MAYSER®

Innovative by tradition.

Safety bumpers SB

EN | Installation instructions

Original instructions

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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).**

Conformity

CE

The design type of the product complies with the basic requirements of the following directives:

- 2006/42/EC (Safety of Machinery)
- 2011/65/EU (RoHS)
- 2014/30/EU (EMC)

The Declaration of Conformity is available in the Downloads section of our website: www.mayser.com.

EC type examination

The product was tested by an independent institute.
There is an EC type examination certificate to confirm conformity.

The EC type examination certificate is stored in the Downloads section of our website: www.mayser.com.

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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)
- Handling instructions
- 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 *Installation*)	Cross-reference

Danger symbols and information

Symbol	Meaning
⚠ **DANGER**	Immediate danger leading to death or serious injury.
⚠ **WARNING**	Imminent danger which may lead to death or serious injury.
⚠ **CAUTION**	Possible danger which may lead to minor or moderate injuries.
NOTE	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.
The sensor is activated by exerting pressure on the actuation area.
In the idle state, no pressure must be applied to the sensor.

Limits

- No more than 10 /BK-type sensors can be connected to one control unit
- No more than 9 /BK-type sensors and 1 /W-type sensor can be connected to one control unit

Exclusions

The sensors are **not** suitable for:

- Detecting fingers

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 protection device and the machine. Take particular care when setting up the interface.

➔ **Do not cover or sheathe the sensor**
Extra sleeves and covers adversely affect the sensor function. Make sure to never sheathe the sensor with extra sleeves or cover it with other elements.

➔ **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 alter the sensor**
Never open, tamper with or alter the sensor. Any modification impairs the protective function.

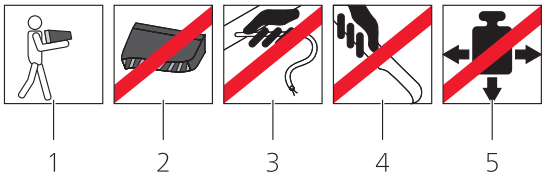
➔ **Handle the sensor with care**
Do not twist or bend the sensor.
Make sure that the sensor does not sag.

➔ **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.

➔ **Do not exert a tensile load on the cable**
Never exceed the maximum tensile load (see *Technical data*), e.g. by pulling the cable.

➔ **Do not kink the cables**
Avoid extreme kinks in cables.

➔ **Follow the handling instructions**
Make sure you follow the handling instructions to avoid damaging the sensor.



1 Carry the safety bumper with the aluminium mounting plate facing towards you.
2 Do not bend or twist the safety bumper.
3 Do not exert any tensile force on the cable.
4 Never use sharp objects on the safety bumper.
5 Do not exert any pressure on the safety bumper in the idle state.

Residual dangers

There are no known residual dangers associated with this product.

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 sensors in a dry place inside the original packaging.

➔ Store the packagings pressure-free and do not stack them.

➔ Observe the storage temperature in accordance with the technical data.

Installation

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

Overview

Install sensors in the following order:
- Preparing for installation
- Laying out the sensors
- Fixing the sensors
- Laying the cables

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 all holes are deburred

➔ Have the tools and aids you will need for installation to hand.

Unpacking the product

The rules of handling contained in chapter *Safety instructions* apply.

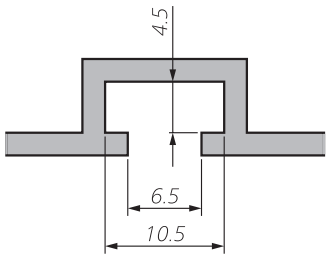
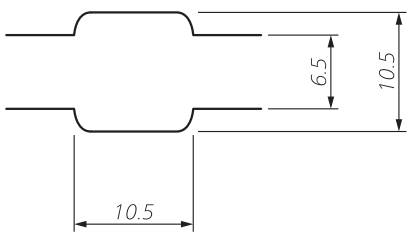
1. Lay out the sensors and installation accessories next to one another at the installation location.

2. Check that you have all the required parts and that they are in good condition.

Loose fixing accessories such as sliding blocks are not included in the scope of supply. Suitable fixing accessories are available from specialist retailers:
- Low-profile M5 sliding blocks for 6 mm groove
- Flat-head M6 hexagon bolts
- M6 thin nuts

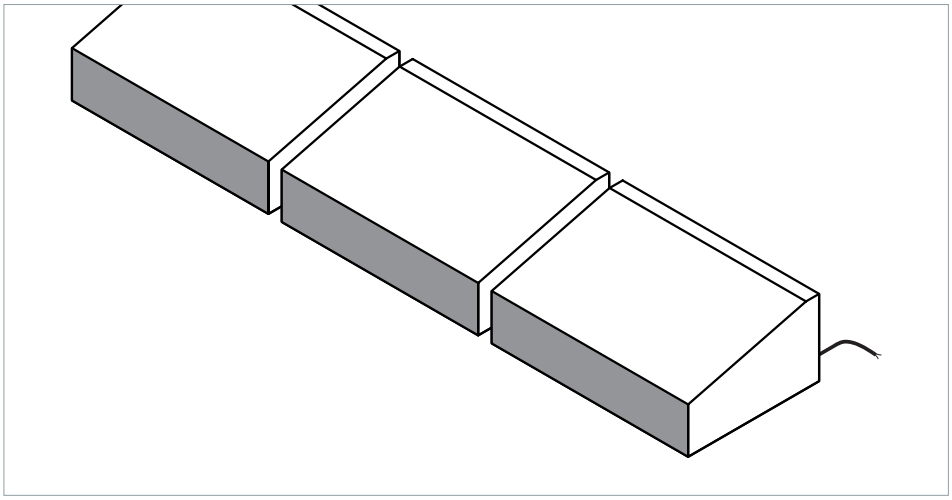
Selecting fixing accessories

➔ Observe the dimensions of the groove and the groove opening.

Fixing groove	Groove opening
	

Laying out the sensors

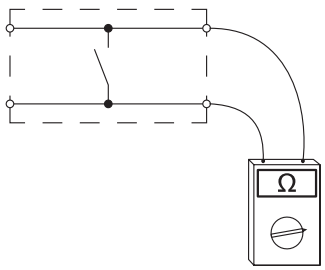
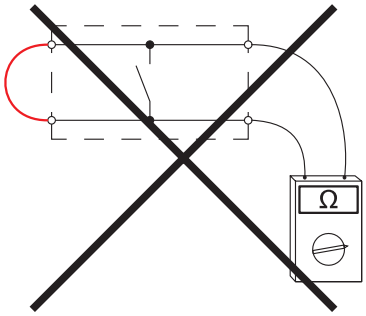
1. Roughly arrange the sensors (according to the sensor system drawing, where applicable). Observe the following:
   - Place the sensors down so the sloping side faces up.
   - Place the sensors down so the cable exits face towards the fixing surface.
   - Place the sensors next to one another so the effective actuation areas are adjacent.



Is the individual sensor OK?

2. Check the resistance between the two wire ends of the cable of each sensor with a multimeter.
   The measured resistance must have the following value:
   - Sensor /BK: > 1 Mohm
   - Sensor /W8k2: 8k2 ±250 ohm

For sensors of type /BK, ensure that no short circuit can ensue between the wires of the second cable.

Correct:	Incorrect:
	

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

Report form filled out?

3. Make a note of the control unit and all the sensors connected to it on the report form (see chapter *Report form*).

Fixing the sensors

Here we describe installation with flexible fastening points. One of the fixing grooves in the aluminium mounting plate is used for this purpose.

Objective: force-locked connection

The following conditions must be met in order to achieve a force-locked connection between the sensor and the machine:

- Sensor is lying flat on the fixing surface and is not twisted
- Minimum number of fastening points has been observed
- Maximum distance between two fastening points is 500 mm
- No spacers between sensor and fixing surface
- For thin nuts, hammer nuts and insert nuts:
  max. screw length = thickness of the fixing surface + 6 mm

Possible to skip steps

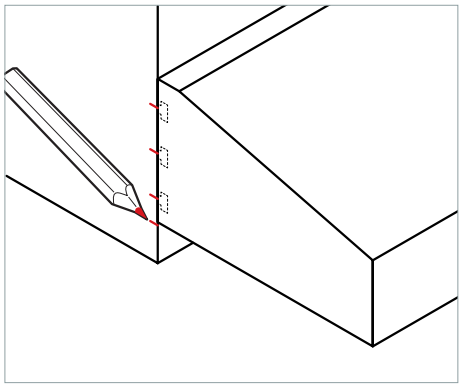
If…	and…	Start
Fixing groove and fastening points defined	Holes present	➔ Step 11
	Holes still missing	➔ Step 8
Fixing groove defined	Fastening points not yet defined	➔ Step 6
Nothing yet defined		➔ Step 1

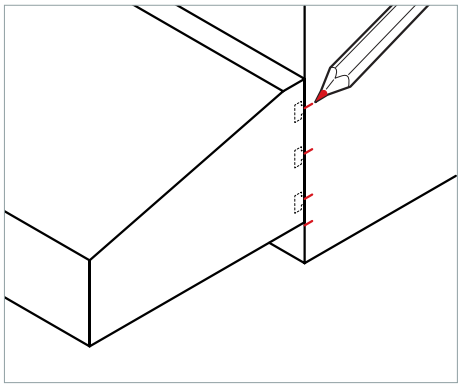
Selecting the fixing groove

If your sensor is equipped with the C 40 aluminium mounting plate, go to Step 6.

1. Hold the sensor in its final position.

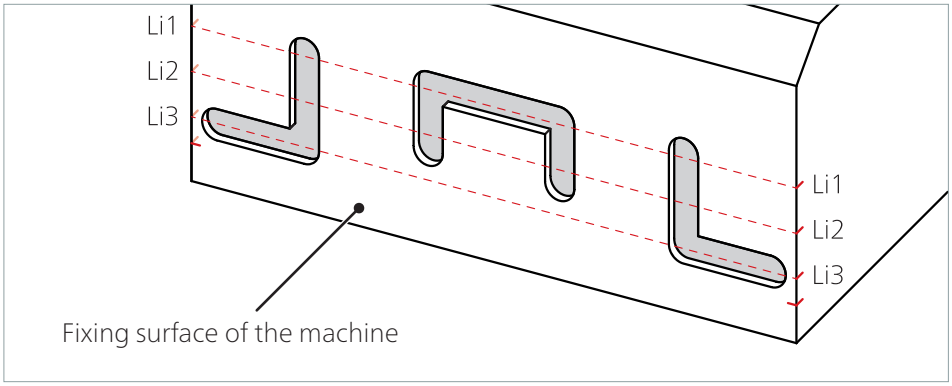
2. Mark the fixing grooves on the fixing surface, as well as the bottom corner of the sensor on both left and right.





3. Remove the sensor.

4. Draw a line (Li) between the markings that belong together.



5. Choose a fixing groove. Observe the following:
   - As large a contact area as possible on the fixing line
   - As few cut-outs as possible on the fixing line
   - Required number of fastening points is possible
   - Max. distance between two fastening points 500 mm
   - Min. distance to the next groove opening (aluminium mounting plate) 10 mm

Selecting the fastening points

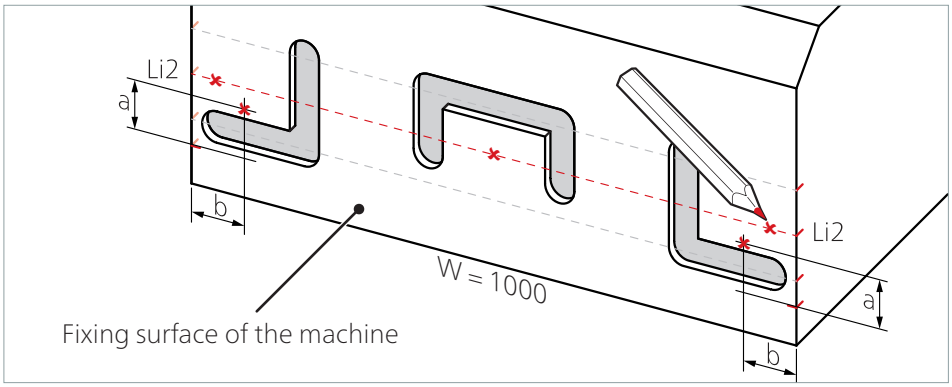
The minimum number of fastening points is based on the width of the sensor.

Up to width W [mm]	500	1000	1500	2000	2500	3000
Fastening points	2	3	4	5	6	7

6. Mark the minimum number of fastening points along the fixing line (from Step 5). Observe the following:
   - Contact area is available around the fastening point
   - Min. distance to the next groove opening (aluminium mounting plate) 10 mm
   - Max. distance between two fastening points 500 mm

Dimensions for cable bushings:

	a	b
C 40	7	50
C 100	40	50
C 150	50	50



7. Mark the locations for the cable bushings too.

Creating fastening points

8. Drill holes for the selected fixing accessories (M5 or M6) at the marks.
9. Drill holes for the cable bushings (Ø 6 mm).
10. Deburr the holes and remove the swarf.

Screwing on sensors

With large sensors it may be necessary to have a second person or an auxiliary device hold the sensor in position while you screw it on.

11. Check that all holes are deburred and the swarf has been removed.
12. Insert the fixing parts that are intended for the fixing groove through the groove openings and into the fixing groove itself. The sleeve blocks the groove being accessed from the side.
13. Guide the sensor cables through the cable bushings.
14. Hold the sensor in its final position.
15. Screw the sensor on at the fastening points.

NOTE Impaired operation due to screws that are too long
Where thin nuts or hammer nuts are used, if the screws are too long they will collide with the base of the fixing groove. When contact is made like this it suggests the screw connection is tight, but the opposite is in fact true: a force-locked connection cannot be achieved in this way. This can alter the actuation distance and the overtravel distance.

➔ Select the screw length using the following formula:
max. screw length = thickness of the fixing surface + 6 mm.

Optional installation

If you want to make use of the installation option with insert nuts or threaded inserts, you must agree this with Mayser. The fixed fastening points are defined in drawings and attached to the aluminium mounting plate by Mayser. The same conditions apply as when installing with flexible fastening points.

NOTE Impaired operation due to screws that are too long
Where insert nuts are used, if the screws are too long they will make contact with or penetrate the internal foam. This can alter the actuation distance and the overtravel distance.

➔ Select the screw length using the following formula:
max. screw length = thickness of the fixing surface + 6 mm.

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. Check the electrical resistance between the wire ends when sensors are activated and not activated. The measured resistance must have the following values:
   When sensor system is **activated**: < 150 ohms
   When sensor system is **not activated**:
   - Without monitoring resistor: > 1 megaohm
   - With monitoring resistor: dependent on the connected resistor

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

4. Wire together 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.
   ➔ Make sure that cables do not sag down to the floor or another surface.

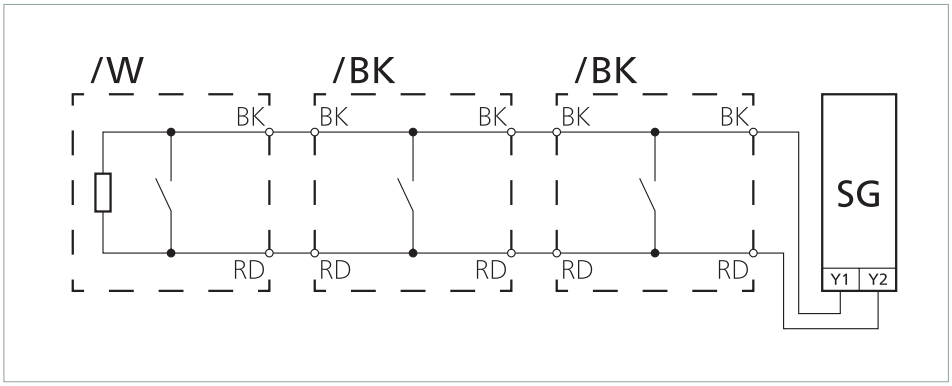
Key to the following wiring diagrams:

/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

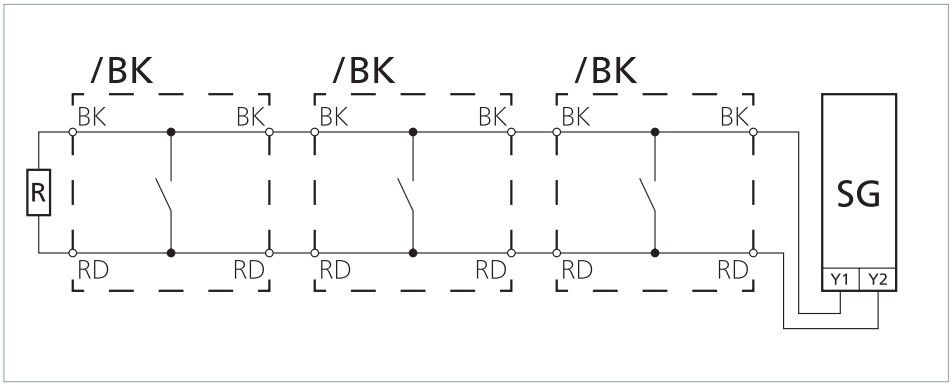
Colour coding

BK	Black
RD	Red

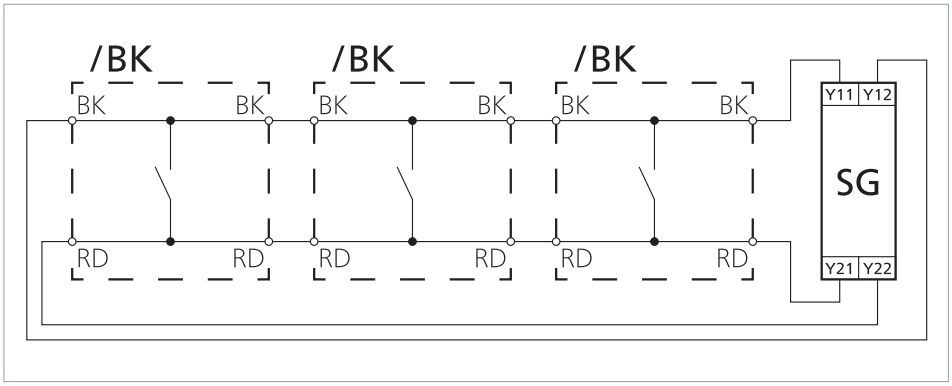
Sensors /W and /BK: 2-wire technology



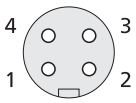
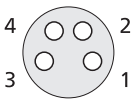
Sensor /BK: 2-wire technology



Sensor /BK: 4-wire technology

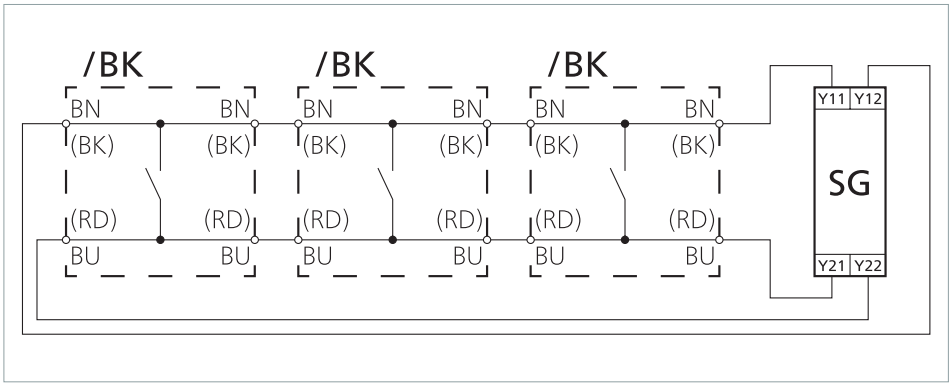


For sensors with optional **M12** or **M8 plug-in connectors**:

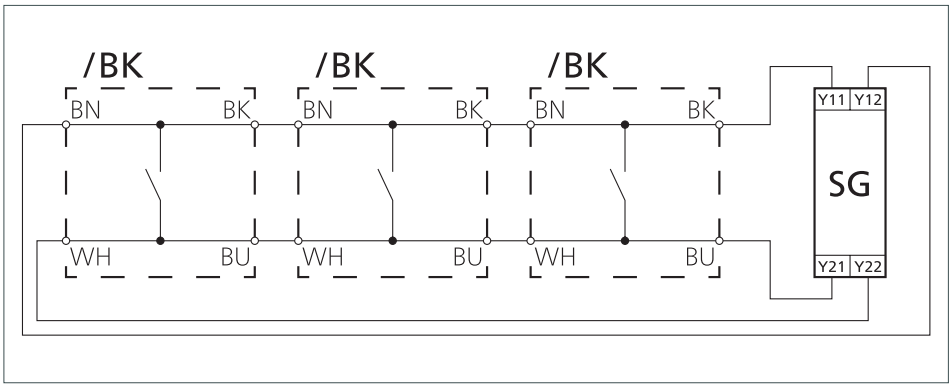
M12	M8
	

Cable	with	PIN	Lead colour	
2× 2-wire	M12, M8	1	BN (BK)	Brown (Black)
		2	–	–
		3	BU (RD)	Blue (Red)
		4	–	–
1× 4-wire	M12	1	BN	Brown
		2	WH	White
		3	BU	Blue
		4	BK	Black

Sensor /BK:
4-wire technology
with 2× 2-wire cable



Sensor /BK:
4-wire technology
with 1× 4-wire cable



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
	Sensor is not fixed properly and is sagging	➔ Check fixing ➔ Check that sensor is lying flat on fixing surface
	Sensor is in contact with opposite closing edge and has already switched	➔ Move sensor to a position where no pressure is exerted on it
	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.

➔ In the event of enquiries, have the information from the type plate to hand.

Type plate There is a type plate on the aluminium mounting plate for identifying the sensor type.

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.

Removal

The sensors can be removed following decommissioning.

1. Take the protective device out of operation (see chapter *Decommissioning*).

2. Remove the sensors by following the installation steps in reverse order.

Disposal

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

Sensor

- PU foam (inside the sensor)
- Aluminium (mounting plate)
- Plastics
- Copper (inside the sensor, cables)

Packaging

- Wood, cardboard, plastics, PU foam

➔ 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

Safety bumper	SB
IEC 60529: degree of protection	IP54
Actuation forces for signal triggering	In accordance with ISO 13856-3
Finger detection	No
Behaviour in the event of a fault E.g. with SG-EFS 104/2W	 ISO 13849-1:2023 category 3 PL d
Operating temperature PES, synthetic leather PUR	 –20 to +55 °C +5 to +55 °C
Storage temperature	–20 to +55 °C
Max. load capacity (signal)	600 N
Tensile load, cable (max.)	20 N
2006/42/EC and UK S.I. 2008 No. 1597: emission sound pressure level	< 70 dB(A)
Weight: STB 1000 × 40 × 100 STB 1000 × 100 × 150 STB 1000 × 100 × 200 STB 1000 × 100 × 250 STB 1000 × 150 × 300 STB 1000 × 150 × 400	 0.99 kg/m 1.76 kg/m 1.86 kg/m 1.93 kg/m 2.50 kg/m 2.73 kg/m

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

Report form

When performing maintenance, repair and servicing work it is beneficial to know which control unit is being used and which sensors are connected to it. Once the sensor has been installed, however, it is not possible to see the type plate attached to it. The evaluating control unit is one of many in the switch cabinet, but which one?

The report form in accordance with ISO 13856 is a great help here. The electrically skilled person performing the installation makes a note of the control unit and sensor types as stated on the type plate. Ideally, the report form should be filled in after the sensors have been laid out and checked.

➔ Fill in a separate report form for each protective device.

Protective device for		
Danger zone:		
Protective device consists of		
Control unit	Model:	Part No.:
Sensor 01	Typ:	Teile-Nr.:
Sensor 02	Typ:	Teile-Nr.:
Sensor 03	Typ:	Teile-Nr.:
Sensor 04	Typ:	Teile-Nr.:
Sensor 05	Typ:	Teile-Nr.:
Sensor 06	Typ:	Teile-Nr.:
Sensor 07	Typ:	Teile-Nr.:
Sensor 08	Typ:	Teile-Nr.:
Sensor 09	Typ:	Teile-Nr.:
Sensor 10	Typ:	Teile-Nr.:
Installed on:		(Date)
Installed by:		(Name)