

## RailFR: Sensor, cable



EN | Data sheet

### Sensor

EKS 002FR

EKS 030FR

SE1 15FR

SE1 18FR

### Cable

RailFR 2×0.25 mm<sup>2</sup>

RailFR 3×0.25 mm<sup>2</sup>

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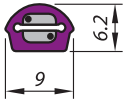
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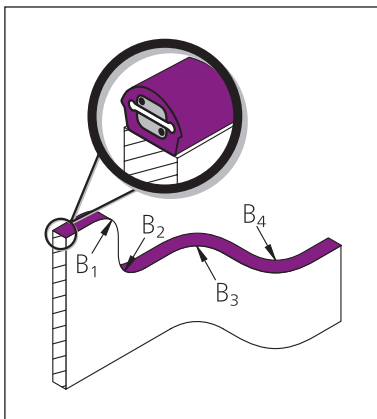
## Safety elements

### EKS 002FR



1:1

Miniature safety edge consists of one sensor EKS 002FR



<b>Switching characteristics at <math>v_{test} = 10 \text{ mm/s}</math></b>	
Switching operations	
Test sample 1 Ø 80 mm / F = 50 N	> $1 \times 10^5$
Actuation force	<b>+23 °C</b> <b>-40 °C</b>
Test sample 1 Ø 80 mm	< 70 N      < 120 N
Test sample 3 Ø 20 mm	< 15 N      < 30 N
Actuation distance	
Test sample 1 Ø 80 mm	< 2.0 mm
Actuation angle	
Test sample 1 Ø 80 mm	< 80°
<b>Safety classifications</b>	
ISO 13849-1: B <sub>10D</sub>	$1 \times 10^6$
<b>Mechanical operating conditions</b>	
Sensor length (min./max.)	70 mm / 50 m
Cable length (min./max.)	200 mm / 100 m
Tensile load, cable (max.)	60 N
Mounting (optional) by peel force	Acrylic foam adhesion 15 N/cm
Bend radii, minimum	
B <sub>1</sub> / B <sub>2</sub> / B <sub>3</sub> / B <sub>4</sub>	40 / 40 / 40 / 40 mm
Installation position	any
IEC 60529: Degree of protection	IP67
Weight (without cable)	43 g/m
EN 50125-1: Air temperature classes	T3
short-duration (max. 10 min)	TX
EN 50125-1: Classes for the height area	AX, max. 2000 m NHN
Operating temperature	-40 to +60 °C
EN 50125-1: max. humidity at maximum temperature change	100 % 3 K/s
<b>Electrical operating conditions</b>	
Not actuated sensor	
Terminal resistance	1k2 ±1 %, 8k2 ±1 %, others on request
Rated power	250 mW
Actuated sensor	Test sample 1 / F = 150 N
Contact transition resistance	< 400 Ohm
Switching current (min./max.)	DC 1 mA / DC 10 mA
Number of sensors	max. 5 in series
Connection cable	Ø 3.8 ±0.2 mm, 2× 0.25 mm <sup>2</sup>
<b>Dimensional tolerances</b>	
ISO 3302-1	E2/L2

**Explanation of symbols:**

- + = suitable
- = not suitable

**Note:** Prior to serial use, check by means of adhesion tests whether adhesion is possible on the selected installation surface.

<b>Application by acrylic foam adhesion</b>	
ABS	+
Aluminium	+
Aluminium: anodised	+
Wood: natural	-
Wood: varnished, veneer or plastic-coated	+
PA6	+
PA66	+
PE, HDPE	-
PMMA	+
PP, SAN	+
PS, CAB	-
PVC	+
Steel, stainless steel	+

**Physical resistance**

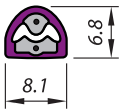
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**Chemical resistance**

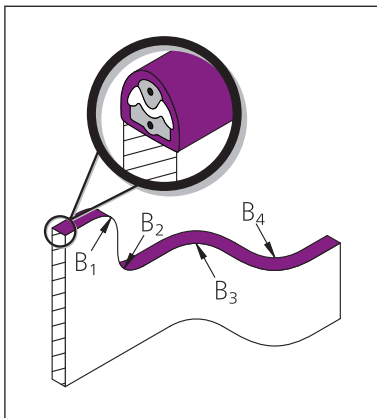
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## EKS 030FR

Miniature safety edge consists of one sensor EKS 030FR



1:1



<b>Switching characteristics at <math>v_{test} = 10 \text{ mm/s}</math></b>	
Switching operations	
Test sample 1 Ø 80 mm / F = 50 N	$> 1 \times 10^5$
Actuation force	<b>+23 °C</b> <b>-40 °C</b>
Test sample 1 Ø 80 mm	$< 80 \text{ N}$ $< 140 \text{ N}$
Test sample 3 Ø 20 mm	$< 15 \text{ N}$ $< 30 \text{ N}$
Actuation distance	
Test sample 1 Ø 80 mm	$< 1.5 \text{ mm}$
Actuation angle	
Test sample 1 Ø 80 mm	$< 100^\circ$
<b>Safety classifications</b>	
ISO 13849-1: B <sub>10D</sub>	$1 \times 10^6$
<b>Mechanical operating conditions</b>	
Sensor length (min./max.)	70 mm / 50 m
Cable length (min./max.)	200 mm / 100 m
Tensile load, cable (max.)	60 N
Mounting (optional) by peel force	Acrylic foam adhesion 15 N/cm
Bend radii, minimum	
B <sub>1</sub> / B <sub>2</sub> / B <sub>3</sub> / B <sub>4</sub>	40 / 40 / 25 / 25 mm
Installation position	any
IEC 60529: Degree of protection	IP67
Weight (without cable)	43 g/m
EN 50125-1: Air temperature classes	T3
short-duration (max. 10 min)	TX
EN 50125-1: Classes for the height area	AX, max. 2000 m NHN
Operating temperature	-40 to +60 °C
EN 50125: max. humidity at maximum temperature change	100 % 3 K/s
<b>Electrical operating conditions</b>	
Not actuated sensor	
Terminal resistance	1k2 ±1 %, 8k2 ±1 %, others on request
Rated power	250 mW
Actuated sensor	Test sample 1 / F = 150 N
Contact transition resistance	$< 400 \text{ Ohm}$
Switching current (min./max.)	DC 1 mA / DC 10 mA
Number of sensors	max. 5 in series
Connection cable	Ø 3.8 ±0.2 mm, 2 × 0.25 mm <sup>2</sup>
<b>Dimensional tolerances</b>	
ISO 3302-1	E2/L2

**Explanation of symbols:**

- + = suitable
- = not suitable

**Note:** Prior to serial use, check by means of adhesion tests whether adhesion is possible on the selected installation surface.

<b>Application by acrylic foam adhesion</b>	
ABS	+
Aluminium	+
Aluminium: anodised	+
Wood: natural	-
Wood: varnished, veneer or plastic-coated	+
PA6	+
PA66	+
PE, HDPE	-
PMMA	+
PP, SAN	+
PS, CAB	-
PVC	+
Steel, stainless steel	+

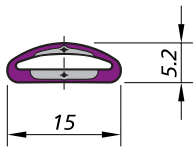
**Physical resistance**

See Page 9

**Chemical resistance**

See Page 9

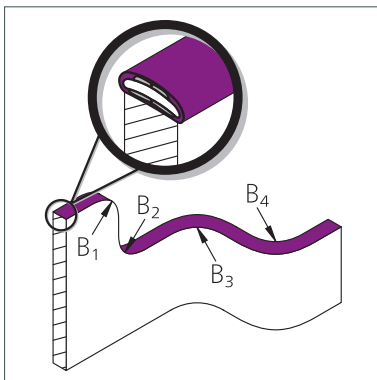
## SE1 15FR



1:1

Safety element SE1 15FR cut-to-size with resistance R = 1k2 or 8k2.

Bend radii:



<b>Switching characteristics at <math>v_{test} = 10 \text{ mm/s}</math></b>		
Switching operations	$> 1 \times 10^5$	
Test sample 1 $\varnothing 80 \text{ mm}$ / F = 20 N	<b>+23 °C</b>	<b>-40 °C</b>
Actuation force		
Test sample 1 $\varnothing 80 \text{ mm}$	$< 40 \text{ N}$	$< 50 \text{ N}$
Test sample 3 $\varnothing 20 \text{ mm}$	$< 5 \text{ N}$	$< 10 \text{ N}$
Actuation distance		
Test sample 1 $\varnothing 80 \text{ mm}$	$< 1.8 \text{ mm}$	
Actuation angle		
Test sample 1 $\varnothing 80 \text{ mm}$	$< 30^\circ$	
<b>Safety classifications</b>		
ISO 13849-1: B <sub>10D</sub>	$1 \times 10^6$	
<b>Mechanical operating conditions</b>		
Sensor length (min./max.)	100 mm / 50 m	
Cable length (min./max.)	200 mm / 100 m	
Pull-in load (max.)		
Cable	50 N	
Pull-in tab	30 N	
Bend radii, minimum		
B <sub>1</sub> / B <sub>2</sub> / B <sub>3</sub> / B <sub>4</sub>	70 / 100 / 150 / 150 mm	
Installation position	any	
IEC 60529: Degree of protection	IP67	
Weight (without cable)	47 g/m	
EN 50125-1: Air temperature classes	T3	
short-duration (max. 10 min)	TX	
EN 50125-1: Classes for the height		
area	AX, max. 2000 m NHN	
Operating temperature	-40 to +60 °C	
EN 50125: max. humidity	100 %	
at maximum temperature change	3 K/s	
<b>Electrical operating conditions</b>		
Not actuated sensor		
Terminal resistance	1k2 $\pm 1 \%$ , 8k2 $\pm 1 \%$ , others on request	
Rated power	250 mW	
Actuated sensor	Test sample 1 / F = 150 N	
Contact transition resistance	$< 400 \text{ Ohm}$	
Switching current (min./max.)	DC 1 mA / DC 10 mA	
Number of sensors	max. 5 in series	
Connection cable	$\varnothing 3.8 \pm 0.2 \text{ mm}$ , 2x 0.25 mm <sup>2</sup>	
<b>Dimensional tolerances</b>		
ISO 3302-1	E2/L2	

### Physical resistance

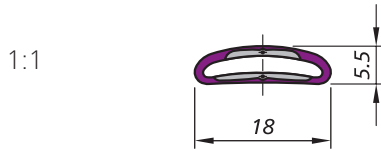
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### Chemical resistance

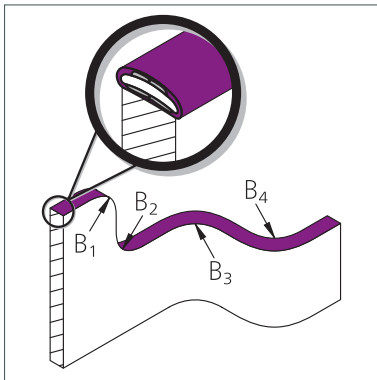
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## SE1 18FR

Safety element SE1 18FR cut-to-size with resistance R = 1k2 or 8k2.



Bend radii:



<b>Switching characteristics at <math>v_{test} = 10 \text{ mm/s}</math></b>	
Switching operations	$> 1 \times 10^5$
Test sample 1 $\varnothing 80 \text{ mm}$ / F = 20 N	<b>+23 °C</b> <b>-40 °C</b>
Actuation force	
Test sample 1 $\varnothing 80 \text{ mm}$	$< 30 \text{ N}$ $< 65 \text{ N}$
Test sample 3 $\varnothing 20 \text{ mm}$	$< 7 \text{ N}$ $< 15 \text{ N}$
Actuation distance	
Test sample 1 $\varnothing 80 \text{ mm}$	$< 2.0 \text{ mm}$
Actuation angle	
Test sample 1 $\varnothing 80 \text{ mm}$	$< 20^\circ$
<b>Safety classifications</b>	
ISO 13849-1: B <sub>10D</sub>	$1 \times 10^6$
<b>Mechanical operating conditions</b>	
Sensor length (min./max.)	100 mm / 50 m
Cable length (min./max.)	200 mm / 100 m
Tensile load, cable (max.)	50 N
Bend radii, minimum	
B <sub>1</sub> / B <sub>2</sub> / B <sub>3</sub> / B <sub>4</sub>	70 / 100 / 150 / 150 mm
Installation position	any
IEC 60529: Degree of protection	IP67
Weight	66 g/m
EN 50125-1: Air temperature classes	T3
short-duration (max. 10 min)	TX
EN 50125-1: Classes for the height	
area	AX, max. 2000 m NHN
Operating temperature	-40 to +60 °C
EN 50125: max. humidity	100 %
at maximum temperature change	3 K/s
<b>Electrical operating conditions</b>	
Not actuated sensor	
Terminal resistance	1k2 $\pm 1 \%$ , 8k2 $\pm 1 \%$ , others on request
Rated power	250 mW
Actuated sensor	Test sample 1 / F = 150 N
Contact transition resistance	$< 400 \text{ Ohm}$
Switching current (min./max.)	DC 1 mA / DC 10 mA
Number of sensors	max. 5 in series
Connection cable	$\varnothing 3.8 \pm 0.2 \text{ mm}$ 2x 0.25 mm <sup>2</sup>
<b>Dimensional tolerances</b>	
ISO 3302-1	E2/L2



## Physical resistance

EN 45545-2

HL3 Class R26

## Chemical resistance

The product is resistant to normal chemical influences over an exposure time of 24 h.

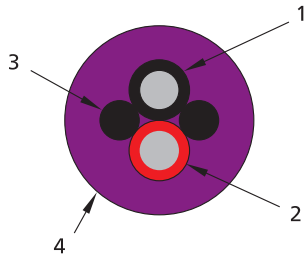
### Explanation of symbols:

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

Product group	Material
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	-

### Note:

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



**Cable**

**RailFR 2× 0.25 mm<sup>2</sup>**

<b>Line construction</b>	
Conductor, Item 1 and 2	CU wire, tinned, CU-ETP1 acc. to EN 13602
Rated diameter	0.25 mm <sup>2</sup>
Insulation Item 1	Black
Item 2	Red
Dummy wire Item 3	Black
Sleeve Item 4	Traffic purple (RAL 4006)
Outer diameter	3.8 ±0.2 mm
Weight	22 g/m
<b>Electrical operating conditions</b>	
Conductor resistance at 20°C	≤ 80 Ohm/km
Operating voltage (max.)	DC 48 V
Test voltage	1.5 kV
<b>Mechanical operating conditions</b>	
Bend radii (min.)	
fixed installation	r = 20 mm
moving / free installation	r = 40 mm
Drag chain	r = 42 mm (cycles: min 1× 10 <sup>6</sup> )
Operating temperature (fixed)	-40 to 90 °C
Operating temperature (flexible)	-30 to 90 °C

**Physical resistance**

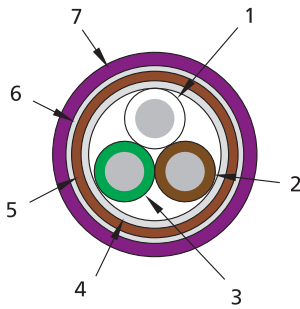
EN 45545-2	HL3 class R15 and R16
EN 60332-1-2	flame-retardant and self-extinguishing
EN 60332-3-25	no spreading of fire
EN 60754-1	halogen-free

**Chemical resistance**

Hydrolysis	+
EN 50264, EM102	
Oil	+
EN 50264, EM104	
Fuels	+
Acids	+

**Explanation of symbols:**

+ = resistant



## RailFR 3x 0.25 mm<sup>2</sup>

<b>Line construction</b>	
Conductor, Item 1, 2 and 3	CU wire, tinned, CU-ETP1 acc. to EN 13602
Rated diameter	0.25 mm <sup>2</sup>
Insulation Item 1	White
Item 2	Brown
Item 3	Green
Separating foil Item 4 and 6	Polypropylene
Shielding Item 5	Copper braid, tinned
Sleeve Item 7	Traffic purple (RAL 4006)
Outer diameter	4.6 ±0.2 mm
Weight	36 g/m
<b>Electrical operating conditions</b>	
Conductor resistance at 20 °C	≤ 78 Ohm/km
Operating voltage (max.)	DC 48 V
Test voltage	1.5 kV
<b>Mechanical operating conditions</b>	
Bend radii (min.)	
fixed installation	r = 24 mm
moving / free installation	r = 48 mm
Drag chain	r = 40 mm (cycles: min 7x 10 <sup>5</sup> )
Operating temperature (fixed)	-40 to 90 °C
Operating temperature (flexible)	-30 to 90 °C

### Physical resistance

EN 45545-2	HL3 class R15 and R16
EN 60332-1-2	flame-retardant and self-extinguishing
EN 60332-3-25	no spreading of fire
EN 60754-1	halogen-free
2011/65/EU	RoHS-compliant

### Chemical resistance

Hydrolysis	+
EN 50264, EM102	
Oil	+
EN 50264, EM104	
Fuels	+
Acids	+

#### Explanation of symbols:

+ = resistant