Operating Manual

HSM®

Safety mats
(Translation of original operating manual)

HSM - S HSM - U

Recognition of persons from 35 kg
PL: feasible up to d, depending on the application
Category: 3
Response time: 39 ms

Illustration shows HSM - S
The illustration may deviate from the actual product.

Read the entire operating manual including the section "Maintenance" before beginning any work!

Haake Technik GmbH
Master Esch 72
48691 Vreden, Germany
info@haake-technik.com
www.haake-technik.com
Tel.: +49 2564 39650
Fax: +49 2564 396590

Doc-ID. 488803
09-2015

Contents

1 Scope

This operating manual is intended for persons who have been authorised to carry out tasks involving the safety mat of the HSM-series. International, national and, where appropriate, regional regulations must be observed when handling safety mats.

If you have any questions which are not answered in this manual, please get in touch with your regional customer service centre or else make direct contact with

Haake Technik GmbH
Master Esch 72, 48691 Vreden, Germany
Telephone +49 2564 39650
Fax +49 2564 396590
Info@haake-technik.com

2 Intended use

Safety mats from the HSM series are area-securing protection devices according to the conditions mentioned in chapter 20, 21 and 23. They are applied as access guarding in danger zones, e.g. automatic door systems, automatic production systems, shelf alleys, woodworking machinery or robotic systems.

Other applications are prohibited.

3 Symbol Explanation

Warnings are indicated by symbols. The notices are introduced by signal words to indicate the extent of the hazard.

Attention!

… indicates a potentially hazardous situation, which may lead to personal injury and damage to property if it is not avoided.

NOTE!

… highlights useful tips and recommendations as well as information for efficient and fault-free operation.

4 Disposal

The device must be properly disposed of in accordance with national laws and regulations.

5 Foreseeable misuse

Examples for reasonably foreseeable misuse

- Safety mats may not be used with additional covers.
- Transport vehicles (e.g. forklift) may not drive on/across safety mats.
- Safety mats may not be connected to voltage ≥ 50 V AC, 75 V DC.
- Safety mats may not be stressed by currents greater than 0.5 A.
- Connection lines may not be installed without protection.

6 Identification

For an accurate identification, you will find the type designation, serial number and year of construction on the type labels of the safety mats.
Note these details (prior to installation, if necessary), so that they can be provided in case of questions or for ordering spare parts.

7 Safety relevant function

The safety mats implement the following safety functions:

1. Interruption of the closed circuit through application of force on the sensor surface
2. The interruption of the closed circuit is maintained as long as the force is applied to the sensor surface.

8 Fault exclusions

Due to the design, materials, and components used for the safety mat, the faults listed in the table can be excluded:

Potential fault	**Exclusion of fault**	**Limitations of use**	**Reason**
Deformation by overload	Admissible in accordance with table A.4. of DIN E ISO 13849-2.	See: **Intended use** in section 2 and **technical data** in section 20.	Use of carefully selected materials and manufacturing procedures; use of special types of fastening. When the safety mat is overloaded, the contact elements of the inlay items will be permanently interrupted.
Modifications of the geometry or breakage of the contact elements	Admissible in accordance with table A.4. of DIN E ISO 13849-2.	See: **Intended use** in section 2 and **technical data** in section 20.	Use of carefully selected materials and manufacturing procedures; use of special fastening types; over-dimensioning.
Short circuit in the lines and line connections	Admissible in accordance with table D.4. of DIN E ISO 13849-2.	See: **Installation** in section 12	Use of doubly insulated sheathed cables and protected cable installation
Fusing of the contacts	Admissible in accordance with table D.8 of DIN E ISO 13849-2.	See: **Installation** in section 12 and **technical data** in section 20.	Use of a fuse (0.5 A) in the supply circuit of the safety mats.

9 Scope of delivery

1 x safety mat

NOTE!

*Fuses (0.5 A) are **not** included in the scope of delivery.*

Means of attachment must be ordered separately.

10 Structure and function

10.1 Description

The safety mats are basically of the same design, independent of their dimensions and shape.
They consist of the components:

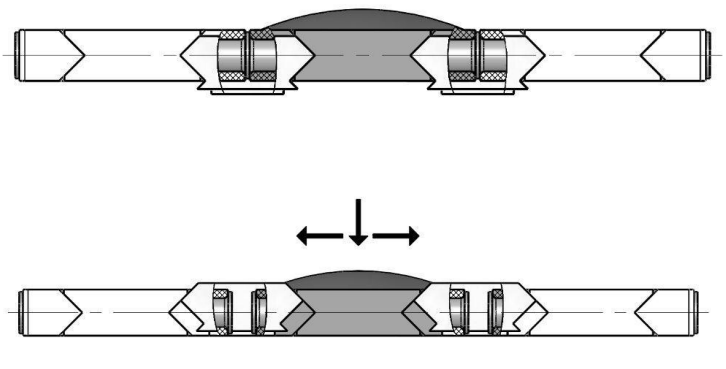
- Haake safety inlay items HSM® (normally closed type)
- PU-coating of the inlay items with special surface structure
- Aluminum profiles for fastening the safety mat and for tripping protection.
- A variety of line connection arrangements depending on the application
- Double insulated connection lines to the machine control

When the safety mat is actuated, the current flow is interrupted by the special geometry of the inlay items inside the sensor. This interruption represents the OFF state of the output signal switching device and thus transmits the safety output signal to the downstream machine control.
The safety mats meet the requirements for automatic resetting because they switch to the ON state when the actuating force is removed.

Should work with a manual reset be required, this should be implemented by means of the machine control in accordance with DIN EN ISO 13856-1:2013-08, Section 4.7.2.

Due to the closed circuit principle (forced interruption of the inlay items) no separate evaluation unit is necessary for provision of the output signal.
The safety mat and downstream machine control must together meet the performance level that was determined by the risk assessment.

10.2 Example



ON state
No actuating force, current flow is given

OFF state
Actuating force is present, current flow is interrupted

Figure shows HSM as a functional principle (sensor profile is not shown)

11 Safety measures

11.1 Organisational measures

Persons who have been authorised to carry out tasks involving the installation or de-installation of the safety mat must have read and understood this manual prior to commencing such tasks.
The operator of the plant or machine has an obligation to ensure the installation and de-installation is carried out safely and with no hazards by implementing appropriate safety measures.

11.2 Safety of persons

Personnel responsible for installation or removal tasks have to be suitably skilled or else have to be instructed by suitably skilled persons. On account of their technical training and experience, such skilled persons have sufficient knowledge of the installation or machine. These persons are sufficiently familiar with the country-specific occupational safety and health provisions and accident prevention regulations applicable on site so that they are able to assess the operational safety of the installation or machine.
It is necessary to implement accident- and fall-prevention measures whenever tasks are performed or areas are traversed at height.

11.3 Avoiding property damage

Please note the **intended use** (cf. section 2) and **installation** (cf. section 12) described in this manual.

11.4 Operating conditions and limitations of use

Please note the **intended use** (cf. section 2), **foreseeable misuse** (cf. section 5) and the **technical data** (cf. section 20) described in this operation manual. Safety mat and downstream machine control must in their entirety comply with the performance level to be determined by means of a risk assessment. The overall system must be validated according to DIN EN ISO 13849-1. This must be guaranteed by the machine manufacturer producing the overall application.

Attention!

The machine must not be restarted in case of existing danger.

11.4 Assembly

Assembly work may only be carried out by skilled workers or personnel qualified by the manufacturer.
Perform the assembly as described in section 12 and always carry out a function test afterwards.
Do not make any alterations to the installation after the function test has been successfully carried out.

11.5 Repairs / alterations

Do not carry out any repairs to the safety mat. Do not replace or exchange any parts. Send damaged or faulty components to Haake Technik GmbH to be repaired.
Do not make any alterations to the safety mat. Otherwise, this could lead to malfunctions, which can cause serious personal injury and irreparable damage to property.

In the event of non-compliance, the guarantee is invalidated and Haake Technik GmbH does not accept any liability.

11.6 Electrical equipment

Electrical connections may only be executed by qualified electricians who are familiar with all international, national and, where appropriate, regional electrical engineering regulations.
Work must only be carried out when the power supply has been shut off.
Always ensure external protection of the safety mat with an overcurrent fuse of 0.5 A (rated value).

12 Installation

Attention!

Always select a fastening means for installation that is sufficiently secured against loosening. The overall safety of the machine depends on the proper execution of the installation.

12.1 Preparation

Before starting the installation, make sure that the type designation specified in this instruction manual matches the type name on the safety mat.

When installing the safety mat, you will need the following hardware that is **not** included in the scope of delivery:

- Screw locking (e.g. gear wheels, disc springs, wave washers or screw glue)
- Protective hoses, cable ducts for connection cables

The following tools (tools) are needed to install the safety mat:

- Drilling machine, and drill bit 8.0 mm
- Countersink 90°
- Crosstip screwdriver
- Voltage tester

The underground has to be clean (clean swept) and even. Slight unevenness will be compensated by the safety mat.
Clean the work environment by removing dirt, grease and oil.

12.2 General approach

Use suitable tools when installing the safety mat. Otherwise, bolts and nuts may become damaged and unusable.
Do not exceed the max. torque when tightening the nuts.

Always use one of the screw locks specified in section 12.1.

12.3 Installation instructions

Make the mounting holes according to the design of the safety mat. The location of the mounting holes is specified by and can be gathered from the customer's order.

The installation procedure depends on local circumstances. Based on the application, different aluminum profiles are available. Observe the following basic instructions:

Attention!

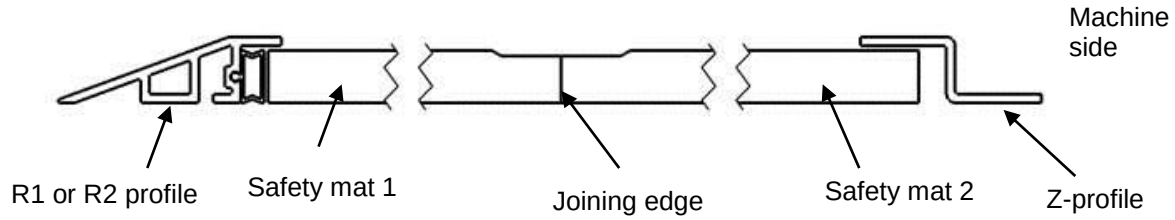
The aluminum profiles may only be installed on a completely even surface. Cavities underneath the profiles may lead to permanent deformations and influence the safety functions of the system.

When mounting the aluminum profiles as tripping protection (ramp profiles), attention must be paid that the safety mat is not clamped too firmly into the aluminum profiles. At locations that are subject to high temperature fluctuations it must be born in mind that boundary profiles must be mounted with sufficient clerance around the circumference of the safety mat so that they can expand accordingly.
(cf. section 20)

A snap-in expansion profile is available for the aluminum profiles. This expansion profile will deform if the safety mat itself is expanded. The expansion profile has to be snapped in before mounting the aluminum profiles.

Never use the connection line to align or move the safety mat.

When assembling two or more safety mats, the safety mats have to be joined together according to the following drawing. The shapes at the two joining edges have to fit together when mounting the mats.



Side view of two safety mats showing the joinability

At the outlets of the connection lines between safety mat and transition to the aluminum profiles, the connection lines have to be protected against damage by protective hoses, cable ducts or similar.

With the separately ordered aluminum profiles (R1, R2 and Z-profile), the safety mat is fastened on a level surface. The aluminum ramp profiles (R1 and R2) also serve as tripping protection. The profile is provided with holes, which are sealed with sealing plugs. The mounting screws and dowels required for fastening the profile are included in the scope of delivery. Other mounting options have to be discussed with the manufacturer.

If the safety mat is going to be mounted in a depression in the floor, the aluminum profile can be ommitted, provided the safety mat does not project more than 4 mm above floor level.
Arrangement and dimensions of the floor depression are determined analogously to the previously mentioned determination of the safety mat size. The allowances for the aluminum profile can be omitted. The depth of the depression must correspond to the installation height of the safety mat (cf. section 20, technical data). No tripping hazards larger than 4 mm may arise. Otherwise, additional measures must be taken to prevent the risk of tripping.

If due to the size of the safety mat it is not guaranteed that there is an adequate distance between the lateral access sides and the danger zones at the machine, separating safety guards (e.g. fences) must be installed to prevent access.

Attention!

It is not permitted to shorten safety mats!

If a safety mat must be shortened for operational reasons, this must be done exclusively by the manufacturer.

No liability is accepted in the event of improper installation!

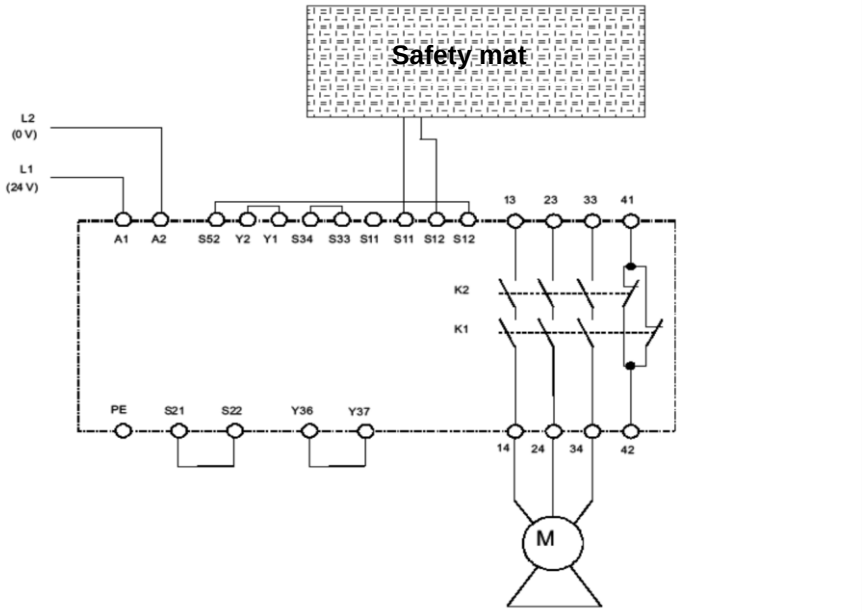
12.4 Electrical connection

The integration of the safety mat in the control circuits of the machine control is performed according to EN 60204-1 "Electrical equipment of machines". Core component of the control unit is e.g. a logical unit for safety functions which realises the required performance level in conjunction with the safety mat.

Because the safety mat is operating according to the normally closed contact principle, it can be directly connected to safety switchgear implementing the safety-related signals of the safety mat.
The electrical connection of the safety mat. must be carried out according to the following specifications:

Rated voltage: < 50 V AC, 75 V DC (with safe disconnection to the grid).
A voltage source for SELV or PELV systems according to DIN VDE 0100-410 must be used.

Rated current: < 0.5 A
The power supply of the safety mat must be protected externally!
Overcurrent protection of 0.5A (rated value)



Connection example (symbolic representation).

For information on the respective safety switchgear, please refer to the operating instructions of the respective product.

Additional installation instructions for cable connections:

- After cutting to the required length, all cable ends must be provided with crimp contacts.
- The cable connections of joined safety mats must be arranged in an offset manner, properly connected and separately insulated from each other.
- The safety mat enclosure and the connection cables must not be damaged.
- All lines must be laid with protection against external mechanical influences.
- Depending on the type of cable connection, protection rating IP 65 must be ensured also at connection points, e.g. by appropriate sheaths or enclosures (control cabinet installation).
- Connection lines and connections must be laid and fastened across their entire length such that external mechanical damage is avoided (e.g. internal space of profile, cable ducts, protective tubes, etc.), see also DIN EN ISO 13849-2:2013-02, tab. D4, D6, D7.

No liability is accepted in the event of improper installation!

13 Regular performance check

Attention!

The protective effect of the safety mat must be checked regularly
- at least once a year
or
- at intervals according to national operating instructions

Once installed, do not loosen any bolts or nuts or remove any pins; otherwise, the effectiveness of the safety-related functions is no longer guaranteed.

Run the following tests after installation and at regular intervals and document the results in the acceptance report (section 22):

- Check all wire connections on the machine control for terminal assignment and tight connection.
- Check the proper function of the safety mat using a resistance meter on the connection lines (not actuated = contact closed; actuated = interruption).
- Check the fastening of the aluminum profiles.
- Check the safety mat surface thoroughly for external damage (visual inspection).
- Check the safety function of the overall system by repeated actuation of the safety mat at different points of the effective actuation area, preferably by a test body of Ø 80 mm with a maximum force of 300 N.
- Check the reset function, if available.

14 Commissioning, operation

After the safety mat has been properly installed, connected and tested, the technical equipment at which the safety mat has been installed can be turned on and operated in accordance with its intended use.

No further work on the safety mat is required.

15 Maintenance / repair

Attention!

Adapt the maintenance intervals to the environmental conditions at the application site.

No maintenance of the internal parts of the safety mat is required.

Damaged or defective safety mats must be replaced.

After reassembly, all dismantled / removed parts (e.g. covers, clamps, profiles, fastenings) must be re-installed.

16 Cleaning

As a rule, no cleaning is required. Soiled safety mats can be cleaned by wiping with a cloth and neutral soap suds.

Attention!

Only use other cleaning methods after prior consultation with the manufacturer.

17 De-installation

Attention!

Only dismantle the safety mat when the electrical system is de-energised.

- Disconnect the electrical connection (section 12.4).
- Loosen the fastening of the safety mat, depending on the design version (section 12.3).

18 Troubleshooting

Fault	Possible cause	Remedy
No interruption of the signal	Connection cable is damaged, short-circuit	Contact Haake Technik GmbH.
	Expansion profile not inserted	Realign the aluminum profiles and insert the expansion profile.
No ON signal (OFF signal is on after activation).	Defective connecting terminals	Tighten terminal screws.
	Cable break	Contact Haake Technik GmbH.
	No level installation surface	Create a level installation surface
	Foreign matter underneath the safety mat	Remove foreign matter
	Contact elements (inlay) damaged	Contact Haake Technik GmbH.
	Safety mat is clamped by the border profile	Loosen the border profile and check whether the safety mat works. Contact Haake Technik GmbH.

19 Transport, handling, unpacking, storage

Attention!

Note the total weight of a packaging unit and always use a suitable transport means.

Dimensions and mass of the packaging arise from the scope of the order. The products are placed in an overpack. Depending on the number of parts to be shipped, cardboard boxes, crates, pallets or containers are used for packaging. Wooden boxes are provided with a lid.

19.1 Transport and handling

If weight is unevenly distributed, the center of gravity is indicated on the wooden box. Depending on their length, safety mats must be handled by one or two people.

In each transport container, goods are provided with filling material to line any clearances. This ensures that goods are protected during transport.

Returned goods must be similarly packed to avoid transport damages.

Goods damaged due to improperly packed returns will be invoiced.

19.2 Unpacking

Special care is needed when opening the packaging.

Open ***products in cartons*** with a knife at the points where adhesive tape was used. When opening, make sure you cut with the knife away from your body.

The lid of ***wooden boxes*** is attached to the box by nails or screws. Therefore use a claw or screwdriver when opening. Always pull nails or screws entirely out of the wood to avoid injuries.
Remove goods from the filling material and place on a clean surface.

19.3 Storage

Never bend or roll up the safety mat (sensor) and always store flat; aluminum profiles must fully rest on the pad.
If safety mats are to be stored for an extended period of time, they should be placed in the original packaging. A dry environment with temperatures ranging between +5 and +55 °C must be chosen for storage. This prevents damage caused by external interferences or environmental influences.

20 Technical data

Types:	HSM xxxx-xx-S HSM xxxx-xx-U *Note:* xxxx-xx is a continous type designation e.g. 3817-00 -S standard design -U moulded-in design
Environment:	indoors
Ambient atmosphere:	industrial environments
Temperature range:	+5º C to +50º C
Humidity:	up to 100% (standard climate)
Material:	
Sensor transmitter profile:	PU
Fastening profile:	Aluminum
Connecting line:	PVC, double insulated, highly flexible single core cables, d=3.5 mm Other lines are possible after consultation with the manufacturer.

Resistance of the sensor surface:

Resistance to ozone:	good
UV-resistance:	good
Organic acids:	short-term
Mineral acids:	short-term
Water:	good
Coolant:	short-term
Drilling emulsion:	good
Oil resistance:	short-term
Resistance to detergents:	short-term
Amines:	short-term
Alcohols, ketones:	short-term

Note: *The resistances indicated refer to the material of the outer shell of the sensor (safety mat housing), which is usually exposed to the media. Depending on the application it should be noted that other outer parts of the component (such as connection cables for example) may be continously exposed to special media. Appropriate resistances are available on request.*

Service life:	10 years

Values according to DIN EN ISO 13849-1:2008-12:

B10d-Value:	1 756 338 (sample safety mat HSM 3817-00-S)
Category:	3
Performance Level:	up to d is feasible
Mean failure probability ($MTTF_d$):	Depending on the application
Protection class:	IP 54 (HSM-S series) IP 65 (HSM-U series)

Rated voltage:	<50 V AC, 75 V DC (with safe disconnection to the grid) A voltage source for SELV or PELV systems according to DIN VDE 0100-410 must be used.
Rated current:	≤ 0.5 A
Person recognition:	>35 Kg (walking aids are recognized)
Weight:	18 Kg/m^2
Trafficability / load bearing capacity:	Wheeled vehicles may not drive on/across the safety mat
Joinabilty:	Suitable at joining edges (cf. section 12.3) For the maximum number of joined safety mats contact the manufacturer

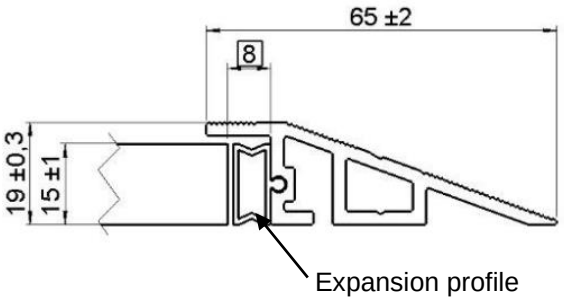
21 Dimensions

(All dimensional specifications in mm).

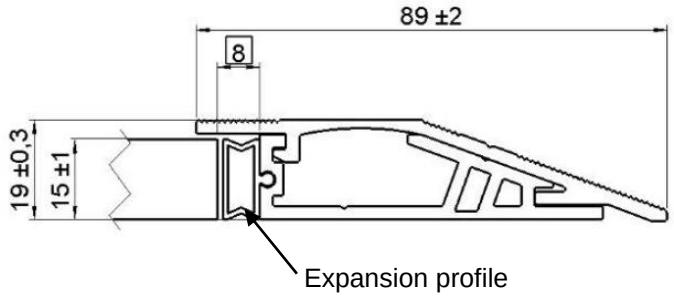
Inactive edge zone:	HSM-S: circumferential 30 mm Cable routing side 40 mm HSM-U: circumferential 35 mm Cable routing side 45 mm
Minimum dimensions:	
Length:	50 mm (active area)
Width:	60 mm (active area) (based on single safety mat)
Maximum dimensions:	
Length:	2000 mm (active area)
Width:	1000 mm (active area) (based on single safety mat)
Construction height:	15±1 mm (w/o aluminum fastening profile)

Profiles:

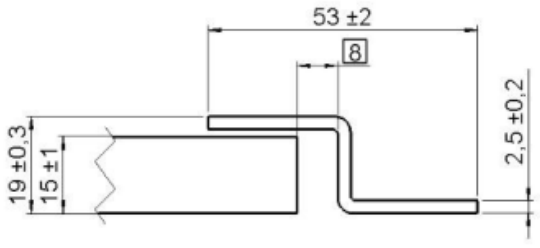
1. Aluminum ramp profile (R1) as trip protection:



2. Aluminum ramp profile (R2) as trip protection:



3. Aluminum Z-Profil (Z):



22 Selection procedure

The two most important parameters for selecting the appropriate safety mats are:

- Determination of the required performance level
- Measuring the stopping distance of the hazardous elements

Legend:

T	=	Overall response time [s]
T_A	=	Response time safety mat [s]
T_N	=	Processing time machine control and overtravel time of drives [s]
F	=	Safety factor, min. 1.2
S	=	min. safety distance [mm]
$1600\frac{mm}{s}mm$		Normative walking speed
H	=	Height of pedestal on which the safety mat is resting (when installed on the floor H=0)

For the selection, proceed as follows:

Step	Action	Remark
1	Determining the required PL according to DIN ISO 13849-1	a) Results from the information in the C standard b) Results from the risk assessment to be carried out, based on the particular application
2	Determining the overall response time (T)	a) Measuring or calculating the processing time of the machine control and the overtravel time of drives (T_N) b) Determining the safety factor (F); min. 1.2 c) Calculation
3	Specifying the environmental conditions	a) Determining, what kind of people (e.g. elderly people, children, etc.) and what body parts are to be recognized. b) Determining the required degree of protection.
4	Selecting the safety mat	a) Selecting the system taking into account the obtained values. b) Calculating the active actuating surface of the safety mat. [1)]

[1)]The active surface of the safety mat (min. safety distance of the outermost active edge of the safety mat to the nearest danger zone) is calculated by the formula according to DIN EN ISO 13855:

Step 2; overall response time:

$$T[s] = (TA[s] + TN[s]) \times F$$

Step 4; safety distance

$$S[mm] = 1600\left[\frac{mm}{s}\right] \times T\ [s] + 1200[mm] - 0.4 \times H[mm]$$

NOTE!

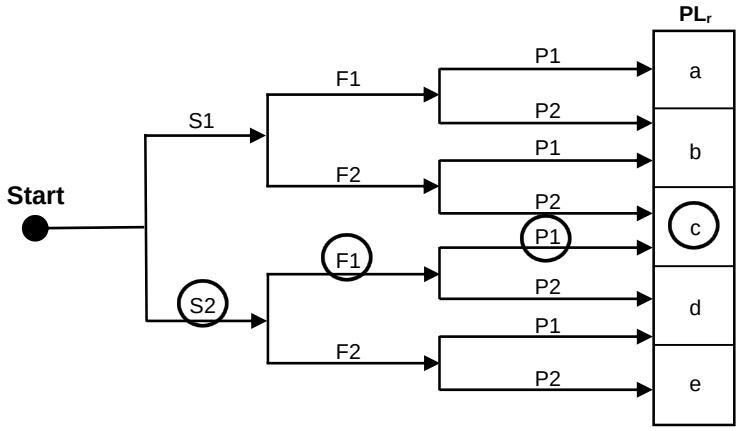
Category and performance level of the safety mat must correspond to the information obtained from the risk assessment of the machine.

The user has to determine the performance level for his particular application.

23 Application example

For the safety of an automated manufacturing system a safety mat as protection against stepping behind is needed (protection against unintentional start-up).
The manufacturing facility is operated 24 hours per day, on 5 days a week and 220 days a year.
The area to be secured must be entered 12 times per shift (8 hours) to perform work for a period of about 2 minutes. Access is secured with a movable separating safety guard (safety door). The start of the production system after a standstill is slow.

Determining the PL_r of the application according to DIN EN ISO 13849-1:



Risk parameters:

S	Severity of injury	F	Frequency of and/or duration of exposure to hazard	P	Possibility of avoiding the hazard
S1	slight (normally reversible injury)	F1	seldom to less often and/or exposure to hazard time is short	P1	Is possible under specific conditions
S2	serious (normally irreversible injury or death)	F2	frequent to continuous and/or exposure to hazard time is long	P2	Is scarcely possible

Calculating the Mean Time Between Failures ($MTTF_d$) within the application according to DIN EN ISO 13849-1:2008-12:

Mean operating time in days per year (d_{op}): $220\,\frac{\text{days}}{\text{year}}$

Mean operating time in hours per day (h_{op}): $24\,\frac{\text{h}}{\text{day}}$

Mean time between the start of two consecutive cycles of the safety mat (t_{cycle}): $2400\,\frac{\text{s}}{\text{cycle}}$

Mean number of annual actuations (n_{op}): $\text{nop} = \frac{\text{dop} \times \text{hop} \times 3600\frac{\text{s}}{\text{h}}}{\text{tcycle}} = 7920\,\frac{\text{cycles}}{\text{year}}$

$B10_d$ – Value of sample safety mat HSM 3817-00-S: 1,756,338 cycles

$MTTF_d$: $\text{MTTFd} = \frac{\text{B10d}}{0.1 \times \text{nop}} = 2217$ years

Determining the PL according to DIN EN ISO 13849-1:2008-12:

Category: 3
$MTTF_d$: 100 years = high (limited according to DIN EN ISO 13849-1)
Performance Level: d

The use of the safety mat in PLd applications depends on a high $MTTF_d$ (min. 30 years). The availability depends on the actuation cycles. For applications with short cycle times, we recommend visual control measures at short intervals to keep up availability. Short cycle times have no influence on the safety function.

24 Acceptance report

The acceptance report must be completed by the operator:

Haake Technik GmbH Vreden	**Acceptance report Safety mat – type:**	
Operator:	Object:	Company:
	Safety mat:	Name:
	Logic unit:	Date:
Order number:	Serial No.:	Signature:

No.	**Activity**	**Measurement**		**Free of defects**		**Remark**
		Target	**Actual**	**Yes**	**No**	
1.0	Visual inspection					
1.1	Fastening of safety mat					
1.2	Damage to the safety mat					
1.3	Damage to the connection lines					
1.4	Damage to the line connection points (if several safety mats are linked)					
1.5	Connection of connection line					
1.6	Reset button / function					
1.7	Dimensions of the safety mat					
1.8	Protective effect overall system					

25 EC Declaration of Conformity

EC Declaration of Conformity
in accordance with EC Directive 2006/42/EC Annex II 1. A
(Translation of the original declaration)

The company:	**Haake Technik GmbH** **Master Esch 72** **48691 Vreden**
hereby declares that the safety component:	**Safety mat**
Series:	**HSM**
Type:	**HSM xxxx-xx-S** **HSM xxxx-xx-U** (Note: xxxx-xx represents a sequential drawing number)

in the delivered version is in accordance with the following relevant regulations:

EC Directives:	**Directive on machinery 2006/42/EC**
Harmonised standard:	**DIN EN ISO 13856-1**

HSM safety mats are used to provide protection at machinery, by preventing persons entering or being present in hazard zones around the machinery while it is in operation.

Our quality assurance system ensures that all safety components are manufactured with the same quality.
Therefore the Declaration of Conformity issued applies for all safety components of the above types produced from serial number 1552544.

Authorized representative to compile the technical documentation is:

HAAKE Technik GmbH
Mr. Heinrich Chrusch
Master Esch 72
48691 Vreden

Vreden, den 07.09.2015

André Haake
(Geschäftsführer)

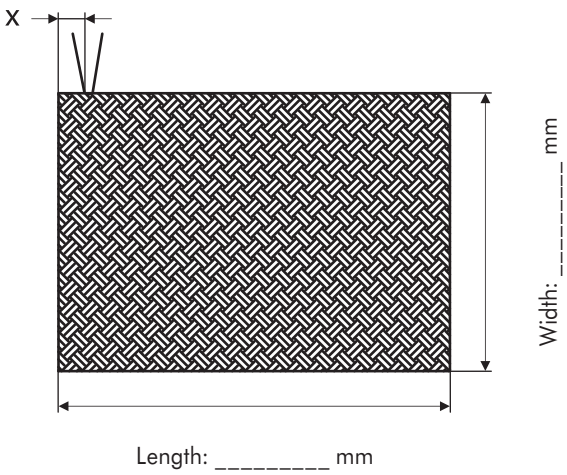
Inquiry

First and last name:		E-Mail:	
Company:			
Street and no.:			
Postal code/ZIP and city:		Country:	
Phone no.:		Fax no.:	

Quantity and application

Quantity:	Field of application:
	Ambient conditions (e.g. oils, lyes, acids):

Dimension of surface and position of cable exit



x dimension of cable exit to edge:

☐ 50 mm (Standard)

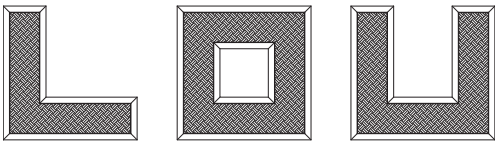
☐ _____ mm (Upon request, surcharge)

cable length:

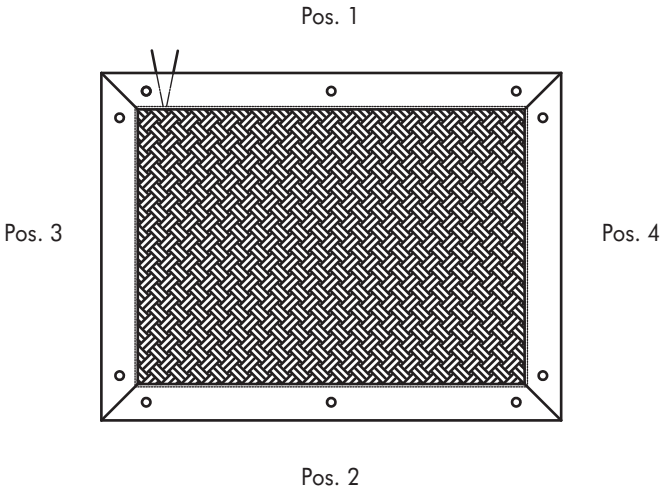
☐ 1.000 mm (Standard)

☐ _____ mm (Upon request, surcharge)

The following special profiles are available:



Choice for mounting



Aluminium ramp trim (R 1):
Width: 65 mm, effective increase in width 60 mm

Aluminium ramp trim (R 2):
Width: 89 mm, effective increase in width 84 mm

Aluminium Z trim (Z):
Width: 52 mm, effective increase in width 28 mm

	No trim	R1	R2	Z
Pos. 1	☐	☐	☐	☐
Pos. 2	☐	☐	☐	☐
Pos. 3	☐	☐	☐	☐
Pos. 4	☐	☐	☐	☐

If not stated otherwise, fixing holes are dimensioned by us and their number is determined corresponding to the dimensions. Fixing material (screws, dowels, plugs) is supplied with the mat.

Haake Technik GmbH
Master Esch 72
48691 Vreden
GERMANY

info@haake-technik.com
www.haake-technik.com
T: +49 2564 39650
F: +49 2564 396590

Haake Technik GmbH
Master Esch 72
48691 Vreden, Deutschland
info@haake-technik.com
www.haake-technik.com
Tel.: +49 2564 39650
Fax: +49 2564 396590