

Safety mats SM8



EN | Installation instructions

Mayser GmbH & Co. KG

Örlinger Straße 1-3

89073 Ulm

GERMANY

Phone: +49 731 2061-0

Fax: +49 731 2061-222

E-mail: info.ulm@mayser.com

Internet: www.mayser.com

Safety first!



- Read the manual carefully before use.
- Warning signs in the manual warn of unexpected dangers. Always observe warning signs.
- Retain the manual throughout the service life of the product.
- Pass the manual on to every subsequent owner or user of the product.
- Insert every supplement received from the manufacturer into the manual.
- **Observe chapter on Safety starting on page 5.**

Conformity



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

- 2006/42/EC (Safety of machinery)
- 2014/30/EU (EMC)

The Declaration of Conformity is available in the download section of the website:
www.mayser.com/en/downloads

Copyright

The reproduction, distribution and utilization of this document as well as the communication of its contents without express authorization are prohibited. Offenders will be held liable for the payment of damages. All rights reserved in the event of the grant of a patent, utility model or design.

© Mayser Ulm 2019

Contents

About this manual	4
Safety	5
Intended use	5
Safety instructions	5
Residual dangers	6
Parts supplied	7
Storage	8
Installation	8
Preparing the installation	8
Laying out the sensors	9
Cutting the cable exit free	10
Cutting off ramps	10
Attachment	12
Laying cables	14
Commissioning	17
Decommissioning	17
Recommissioning	17
Maintenance and cleaning	17
Maintenance	17
Cleaning	18
Troubleshooting and remedies	18
Replacement parts	18
Disposal	19
Technical data	19

About this manual

This manual is an integral part of the product.
 Mayser will assume no liability and provide no guarantee whatsoever for damages and consequential damages resulting from failure to comply with the manual.

Validity

This manual is valid only for the product specified on the title page.

Target group

This manual is intended for the owner and electricians. The electrician must be familiar with the installation and commissioning.

Other applicable documents

- ➔ Also observe the following documents:
 - Product information
 - Drawing of the sensor system (optional)
 - Wiring diagram (optional)
 - Operating manual for the switching device used

Symbols used

Symbol	Meaning
➔ ...	Action with one or more steps whose order is not relevant.
1. ...	Action with several steps whose order is relevant.
• ... - ...	Bullets first level Bullets second level
(see Section <i>Installation</i>)	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 danger of property damage or environmental degradation. Information on easier and safer working practices.

Dimensions in drawings

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

Safety

Intended use

The product is designed as a pressure-sensitive protective device for protecting areas. Individual sensors are activated by persons weighing more than 20 kg stepping on them. Combinations of sensors are activated by persons weighing more than 35 kg.

Limits

- Max. 10 sensors type BK on one control unit
- System size max. 15 m²
= max. number × max. sensor size

Safety instructions

For your **own safety** the following safety instructions apply.

➔ Prevent electric shock

When working on electrical systems, always disconnect them from the power supply and secure them against being switched on again, to prevent injuries from electric shock.

➔ Ensure careful configuration of interface

The quality and reliability of the interface between the safety device and the machine affects the overall safety. Take special care when setting up this interface.

➔ Prohibit use with walking aids

Take measures to ensure that no one ever steps on them with walking aids. The sensors are not suitable for detecting walking aids.

➔ Specify minimum body weight

Take measures to ensure that only people with the minimum specified body weight step on the sensors.

Sensor combinations: 35 kg minimum.

Single sensor: 20 kg minimum.

➔ Disable in case of error

Disable the safety device in case of malfunctions or visible damage.

To prevent irreparable damage to the **product**, the following safety instructions apply.

➔ Stand sensor on end for transport

Always stand unpacked sensors on end for transport and transport with 4 hands to prevent sagging.

→ **Clean positioning of sensors**

Ensure that the sensors are always placed clean, dry and level surfaces.

→ **Do not pull on cables**

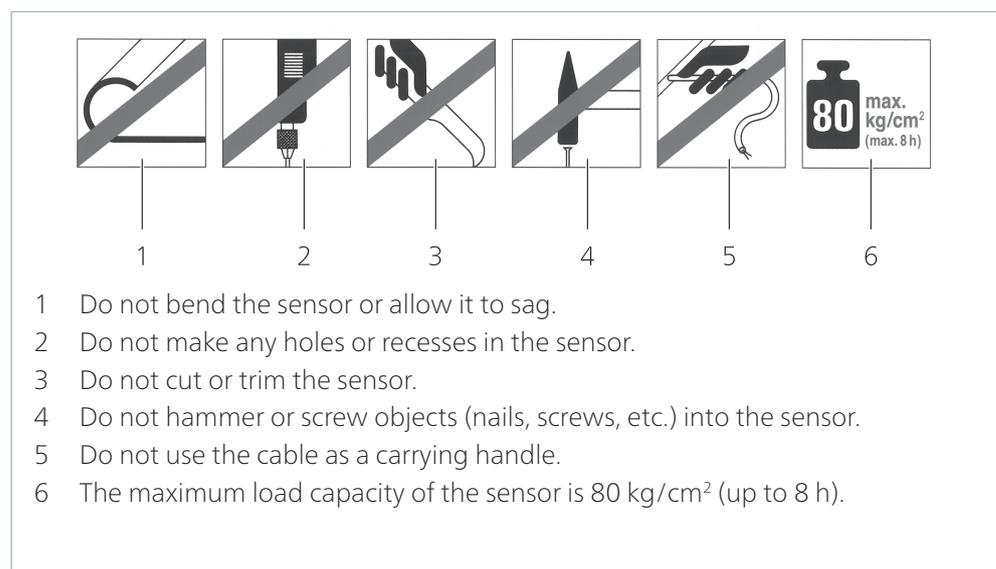
Avoid pulling on cables.

→ **Avoid kinks in cables**

Avoid extreme cable kinking.

→ **Observe labels**

Observe the label on the sensor. It visualises the 6 most important rules to prevent damage to the product.



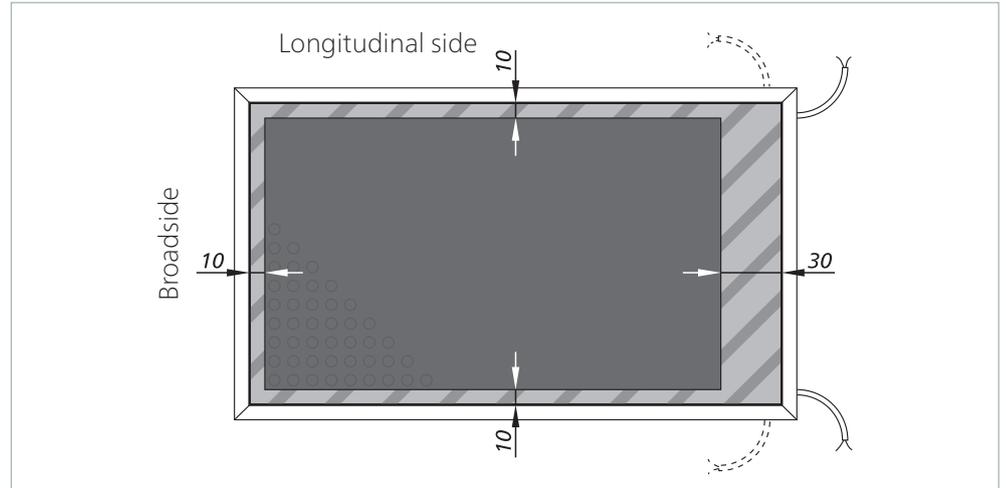
→ **Do not drive on with industrial trucks**

Take measures to ensure that industrial trucks never drive on the sensors. The sensors are not suitable for this use.

Residual dangers

Non-sensitive areas

The end areas of the sensor are not sensitive (30 mm on cable exit side, 10 mm on remaining three sides). When stepping on non-sensitive areas, there is no protective function.



- ➔ Mount the sensor as close as possible to the hazard source.
- ➔ When installing multiple sensors, make sure that only the long sides are next to each other.
- ➔ At the hazard source: Cover parts (such as surfaces, cross struts, etc.) that could be used as stepping surfaces.
- ➔ Comply with the ISO 13855 standard "Positioning of safeguards with respect to the approach speeds of parts of the human body" with respect to the layout of the sensors.

Unexpected tripping hazard

Sensor combinations present a tripping hazard due to the fact that dirt can accumulate in non-homogeneous abutting edges. Over time this dirt can also be pushed under the sensor, causing the sensor to be raised in those areas. This presents a tripping hazard, which is hardly visible and therefore unexpected.

- ➔ Create abutting edges that are as homogeneous as possible.

Parts supplied

The scope of supply is listed in the delivery note.

- ➔ Upon receipt of the parts supplied, check immediately for completeness and good condition.

Storage

- ➔ Store the sensors in the original package, in a dry place.
- ➔ Comply with the storage temperature specified in the technical data.

Installation

- ➔ Prior to installation, check on the basis of the technical data whether the product is suitable for your particular application (see *Technical data*).

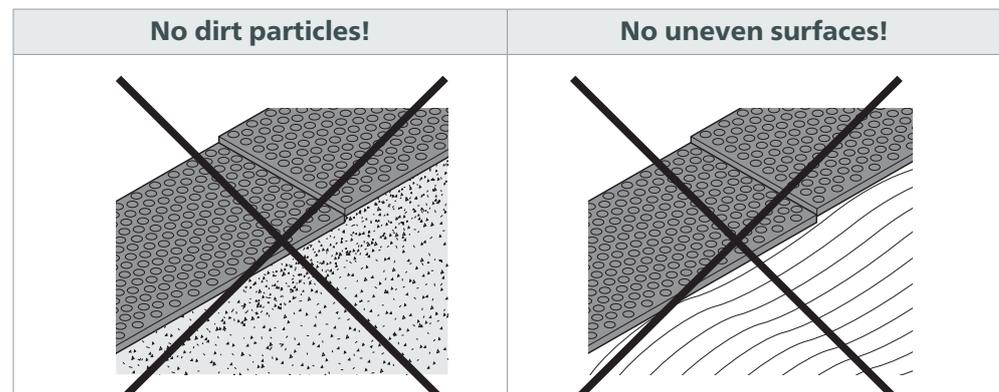
Overview

Install sensors in the following order:

- Prepare the installation site
- Lay out the sensor
- Cut the cable exit free
- Cut off ramps
- Fix the sensor
- Lay cables
- Test function

Preparing the installation

- ➔ Prepare the installation surface as follows:
 - Remove any dirt particles from the installation surface.
 - Make sure that the installation surface is level (e.g. screed).
 - Make sure that there are no holes with a diameter larger than 20 mm, and no high spots.
 - Make sure that the installation surface is dry.



- ➔ Have the necessary tools ready for installation.

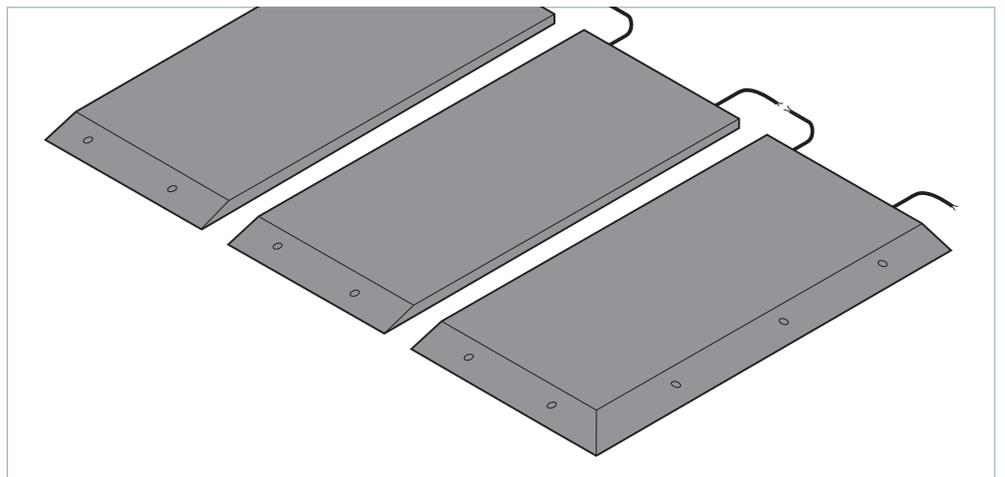
Unpacking the product

Follow the handling instructions in the chapter *Safety instructions*.

1. Place the sensors and the installation accessories next to each other at the installation location.
2. Check whether all needed parts are present and in perfect condition.

Laying out the sensors

1. Position the sensor roughly (based on the drawing of the sensor system, if available). Observe the following:
 - Lay the sensors in such a way that the structured side is face up and the type plate is face down.
 - Position the sensors so that the cable exits point in the direction of the hazard source.
 - Place sensors next to each other only lengthwise.

**Single sensor OK?**

2. Use an ohmmeter to check the resistance between the two wire ends of the cables for each sensor.
The measured resistance must have the following value:
 - Sensor BK: > 1 MOhm

Cutting the cable exit free

1. Determine the suitable side for the cable exit.
2. Flip the sensor.
3. Continue the cable exit that was started on the bottom. To do so, cut a hole in the slanted surface of the ramp.



4. Flip the sensor again.
5. Feed the cable through the hole.

For **sensor combinations** the cable exit on the broad side must be used. Cutting off the wheelchair ramp will make the cable exit on the long side unusable.

In the case of **single sensors**, the cable exit can also be on the long side.

Cutting off ramps

This section applies only to sensor combinations, not to single sensors.

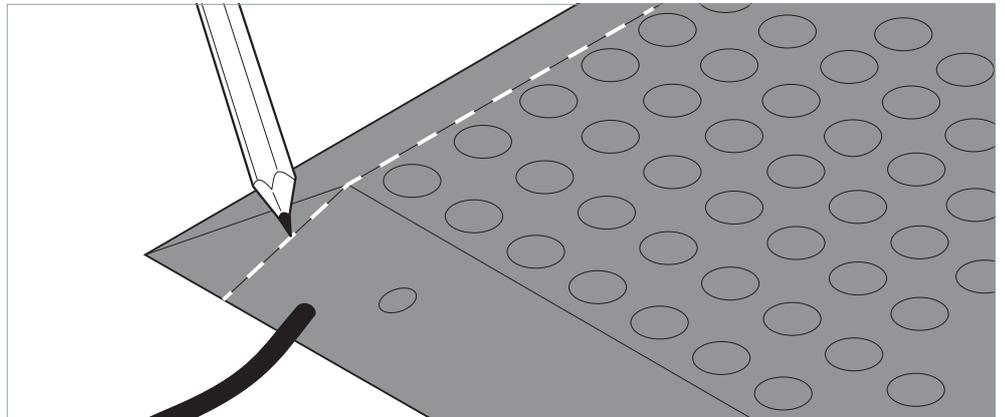
In sensor combinations, only the long sides can be next to each other. For an even abutting edge, the integrated ramp must be removed on the long side. This results in a non-sensitive area of only 20 mm on the abutting edges. This is not critical for the safety function.

⚠ **CAUTION: Tripping hazard**

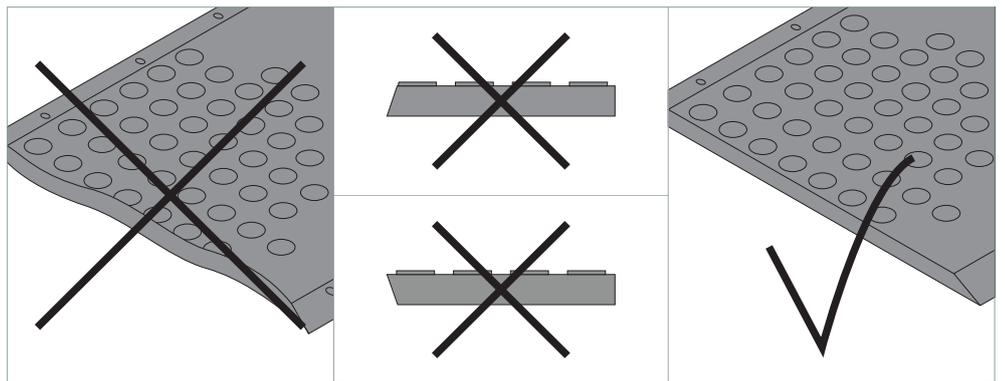
An imprecise cut (wavy, non-orthogonal) holds the long-term risk of expansion in and below the abutment due to the accumulation of dirt.

➔ Create abutting edges that are as homogeneous as possible.

1. Mark the extension of the upper ramp edge in the slanted surface of the ramp on the broad sides.



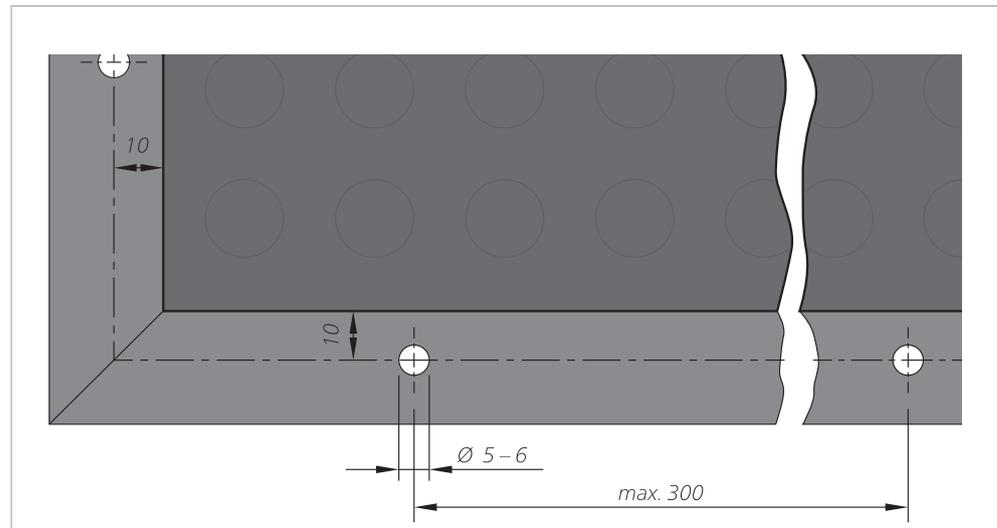
2. Use a suitable tool (a cutter or carpet knife) to cut along the marking and the upper ramp edge:
 - with no waves and
 - perpendicular (orthogonal) to the actuation area.



Tip: For a smooth cut, use a **solid steel edge as a guide**. A smoother cut will ensure a more homogeneous abutting edge.

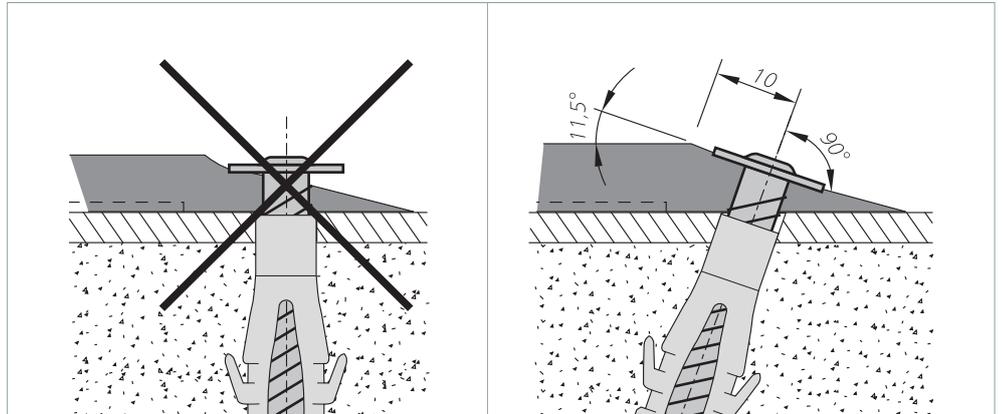
Attachment

1. Place all sensors at the final position. Observe the following:
 - Install all cable exit sides in the same direction.
 - Make sure that the distances between the sensors in sensor combinations is not more than 1 mm.
 - Do not compress or bend sensors.
 - Make sure that there are no steps on the abutments of combined sensors.



2. Use slight pressure for drilling all mounting points through the integrated ramps. Observe the following:
 - Drill into the ramp 10 mm from the upper ramp edge.
 - Drill at a right angle to the slanted surface of the ramp.
 - Required screw diameter: 5 to 6 mm.
 - Maximum distance between the mounting points: 300 mm.
 - Drill into the mounting surface only slightly (observe markings).
3. Remove all sensors.
4. Remove the drill cuttings and projections from the sensors.

5. Make markings on the mounting surface for anchors at right angles to the ramp surface for screws with a length of at least 50 mm.



6. Remove the drill cuttings (with a vacuum cleaner, for example).
The drill cuttings could otherwise accumulate beneath the sensor, which would result in an uneven surface.
7. Place all sensors at their correct position.
There must be an anchor under each hole in the ramp.
8. Fasten the sensors with screws (minimum length: 50 mm) to the mounting surface.
9. Make sure not to screw the screws through the ramp.

⚠ CAUTION: Tripping hazard

Protruding screw heads present a tripping hazard.

If standard countersunk head screws are used, there is a risk that they can slip through. The sensor is then no longer fastened and can raise at the edges. This presents a tripping hazard.

➔ Use suitable screws for secure fastening of the sensor.

For mounting sensors we recommend anchors with a diameter of 8 mm and size 6 x 50 feather head screws. Feather head screws reduce the hazard of tripping to a minimum and prevent the screw heads from slipping through.

Laying cables

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

1. Wire up the sensors in accordance with 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 all the way to the control unit. Connection of the wiring to the control unit will be completed later.

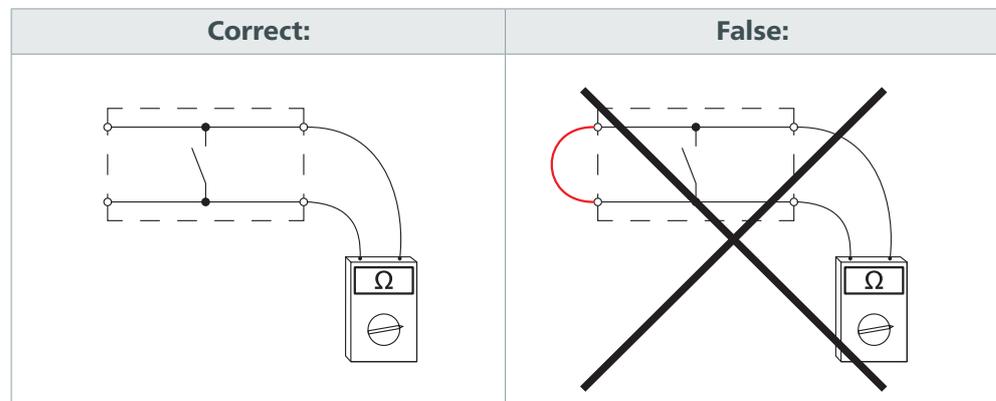
Is sensor system correctly wired?

3. Use an ohmmeter to check the electrical resistance between the ends of the wires on sensors, both actuated and non-actuated.

The measured resistance must have the following values:

- Actuated sensor system: < 150 Ohm
- Non-actuated sensor system:
 - Without monitoring resistor: > 1 MOhm
 - With monitoring resistor: dependent on the connected resistor

With Type BK sensors, take measures to prevent the wires of the second cable from being short circuited.



In the case of severe deviations in the values, please consult the chapter *Troubleshooting and remedies*.

4. Wire the sensor system to the control unit (see operating manual for the particular control unit).

NOTICE

Cables can be damaged from incorrect installation.

- ➔ Take measures to prevent cables from being kinked or crushed.
- ➔ Ensure that cables are installed without tension.

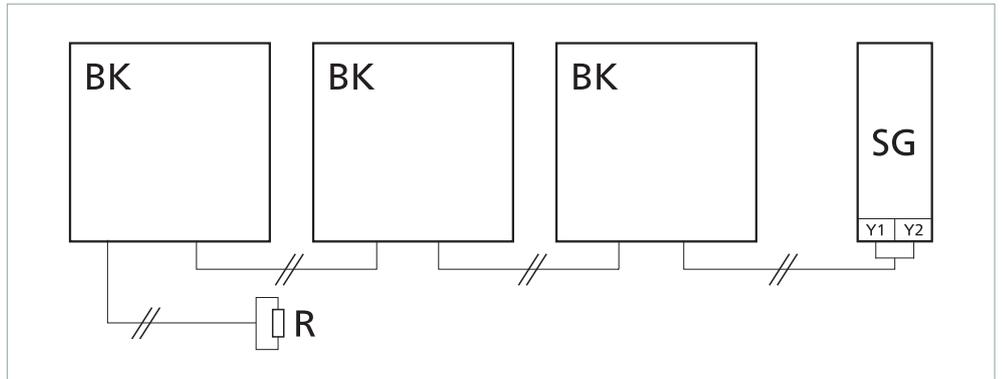
Key to the following wiring diagrams

- BK Sensor with two-sided cables as feed-through sensors or for connection of an external monitoring resistor
- R Resistance for monitoring the function of the system based on the connected control unit
- SG Control unit
- X Sub-distribution with series terminals

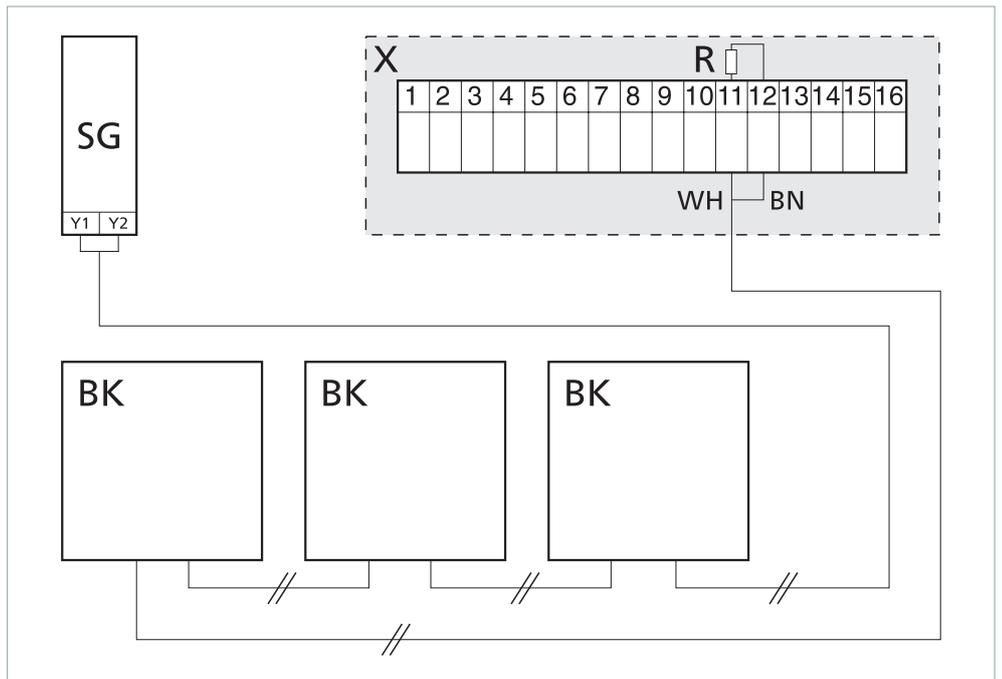
Colour coding

- BN Brown
- WH White

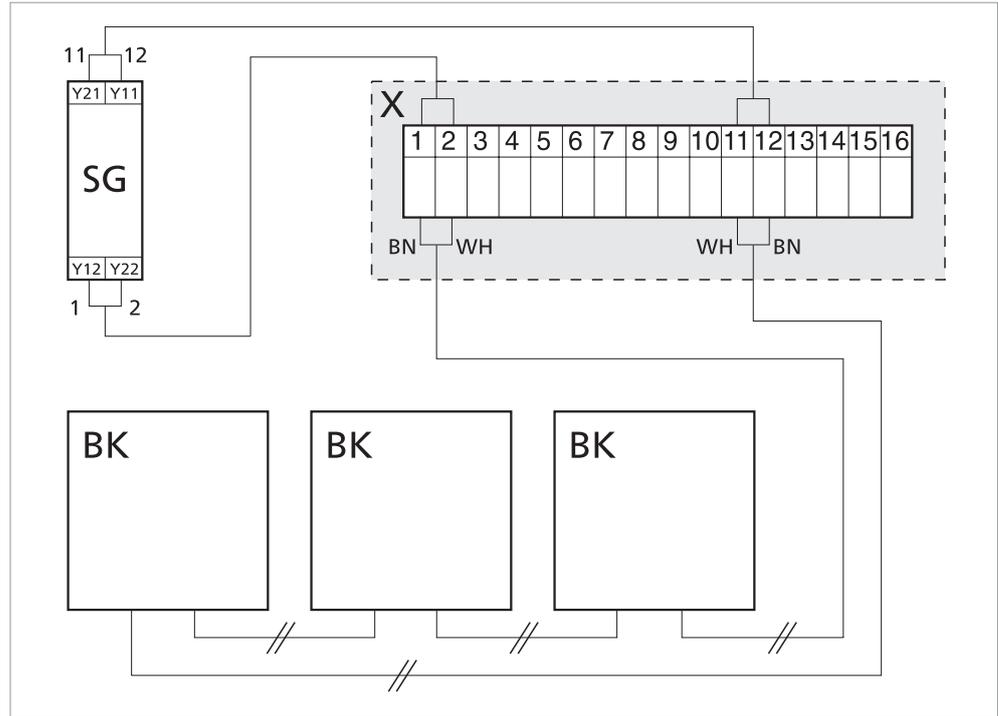
**Sensor BK:
2-wire-technology
wired straight to the
control unit**



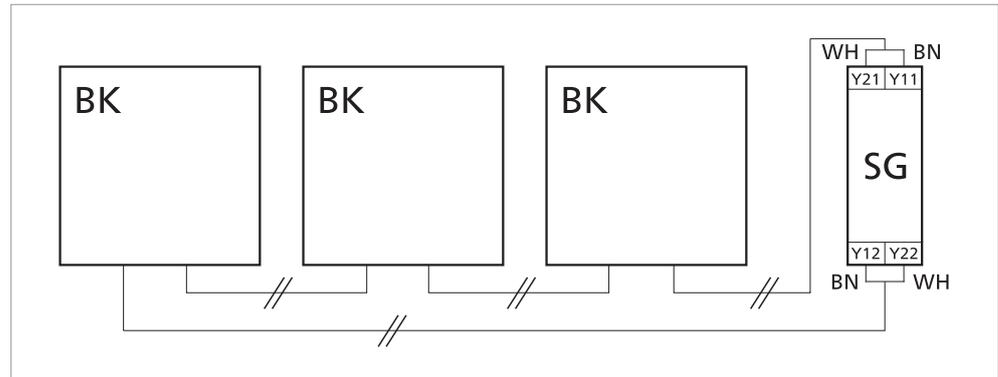
**Sensor BK:
2-wire-technology
with terminal box**



**Sensor BK:
4-wire-technology
via sub-distribution
system**



**Sensor BK:
4-wire-technology
wired straight to the
control unit**



Commissioning

The sensors can be commissioned in combination with a suitable control unit. Commissioning is described in the operating manual for the control unit.

Decommissioning

The sensors are decommissioned together with the connected control unit. Decommissioning is described in the operating manual for the control unit.

Recommissioning

The sensors can be re-commissioned in combination with a suitable control unit. Re-commissioning is described in the operating manual for the control unit.

Maintenance and cleaning

Maintenance

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

WARNING Failure of the safety function

Damage to the sensor can result in failure of the safety function.

- ➔ Discontinue use of the safety device immediately if you detect damage that could affect safe operation.

Depending on the utilisation, sensors must be inspected at regular intervals (at least monthly).

- ➔ Check the safety function by actuating it or attaching the respective test piece.
- ➔ Conduct a visual inspection of the sensor for signs of damage.
- ➔ Conduct a visual inspection of the sensor to ensure it is properly mounted.

Cleaning

- ➔ Clean dirty sensors with a mild cleaning product.
- ➔ After cleaning, wipe dry to remove any remaining moisture.

Troubleshooting and remedies

Fault display	Possible cause	Elimination
Resistance values deviate from specifications	Cables of the single sensors are not correctly connected	➔ Check connections between the sensors
	Cables are kinked or damaged	➔ Replace affected sensors
	Sensors are not flat on the floor	➔ Check mounting surface under the sensors
		➔ Eliminate unevenness and remove dirt particles
	Sensor faulty	➔ Replace the sensor

Refer also to the section *Troubleshooting and remedies* in the operating manual for the control unit.

The fault can still not be removed?

- ➔ Contact Mayser support: Phone +49 731 2061-0.
- ➔ In case of queries, have the information on the type plate at hand.

Type plate

A type plate stating the sensor type is affixed to the bottom of the sensor at the cable exit.

Replacement parts

⚠ CAUTION Overall safety endangered

If the sensor is not replaced with original Mayser parts, operation of the protective device may be impaired.

- ➔ Only use original parts from Mayser.

Disposal

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

Sensor

- Plastics
- Aluminium (interior of sensor, depending on type)
- Copper (cables)

Packaging

- Wood, cardboard, plastics

- ➔ Observe the following with respect to disposal:
- Comply with the relevant national disposal regulations and legal stipulations for these materials.
 - If you enlist the services of a disposal company, the company will need the aforementioned list of materials.
 - Materials should be recycled or disposed of in an eco-friendly manner.

Technical data

Safety mat	SM8
IEC 60529: Degree of protection sensor	IP65
Operating forces to trigger signal	In accordance with ISO 13856-1
Response time (with SG-EFS 104/4L)	38 ms
Behaviour in the event of a fault e. g. with SG-EFS 104/4L	ISO 13849-1:2006 Category 3 PL d
Operating temperature Single sensor Combination of sensors	-25 to +55 °C +5 to +55 °C
Storage temperature	-25 to +55 °C
Static load (up to 8 h)	≤ 800 N/cm ²
2006/42/EG: Emission sound pressure level	< 70 dB(A)
Weight sensor	13.0 kg/m ²

This table is an excerpt from the detailed table in the product information (see *Technical data* in product information).