



## DIY miniature safety edges



EN | Installation instructions

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Original instructions

## Safety first!



- Read the instructions carefully before use.
- The warnings in the instructions are there to warn you of any unexpected dangers. Always heed the warnings.
- Keep the instructions somewhere safe so you can refer to them throughout the product's entire service life.
- Pass the instructions on to every subsequent owner or user of the product.
- Add any supplement received from the manufacturer to the instructions.
- **Observe the information under "Safety" (starting on page 5).**

## UL certification



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

- UL 325

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## About these instructions

These instructions are part of the product.

Mayser accepts no responsibility or warranty claims for damage and consequential damage due to failure to observe the instructions.

**Validity** These instructions are only valid for the products specified on the title page.

**Target group** These instructions are intended for the operating company and for electrically skilled persons. The electrically skilled person must be familiar with installation and commissioning.

**Other applicable documents** ➔ Please also observe the following documents:

- Product information
- Drawing of the sensor system (optional)
- Wiring diagram (optional)
- Operating instructions of the control unit used

### Symbols used

Symbol	Meaning
➔ ...	Action with one step or with more than one step where the order is not relevant.
1. ...	Action with more than one step where the order is relevant.
• ... - ...	Bullets first level Bullets second level
(see chapter <i>Installation</i> )	Cross-reference

### Danger symbols and information

Symbol	Meaning
⚠ <b>DANGER</b>	Immediate danger leading to death or serious injury.
⚠ <b>WARNING</b>	Imminent danger which may lead to death or serious injury.
⚠ <b>CAUTION</b>	Possible danger which may lead to minor or moderate injuries.
<b>NOTE</b>	Potential risk of damage to property or the environment. Information on easier and safer working practices.

### Dimensions in drawings

Unless otherwise stated, all dimensions are in millimetres (mm).

## Safety

### Intended use

This product has been designed as a linear pressure-sensitive protective device for hazardous closing edges. The sensor will be activated if pressure is applied to the actuation area.

In the idle state, no pressure must be applied to the sensor.

#### 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.

### Safety instructions

For your **own safety**, you must adhere to the following safety instructions.

#### ➔ Avoid electric shocks

Before working on electrical systems, disconnect them from the power supply and secure them to prevent them being switched back on to avoid electrical injuries.

#### ➔ Take care when setting up the interface

Overall safety is affected by the quality and reliability of the interface between the protective device and the machine. Take particular care when setting up the interface.

#### ➔ Do not cover or sheathe the sensor

Outer sleeves and covers adversely affect the sensor function. Never place the sensor inside an outer sleeve or cover it with other elements.

#### ➔ Prevent the machine from restarting

Prevent the machine from restarting while a hazard exists, e.g. by using a starting lockout.

#### ➔ In the event of a fault, put out of operation

In the event of malfunctions and visible damage, put the protective device out of operation by decommissioning it.

To prevent irreparable damage to the **product**, you must observe the following safety instructions.

➔ **Do not load the ends**

Avoid pressure loads and tensile loads on the EKS ends.

➔ **Do not kink the cables**

Avoid extreme kinks in cables.

➔ **Observe minimum bend radii**

Always adhere to the minimum bend radii specified in the technical data.  
Values lower than these are not permitted.

➔ **Ensure a generous rolling diameter**

Ensure a minimum diameter of 600 mm when rolling EKS products.

➔ **Do not exert a tensile load on the cable**

Never exceed the maximum tensile load (see *Technical data*), e.g. by pulling the cable.

➔ **Only clip-in the snap-in foot, never pull it in**

Always clip in EKS products one piece at a time using the snap-in foot.  
Never pull in the foot!

➔ **Do not use the sensor as a seal**

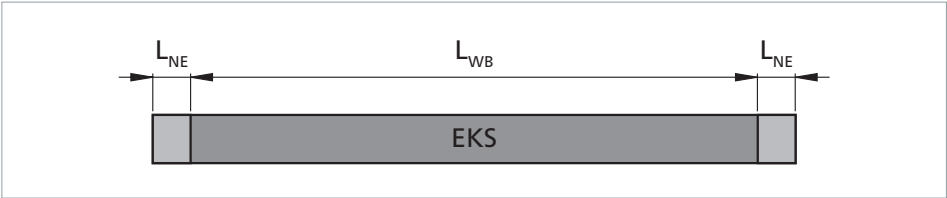
Never use the sensor as a means of sealing the closing edge. Constant actuation of sensors can result in permanent damage.

➔ **Protect the sensor from sharp edges**

Make sure that no sharp-edged objects come into contact with the sensor.  
Sharp edges can cause lasting damage to the sensor.

## Residual dangers

**Non-sensitive areas** The edge areas of the sensor are not sensitive. When a non-sensitive area is actuated, the sensor will not respond and so will not provide any protection.



$L_{NE}$  = non-sensitive edges  $L_{WB}$  = effective actuation length

EKS with	End piece W	End piece with cable, angled 90°	End piece with cable, axial
$L_{NE}$	27 mm	28.5 mm	27 mm

- ➔ Always protect each closing edge with a single sensor.
- ➔ Do not assemble sensors across corners.

## Parts supplied

The parts supplied are listed on the delivery note.

- ➔ Upon receipt, immediately check the parts supplied to ensure they are complete and in good condition.

## Storage

- ➔ Store the individual parts in a dry place inside the original packaging.
- ➔ Store the packs pressure-free and do not stack them.
- ➔ Store cardboard tube packaging horizontally.
- ➔ Store assembled sensors either flat or rolled, never folded.
- ➔ Observe the storage temperature in accordance with the technical data.

## Installation

- ➔ Before starting the installation process, refer to the technical data to check that the product is suitable for your application (see *Technical data*).

**Overview** The installation process consists of the following steps:

- Preparing for installation
- DIY assembly
- Fixing

## Preparing for installation

- ➔ Prepare the fixing surface by:
- Removing dirt particles from the fixing surface
  - Making sure that the fixing surface is flat and sturdy
  - Making sure that cable bushings have been deburred
  - Make sure that groove edges have been deburred.
- ➔ Have the tools and aids you will need for installation to hand.
- Scissors with stop (1 1002568)
  - Assembly aid SH1 (forms part of 7502412)
  - Assembly aid SH2 (forms part of 7502412)

**Unpacking the product** The handling rules contained in chapter *Safety instructions* apply.

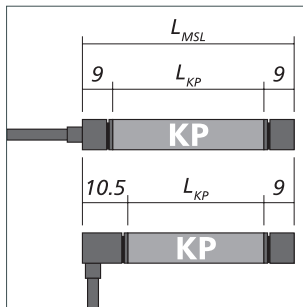
1. Lay out the individual parts and installation accessories next to one another at the installation location.
2. Check that you have all the required parts and that they are in good condition.

## DIY assembly

This chapter describes

- How to cut the contact profile to length
- How to insert the end pieces
- How to carry out final testing

The end product is an SK EKS miniature safety edge with IP40 degree of protection.



## Cutting to length

1. Measure out the required length of the contact profile (CP) and mark the cutting point. The following applies:

$$L_{KP} = L_{MSL} - (2 \times \text{end pieces})$$

$L_{KP}$  = length of contact profile

$L_{MSL}$  = length of miniature safety edge

2. Place the contact profile against the stop of the scissors and cut it off at the marked point.



## Insertion

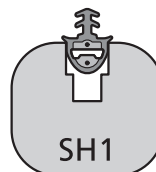
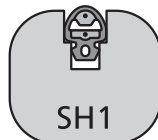
1. Insert the contact profile into the SH1 assembly aid so that the contact profile protrudes over the edge by 2 to 3 mm.

Position of the contact profile in the SH1 assembly aid:

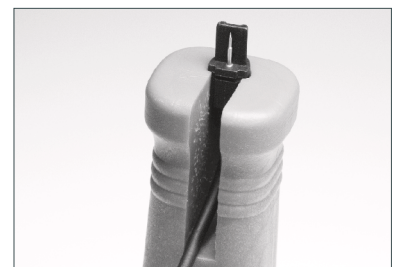
EKS 011

EKS 014

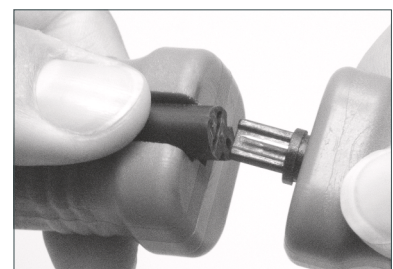
EKS 052



2. Insert the cable end piece into the SH2 assembly aid.



3. Secure the contact profile in the SH1 assembly aid by applying firm pressure with your thumb.
4. Using the SH2 assembly aid, guide the end piece into the contact profile in a straight line, pressing it firmly against the SH1 assembly aid until the gap between the end piece and contact profile disappears.



5. Remove the SH2 assembly aid and take the semi-finished miniature safety edge out of the SH1 assembly aid.

Tip: Use the leverage effect – by applying light pressure to the contact profile at the end of the handle.



6. Proceed in the same manner at the other end of the contact profile using a resistor end piece (EKS/W) or another cable end piece (EKS/BK).

### Alternative method using special adhesive

For a better bond between the end piece and the contact profile, we recommend using special adhesive (1004987). This enables higher degrees of protection of up to IP64 to be achieved.

1. Apply a thin layer of special adhesive to the end of the contact profile.
2. Proceed as described under *Insertion*.
3. Remove excessive adhesive from the assembly aids.

### Final test after completion of DIY assembly

- ➔ Conduct a visual check to ensure a flush connection of the end pieces all the way around.
- ➔ Use a multimeter to check for compliance with the target values.



Target value for EKS **not actuated**:

EKS/W with 1k2	1.2 kohms ±10%
EKS/W with 2k2	2.2 kohms ±5%
EKS/W with 8k2	8.2 kohms ±3%
EKS/BK	> 20 megaohms

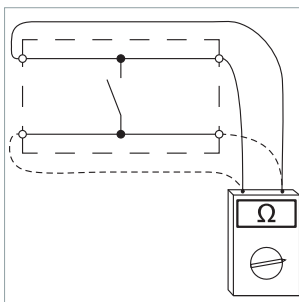
Continuity test

Per channel  $< (5 + (L_{KS} \times 0.5/m))$  ohms

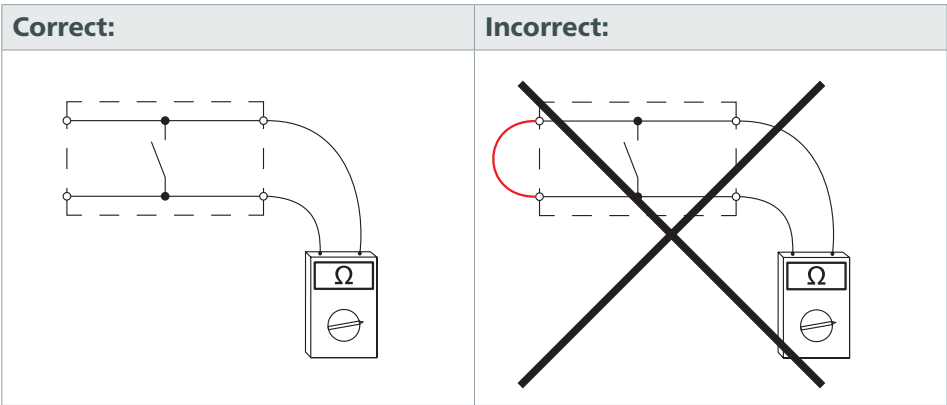
Target value for EKS **actuated**:

Each EKS  $< 400$  ohms

Continuity test:



For sensors of type /BK, be sure to avoid short circuits between the wires of the second cable.



If your values deviate greatly from those given above, refer to chapter *Troubleshooting and remedies*.

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

The following procedure applies to miniature safety edges that already include acrylic foam (double-sided foam adhesive tape), such as the EKS 011. They must be stuck onto a clean bonding surface.

Requirements

To ensure optimum fixing:

- ➔ Ensure that the bonding surface is
- clean,
  - dry and
  - smooth.

- ➔ Avoid bonding surfaces that are
- very uneven or
  - have sharp edges.

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

Before starting series production, carry out adhesion tests to check whether the product can be bonded to the selected fixing surface.

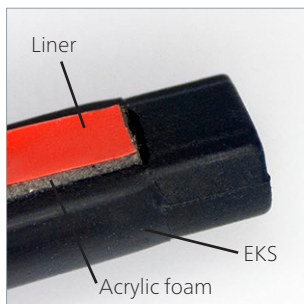
#### Explanation of symbols:

- + = suitable  
 – = not suitable

to ...	Bonding ...	With primer	Without primer
ABS		1	–
Aluminium: uncoated		1	+
Aluminium, anodised		1 / 3	–
Aluminium: powder-coated		1	–
CAB		–	–
Glass		–	–
Wood: uncoated		–	–
Wood: glazed, varnished		2 <sup>a)</sup>	–
Wood: veneered, lightweight building board		2 <sup>a)</sup>	–
PA6, PA66		3	–
PE, HDPE		–	–
PMMA		1	–
PP		1	–
PS		–	–
PVC		2 <sup>b)</sup>	–
SAN		1	–
Steel, stainless steel		1 / 3	–
Tests were carried out at room temperature (+23 °C).			
1 3M™ Adhesion Promoter 4298UV (ID 7000052028)			
2 3M™ Adhesion Promoter 4297 (ID 7100079560)			
3 Carlofon Multiprimer (ID 40478)			
<sup>a)</sup> In the USA: Rubber & Vinyl 80 <sup>b)</sup> In the USA: 2262AT			

#### Bonding

1. Clean and degrease the bonding surface (e.g. with isopropanol).
2. Using a brush, apply as thin a coating of primer as possible to the entire bonding surface.\*
3. Allow the primer to flash off for approx. 10 minutes.\*



4. Pull off the liner from the acrylic foam by about 10 to 15 cm.
5. Place the EKS on the bonding surface **without** any tensile stress\*\* and press it on firmly.
6. Repeat points 4 and 5 until the EKS is fully bonded.
7. Wait another 24 hours until the maximum adhesion is reached.

\* This is optional in the case of uncoated aluminium.

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

### Using a snap-in foot

The following procedure applies to miniature safety edges with snap-in foot, such as the EKS 014. They must be clipped into a suitable aluminium profile.

#### Requirements

To ensure optimum fixing:

- ➔ Ensure that the aluminium profile is
  - compatible (e.g. C 10 for EKS 014),
  - clean and
  - smooth.
- ➔ On holes, avoid
  - drilling dust or
  - sharp-edged burrs.

#### Clipping

1. Fix the aluminium profile with countersunk screws, e.g. M2x2.5.
2. Fully clip the snap-in foot into the aluminium profile.

Tip 1: Brush the aluminium profile and snap-in foot with a volatile **sliding agent** (e.g. water with washing-up liquid).

Tip 2: Use a **seam roller** for pressing in.

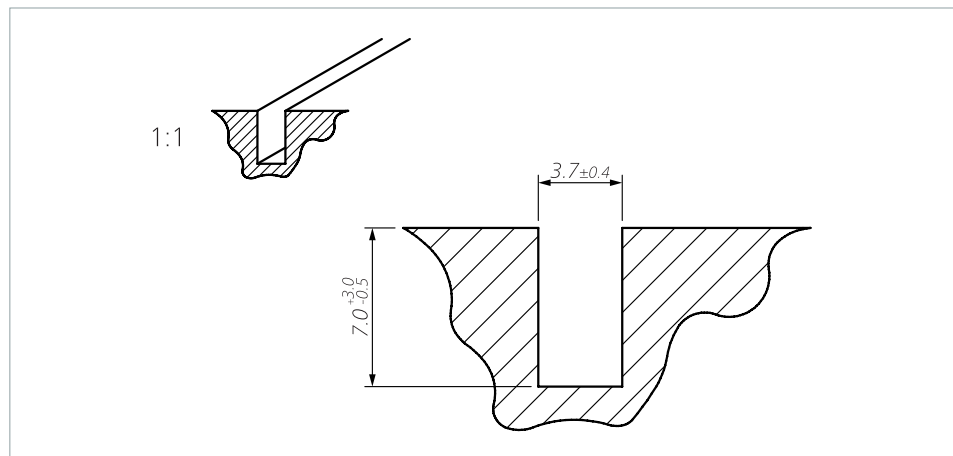
### Using a clamp foot

The following procedure applies to miniature safety edges with clamp foot, such as the EKS 052. They must be pressed into a groove that will ensure a perfect fit.

#### Requirements

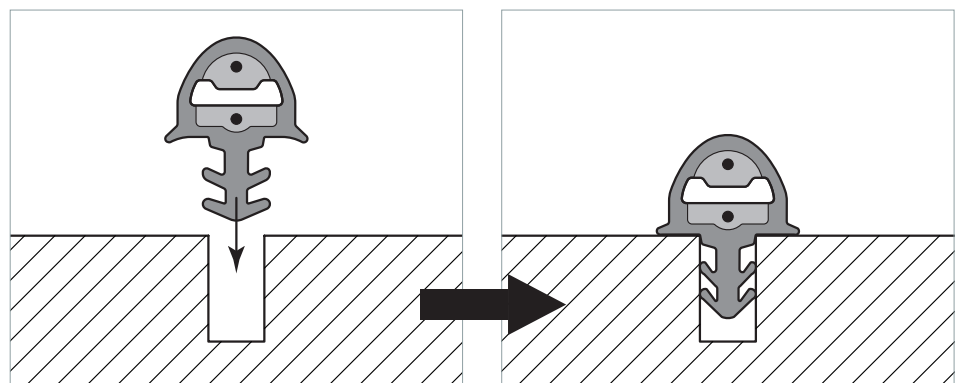
To ensure optimum fixing:

- ➔ Ensure that the groove is
  - made for a perfect fit,
  - clean and
  - smooth.
- ➔ On and in the groove, avoid
  - dirt or
  - sharp-edged burrs.



### Clamping

- ➔ Press the clamp foot into the groove until the EKS is snugly fitted and completely flat.



## Laying the cables

The type of cabling depends on the operation principle of your system.

1. Wire the sensors in accordance with the wiring diagram (optional) or in accordance with the wiring technologies described below. Observe the following:
  - Connect the wire ends of the sensors in accordance with the colour coding.
  - Insulate soldering points and seal with heat-shrinkable sleeves.

2. Lay the cables to the control unit.  
The control unit will be wired later.

### Sensor system wired correctly?

3. Use a multimeter to check the electrical resistance between the wire ends when sensors are activated and not activated.

The measured resistance must have the following values:

- Activated sensor system: < 150 ohms
- Sensor system not activated:
  - Without monitoring resistor: > 1 megaohms
  - With monitoring resistor: dependent on the connected resistor

4. Wire the sensor system and the control unit (see the control unit operating instructions).

### NOTE

Cables can become damaged if laid incorrectly.

- ➔ Make sure that cables are neither bent nor crushed.
- ➔ Make sure that cables are laid free of tension.

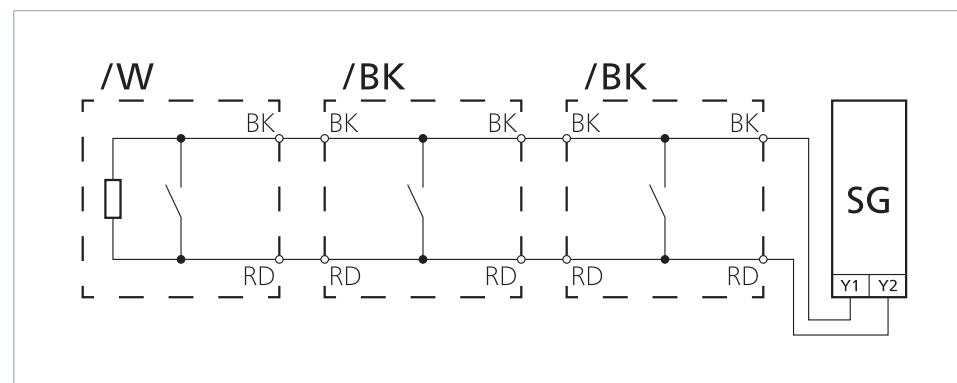
## Key to the following wiring diagrams:

- /W Sensor with integrated monitoring resistor
- /BK Sensor with cables on both sides for use as a through sensor or for connection of an external monitoring resistor
- SG Control unit
- R Resistor for functional monitoring of the system

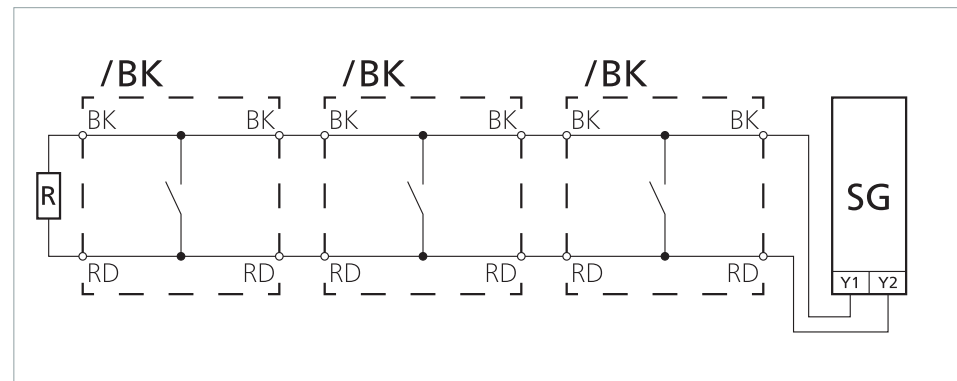
## Colour coding

- BK Black
- RD Red

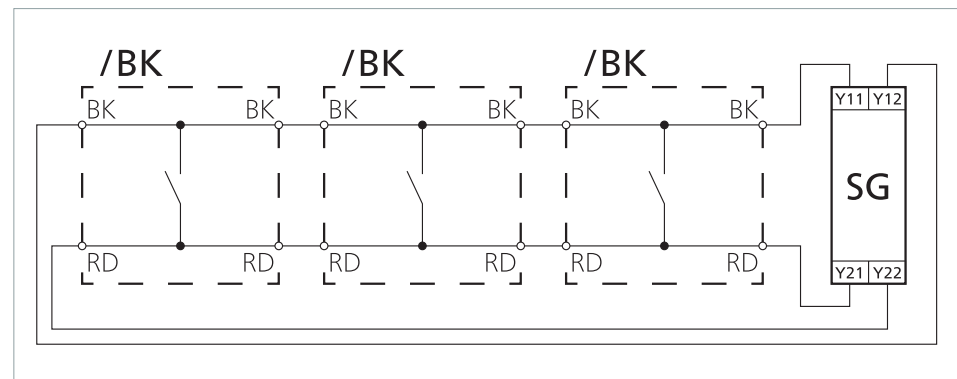
### Sensors /W and /BK: 2-wire technology



### Sensor /BK: 2-wire technology

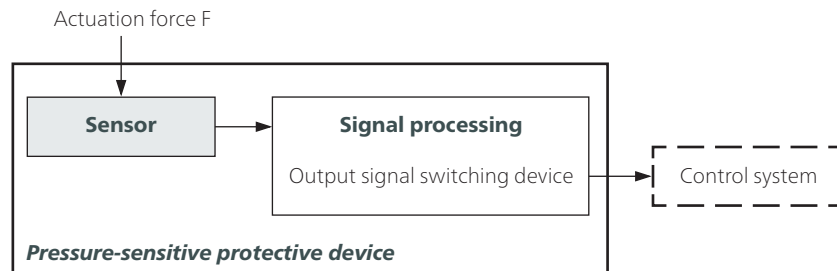


### Sensor /BK: 4-wire technology



## Marking

Fully assembled sensors can be used as sensors for pressure-sensitive protective devices. Depending on the signal processing (control unit), protective devices up to PL d according to ISO 13849-1 are possible.



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.

## Commissioning

The sensors can only be put into operation in conjunction with a suitable control unit.

Commissioning is described in the control unit operating instructions.

## Decommissioning

The sensors are taken out of operation together with the connected control unit. Decommissioning is described in the control unit operating instructions.

## Recommissioning

The sensors can only be put back into operation in conjunction with a suitable control unit.

Recommissioning is described in the control unit operating instructions.

## Maintenance and cleaning

### Maintenance

The sensors are virtually maintenance-free.

The control unit also monitors the sensor at the same time.

#### **WARNING Failure of protective function**

If the sensor is damaged, this could cause the protective function to fail.

- ➔ Immediately put the protective device out of operation as soon as damage is detected which could impair safe operation.

Depending on the operational demands, the sensors must be inspected at regular intervals (at least monthly). The operating company must define the testing interval in accordance with the applicable national regulations.

- ➔ Check the protective function by activating or applying the relevant test sample.
- ➔ Visually inspect the sensors for damage.
- ➔ Visually inspect the sensors for good fixing.

### Cleaning

- ➔ If the sensors are dirty, clean them with a mild cleaning product.
- ➔ After cleaning, remove any remaining fluid.

## Troubleshooting and remedies

Fault indication	Possible cause	Remedy
Resistance values do not match specifications	Cables of the individual sensors are incorrectly connected	➔ Check connections between the sensors
	Cables are bent or damaged	➔ Replace affected sensors
	Sensors are not mounted level	➔ Check mounting surface under the sensors ➔ Eliminate unevenness and remove dirt particles
	Sensor is already actuated in end position	➔ Ensure that no pressure is exerted on the sensor in end position
	Sensor is faulty	➔ Replace sensor

You may also find chapter *Troubleshooting and remedies* in the control unit operating instructions helpful.

Fault still cannot be resolved?

➔ Contact Mayser-Support: Tel. +49 731 2061-0.

## Replacement parts

### **CAUTION Overall safety at risk**

Failure to use original Mayser parts when replacing parts of the product can impair the function of the protective device.

➔ Only use original Mayser parts.

## Disposal

The products included in the scope of supply contain the following materials:

- Sensor**
- Plastics
  - Copper (inside the sensor, cables)
  - Steel

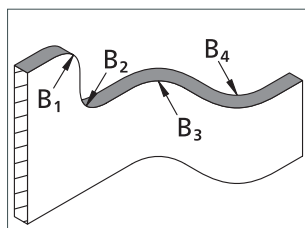
- Installation accessories**
- Steel (screws)
  - Aluminium (aluminium profiles)

- Packaging**
- Wood, cardboard, plastics

- ➔ When disposing of the product:
- Ensure compliance with the relevant national disposal regulations and statutory requirements.
  - Ensure that any disposal company you use receives a list of the aforementioned materials along with the product.
  - Ensure that the materials are recycled or disposed of in an environmentally friendly way.

## Technical data

Bend radii:



Miniature safety edge	SK EKS
IEC 60529: degree of protection Sensors without special adhesive Sensors with special adhesive	IP40 to IP64
Actuation forces for signal triggering	< 50 N
Finger detection	Yes
Behaviour in the event of a fault E.g. with SG-EFS 104/4L	ISO 13849-1:2015 category 3 PL d
Bend radii (min.): B <sub>1</sub> / B <sub>2</sub> / B <sub>3</sub> / B <sub>4</sub>	120 / 150 / 20 / 20 mm
Operating temperature	–25 to +80 °C
Storage temperature	–40 to +80 °C
Max. load capacity (signal)	600 N
2006/42/EC and UK S.I. 2008 No. 1597: Emission sound pressure level	< 70 dB(A)
Weight: EKS 011 EKS 014 (without / with C 10) EKS 052	43 g/m 49 g/m / 125 g/m 54 g/m

This table is an extract of the full table contained in the product information (see *Technical data* in the product information).