas are automatic windows, covers on machines, medical diagnostic equipment and height-adjustable furniture.

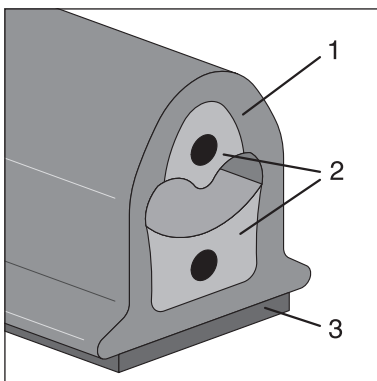
Safe operation of a Miniature Safety Edge depends entirely on

- the surface condition of the mounting surface,
- the correct selection of the size and resistance,
- correct installation as well as
- selection of the suitable Control Unit according to ISO 13849-1.

Limits

A maximum of 5 Miniature Safety Edges may be connected to one Control Unit.

Design



The Miniature Safety Edge EKS 038 consists of
(1) insulating TPE-covering,
(2) conductive contact layers with embedded wires and
(3) self-adhesive acrylic foam on the base of profile.

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Subject to technical modifications.

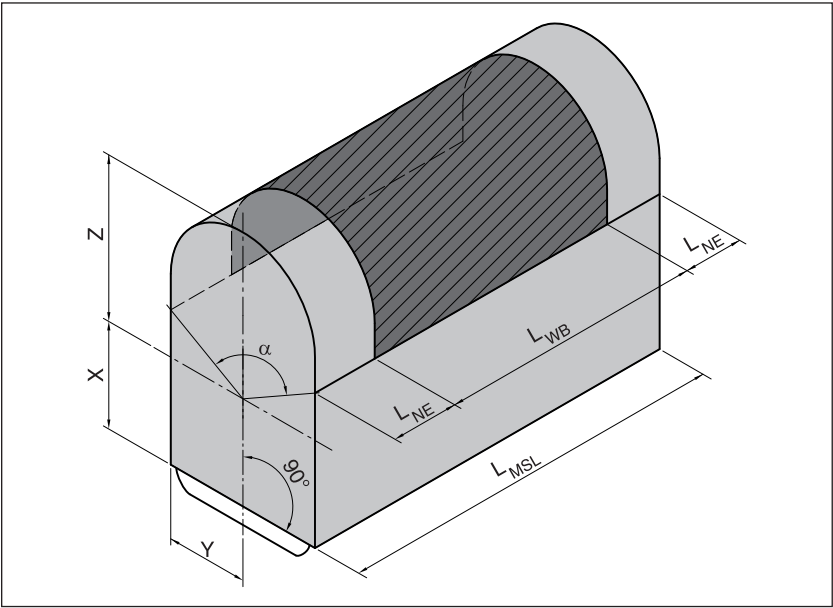
Effective actuation area

The parameters X, Y, Z, L_{NE} and angle α describe the effective actuation area.

For the effective actuation area, the following applies:

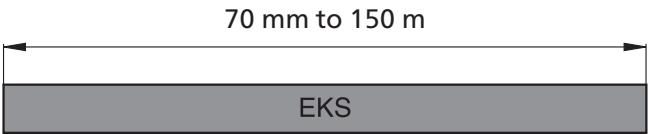
$$L_{WB} = L_{MSL} - 2 \times L_{NE}$$

- Parameters:
- L_{WB} = effective actuation length
 - L_{MSL} = overall length of the Miniature Safety Edge
 - L_{NE} = non-sensitive length at the end
 - α = effective actuation angle



MSL	EKS 038			
α	60°			
L _{NE}	10 mm			
X	2 mm			
Y	2,55 mm			
Z	2,9 mm			

Available lengths



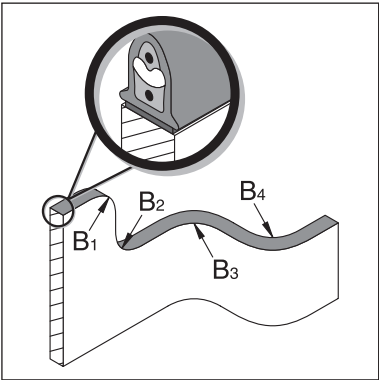
Subject to technical modifications.

Bend angles and bend radii

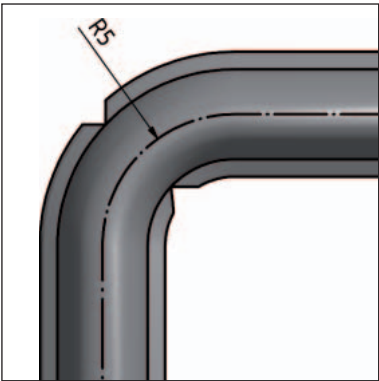
Bend angles

Bend angles are not possible on the Miniature Safety Edge.

Bend radius



Bend radius min.	EKS 038
B ₁	500 mm
B ₂	300 mm
B ₃	15 mm
B ₄	15 mm



Small 90° bends can also be implemented: Small bend radii up to 5 mm are possible for B₃ and B₄ with two opposite cuts in the protruding parts of the profile base.

Installation position

The installation position can be selected as required.

CAUTION

No pressure must be exerted on the Miniature Safety Edge in non-operative mode.

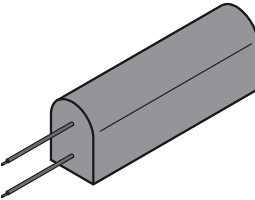
Connection

Cable exits

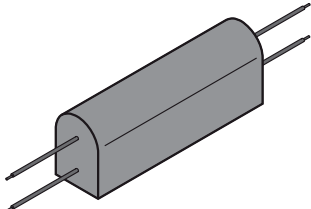
Tip

With more than one sensor connected one behind the other, we recommend the BK versions.

Axial exit



Version: EKS 038/W



Version: EKS 038/BK

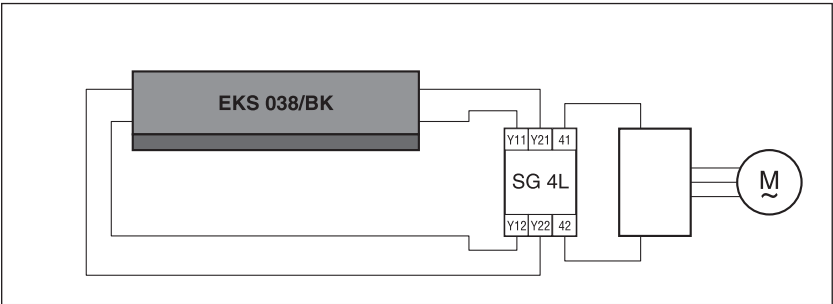
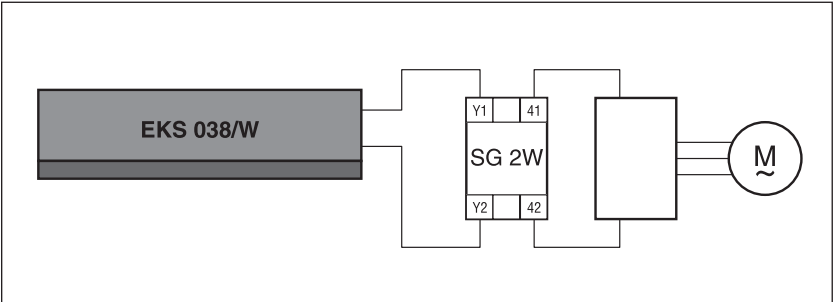
Cable connection

CAUTION

The cables must be laid free of tension.

- Cable: 0.35 mm² per strand, Ø 1.4 mm, black
- Cable length: 2.0 m
Option: to max. 200 m
- Cable ends: strands stripped
Option: cable ends available with plug and coupling

Connection example



Key:

SG 2W

2-wire-technology evaluation

SG 4L

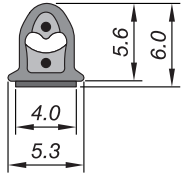
4-wire-technology evaluation

Y11, Y12 lower cables; Y21, Y22 upper cables

Subject to technical modifications.

Profiles

Dimensions and operating paths

EKS 038	
	
Actuation force: < 50 N Actuation distance: < 1.2 mm	

Physical resistance

Miniature Safety Edges EKS	TPE
Degree of protection (IEC 60529) Hardness as per Shore A Behaviour in fire (DIN 75200)	IP65 50 ±5 approx. 40 mm/min

Chemical resistance

The Miniature Safety Edge is resistant against 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 results of tests carried out in our laboratory to the best of our knowledge and belief. The suitability of our products for your special area of application must always be verified with your own practical tests.

Explanation of symbols:

+ = resistant

± = resistant to a certain extent

- = not resistant

Miniature Safety Edge EKS	TPE
Acetone	-
Formic acid	-
Armor All	+
Car shampoo	+
Buraton	+
Butanol	-
Sodium hypochlorite	-
Disinfectant	+
Acetic acid 10 %	-
Ethanol	+
Ethyl acetate	-
Ethylene glycol	+
Window cleaner	
Alcohol-based	+
Alkaline cleaner	+
Neutral cleaner	+
Greases	±
Volatile softeners	-
Anti-frost agent	+
Skin cream	+
Icidine	+
Incidine	+
Incidine plus	+
Plastic cleaner	+
Lyso FD 10	+
Metal working oil	-
Microbac	+
Microbac forte	+
Minutil	+
Saline solution 5 %	+
Spirit (ethyl alcohol)	+
Terralin	+
UV-resistance	+
Centring oil	-

Note:

Tests are carried out at room temperature (+23 °C).

Subject to technical modifications.

Attachment

Per acrylic-foam adhesive tape

Requirements

For ideal bonding, the bonding surface must be

- + clean
- + dry
- + smooth.

Avoid

- very uneven
- sharp-edged bonding surfaces.

Recommended working temperature: +15 to +25°C.

Note:

Check with adhesion tests before serial use whether bonding is possible on the selected installation surface.

on ...	Bonding with ...	with Primer	without Primer
ABS		1	-
Aluminium: natural		1	+
Aluminium: anodised		1 / 3	-
Aluminium: powder-coated		1	-
CAB		-	-
Glass		4 / 5	-
Wood: natural		-	-
Wood: glazed, varnished		2	-
Wood: veneered, light weight building board		2	-
PA6, PA66		3	-
PE, HDPE		-	-
PMMA		1	-
PP		1	-
PS		-	-
PVC		2	-
SAN		1	-
Steel, stainless steel		1 / 3	-
Tests are carried out at room temperature (+23 °C).			

Explanation of symbols:

+ = suitable

- = not suitable

1 = Primer 4298UV

2 = Primer 4297

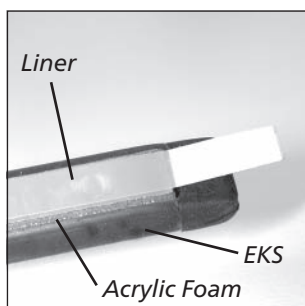
3 = Multiprimer

4 = Silan Primer

5 = Primer 4299

CAUTION

Damage to the rest of the TPE-covering renders the Miniature Safety Edge unusable. Dispose of faulty Miniature Safety Edge.



Preparation

Only applies to bend radii < 15 mm.

1. Measure bend locations and mark on both sides.
2. Carefully cut both profile sides at marks, making sure that only projecting part is cut.

Bonding

1. Clean and degrease bonding surface (e.g. with isopropanol).
2. Apply primer as thinly as possible to complete bonding surface with brush.
3. Air dry primer for approx. 10 minutes.
4. Remove 10 to 15 cm of liner from acrylic foam.
5. Place on bonding surface and press on firmly, without any tensile stress.
6. Repeat items 4. and 5. until EKS is completely bonded.
7. Maximum adhesion is achieved after 24 hrs.

Note:

If tensile stress is applied, the EKS can become several millimetres longer.

Tip:

For long straight sections, an extended try square may be useful for alignment.

Installation accessories

Part no.	Designation	Pack. unit
7500462	Primer 4298 type 3M, 125 ml, in can	1 pc.
7501995	Primer 4297 type 3M, 125 ml, in can	1 pc.
1003360	Multiprimer, 250 ml 24-P	1 pc.

Subject to technical modifications.

Technical data EKS 038

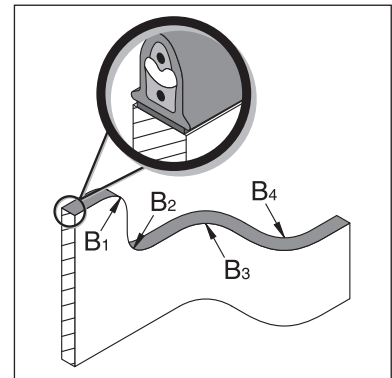
Miniature Safety Edge EKS 038 cut-to-size
with resistor (type W) or
without resistor (type BK).



1:1

Switching characteristics at $v_{\text{test}} = 50 \text{ mm/min}$		
Switching operations	$> 1 \times 10^5$	
Actuating force	+23 °C	-25 °C
Test piece (rod) Ø 4 mm	$< 15 \text{ N}$	$< 25 \text{ N}$
Test piece (rod) Ø 200 mm	$< 35 \text{ N}$	$< 50 \text{ N}$
Actuating distance		
Test piece (cylinder) Ø 80 mm	$< 1.2 \text{ mm}$	
Actuation angle		
Test piece (cylinder) Ø 80 mm	$\pm 30^\circ$	
Safety classifications		
B_{10d} as per ISO 13849-1	2×10^6	
Mechanical operating conditions		
Sensor length (min./max.)	70 mm / 150 m	
Cable length (min./max.)	2 / 200 m	
Attachment	Using acrylic-foam adhesive	
Peel force	15 N/cm	
Bend radii, minimum		
$B_1 / B_2 / B_3 / B_4$	500 / 300 / 15 / 15 mm	
IEC 60529: Degree of protection	IP65	
Operating temperature	$-25 \text{ °C to } +80 \text{ °C}$	
short-term (15 min)	$-40 \text{ °C to } +100 \text{ °C}$	
Electrical operating conditions		
Terminal resistance	$1k\Omega \pm 5\%$	
Output	max. 250 mW	
Contact transition resistance	$< 400 \text{ Ohm (per sensor)}$	
More than one sensor	5 in series max.	
Electrical rating		
Voltage	max. 24 V DC	
Current (min./max.)	1 mA / 10 mA	
Connection cable	Ø 1.4 mm per strand	
	$2 \times 0.35 \text{ mm}^2$	
Control Unit (recommendation)		
ISO 13849-1 Cat. 3	SG-EFS 104/2W (type W)	
ISO 13849-1 Cat. 3	SG-EFS 104/4L (type BK)	
Chemical resistance		
The Miniature Safety Edge is resistant against normal chemical influences over a period of exposure of 24 hrs (see p. 8).		
Dimensional tolerances		
Length as per	ISO 3302 L2	
Profile section as per	ISO 3302 E2	

Bend radii:



Request for quotation

Fax:

+49 731 2061-222

From:

Company

Department

Name, first name

P. O. Box

Post code

City

Street

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City

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Fax

E-mail

↓ Please keep free! ↓
For internal use only

Area of application

(e.g.. window construction, medical technology, machine closing edges, public transport, ...)

Mechanical conditions

EKS _____

☐ Type BK

☐ Type W with resistor _____ kΩ

Length: _____ m

Packing unit: _____ units

Attachment per:

☐ Bonding

☐ Snap-in foot

☐ Angle piece construction:

_____ x per EKS

☐ Cable length:

_____ m (standard: 2.0 m)

☐ Number of monitoring circuits: _____

☐ SG- _____

Pinching and shearing edges to be protected:

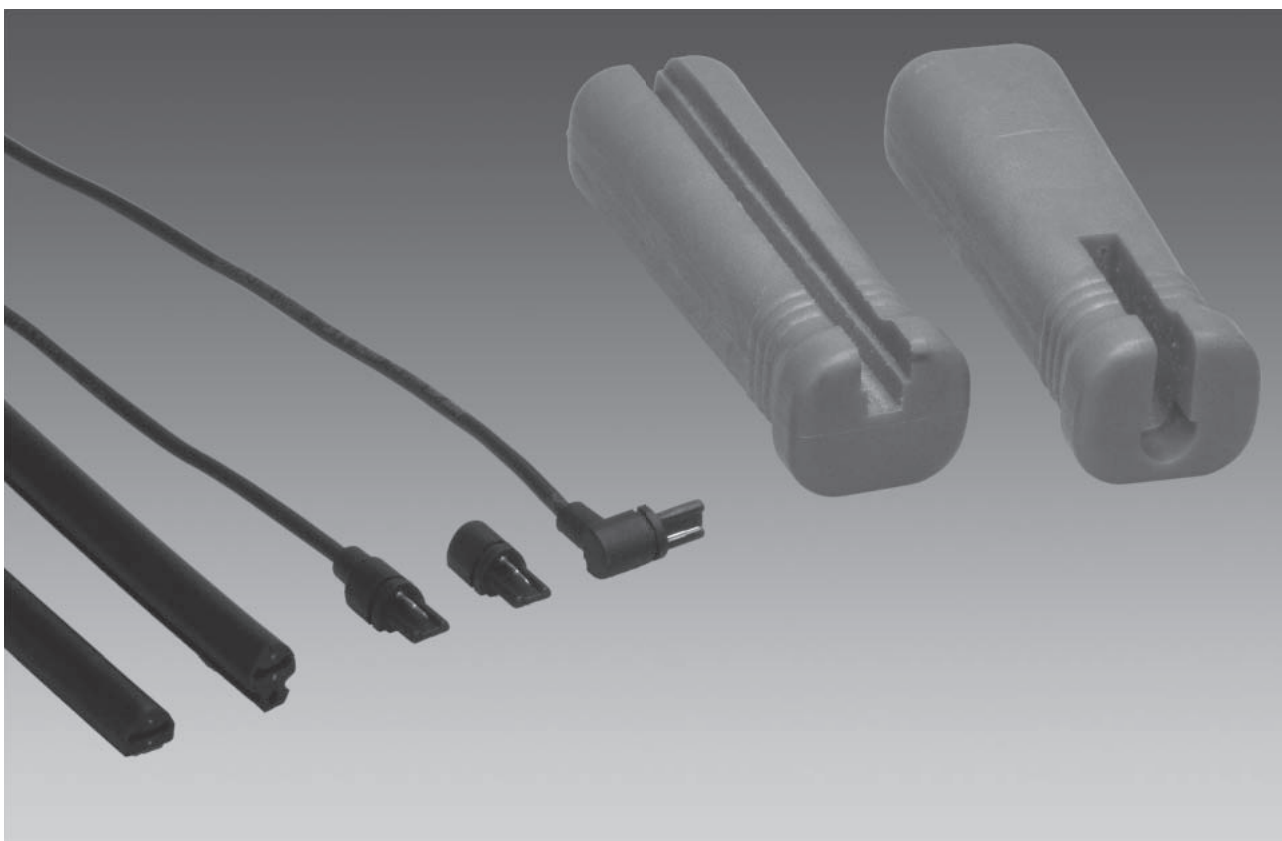
(Diagram incl. mounting possibility and cable routing)

MAYSER®

Polymer Electric



Product Information



DIY Miniature Safety Edges

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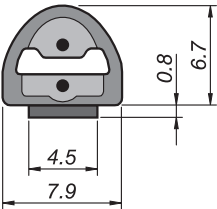
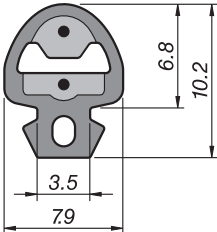
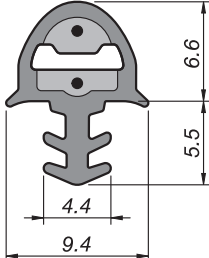
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Materials list

Part no.	Designation	Pack. unit
7502395	Contact tube EKS 011, self-adhesive	50 m
7502394	Contact tube EKS 014, with clip foot	50 m
7502773	Contact tube EKS 052, with clamp foot	45 m
1004580	End piece with resistor 1k2	50 pc.
1004747	End piece with resistor 2k2	50 pc.
1004579	End piece with PVC cable 2.5 m, axial	50 pc.
1004581	End piece with PVC cable 2.5 m, angled 90°	50 pc.
1003436	Aluminium profile C 10 for EKS 014 with clip 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.

Contact tubes

Dimensions

EKS 011 TPE	EKS 014 TPE	EKS 052 TPE
		
Actuating force: < 50 N actuating distance at 50 mm/s < 2 mm	Actuating force: < 50 N actuating distance at 50 mm/s < 2 mm	Actuating force: < 50 N actuating distance at 50 mm/s < 2 mm

Notes: Dimensional tolerances as per ISO 3302 E2/L2.

Subject to technical modifications.

Physical resistance

Notes:

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

Miniature Safety Edge EKS	TPE
IEC 60529: Degree of protection	IP40
Hardness as per Shore A	50 ±5

Chemical resistance

Explanation of symbols:

+ = resistant
± = limited resistance
- = not resistant

Miniature Safety Edge EKS	TPE
Acetone	-
Formic acid	-
Armor All	+
Car shampoo	+
Petrol	-
Brake fluid	+
Buraton	+
Butanol	-
Sodium hypochlorite	-
Disinfectant	+
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	+
UV-resistance	+
Centring oil	-

Notes:

Tests are carried out at room temperature (+23 °C).

Subject to technical modifications.

The Safety Element is resistant against 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 results of tests carried out in our laboratory to the best of our knowledge and belief. The suitability of our products for your special area of application must always be verified with your own practical tests.

DIY in 3 steps

These instructions describe cutting the contact tube to the required length, application of the end pieces and final testing. The end product is a Miniature Safety Edge EKS 011, EKS 014 or EKS 052 with degree of protection IP40.

1. Cutting to length

- Measure contact tube (KS) to length and mark.

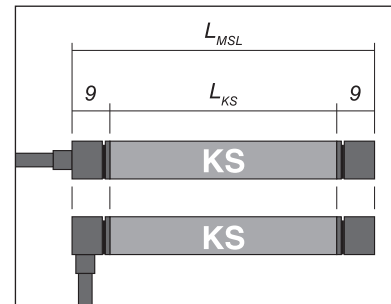
The following applies: $L_{KS} = L_{MSL} - 18 \text{ mm}$

where:

L_{KS} = length of contact tube

L_{MSL} = length of Miniature Safety Edge

- Place contact tube against stop of the scissors and cut off at marking

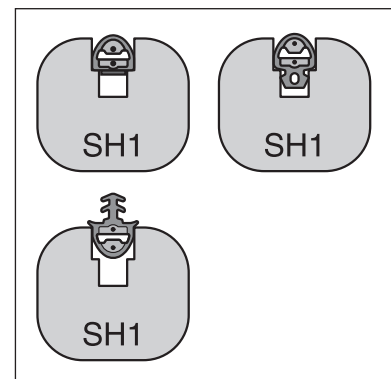


2. Insertion

- Insert contact tube in assembly aid SH1 so that the contact tube protrudes 2 to 3 mm beyond the edge.



- Insert cable end piece in assembly aid SH2.



Subject to technical modifications.

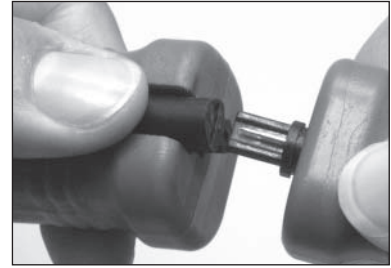
Tip

For a better bond between the end piece and the end of the contact tube, brush with a thin layer of special adhesive (part no. 1004987). When finished, wipe away any excess adhesive from assembly aid.

Tip

Use leverage effect – with slight pressure on contact tube at the end of the handle.

- Fix contact tube in assembly aid SH1 by pressing firmly with thumb.
- Insert end piece straight into contact tube with assembly aid SH2 and press firmly against assembly aid SH1 until the air gap between the end piece and the contact tube disappears.



- Loosely detach assembly aid SH2 and remove semi-finished Miniature Safety Edge.



- Assemble the other end of the contact tube with a resistor end piece in the same way.

3. Check

- Visual check for flush connection of the end pieces all round.
- Check operation with multimeter: Are set values met?



Set values:

Miniature Safety Edge not activated

EKS/W with 1k2:	1.2 kOhm ±10%
EKS/W with 2k2:	2.2 kOhm ±5%
EKS/BK:	> 20 MOhm
Continuity test per channel:	< (5 + (L _{KS} × 0.5/m)) Ohm

Miniature Safety Edge activated

all EKS:	< 400 Ohm
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Miniature Safety Edge may be irreparably damaged!

- ➔ No tensile load may be applied to the cable.
- ➔ Do not pull Miniature Safety Edge into an outer profile.
- ➔ Clip EKS 014 into aluminium profile C 10, do not pull in.
- ➔ No pressure may be exerted on the contact tube in non-operative mode.

Subject to technical modifications.

Attachment

Per acrylic-foam adhesive tape

e.g. EKS 011

Requirements

For ideal bonding, the bonding surface must be

- + clean
- + dry
- + smooth.

Avoid

- very uneven
- sharp-edged bonding surfaces.

Recommended working temperature: +15 to +25°C.

Note:

Check with adhesion tests before serial use whether bonding is possible on the selected installation surface.

on ...	Bonding with ...	with Primer	without Primer
ABS		1	-
Aluminium: natural		1	+
Aluminium: anodised		1 / 3	-
Aluminium: powder-coated		1	-
CAB		-	-
Glass		4 / 5	-
Wood: natural		-	-
Wood: glazed, varnished		2	-
Wood: veneered, light weight building board		2	-
PA6, PA66		3	-
PE, HDPE		-	-
PMMA		1	-
PP		1	-
PS		-	-
PVC		2	-
SAN		1	-
Steel, stainless steel		1 / 3	-
Tests are carried out at room temperature (+23 °C).			

Explanation of symbols:

+ = suitable

- = not suitable

1 = Primer 4298UV

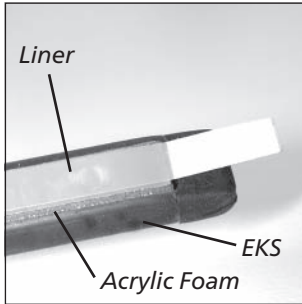
2 = Primer 4297

3 = Multiprimer

4 = Silan Primer

5 = Primer 4299

Bonding



1. Clean and degrease bonding surface. (e.g. with isopropanol)
2. Apply primer as thinly as possible to complete bonding surface with brush.
3. Air dry primer for approx. 10 minutes.
4. Remove 10 to 15 cm of liner from acrylic foam.
5. Place on bonding surface and press on firmly, without any tensile stress.
6. Repeat items 4. and 5. until EKS is completely bonded.
7. Maximum adhesion is achieved after 24 hrs.

Note:

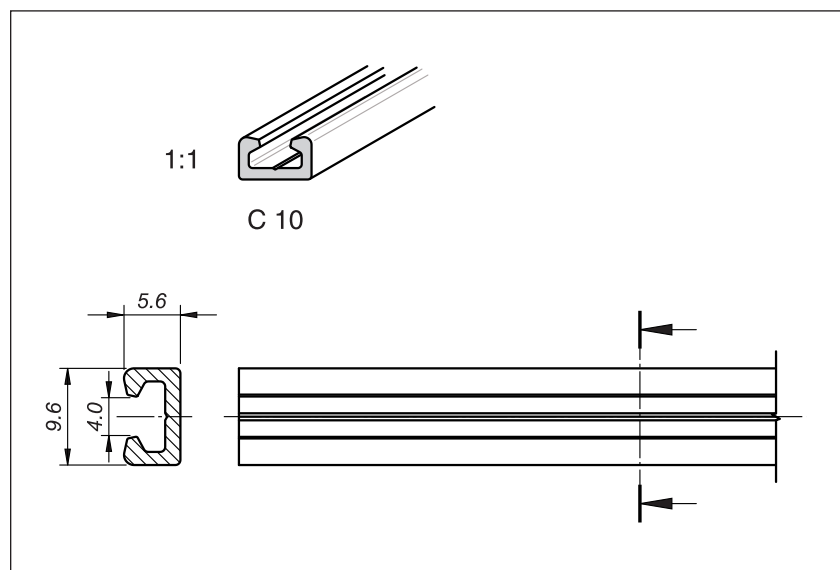
If tensile stress is applied, the EKS can become several millimetres longer.

Per clip foot

e.g. EKS 014

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.

Subject to technical modifications.

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Requirements

To ensure optimum fixing, the aluminium profile must be

- + compatible (e.g. C 10 for EKS 014)
- + clean
- + smooth.

Avoid

- drilling dust
- sharp-edged burrs on holes.

Recommended aids: sliding agents and seam rollers.

Note on aids:

- Brush aluminium profile and clip foot with a volatile **sliding agent** (e.g. water with washing-up liquid).
- **Seam roller** for pushing in.

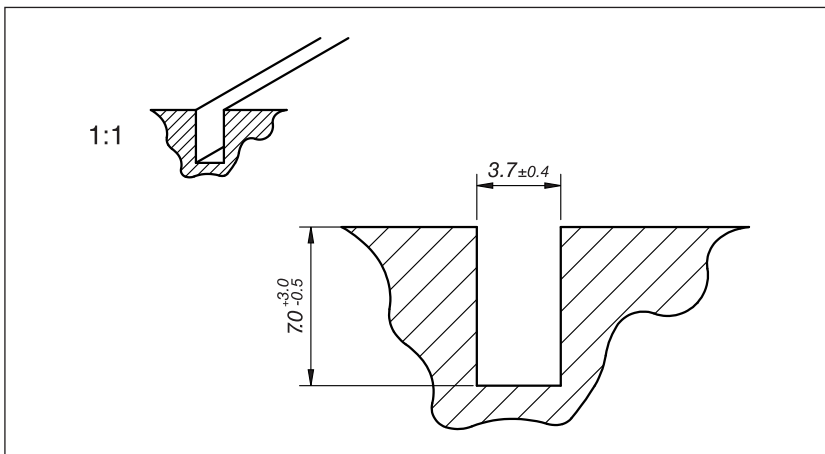
Clipping

1. Fix aluminium profile with countersunk screws, e.g. M2×2.5.
2. Clip Miniature Safety Edge with clip foot into the aluminium profile.

Per clamp foot

e.g. EKS 052

The Miniature Safety Edge is pressed into a groove.



Requirements

To ensure optimum fixing, the groove must be

- + manufactured for an exact fit
- + clean
- + smooth.

Avoid

- dirt
- sharp-edged burrs.

Recommended aids: seam roller.

Clamping

- ➔ Press the clamp foot into the groove until the Miniature Safety Edge is evenly inserted.

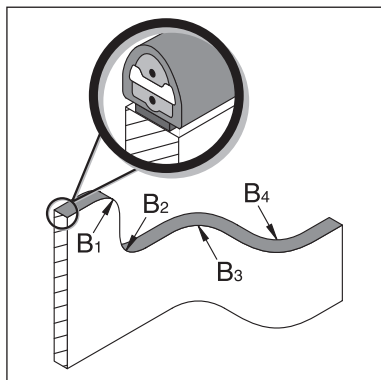
Subject to technical modifications.

Technical data DIY EKS 011

Miniature Safety Edge EKS 011
manufactured with resistor for 2-wire technology
or without resistor for 4-wire technology.



Bend radii:



Note:

Higher degrees of protection up to IP64 and a tensile load on the cable of up to 60 N are possible using special adhesive (part no. 1004987).

Switching characteristics at $v_{\text{test}} = 50 \text{ mm/min}$		
Switching operations		
Test piece (rod) Ø 10 mm, F = 100 N	$> 1 \times 10^5$	
Actuating force	+23 °C	-25 °C
Test piece (rod) Ø 4 mm	$< 15 \text{ N}$	$< 30 \text{ N}$
Test piece (rod) Ø 200 mm	$< 25 \text{ N}$	$< 50 \text{ N}$
Actuating distance		
Test piece (cylinder) Ø 80 mm	$< 2.0 \text{ mm}$	
Actuation angle		
Test piece (cylinder) Ø 80 mm	$\pm 40^\circ$	
Safety classifications		
ISO 13849-1: B _{10d}	2×10^6	
Mechanical operating conditions		
Acrylic foam		
Peel force	15 N/cm	
Bend radii, minimum		
B ₁ / B ₂ / B ₃ / B ₄	120 / 150 / 20 / 20 mm	
Tensile load, cable (max.)	20 N	
IEC 60529: Degree of protection	IP40	
Operating temperature	-25 to +80 °C	
temporary (15 min)	-40 to +100 °C	
Behaviour in fire		
as per DIN 75200	approx. 40 mm/min	
Electrical operating conditions		
Terminal resistance 1k2/2k2	$\pm 10\% / \pm 5\%$	
Switching capacity (max.)	250 mW	
Contact transition resistance	$< 400 \text{ Ohm}$ (per sensor)	
More than one sensor	max. 3 in series	
Electrical rating		
Voltage (max.)	DC 24 V	
Current (min./max.)	1 mA / 10 mA	
Connection cable	Ø 2.7 mm PVC 2x 0.25 mm ²	
Chemical resistance		
The sensor is resistant against normal chemical influences over a period of exposure of 24 hrs (see p. 4).		
Dimensional tolerances		
Length as per	ISO 3302 L2	
Profile section as per	ISO 3302 E2	

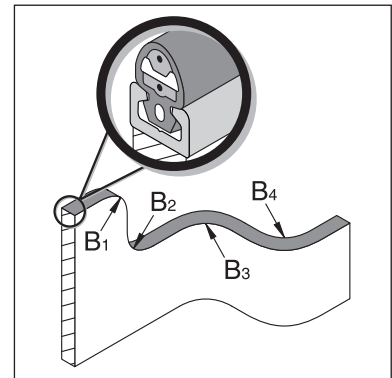
Technical data DIY EKS 014

Miniature Safety Edge EKS 014
manufactured with resistor for 2-wire technology
or without resistor for 4-wire technology.



Switching characteristics at $v_{\text{test}} = 50 \text{ mm/min}$		
Switching operations		
Test piece (rod) Ø 10 mm, F = 100 N	$> 1 \times 10^5$	
Actuating force	+23 °C	-25 °C
Test piece (rod) Ø 4 mm	$< 15 \text{ N}$	$< 30 \text{ N}$
Test piece (rod) Ø 200 mm	$< 25 \text{ N}$	$< 50 \text{ N}$
Actuating distance		
Test piece (cylinder) Ø 80 mm	$< 2.0 \text{ mm}$	
Actuation angle		
Test piece (cylinder) Ø 80 mm	$\pm 40^\circ$	
Safety classifications		
ISO 13849-1: B _{10d}	2×10^6	
Mechanical operating conditions		
Clip foot width	3.5 mm	
Aluminium profile (recommended)	C 10	
Bend radii, minimum		
B ₁ / B ₂ / B ₃ / B ₄	120 / 150 / 20 / 20 mm	
Tensile load, cable (max.)	20 N	
IEC 60529: Degree of protection	IP40	
Operating temperature		
temporary (15 min)	-25 to +80 °C	
	-40 to +100 °C	
Behaviour in fire		
as per DIN 75200	approx. 40 mm/min	
Electrical operating conditions		
Terminal resistance 1k2/2k2	$\pm 10\% / \pm 5\%$	
Switching capacity (max.)	250 mW	
Contact transition resistance	$< 400 \text{ Ohm}$ (per sensor)	
More than one sensor	max. 3 in series	
Electrical rating		
Voltage (max.)	DC 24 V	
Current (min./max.)	1 mA / 10 mA	
Connection cable	Ø 2.7 mm PVC 2x 0.25 mm ²	
Chemical resistance		
The sensor is resistant against normal chemical influences over a period of exposure of 24 hrs (see p. 4).		
Dimensional tolerances		
Length as per	ISO 3302 L2	
Profile section as per	ISO 3302 E2	

Bend radii:



Note:

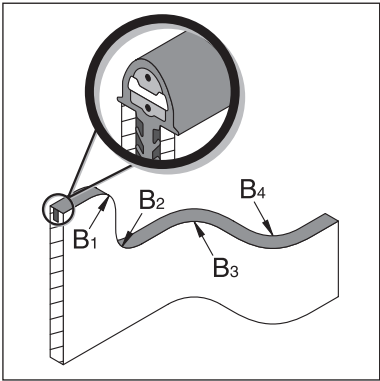
Higher degrees of protection up to IP64 and a tensile load on the cable of up to 60 N are possible using special adhesive (part no. 1004987).

Technical data DIY EKS 052

Miniature Safety Edge EKS 052
manufactured with resistor for 2-wire technology
or without resistor for 4-wire technology.



Bend radii:



Note:
Higher degrees of protection
up to IP64 and a tensile load
on the cable of up to 60 N are
possible using special adhe-
sive (part no. 1004987).

Switching characteristics at v _{Prüf} = 50 mm/min		
Switching operations		
Test piece (rod) Ø 10 mm, F = 100 N	> 1× 10 ⁵	
Actuating force	+23 °C	-25 °C
Test piece (rod) Ø 4 mm	< 15 N	< 30 N
Test piece (rod) Ø 200 mm	< 25 N	< 50 N
Actuating distance		
Test piece (cylinder) Ø 80 mm	< 2.0 mm	
Actuation angle		
Test piece (cylinder) Ø 80 mm	± 40°	
Safety classifications		
ISO 13849-1: B _{10d}	2× 10 ⁶	
Mechanical operating conditions		
Groove width for clamp foot	3.7 ±0.4 mm	
Bend radii, minimum		
B ₁ / B ₂ / B ₃ / B ₄	120 / 150 / 20 / 20 mm	
Tensile load, cable (max.)	20 N	
IEC 60529: Degree of protection	IP40	
Operating temperature	-25 to +80 °C	
temporary (15 min)	-40 to +100 °C	
Behaviour in fire		
as per DIN 75200	approx. 40 mm/min	
Electrical operating conditions		
Terminal resistance 1k2/2k2	±10% / ±5%	
Switching capacity (max.)	250 mW	
Contact transition resistance	< 400 Ohm (per sensor)	
More than one sensor	max. 3 in series	
Electrical rating		
Voltage (max.)	DC 24 V	
Current (min./max.)	1 mA / 10 mA	
Connection cable	Ø 2.7 mm PVC 2× 0.25 mm ²	
Chemical resistance		
The sensor is resistant against normal chemical influences over a period of exposure of 24 hrs (see p. 4).		
Dimensional tolerances		
Length as per	ISO 3302 L2	
Profile section as per	ISO 3302 E2	

Subject to technical modifications.