



## Line-Type Sensor Cable Alarm

SKM-03.2

DIN EN54-22:2015+A1:2020

### Technical Description

Item no. BK83000

VdS G221005



Securitas Electronic Security Deutschland GmbH  
SeTec Sicherheitstechnik  
Hauptstr. 40a  
82229 Seefeld

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## 1 General / product features

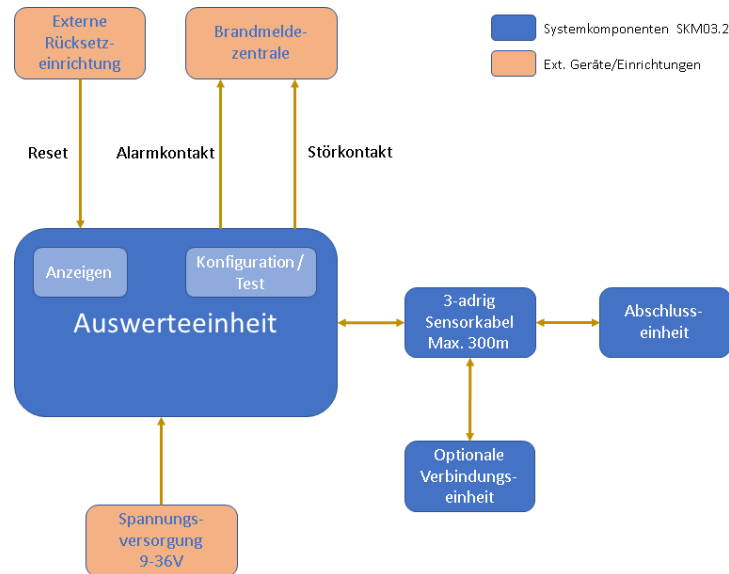
- the SKM-03.2 sensor cable alarm is a line-type heat detector
- maximum sensor cable length 300 m
- temperature increases are detected reliably
- sensor cable resistant to mechanical and chemical influences, corrosion, moisture and dust
- easy and very cost-effective system installation
- easy start-up without special tools
- basic settings can be configured on site using a DIP switch
- alarm indicator meets DIN 14 623 "Parallel display for fire alarms"
- DIN / EN 54-22:2015, A1I, A2I and CI approved
- VdS testing as per DIN / EN 52-22 pending

The sensor cable monitoring system enables early detection of a fire as well as overheating of e.g. conveyor belts, cable lines or transportation tunnels. It can be installed on the ceiling or directly above objects for the purpose of detection.

The sensor cable requires very little space and also detects in rough ambient conditions other fire alarm systems will produce false alarms. The system consists of the sensor cable (3-core) of the SKM control unit and the termination box. The minimum triggering level for the temperature can be selected according to classes A1I, A2I and CI.

## 2 System description

### 2.1 Overview



**Figure 1 Block diagram SKM-03.2 system**

The SKM-03.2 is a resettable line-type heat detector.

The system consists of the components

- control unit with termination unit                      BK83000
- sensor cable, red    BK83001
- optional connector units                                      BK83004

Cables up to 300m can be connected as the sensor cable. The sensor cable is typically installed under the ceiling when monitoring areas.

The cable being exposed to heat in the case of a fire changes the electrical properties of the cable, which is detected by the control unit and triggers the alarm.

LEDs on the control unit indicate the modes operation, fault and alarm. In addition, dry contacts can output fault and alarm to external signalling units.

The alarm can be configured for response grade A and C according to EN 54-22 via coding switches.

The system further offers the option to self-hold an alarm even after the trigger for the alarm no longer exists. This state can be cleared with an external reset switch.

## 2.2 Technical data

Designation / function	Data
Manufacturer	STANLEY Security Deutschland GmbH Hauptstr. 40a 82229 Seefeld
Heat response grades as per EN 54-22	A1I, A2I, CI
<b>Control unit</b>	
Housing dimensions	110 mm x 110 mm x 66 mm
Housing material	Fibreglass-reinforced polycarbonate, grey, similar to RAL 7035 Cover: polycarbonate, transparent
Protection class	IP66
Operating temperature	-25°C to 70°C
Operating voltage	9 VDC to 36 VDC
Standby power usage at $U_B=24V$ / 100m sensor cable	13 mA
Alarm power usage at $U_B=24V$ / 100m sensor cable	21 mA
Maximum standby power usage at $U_B=9V$ / 100m sensor cable	26 mA
Maximum alarm power usage at $U_B=9V$ / 100m sensor cable	49 mA
Displays	LED operation, fault, alarm
Ext. reset	Dry contact (NC contact)
Maximum load capacity Potential-free outputs alarm / fault	30W / 62.5 VA 220VDC, 250 VAC 1A
<b>Sensor cable</b>	
Maximum cable length	300 m
Min. cable length	10 m
Diameter	4.4mm (twisted pair)
Min. bending radius	16 mm
Operating temperature	Class A1I, A2I: -25°C to 50°C Class C: -25°C to 80°C
<b>Termination unit</b>	
Housing dimensions	82 mm x 82 mm x 52 mm
Housing material	Polycarbonate, grey
Protection class	IP66
Operating temperature	-25°C to 80°C
<b>Connector unit</b>	
Housing dimensions	82 mm x 82 mm x 52 mm
Housing material	Polycarbonate, grey
Protection class	IP66
Operating temperature	-25°C to 80°C

**Table 1 SKM-03.2 technical data**

### 2.3 Application

The sensor cable alarm is suitable for area monitoring according to heat response grades A1I and A2I as well as equipment monitoring according to heat response grade CI.

All components are splash water protected up to ingress protection IP66 and can be operated in the -25°C to 50°C (class A) resp. -25°C to 80°C (class C) range.

Heat response grade integrated resettable line- type heat detector	Typical application temperature °C	Maximum application temperature °C	Minimum response temperatur e °C	Maximum response temperatur e °C
A1I (area monitoring)	25	50	54	65
A2I (area monitoring)	25	50	54	70
CI (Equipment monitoring)	55	80	84	100

**Table 2 Response grades – temperatures**

### 2.4 Static operating principle

The measurement principle of the SKM-03.2 is based on measuring temperature-related resistance change.

The sensor element consists of a 2-core coaxial cable. The insulating layer between the inner conductor and the cable shielding consists of a semiconductor with increasing conductivity when exposed to heat. The entire cable has a uniform, homogeneous construction with a small diameter, which is beneficial for practical use on site.

When the cable is exposed to heat, its resistance drops along the affected cable length. The change in resistance is of non-linear correlation and depends on the ambient temperature the entire cable is exposed to, how high the fire temperature is, and the length of the cable exposed to the temperature.

The change in resistance due to the temperature of the fire is absorbed across the affected cable length.

The technician configures the length relation of the sensor cable is mapped by 50m segmentation and the cable length type (segment value) using a coding switch.

The limit table is further broken down by response grade A and C, as they are defined for different response temperatures.

### 3 Description of components

#### ***3.1 Control unit description***

The control unit consists of the components

- control circuit board with 30mm spacer
- housing
- imprinted front panel with 7.9mm spacer
- type plate (decal)

The control unit of the SKM-03.2 comes inside a Spelsberg TK-PC-1111-7-tm housing. The housing meets the relevant environmental requirements and is waterproof as per IP66.

Trained personnel connects the control unit to the power supply per manufacturer instructions, and the sensor element and, if applicable, additional signal lines such as reset, fault or alarm. The lines are routed through the housing and connected to the control circuit board.

The function of the control unit is bundled on the SKM-03.2 control circuit board.

Optical indicators for operation, fault and alarm are routed through a front panel and to the top of the front panel using light guides, with the transparent housing cover ensuring they are visible. The bright alarm LED is also clearly visible from several metres away.

The front panel labelled "SENSOR CABLE ALARM" connects to the display end of the control circuit board using small spaces.

The control circuit board has 30mm spacers on the connection end.

In the delivery condition, the control circuit board, front panel with all spacers make up a pre-assembled unit. This unit can be removed from the housing and the connection cables fixed to the now exposed connection end of the control circuit board. Due to the 30mm spacers leave enough space between the bottom of the housing and control circuit board to properly route the cable heads.



### 3.1.1 Connection / terminal assignment

All connections use terminal X1.

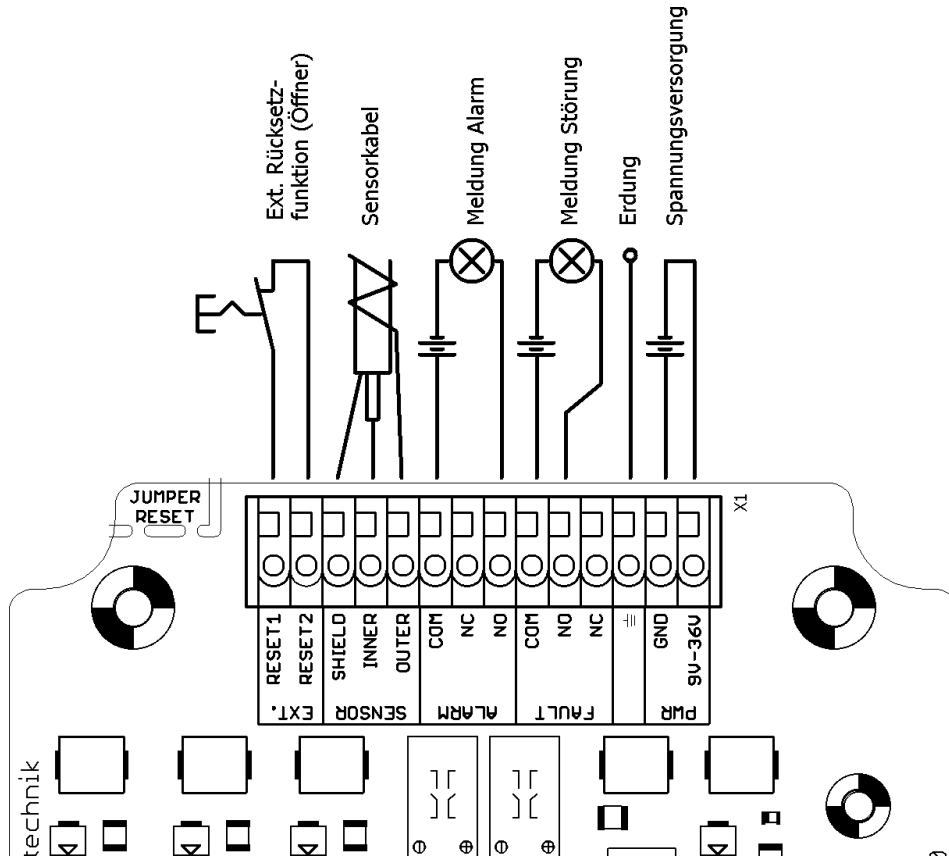


Figure 2 Connecting the SKM-03.2 control unit

Terminal designation	Description	Comment
9-36V	Positive supply voltage in 9-36V range	24V recommended
GND	Supply voltage GND	
←	Earth	
ALARM NC	Signal output: Active if "no alarm"	
ALARM NO	Signal output: Active on alarm	
ALARM COM	Signal voltage for ALARM NC/NO	
FAULT NO	Signal output: Active on fault	
FAULT NC	Signal output: Active if "no fault"	
FAULT COM	Signal voltage for FAULT NC/NO	
OUTER	Sensor cable outer conductor	
INNER	Sensor cable inner conductor	
SHIELD	Sensor cable shielding	
RESET2	Reset line, dry contact 2	Only used if break-off jumper removed
RESET1	Reset line, dry contact 1	Only used if break-off jumper removed

**Table 2 Terminal assignment SKM-03.2 control unit**

### 3.1.2 Display elements

On the display end of the control circuit board are the 3 LEDs

- operation, green
- fault, yellow
- alarm, red (ultra bright)

The indicators are visible through the front panel.



**Figure 3 Front panel SKM-03.2 control unit**

The operation LED stays on once supply voltage within the valid operating range of the DC/DC transducer is applied (approx. 6-36VDC).

The fault LED lights up or flashes in fault condition

<b>Fault mode</b>	<b>Indicator</b>
Illegal cable length setting	Flashing 1Hz
Low voltage (< 9VDC)	Flashing 0.5Hz
Sensor cable short-circuit	Flashing 0.25Hz
Sensor cable wire break	Durati on

**Table 3 Fault indications**

The alarm LED stays on as soon as the software detects an alarm condition. The alarm LED is ultra bright.

### 3.1.3 Signal contacts

The SKM-03.2 control circuit board has two relays which can be transmitted to an external signalling unit via the alarm and fault contacts. The dry contacts are rated 30W / 62.5VA.

<b>Contact</b>	<b>Description</b>
ALARM NC	Active if "no alarm"
ALARM NO	Active on alarm
ALARM COM	Signal voltage for ALARM NC/NO
FAULT NO	Active on fault
FAULT NC	Active if "no fault"
FAULT COM	Signal voltage for FAULT NC/NO

**Table 4 Signal contacts SKM-03.2 control unit**

### 3.1.4 Operating elements

Switches S1 to S3 on the control circuit board are used for operation and configuration.

The system can be configured using the 6 position coding switch S1. This can only be configured with a thin pin or screwdriver after opening the housing and removing the control circuit board. On delivery, all coding switches are in the OFF position, corresponding to the configuration

- cable length "up to 50m",
- response grade A,
- self-hold alarm disabled

The cable length type must be set during installation according to the installed sensor cable length. The length from the control unit output to the termination unit is relevant.

Response grade A (A1I, A2I) or C (CI) must be set via coding switch position 5 (CLASS A/C) based on whether the SKM is used to monitor an area or equipment.

When enabling self-hold with coding switch position 6 (SELF-HOLD ALARM), the alarm condition is held until it is reset.

Coding switch position	Cable length setting						
		50 m	100 m	150 m	200 m	250 m	300 m
1	CABLE 1	off	on	off	on	off	on
2	CABLE 2	off	off	on	on	off	off
3	CABLE 3	off	off	off	off	on	on
	Name	Item	Explanation				
4	n/a	n/a	not used				
5	CLASS A/C	off	Sensor parameter setting for response grade A				
5	CLASS A/C	on	Sensor parameter setting for response grade C				
6	SELF-HOLD ALARM	off	Self-hold alarm disabled				
6	SELF-HOLD ALARM	on	Self-hold alarm enabled				

**Table 5 Coding switch configuration S1**

An alarm can be simulated with the S2 button (TEST ALARM). This sets the sensor cable signal to a defined value within the alarm range for all cable length settings. This can be used to test the alarm indicator and the alarm relay. If self-hold alarm is enabled, the system must then be reset (see 3.1.5).

A fault can be simulated with the S3 button (TEST FAULT). This moves the sensor cable signal to Ground, i.e. simulating a short-circuit. This can be used to test the fault indicator and the fault relay. The fault indicator will slowly flash at 0.25Hz.

In both test scenarios, the system must first be idle, i.e. the supply voltage within the valid range - no active fault or alarm.

Note: The test functions using switch S2 and S3 only test the functionality of the control unit. The fault detection of the control unit continuously monitors the sensor cable incl. termination unit during operation.

### 3.1.5 Self-hold alarm with reset function

The control unit offers an alarm self-hold function. This is enabled by setting coding switch S1 to position 6. When the system activates an alarm condition, the alarm condition will be held, including if the signal which triggered the alarm has meanwhile dropped.

The system can be briefly switched off to reset the control unit. In addition, a dry contact serving as NC contact can be connected via terminals RESET1 and 2. An electronic system

or similar can temporarily open this contact and cancel the self-hold function. Meaning the system is reset without interrupting power.

Note: Temporarily switching off will cause the fault relay to indicate a fault whilst off.  
This can be a negative effect in specific applications.

To be able to use the external reset, the break-off jumper must be broken off. The break-off jumper is a jumper between RESET1 and 2. Meaning it would suppress the opening function of a connected dry contact.

If the break-off jumper is accidentally broken off or damaged or the control unit is later used for a different purpose, the bridge must be restored with a wire connection between RESET1 and 2 if the self-hold function is required.

### ***3.2 Sensor cable description***

The sensor cable is a 3-core cable. It is a component consisting of

- coaxial cable
- signal line

The coaxial cable serves as the actual sensor element. The insulation between the inner conductor and shielding becomes partly conductive at high temperatures, which the control unit uses to trigger an alarm by changing the resistance. In addition, a short-circuit between inner conductor and shield can be detected as a fault.

The signal line (3rd core) monitors the cable condition. The termination unit alternates between transmitting the electrical signal to the inner conductor and the shielding of the coaxial cable. The measurement results can be used to detect a short-circuit and wire break as faults.

If the sensor cable is strained by heating beyond the permitted range of 125°C, permanent cable damage can be assumed. In this case the sensor cable must be replaced, at a minimum in the damaged area!

The sensor cable may be broken up to two times for installation and repair purposes. When doing so, the cable heads must be spliced in a connector unit sold separately by the manufacturer. The cable heads must be spliced with wire connectors 1:1. Reversing the inner conductor with the shielding is prohibited. The entire splice meets the same environmental conditions as the termination unit.

Extending the sensor cable at the control or termination unit or at sectioning points with cables not subject to this certification is prohibited.

### 3.2.1 Sensor element labelling

Following installation, the included label must be affixed to the sensor cable with the included cable ties.



Figure 4 Sensor element labelling

### 3.2.2 Packaging / cable reel labelling

The cable reel is marked as follows when the sensor cable is being transported.



Figure 5 Packaging / cable reel labelling

### **3.3 Termination unit description**

The termination unit consists of the components

- SKM-03.2 adapter board
- housing
- decal "F"

The termination unit of the SKM-03.2 comes in a Spelsberg Abox-i-m-025-L housing. The housing meets the relevant environmental requirements and is waterproof as per IP66.

The termination unit connects to the open end of the sensor cable. The actual sensor element can be tested for short-circuit and wire break using this end.

The Adapter board is fixed inside the housing. The sensor cable is routed into the housing and connects to the adapter board.

The housing bears a decal "F".



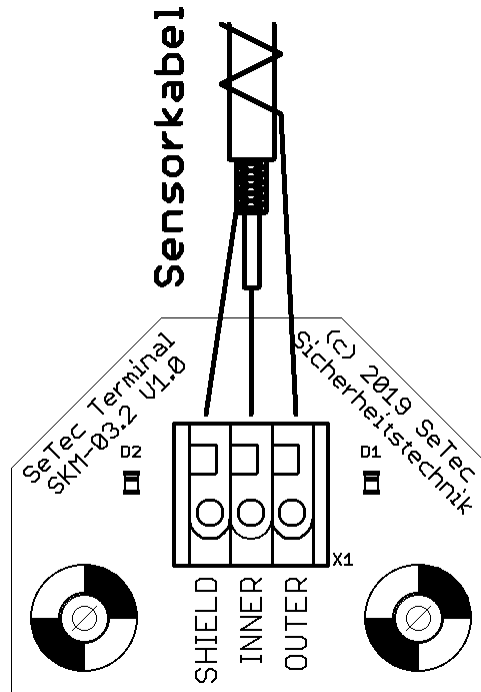
**Figure 6 Termination unit SKM-03.2 with decal "F"**



### 3.3.1 Connection / terminal assignment

The terminal assignment of the adapter board is identical to the terminal assignment of the control circuit board.

The sensor cable connects to terminal X1:



**Figure 7 Connection SKM-03.2 termination unit**

Terminal designation	Description
OUTER	Sensor cable outer conductor
INNER	Sensor cable inner conductor
SHIELD	Sensor cable shielding

**Table 6 Terminal assignment SKM-03.2 termination unit**

### ***3.4 Description of the optional connector unit***

The connector unit consists of the components

- SKM-03.2 connection board
- housing
- decal "F"

The connector unit of the SKM-03.2 comes in a Spelsberg Abox-i-m-025-L housing. The housing meets the relevant environmental requirements and is waterproof as per IP66.

The connector unit is an optional accessory. It can be connected to several sectioning points of the sensor cable and meet the environmental conditions of the complete system.

The connection board is fixed inside the housing. The sensor cable ends to be connected are routed into the housing and connect to the connection board.

The housing bears a decal "F".



**Figure 8 SKM-03.2 connector unit with decal "F"**

### 3.4.1 Connection / terminal assignment

The terminal assignment of the connection board is identical to the terminal assignment of the control circuit board.

The sensor cable ends connect to terminals X1 and X2:

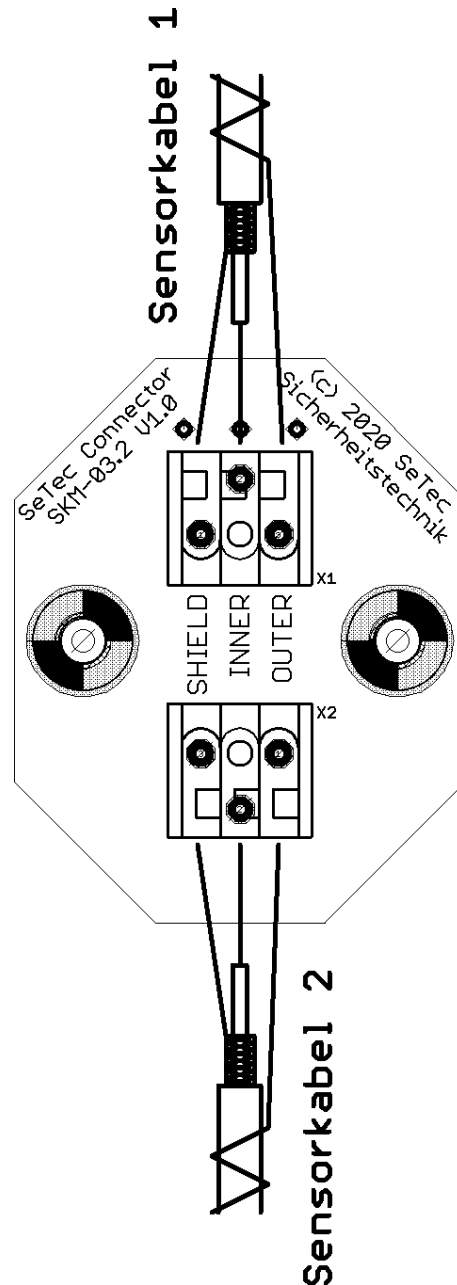


Figure 9 Connection SKM-03.2 connector unit

Terminal designation	Description
OUTER	Sensor cable outer conductor
INNER	Sensor cable inner conductor
SHIELD	Sensor cable shielding

Table 7 Terminal assignment SKM-03.2 connector unit

## 4 Project planning

### 4.1 Area monitoring

The line-type heat detector SKM-03.2 is suitable for area monitoring. Applications where the sensor cable is normally installed on the ceiling, e.g. underground car park. The sensor cable should be installed with cable clips or modular snap-in clamps.

The cable must be between 10 and 20mm from the ceiling. It must not come into contact with metallic surfaces. This is particularly important when mounting the sensor cable to non-insulated ceilings.

For installations in compliance with **DIN VDE 0833-2:2017-10**, the maximum horizontal spacing between the sensor cable and any point on the ceiling is specified as " $D_H$ ". See table 6. DIN VDE 0833-2:2017-10  $D_H$  spacing for sensor lines line-type heat detector

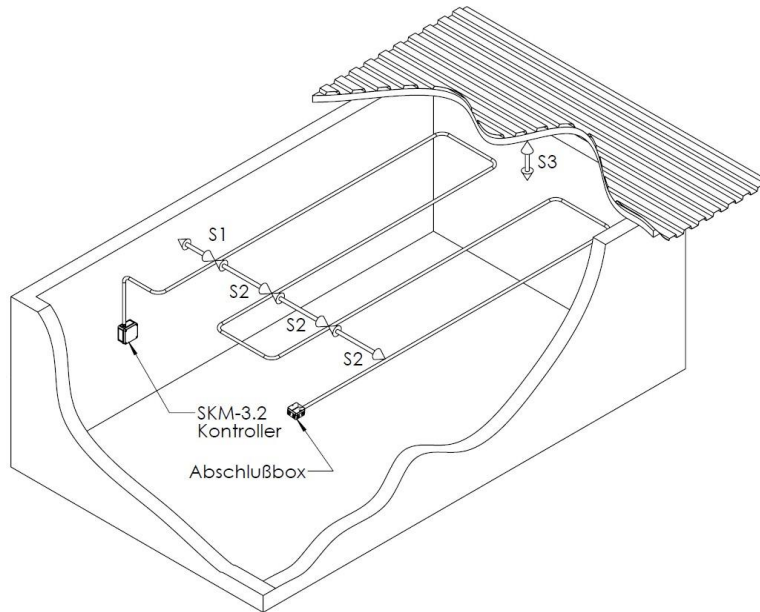
Room size	Flat room up to 20 °	over 20 ° roof pitch
up to 30 m <sup>2</sup>	$D_H = 4.4$ m ( $S_2 = 8.8$ m)	$D_H = 4.4$ m ( $S_2 = 8.8$ m)
over 30 m <sup>2</sup>	$D_H = 3.5$ m ( $S_2 = 7$ m)	$D_H = 5.0$ m ( $S_2 = 10$ m)

- The spacing  $S_2$  between two parallel cables (as in Figure 8 and 9) must not be greater than the value " $2 \times D_H$ " in "Table 6. DIN VDE 0833-2:2017-10"
- For class A1I, the maximum ceiling height (h) is 9 m. (see DIN VDE 0833-2 Section 6.1.5.3).

- The recommended spacing between two fixing points is 0.4 m.
- Ensure the spacing between adjacent cables meets the recommended regulations, e.g. DIN VDE 0833-2, Section 6.2.7.12 (or other country-specific standard)
- The sensor cable must always be fixed at least 0.5m from walls, equipments or stored goods (" $S_1$ " in Figure 8 and 9).
- Ensure a minimum of 10 to 20mm between the sensor cable and the ceiling. Our cable clips can be used for this purpose. (Item no.: BK83005)

## 4.2 Installation example

### 4.2.1 Room size from 30m<sup>2</sup> flat roof up to 20° pitch

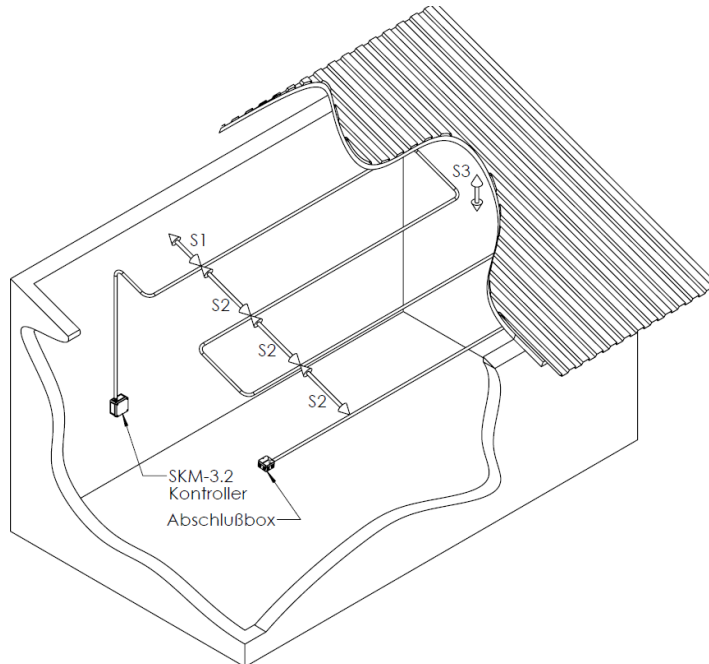


S1 – 0.5m to 2.5m from walls, equipment or stored goods  
 S2 – max. 7m between two parallel sensor lines  
 (max. 2 x D<sub>H</sub>)

(max. 2 x D<sub>H</sub>)

S3 – 10mm to 20mm from the ceiling

### 4.2.2 Room size from 30m<sup>2</sup> flat roof over 20° pitch



S1 – 0.5m to 3m from walls, equipment or stored goods  
 S2 – max. 10m between two parallel sensor lines  
 (max. 2 x D<sub>H</sub>)

(max. 2 x D<sub>H</sub>)

S3 – 10mm to 20mm from the ceiling

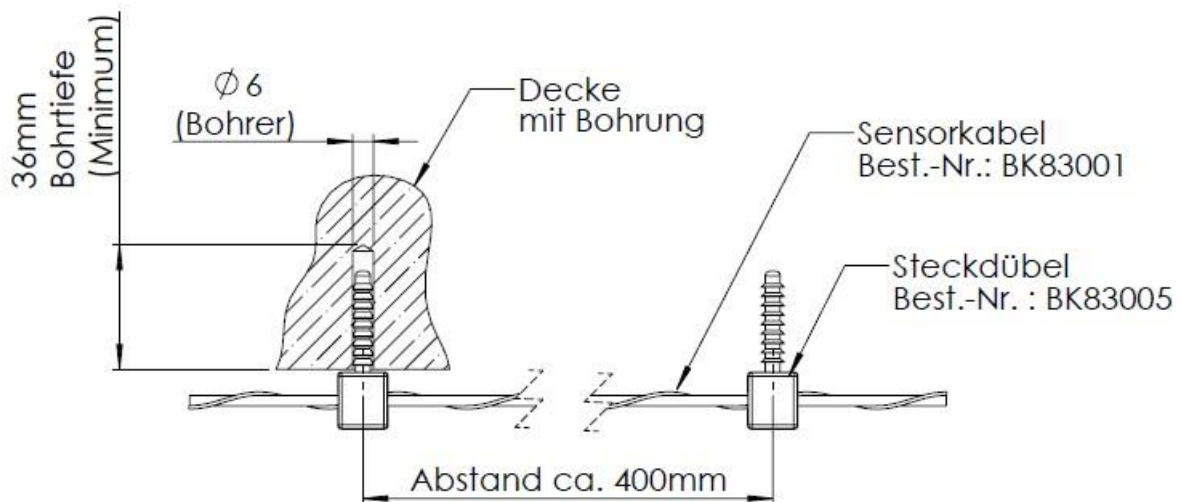
### 4.3 Sensor cable installation

The sensor cable can be installed with the following clips:

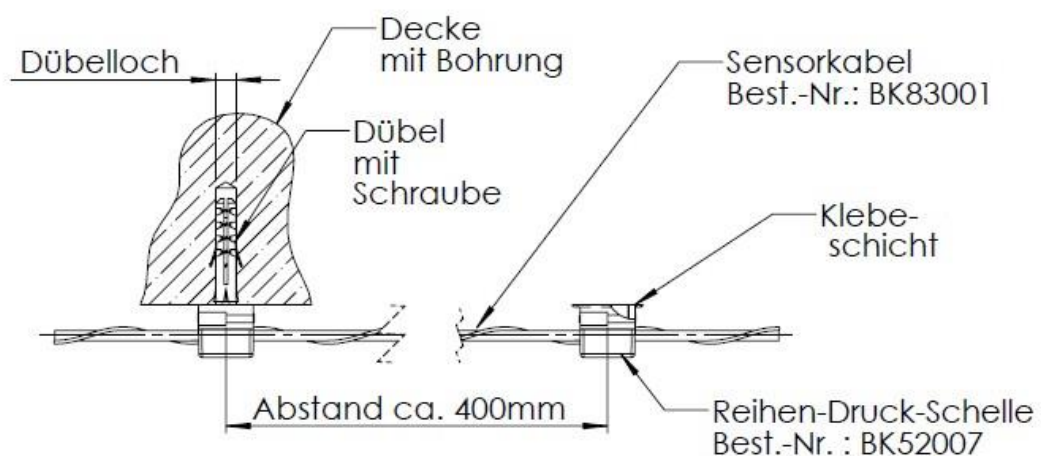
- OBO cable clip 2037 – Item no.: BK52007
- SeTec cable clip – Item no.: BK83005

The recommended spacing between two fixing points is 0.4m.

#### Befestigung mittels SETEC-Steckdübel



#### Befestigung mittels Reihen-Druck-Schelle



**gedübelte Variante**

**geklebte Variante**

(zum Kleben die Anleitung des Herstellers beachten)

## 5 Tips and tricks

Error / malfunction	Possible cause / solution								
Green LED doesn't light up	→ Are the PWR terminals powered → Supply voltage polarity correct?								
Alarm automatically resets	→ DIP switch 6 position correct? "ON"?								
Alarm doesn't automatically reset	→ DIP switch 6 position correct? "OFF"								
Checking alarm release	→ Press the "TEST ALARM" button on the PCB for 7 sec.								
Checking fault release	→ Press the "TEST FAULT" button on the PCB for 7 sec.								
Fault status / fault LED	<table border="0"> <tr> <td>→ incorrect cable length setting</td> <td>Flashing 1Hz</td> </tr> <tr> <td>→ Low voltage (&lt; 9VDC)</td> <td>Flashing 0.5Hz</td> </tr> <tr> <td>→ Sensor cable short-circuit</td> <td>Flashing 0.25Hz</td> </tr> <tr> <td>→ Sensor cable wire break</td> <td>Duration</td> </tr> </table>	→ incorrect cable length setting	Flashing 1Hz	→ Low voltage (< 9VDC)	Flashing 0.5Hz	→ Sensor cable short-circuit	Flashing 0.25Hz	→ Sensor cable wire break	Duration
→ incorrect cable length setting	Flashing 1Hz								
→ Low voltage (< 9VDC)	Flashing 0.5Hz								
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