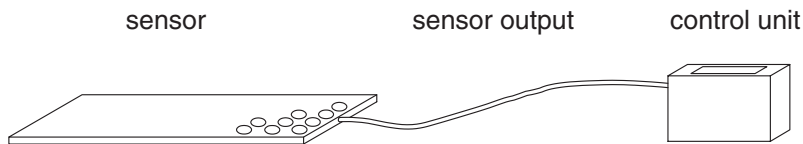


## Proven Safety

## Safety Mats 1.1.1 Product Range

### Pressure Sensitive Mats

Pressure sensitive mats are protective devices used for protecting areas. They comprise sensor, control device and output signal switching device(s).



The control unit is made up of control device and output signal switching device(s).

### Sensor

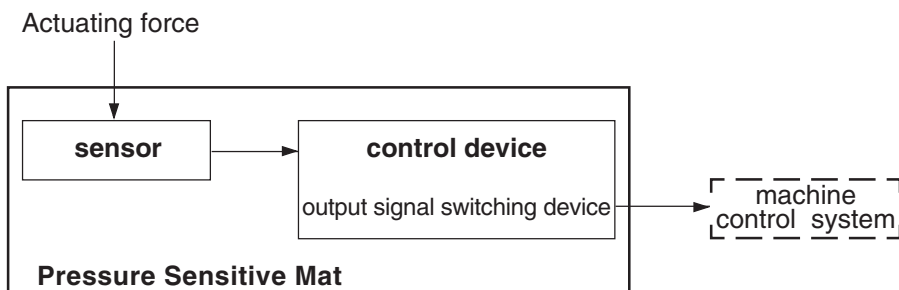
The sensor is that part of the pressure sensitive mat which produces a control command when the actuating force is applied. The sensor of the pressure sensitive mat is a flat surface area.

The effective sensing areas can be fitted with additional covering (e.g. with a non-slip topping).

### Control device

The control device is that part of the pressure sensitive mat which converts the output signal transmitted by the sensor and controls the state of the output signal switching device.

The output signal switching device is that part of the control device which is connected to the machine control system and transmits safety output signals.



### The following points should be considered when choosing the sensors:

- temperature range
- response time
- protection class (standard: IP65)
- environmental considerations (metal swarf, oil, fluids, ...)

### Single sensors:

- suitable for children weighing more than 20 kg

### Combination of sensors:

- **NOT** suitable for children

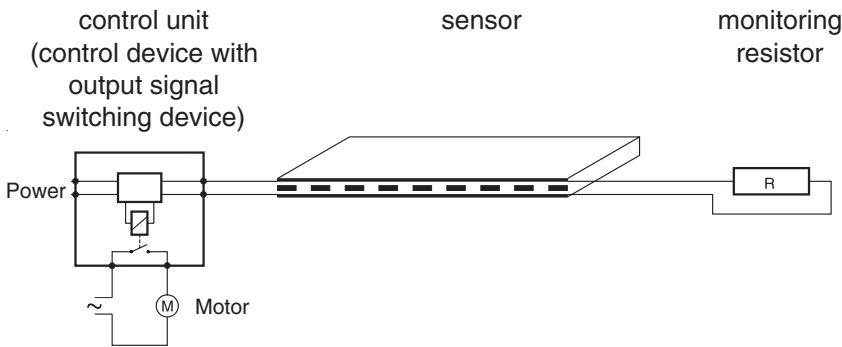
### PLEASE NOTE:

The certification of design becomes invalid if our products are used in combination with control units or sensors which do not comply with the tested types.

Subject to technical modifications.

**2-wire-connection system  
(with monitoring resistor)**

**Safety Mats 1.2.1  
Product Range**

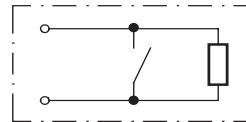
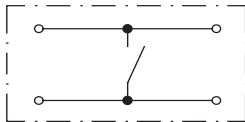
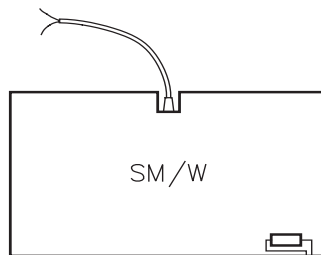
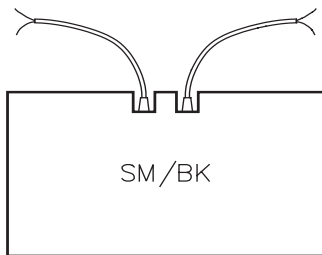


The Pressure Sensitive Mat is actuated by standing onto the sensor. It comprises sensor, control device and output signal switching device. The control device and the output signal switching device are combined in the control unit.

**Types**

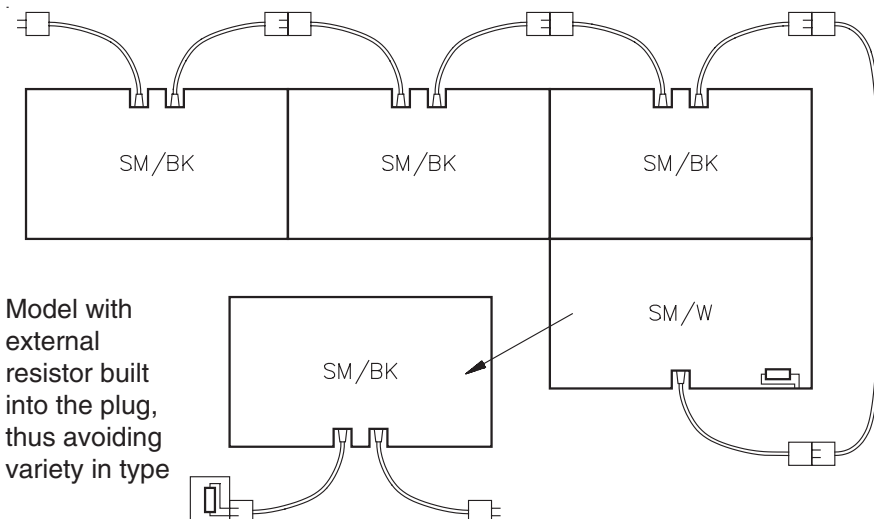
- SM/BK Through sensor for combinations of sensors or for connecting up a monitoring resistor externally
- SM/W with integrated monitoring resistor

For your safety:  
The sensor and the connecting cable are constantly monitored for function. A control function is attained by bridging the conductive areas with a monitoring sensor.



**Combination of sensors**

Example:



- Combinations:
- connection of several sensors
  - shape and size of sensitive areas can be individually laid out
  - only one control unit necessary

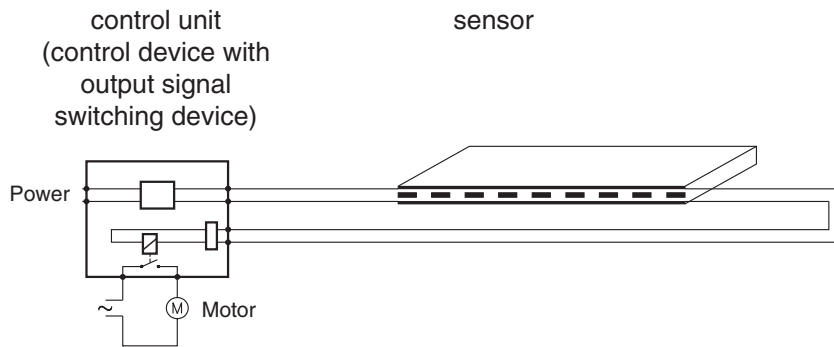
Extension lead with moulded plug and socket

See 1.4.1 for cable connection

Subject to technical modifications.

**4-wire-connection system  
(without monitoring resistor)**

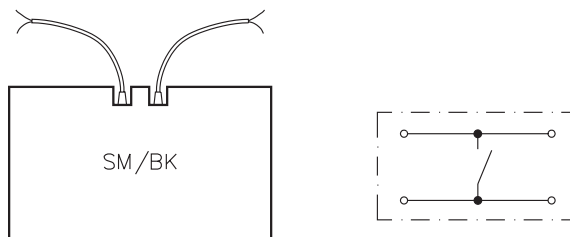
**Safety Mats 1.2.2  
Product Range**



The Pressure Sensitive Mat is actuated by stepping onto the sensor. It comprises sensor, control device and output signal switching device. The control device and the output signal switching device are combined in the control unit.

**Type**

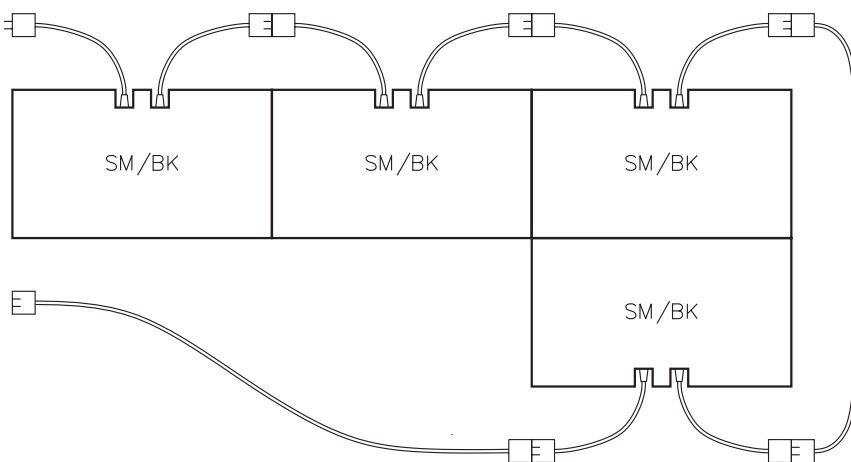
SM/BK Through sensor



For your safety:  
The sensor and the connecting cable are constantly monitored for function. The monitoring resistor is not required due to signal transmission feedback.

**Combination of sensors**

Example:



Combinations:  
- connection of several sensors  
- shape and size of sensitive areas can be individually laid out  
- connection to Safe Edges and Safety Bumpers possible  
- only one control unit necessary

Extension lead with moulded plug and socket

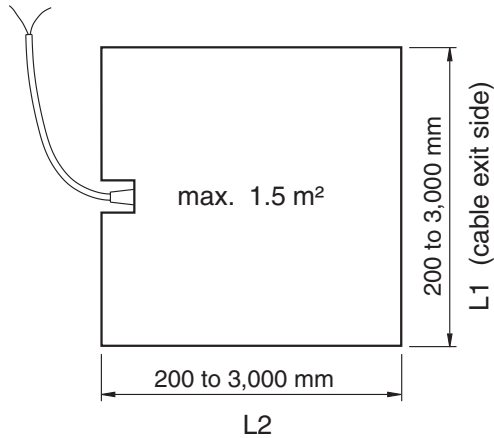
See 1.4.1 for cable connection

**Note:**  
The 4-wire-connection system can only be applied using the control unit SG-SUE 41X4 NA.

Subject to technical modifications.

## Available sizes

The sensors can be supplied with a maximum area of 1.5 m<sup>2</sup>.  
The sides must be within 200 to 3,000 mm long.



## Safety Mats 1.3.1 Product Range

Please observe order instructions!  
L1 x L2 (≤ 1.5 m<sup>2</sup>)

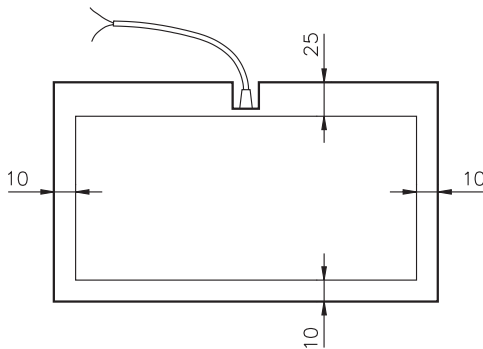
L1: cable exit side  
L2: side without cable exit

The cable exit can be on the long or the short side.

## Dead zone along edges

The non-sensitive area around a sensor:

- 25 mm = on cable exit side
- 10 mm = on remaining three sides

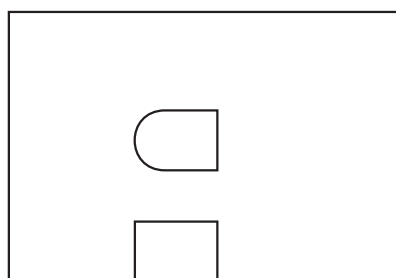
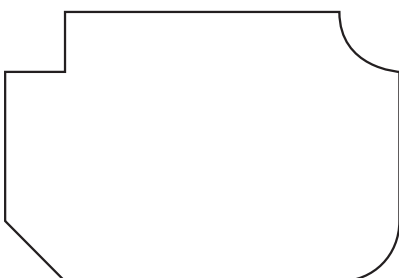


Where several sensors make up one contact area only the mat sides with 10 mm edges should lie next to one another.

## Special shapes

e.g. other corner shapes

e.g. cut-outs



Cut-outs e.g. for machine feet, switch cabinets etc. can be taken into consideration when the mats are being produced.

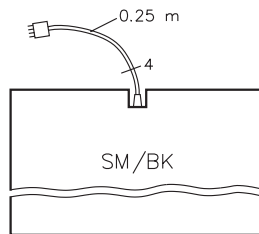
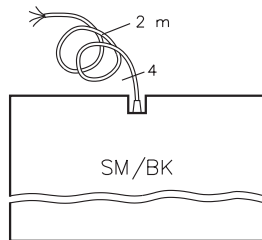
Other shapes such as circles, circle segments, trapezia, etc. are also possible.

Subject to technical modifications.

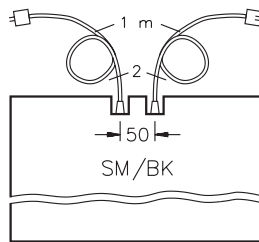
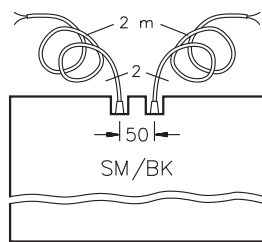
## Cable connection

The cable exits are in the middle of the mat sides.  
In the case of the SM/BK the cable entries are 50 mm apart.  
The plugs and sockets are moulded onto the cable and are watertight.

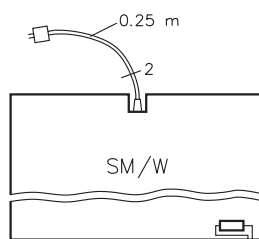
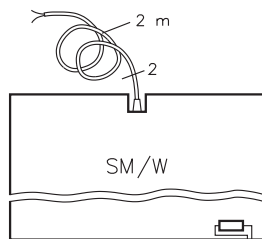
## Safety Mats 1.4.1 Product Range



- through mat SM/BK
- no resistor
- 4-wire cable  
( $\varnothing$  5 mm; 4 x 0.25 mm<sup>2</sup> Cu)



- through mat SM/BK
- no resistor
- 2-wire cable  
( $\varnothing$  5 mm; 2 x 0.5 mm<sup>2</sup> Cu)



- single or end mat SM/W
- integrated resistor
- 2-wire cable  
( $\varnothing$  5 mm; 2 x 0.5 mm<sup>2</sup> Cu)

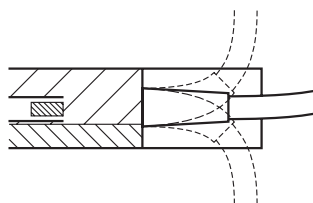
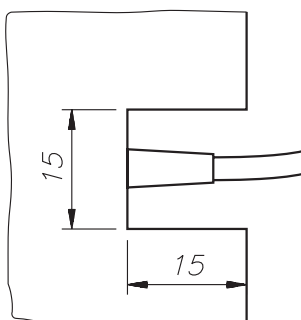
### without plug

- all-purpose
- length of cable can be varied

### with plug

- easy servicing
- simple installation
- reliable connection
- watertight plug-in connection

## Cable exit

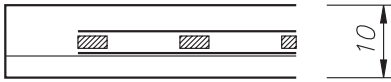


The multifunctional cable exit also allows the cable to be laid vertically or horizontally.

Subject to technical modifications.

**Base**

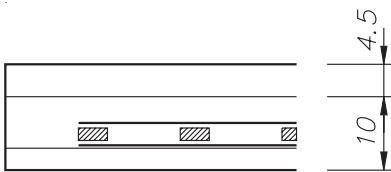
**Safety Mats 1.5.1**  
**Product Range**



**Standard model**  
Moulded onto PVC plate  
Protection class: IP65

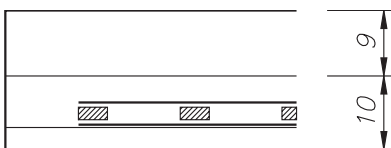
**Special models**  
Special models are possible for exceptional area conditions, e.g. protection class IP 68 or aggressive substances (motor fuels, solvents etc.).

**Covering / Rubber surface topping**



**GM 1 and GM 4**  
(see 1.6.1: Rubber Surface Toppings)  
Together with GM 1 or GM 4 the sensor has a maximum loading capacity of 800 N/cm<sup>2</sup>.

A rubber surface topping provides the required non-slip quality and also serves as mechanical protection. The toppings can be supplied already stuck on to the sensors or delivered separately.

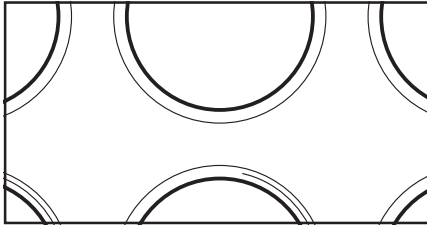


**GM 5 for heavy loads**  
(see 1.6.1: Rubber Surface Toppings)  
Together with GM 5 the sensor has a maximum loading capacity of 1200 N/cm<sup>2</sup>.

Subject to technical modifications.

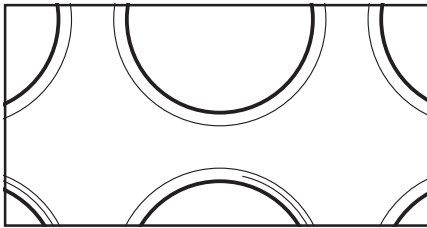
**Rubber Surface Toppings**  
(Sensor covering)

**Safety Mats** 1.6.1  
**Product Range**



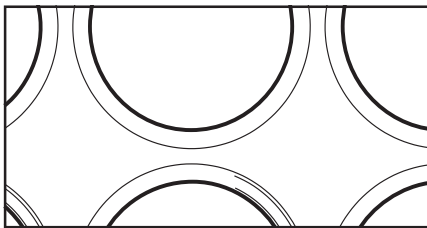
**GM 1** SBR  
Round nap topping, black  
Round nap topping, yellow

Thickness: 4.5 <sup>+0.5</sup> mm  
max. size: 1.0 m x 10 m  
1.2 m x 10 m



**GM 4** NBR  
Round nap topping, black  
Round nap topping, yellow

Thickness: 4.5 <sup>+0.5</sup> mm  
max. size: 1.0 m x 10 m  
1.2 m x 10 m



**GM 5** NBR  
Round nap topping, green  
with high mechanical resistance

Thickness: 9 mm  
max. size: 1.2 m x 10 m

**Notes on toppings:**

The toppings can be supplied already stuck on to the sensors or delivered separately.

See table 1.6.2 for chemical resistances

Subject to technical modifications.

**Rubber Surface Toppings**  
(Sensor covering)

**Safety Mats** 1.6.2  
**Product Range**

The following resistances are only given (at a room temperature of 23 °C) on condition that the surface is not damaged in any way.

Rubber Surface Topping	GM 1	GM 4	GM 5
<b>Material Rating</b>			
Hardness Shore A	70 ±5	70 ±5	70 ±5
Abrasion (DIN 53516)	120 mg	120 mg	120 mg
Tensile strength	7 N/mm <sup>2</sup>	7 N/mm <sup>2</sup>	7 N/mm <sup>2</sup>
Ultimate elongation	8 N/mm <sup>2</sup>	8 N/mm <sup>2</sup>	8 N/mm <sup>2</sup>
Tear strength	250 %	250 %	250 %
Behaviour in fire (DIN 4102)	B2	B2	B2
glowing tobacco	+	+	+
<b>Chemische Beständigkeit</b>			
Acetone	+	+	+
Ammonia	+	+	+
ASTM-Oil No. 1/ 2/ 3	-	+	+
Brake fluid	-	±	±
Boring emulsion	-	±	±
Acetic acid	±	±	±
Greases	±	+	+
Caustic potash solution	+	+	+
Methanol	±	±	±
Sodium hydroxide	+	+	+
Thinner	±	±	±
Hydrochloric acid 10 %	±	+	+
Soap suds	+	+	+
Spirit (ethyl alcohol)	+	+	+
UV resistance	+	+	+
Water	+	+	+
Petroleum ether / Petroleum	-	+	+
Citrid acid	+	+	+
Drawing compound	-	±	±

Key to symbols:

- + = resistant
- ± = limited resistance
- = not resistant

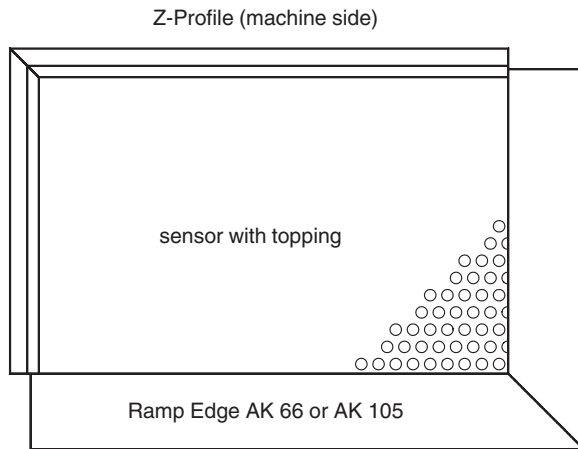
The above data are results of tests which were undertaken in our laboratory to the best of our knowledge and belief. We cannot accept any obligations being deduced from them. You must always test the suitability of our products for your special application purpose under practical conditions.

Subject to technical modifications.



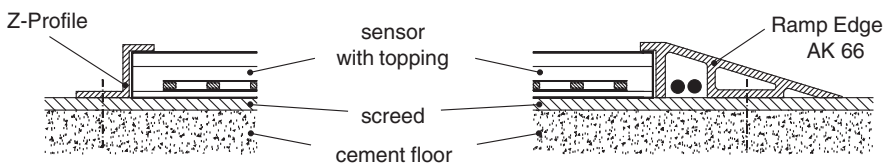
**Securing methods**

**Safety Mats 1.7.1**  
**Product Range**



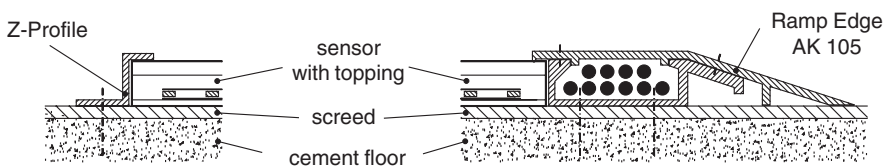
Ramp edge is quick and easy to fit.

**Ramp Edge AK 66**



- not suitable for plug-and-socket connections
- cable channel for 2 cables max.

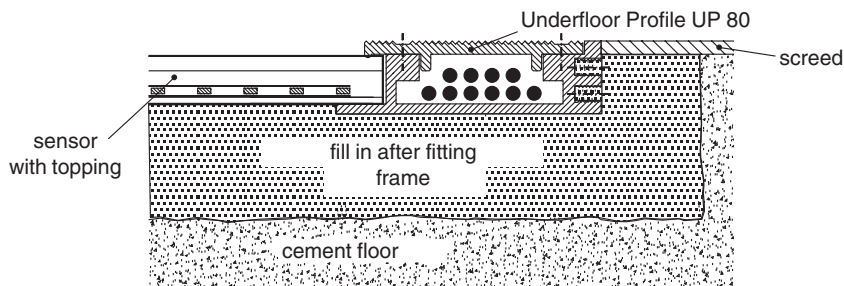
**Ramp Edge AK 105 and AK 105/1**



- suitable for plug-and-socket connections
- cable channel for 10 cables max.

Ramp Edge AK 105/1 only for sensors with GM 5 covering.

**Underfloor Profile UP 80**



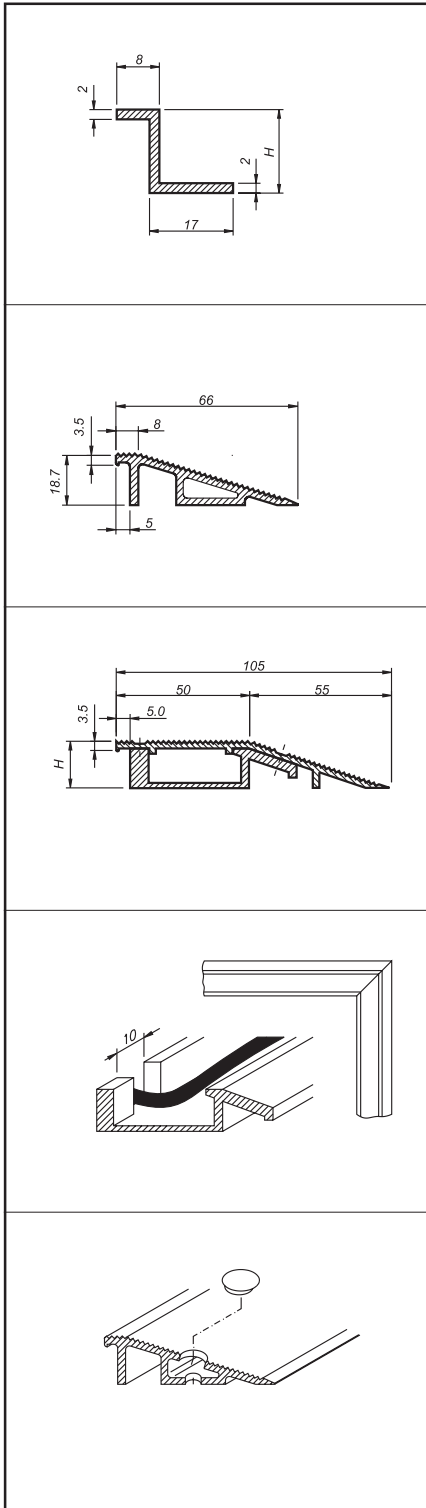
- suitable for plug-and-socket connections
- cable channel for 10 cables max.

See 1.8.1 und 1.8.2 for dimensions

Subject to technical modifications.

**Dimensions - Securing elements**  
Ramp Edge and Z-Profile

**Safety Mats 1.8.1**  
Product Range



**Aluminium Z- and Z/1-Profile**

Z-Profile: H = 17.0 mm  
Z/1-Profile: H = 21.0 mm

3 m length  
6 m length  
Fixed length

- for use next to the machine or wall  
- Z/1-Profile for sensor with GM 5

**Aluminium Ramp Edge AK 66**

AK 66: H = 18.7 mm

3 m length  
6 m length  
Fixed length

- 1 part with cable channel  
- in the case of combinations, 2 sensors max.  
- no plug-in connectors on sensors

**Aluminium Ramp Edge AK 105**  
**Aluminium Ramp Edge AK 105/1**

AK 105: H = 17.5 mm  
AK 105/1: H = 21.0 mm

3 m length  
6 m length  
Fixed length

- 2 parts with cable channel for cable and plug-in connector  
- several sensors in the case of combinations  
- sensors with or without plug-in connector  
- AK 105/1 for sensors with GM 5

**Mitre**

for corner joints

**Cut-out for cable**

done during installation

**Graduated bore hole for AK 66**

for securing the ramp edge AK 66

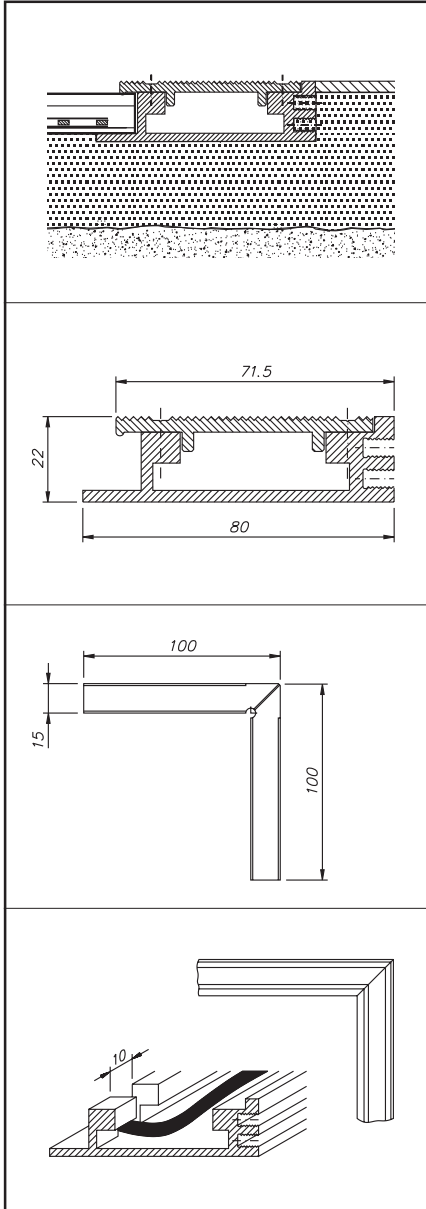
**Plug for graduated bore hole**

seals the boreholes

Subject to technical modifications.

**Dimensions - Securing elements**  
Aluminium Underfloor Profile

**Safety Mats** 1.8.2  
**Product Range**



**Use**  
- flush with floor

Fitting possibilities:  
- fit the frame profile together with the corner connecting angles (see below) to the cement floor and screw down or  
- level out the frame profile using mortar or quick-drying binding stone

**UP-frame profile and lid**

3 m length  
6 m length  
Fixed length

- single sensors  
- combination of sensors  
- sensors with or without plug-in connectors

**UP-corner connecting angle**

for the corner connections of UP-Profiles when fitting

**Mitre**

corner joints

**Cut-out for cable**

done during installation

Subject to technical modifications.

**Data Sheet**

**Safety Mats** 1.9.1  
**Product Range**

Pressure Sensitive Mat comprising sensor SM/W 2 and SM/BK 2 and control unit SG-EFS 1X4 ZK2/1 or SG-SUE 41X4 NA

- |     |  |   |
|-----|--|---|
| 1.  | Protection class sensor  | IP 65   |
| 2.  | Sensor switching operations  | > 4 x 10 <sup>6</sup><br>> 1 x 10 <sup>6</sup> *)   |
| 3.  | Switching times  |   |
| 3.1 | Response time at 250 mm/s  | EFS 1X4 ZK2/1    SUE 41X4 NA<br>16 ms                    20 ms  |
| 3.2 | Control command reset  | manual or automatic   |
| 4.  | Pressure Sensitive Mat actuating forces:<br>Testing basis: EN 1760-1 |   |
|     | Test piece Ø 11 mm   | < 300 N *)  |
|     | Test piece Ø 80 mm   | < 300 N *)  |
|     | Test piece Ø 200 mm  | < 600 N *)  |
| 5.  | Behaviour in fault instance  | Category 3 according to EN 954-1  |
| 6.  | Operating and environmental conditions                               |   |
| 6.1 | Ambient temperature  |   |
|     | single sensors   | - 20 °C to + 55 °C *)   |
|     | combination of sensors   | + 5 °C to + 55 °C *)  |
| 6.2 | Static force   | 800 N/cm <sup>2</sup><br>750 N/cm <sup>2</sup> *)   |
| 7.  | Operation –Maintenance   |   |
| 7.1 | Maintenance  | The sensor is maintenance free.   |
| 7.2 | Monitoring   | The control unit aids monitoring.   |
| 7.3 | Check  | Depending on the working rate, the sensors should be tested for function at regular intervals (at least once monthly) by stepping onto them or by applying the relevant test piece. A visual examination for damage should also be carried out. |
| 8.  | Chemical resistance  | Resistant to customary chemical influences such as dilute acids and alkaline solutions as well as alcohol for an exposure duration of 24 hours. Take resistance of rubber surface toppings into consideration.                                  |
| 9.  | Dimensional tolerances   | - length per DIN ISO 2768 c<br>e.g. mat length 1,000 mm ± 2 mm<br>- right angles per DIN ISO 2768 L<br>e.g. length 1,000 mm ± 1.5 mm  |

All given data marked with \*) are verified by EEC-type-examination certificates.