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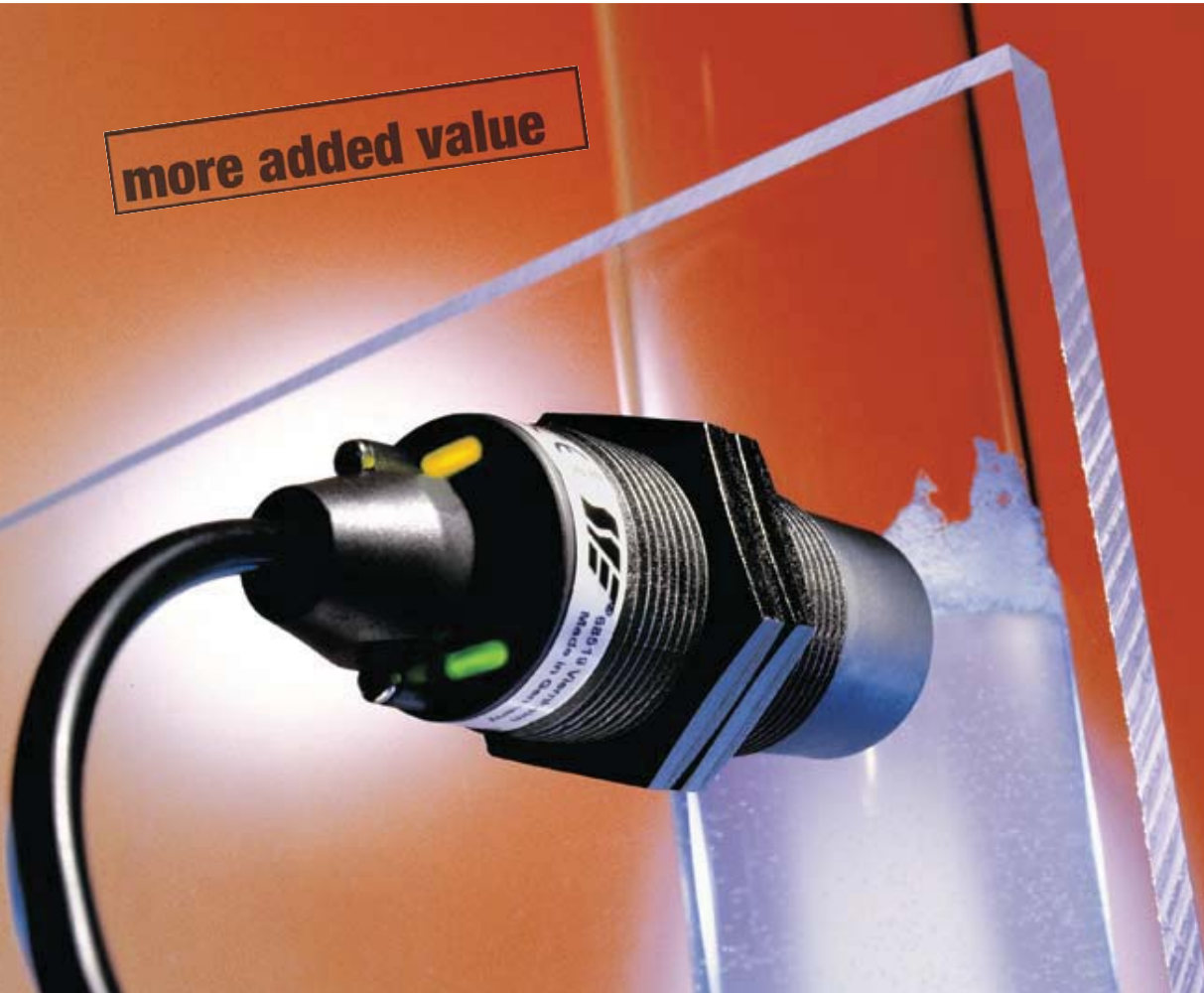
SIESENSORIK

Capacitive Sensors

... new possibilities in object detection and level sensing



more added value



Overview



Capacitive Mini-sensors, SK

- Housings in V2A/PTFE from Ø 4 mm
- Flat disk form from Ø 18 mm by only 2.5 mm high
- Sensing distance adjustable on the amplifier
- Variety of processing electronics available



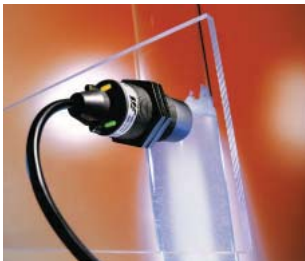
Capacitive sensors for object detection, SK1-B

- Housings made of metal or plastic
- Compact sizes with potentiometer starting at Ø 6.5 mm
- Disc sizes up to Ø 50 mm
- Sensing distance up to 25 mm
- Flush mounting
- Connecting lead or plug connector



Capacitive sensors for level sensing, SK1-NB

- Housings M12 and larger in metal, plastic and PTFE
- Cable, connector and terminal versions available
- Operating temperature up to 125 °C at 10 bar pressure rating
- Dependable switching for granules, powders and liquids



Sensors for level sensing

Capacitive smartLEVEL sensors, FSA

- For aqueous media
- No adjustment in standard application
- Self-compensating
- Through glass or plastic
- Flush and non-flush versions



Sensors for level sensing

Capacitive microBOX sensors

- As sensors for object detection of in smartLEVEL technology
- Compact housing design
- Variety of mounting options
- Mounting bracket included
- Polypropylene housing
- 3-D cable exit

Table of Contents

Page

Capacitive sensors –
general description

1.02 –
1.10

Mini-sensors

3.01 –
3.09

Sensor amplifiers

4.01 –
4.05

Sensors for
object detection

6.01 –
6.15

Sensors for
level sensing

7.01 –
7.12

Sensors for level sensing,
smartLEVEL-Technology

7.13 –
7.22

microLEVEL

7.15 –
7.17

microBOX

7.21

Analog sensor

8.01 –
8.04

Sensors for the high
temperature range

9.01 –
9.03

Sensor power packs

12.01 –
12.03

Accessories

13.01 –
13.05

Analog sensor

Series SK1-A 0800

- Measuring range 0...8 mm adjustable
- Flush mounting
- Output signal current 4...20 mA
- Housing M18



8.01 -
8.04



DIN EN ISO 9001:2000
QA 05 100 1050

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0...8

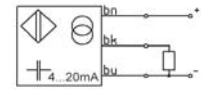
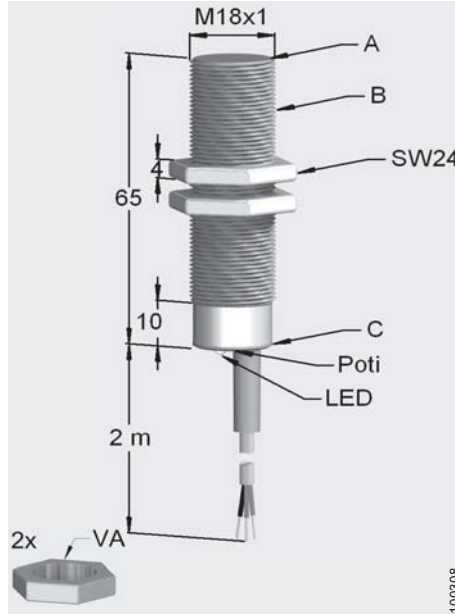
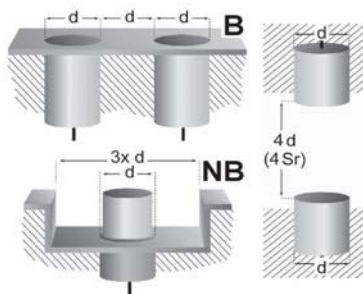


M18

application notes

Type code (abstract)

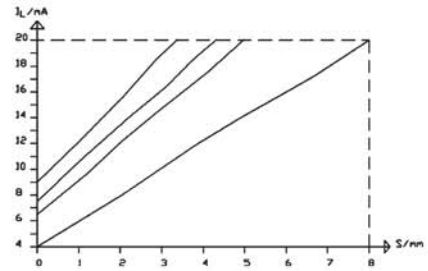
- SK sensor capacitive, w/o amplifier
- SKF sensor cap. w/o amplifier, flexible
- SK1 sensor capacitive, self-contained
- SV(D) sensor amplifier (dynamic)
- SNG sensor power pack
- HT### high temperature use
- TM pulse modulation technique (High noise immune)
- ## / FS(A) max sensing distance / Fill-level switch (adaptive)
- M30 model and/or dimension
- P output stage PNP, NPN, X (switchable)
- B mounting B=flush NB=non-flush
- S S=N.O. Ö=N.C. X=function switchable
- (C)PTFE Housing material, e.g. PTFE CPTFE=complete PTFE
- 1M2-Y2 cable & connector: Y# = connector 1M2 = 1.2m cable length



Typ / Type
SK1-A-8-M18-4I20-B-VA/PBT

Calibration

When performing measurements on objects with a low relative dielectric coefficient ($\epsilon_r \leq 10$), it is possible to calibrate the sensor to match the specific material properties involved (Fig. 8.02) or the size of the object in order to maintain the full output signal range (4...20 mA).



For this purpose, the object in question is held against the sensor (distance $S = 0$ mm) and the trimming potentiometer (which can be operated from the rear of the sensor) adjusted until the signal LED lights up green. While performing the calibration procedure, make sure that the object is lying flush against the sensor surface and that there is no other object (which might disturb the procedure) located directly behind the object in the direct extension of the active sensor surface. If the signal LED lights up red, turn the trimming potentiometer to the right (clockwise); when this LED lights up orange, turn it to the left. The sensor has now been calibrated to match the properties of the new object.

This calibration procedure ensures that the sensor will always supply the full output signal range as long as the size of the object is sufficient and the object possesses a relative dielectric coefficient still allowing evaluation. In the case of objects with insufficient dielectric coefficient or insufficient size, the signal range is restricted. Objects with a relative dielectric coefficient ϵ_r of about 1 or objects which are too small will not cause the output signal to alter. For appropriate reduction factors in dependence on the object properties involved, please consult the table.

Material	Thickness d / mm	Measuring range S / mm	I_s / mA	Reduction-factor
Steel ST-37	1,5	0...8	4...20	/
Brass Ms	1,5	0...8	4...20	/
Water				/
Polyvinylchloride (PVC)	4,0	0...2,8	4...20	0,35
	6,0	0...3,25		0,41
Acryl glass (PMMA)	8,0	0...3,45		0,47
	12,0	0...3,75		0,47
Hard paper	6,5	0...5,5	4...20	0,69
Foamed PVC	3	0...1,75	6,5...20	0,22
	6	0...2	5,7...20	0,25

If the sensor has to be used for material selection in a particular application, the calibration can be dispensed with if the trimming potentiometer has not been adjusted after delivery. The as-delivered condition is calibration on a metal target.

Mounting [flush / nonflush]	[B / NB]	B
Operating distance	S_n [mm]	0... 8
Hysteresis	H [%SR]	
Frequency of operating cycles	f [Hz]	100
Repeat accuracy	R [%SR]	0,05mm
Operating temperature range	T_a [C°]	10... 55
Temperature drift [range]	[%SR]	10[10... 55]
Protection class		IP 67
Rated insulation voltage	U_i [V]	75 d. c.
Material of housing		A: PBT; B: VA; C: PVC
Utilisation category		
Connection		2m / 3x 0,25mm ² PVC
Supply voltage range U_B	U_b [V]	12... 35
No-load supply current	I_{omax} [mA]	17
Minimum operational current	I_m [mA]	
Operational current	I_e [mA]	4... 20
Off-state current	I_r [mA]	
Voltage drop	$U_d @ I_e$ [V]	
Time delay before availability	t_v [ms]	
Indicator [UB / Output]		• / • Duo-LED
Short circuit- overload-protection		• / •
Reverse polarity protection		•
Conformity	EMC EEC-direct.	IEC 60947-5-2 : 2004
EMC		IEC 61000-4-6 (Testlevel 3V) Functional errors may occur in partition of working frequency 1.2 Mhz.
Associated equipment		
Additional functionality		
Application		

Functional principle

Function principle

The functional principle behind the capacitive analog position pickup is similar to that of a capacitive proximity switch. It detects objects which are within its response range without touching them. The function is based on the effect on the electric field in the vicinity of its "active sensor surface". The basic structure of the sensor consists of an oscillator, a demodulator, the linearization network and the controlled current source.

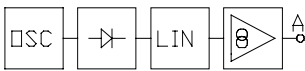


Fig. 8.01

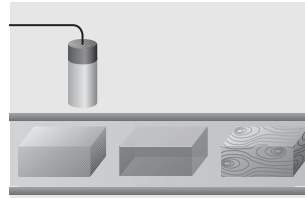
The criteria for an analog evaluation are the material properties, the size of the object involved, and its distance from the "active sensor surface". For objects deviating from the standard target, the maximum working distance is reduced (see Fig. 8.06 on page 8.04). In actual operation, the optimum calibration to be performed from the rear of the housing over a trimming potentiometer is signaled to the user by the adjacent LED. As a further special feature, this LED also signals if the load impedance at the output is too high or non-existent.

Advantages of the capacitive analog pickup

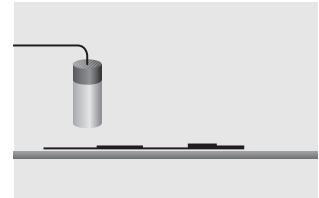
The capacitive analog sensor scans objects without contact. This means that the object scanned is not subjected to any mechanical wear and tear. Nor do colors and surface roughnesses have any negative effect on the measured result. In the case of differing object materials, the output signal deviates from the standard output signal of 4...20 mA, and can be returned by a simple-to-perform user calibration procedure to the standard output signal.

Applications

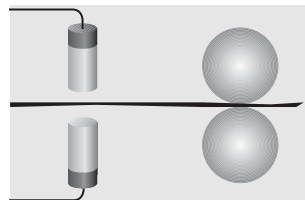
The capacitive analog sensor makes linear evaluation of a position for the first time; as soon as an object is located within the sensor's measuring range, a precise output current is produced. The uses shown represent only a fraction of the multifaceted application options provided by the capacitive analog sensor.



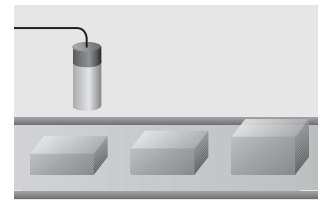
Material selection



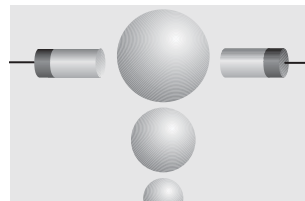
Measuring nonmetallic coating thicknesses



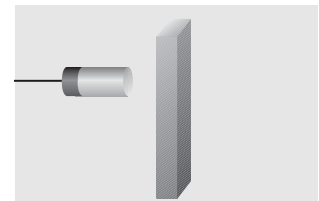
Product thickness monitoring



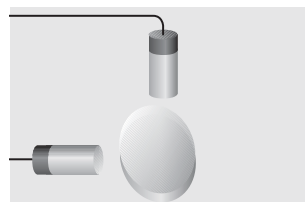
Height measurement



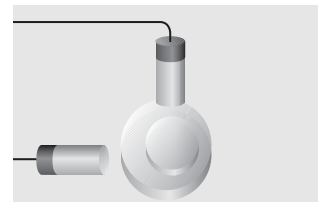
Determining diameters



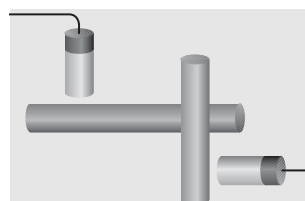
Static/dynamic movement



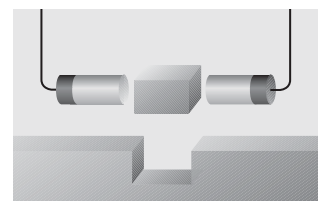
Registering radial runout



Concentricity and eccentricity



Axial and radial runout deviation



Monitoring fit

Functional principle

Calibration

When performing measurements on objects with a low relative dielectric coefficient ($\epsilon_r < 10$), it is possible to calibrate the sensor to match the specific material properties involved (Fig. 8.02) or the size of the object in order to maintain the full output signal range (4...20 mA).

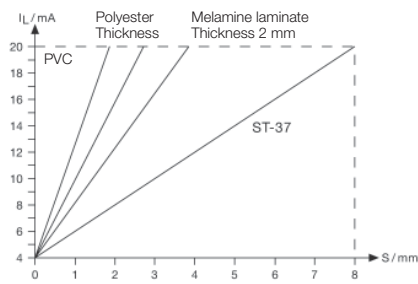


Fig. 8.02

For this purpose, the object in question is held against the sensor (distance $S = 0$ mm) and the trimming potentiometer (which can be operated from the rear of the sensor) adjusted until the signal LED lights up green. While performing the calibration procedure, make sure that the object is lying flush against the sensor surface and that there is no other object (which might disturb the procedure) located directly behind the object in the direct extension of the active sensor surface. If the signal LED lights up red, turn the trimming potentiometer to the right (clockwise); when this LED lights up orange, turn it to the left. The sensor has now been calibrated to match the properties of the new object.

This calibration procedure ensures that the sensor will always supply the full output signal range as long as the size of the object is sufficient and the object possesses a relative dielectric coefficient still allowing evaluation. In the case of objects with insufficient dielectric coefficient or insufficient size, the signal range is restricted. Objects with a relative dielectric coefficient ϵ_r of about 1 or objects which are too small will not cause the output signal to alter.

For appropriate reduction factors in dependence on the object properties involved, please consult the table of Fig. 8.06.

If the sensor has to be used for material selection in a particular application, the calibration can be dispensed with if the trimming potentiometer has not been adjusted after delivery. The as-delivered condition is calibration on ST-37 target.

Determining the load impedance

Mathematical determination of the max. permissible value for load impedance R_L

$$R_L = [(40 \times U_B / V) - 200] \Omega$$

with $U_B / V = 12 \dots 35$ VDC

Please note:

Care must be taken to ensure that the load impedance is made up of the line impedance R_{ZL} and the actual load impedance R_L . The sum of these two impedance values must be within the impedance range mentioned above.

Graphical determination of the maximum permissible load impedance

Fig. 8.03 shows the diagram used for determining permissible load impedance values R_L in dependence on the sensor supply voltage U_B .

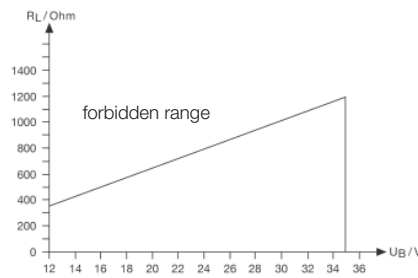


Fig. 8.03

Dimensioning example

(Fig. 8.04)

Application data: $U_B = 24$ V

To find: possible impedance range for load impedance.



Fig. 8.04

How to proceed:

Move vertically upwards from the defined supply voltage value U_B to obtain an intersection point with the load impedance limit curve. The maximum permissible value for load impedance R_L can now be read off on the Y-axis at the height of this intersection point. The minimal value for load impedance R_L is always 0Ω . You will thus obtain a permissible load impedance range of $0 \dots 760 \Omega$ for the supply voltage value mentioned above.

Error messages

The analog sensor automatically detects whether the load impedance connected has been too generously dimensioned.

In this case, proper function of the sensor is no longer guaranteed, since the behavior of the output signal is no longer proportional to the distance from the object. An operating error of this type is indicated by the flashing calibration display.

To check the sensor for proper function, the following two tests should be performed:

- Object located as close as 0 mm to the object: signal LED permanently lit up green.
- Object outside the response range of the sensor: signal LED permanently lit up orange.

If these two tests have given the above results, the load impedance selected is okay. If these two tests produce different LED displays, this indicates impermissible operating conditions. An error analysis can be performed using the table below (Fig. 8.05).

Distance Sensor-Object	Display	Meaning of Display
0 mm	red flashing	calibration too low/ R_L too high
0 mm	green flashing	calibration okay/ R_L too high
0 mm	orange flashing	calibration too high/ R_L too high
0 mm	red steady	calibration too low/ R_L ?
0 mm	green steady	calibration okay/ R_L ?
0 mm	orange steady	calibration too high/ R_L ?
>11 mm	orange flashing	calibration?/ R_L too high
<11 mm	orange steady	calibration?/ R_L okay

Fig. 8.05

If the signal LED is permanently flashing (even if the output has been short-circuited to ground), this means that there is a cable break. In this case, check the cable between sensor and evaluation device, and replace it if necessary.

Material correction table

The measuring ranges reduced due to different material properties can be taken from the following table (Fig. 8.06)

Material	Thickness d / mm	Measuring range S / mm	I_L / mA	Reduction-factor
Steel ST-37	1.5	0...8	4...20	/
Brass Ms	1.5	0...8	4...20	/
Water				/
Polyvinyl chloride (PVC)	4.0	0...2.8	4...20	0.35
Acrylic (PMMA)	6.0	0...3.25		0.41
	8.0	0...3.45		0.47
	12.0	0...3.75		0.47
Hard paper	6.5	0...5.5	4...20	0.69
Foamed PVC	3	0...1.75	6.5...20	0.22
	6	0...2	5.7...20	0.25

Fig. 8.06

Sensors for the high temperature range

Series SK-HT 0900

- Ambient temperature up to 180 °C and up to 250 °C
- Housing M18, M30 and 3/8" in V2A/PTFE
- Connection sensor lead with plug connector
- Non-flush mountable
- Adjustment using sensor amplifiers 0400



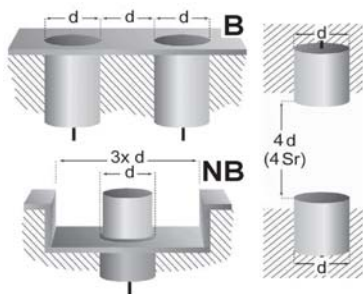
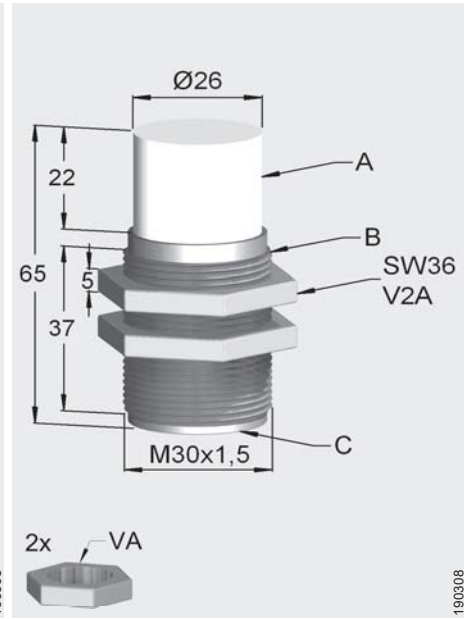
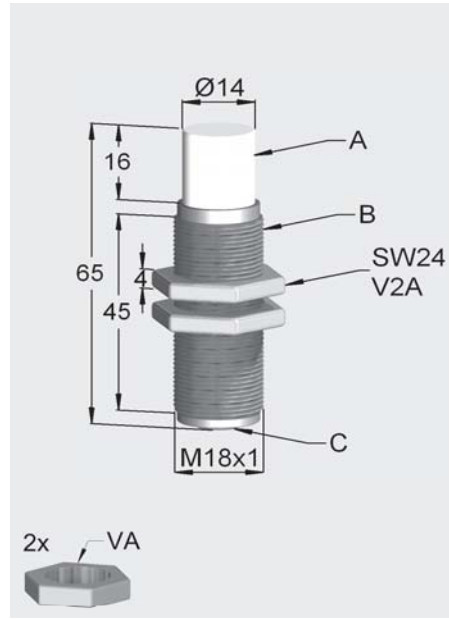
9.01 -
9.03



DIN EN ISO 9001:2000
QA 05 100 1050

Type code (abstract)

- SK sensor capacitive, w/o amplifier
- SKF sensor cap., w/o amplifier, flexible
- SK1 sensor capacitive, self-contained
- SV(D) sensor amplifier (dynamic)
- SNG sensor power pack
- HT### high temperature use
- TM pulse modulation technique (High noise immune)
- ## / FS(A) max sensing distance / Fill-level switch (adaptive)
- M30 model and/or dimension
- P output stage PNP, NPN, X (switchable)
- B mounting B=flush NB=non-flush
- S S=N.O. Ö=N.C. X=function switchable
- (C)PTFE Housing material, e.g. PTFE CPTFE=complete PTFE
- 1M2-Y2 cable & connector: Y# = connector 1M2 = 1.2m cable length



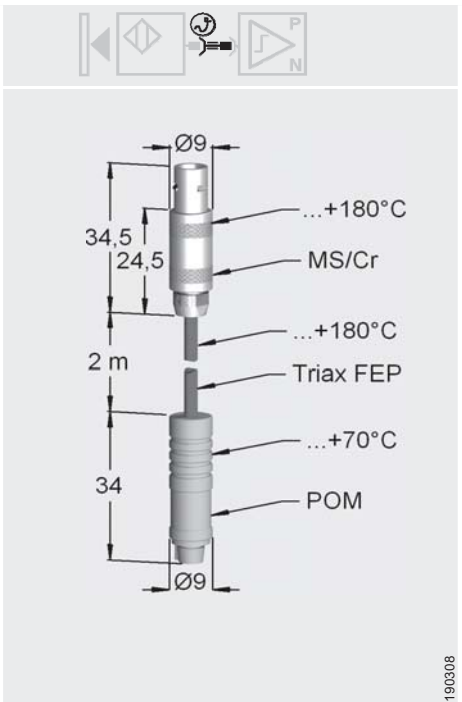
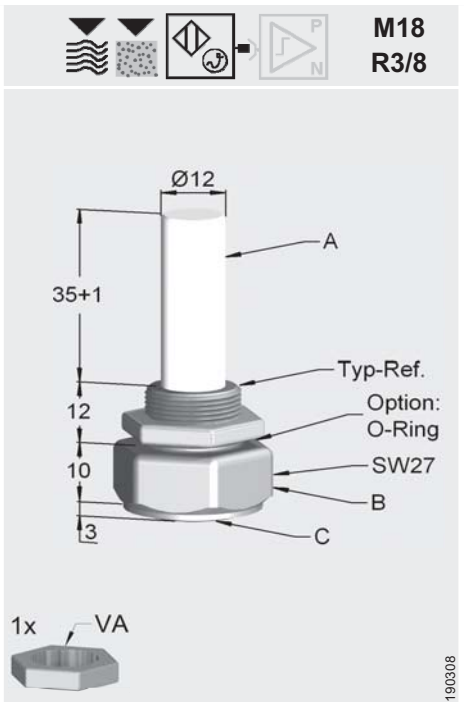
Typ / Type
SK-HT250-10-M18-NB-VA/PTFE

Typ / Type
SK-HT250-20-M30-NB-VA/PTFE

Mounting [flush / nonflush]	[B / NB]	NB	NB
Operating distance	Sn [mm]	1... 10	1... 20
Hysteresis	H [%SR]	15	15
Frequency of operating cycles	f [Hz]		
Repeat accuracy	R [%SR]	2	2
Operating temperature range	Ta [C°]	-180... 250	-180...250
Temperature drift [range]	[%SR]		
Protection class		IP 66 / IP 54	IP 66 / IP 54
Rated insulation voltage	Ui [V]		
Material of housing		A: PTFE; B: V2A; C: PTFE/MS/Cr	A: PTFE; B: V2A; C: PTFE/MS/Cr
Utilisation category			
Connection		SLK-HT	SLK-HT
Supply voltage range UB	Ub [V]		
No-load supply current	Iomax. [mA]		
Minimum operational current	I _m [mA]		
Operational current	I _e [mA]		
Off-state current	I _r [mA]		
Voltage drop	U _d @ I _e [V]		
Time delay before availability	t _v [ms]		
Indicator [UB / Output]			
Short circuit- overload-protection			
Reverse polarity protection			
Conformity	EMC EEC-direct.	IEC 60947-5-2 : 2004	IEC 60947-5-2 : 2004
EMC		IEC 61000-4-6 (3V) Functional errors may occur in frequency range 0.25-0.6 Mhz (sensor grounded)	IEC 61000-4-6 (3V) Functional errors may occur in frequency range 0.25-0.6 Mhz (sensor grounded)
Associated equipment		SLK-HT	SLK-HT
Additional functionality			

Application





application notes

The capacitive high temperature sensors are especially suitable for applications where the sensor head is exposed to a high ambient temperature, or comes directly into contact with hot materials. The units are used as fill level detectors in liquids and bulk goods, or as distance sensors for detecting block materials in hot surroundings.

Application

Sensors of the SK-HT series connected only via additional lead / triax FEP 2 m fix with integrated oscillator, **Type SLK-HT**, Art. No. 09007

Typ / Type	Typ / Type
SK-HT180-FS-M18-VA/PTFE	SLK-HT
SK-HT180-FS-R3/8-VA/PTFE	
SK-HT180-FS-J3/8NPTF-VA/PTFE	
NB	
-10... 180	-10...70
IP 68 (6 bar max) / IP 54	IP 54
A: PTFE; B: V2A; C: PTFE/MS/Cr	
SLK-HT	2m Triax FEP
IEC 60947-5-2 : 2004	IEC 60947-5-2 : 2004
IEC 61000-4-6 (3V) Functional errors may occur in frequency range 0.25-0.6 Mhz (sensor grounded)	see SK-HT### sensors
SLK-HT	SV-; SNG-...-K & SL-YA-m20; SL-YAZA-3m



Sensor power packs

Series SNG 1200

- Clamps housing width 22.5 mm
- Quick-mount
- Relay output
- Supply voltage 230 VAC or 115 VAC
- Sensor input PNP and NPN
- Min-Max control



12.01 -
12.03



DIN EN ISO 9001:2000
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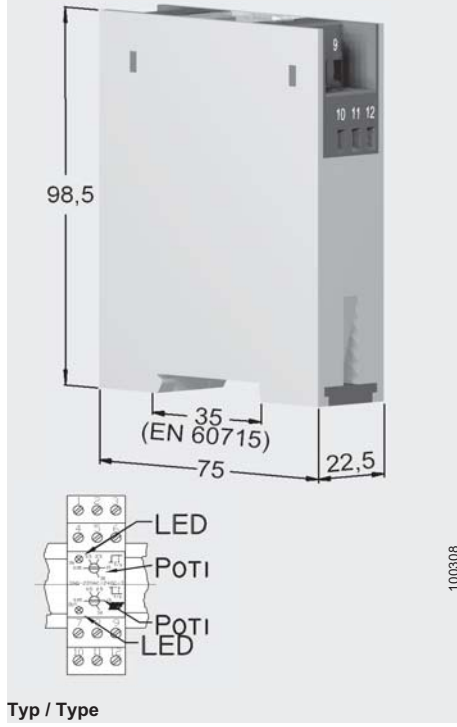
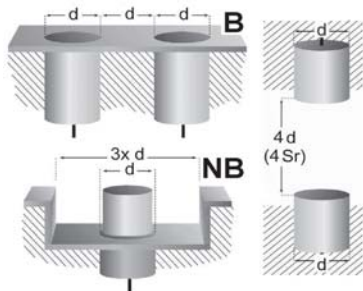


DC

application notes

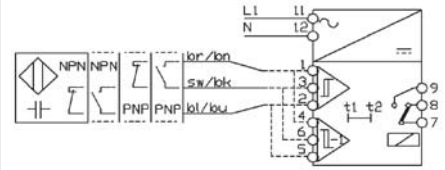
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- HT### high temperature use
- TM pulse modulation technique (High noise immune)
- ## / FS(A) max sensing distance / Fill-level switch (adaptive)
- M30 model and/or dimension
- P output stage PNP, NPN, X (switchable)
- B mounting B=flush NB=non-flush
- S S=N.O. Ö=N.C. X=function switchable
- (C)PTFE Housing material, e.g. PTFE CPTFE=complete PTFE
- 1M2-Y2 cable & connector: Y# = connector 1M2 = 1.2m cable length



Not for use with XDC-output stage (e.g. microLEVEL)

Wiring diagramm



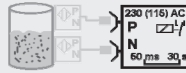
Typ / Type
SNG-230AC/24DC-T
SNG-115AC/24DC-T

Mounting [flush / nonflush]	[B / NB]	
Operating distance	Sn [mm]	
Hysteresis	H [%SR]	
Frequency of operating cycles	f [Hz]	10
Repeat accuracy	R [%SR]	
Operating temperature range	Ta [C°]	-30... 70
Temperature drift [range]	[%SR]	
Protection class		IP 40 / 20
Rated insulation voltage	Ui [V]	
Material of housing		Makrolon 8020, 2800
Utilisation category		
Connection		Klemmen
Supply voltage range UB	Ub [V]	230 (115) V 40... 60 Hz
No-load supply current	lomax. [mA]	20 / 40
Minimum operational current	Im [mA]	
Operational current	Ie [mA]	380VAC / 250VDC / 8A
Off-state current	Ir [mA]	
Voltage drop	Ud @ Ie [V]	
Time delay before availability	tv [ms]	
Indicator [UB / Output]		- / •
Short circuit- overload-protection		
Reverse polarity protection		
Conformity	EMC EEC-direct.	IEC 60947-5-2 : 2004 73/23
EMC		
Associated equipment		
Additional functionality		50ms...30s
Application		

100308

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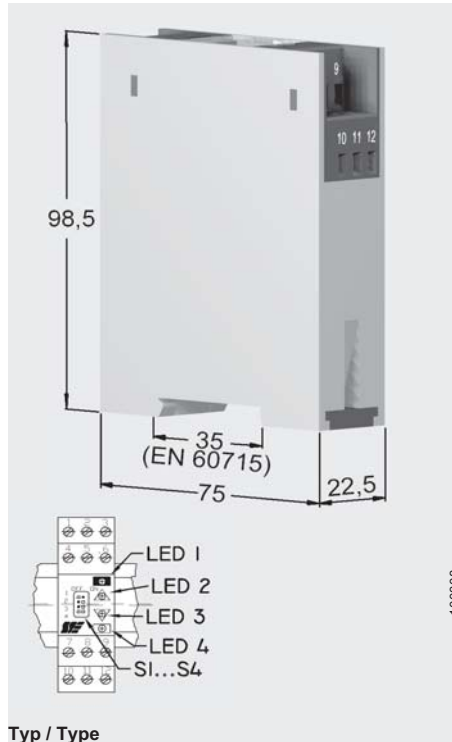
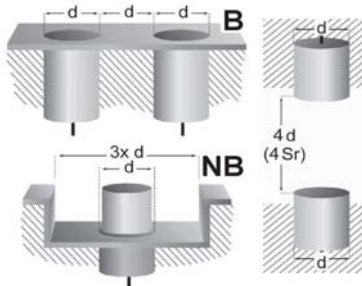
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DC

Type code (abstract)

- SK sensor capacitive, w/o amplifier
- SKF sensor cap., w/o amplifier, flexible
- SK1 sensor capacitive, self-contained
- SV(D) sensor amplifier (dynamic)
- SNG sensor power pack
- HT### high temperature use
- TM pulse modulation technique (High noise immune)
- ## / FS(A) max sensing distance / Fill-level switch (adaptive)
- M30 model and/or dimension
- P output stage PNP, NPN, X (switchable)
- B mounting B=flush NB=non-flush
- S S=N.O. Ö=N.C. X=function switchable
- (C)PTFE Housing material, e.g. PTFE CPTFE=complete PTFE
- 1M2-Y2 cable & connector: Y# = connector 1M2 = 1.2m cable length



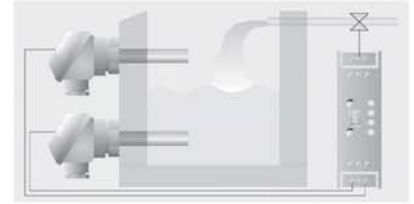
Typ / Type
SNG-230AC-MINMAX
SNG-115AC-MINMAX

100308

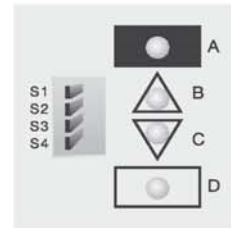
application notes



Function



When both sensors are de-activated, the relay switches on "LED-empty" lights up (contact 7/9 locked out). When the minimum sensor gives a closed signal, the "LED-filling" illuminates. As soon as both sensors are activated, the relay switches off "LED-full" lights up (contact 7/9 open). When the maximum sensor signals open, the "LED indicating empty" will light up. The relay will not switch on again until both sensors are de-activated. Further functions are possible with the Mini-Dip-Switch (see below).



Dip-Switch Function

- Sensing setting (sketch) = as-delivered condition
- S1 Time-delay Max sensor (off: approx. 0.2 sec.; on: approx. 5 sec.)
 - S2 Time-delay Min sensor (off: approx. 0.2 sec.; on: approx. 5 sec.)
 - S3 Power-on set-up (off: filling; on: emptying)
 - S4 Output (Relay invers)

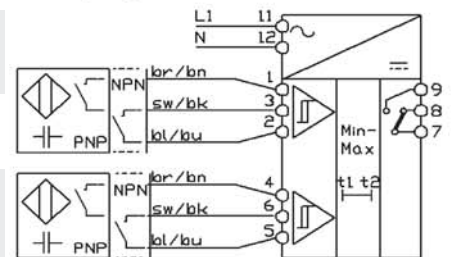
Display

A fill - B filling - C emptying - D empty

Features

- Min/Max level sensor controls
- automatical adapting PNP and NPN
- Connection points for two sensors SK-1 series (N.O.)
- Short circuit proof on the DC side
- Separate switchable delays for either Min - Max sensor from approx. 0,2 sec / 5sec

Wiring diagramm



Mounting [flush / nonflush]	[B / NB]		
Operating distance	Sn	[mm]	
Hysteresis	H	[%SR]	
Frequency of operating cycles	f	[Hz]	5
Repeat accuracy	R	[%SR]	
Operating temperature range	Ta	[C°]	-30... 70
Temperature drift [range]		[%SR]	
Protection class			IP 40 / 20
Rated insulation voltage	Ui	[V]	
Material of housing			Makrolon 8020, 2800
Utilisation category			
Connection			Klemmen
Supply voltage range UB	Ub	[V]	230 (115) V 40... 60 Hz
No-load supply current	Iomax.	[mA]	20 / 40
Minimum operational current	Im	[mA]	
Operational current	Ie	[mA]	380VAC / 250VDC / 8A
Off-state current	Ir	[mA]	
Voltage drop	Ud @ Ie	[V]	
Time delay before availability	tv	[ms]	
Indicator [UB / Output]			- / •
Short circuit- overload-protection			
Reverse polarity protection			
Conformity	EMC EEC-direct.		IEC 60947-5-2 : 2004 73/23
EMC			
Associated equipment			
Additional functionality			Min Sensor: 0,2 s / 5s Max-Sensor: 0,2s / 5s INIT-set-up

Application

Accessories

Series 1300

- Mounting blocks
- Plugs
- Connection leads
- Threaded adapters



13.01 –
13.05



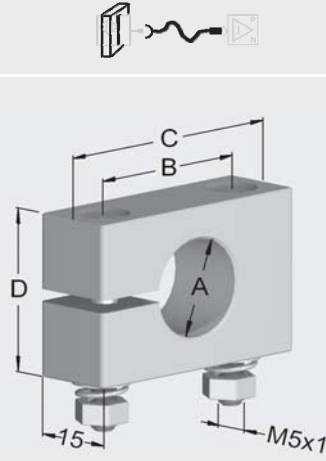
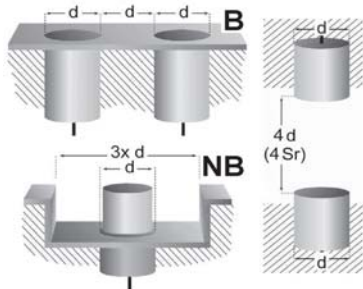
DIN EN ISO 9001:2000
QA 05 100 1050

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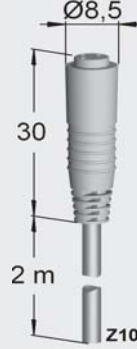
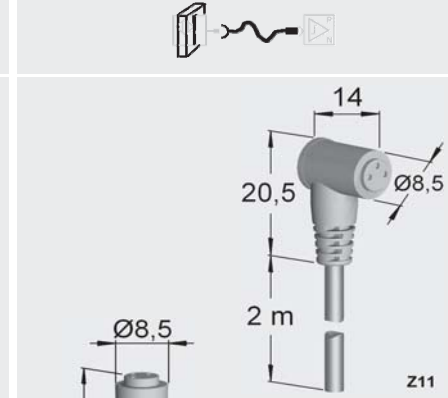
Type code (abstract)

- SK sensor capacitive, w/o amplifier
- SKF sensor cap., w/o amplifier, flexible
- SK1 sensor capacitive, self-contained
- SV(D) sensor amplifier (dynamic)
- SNG sensor power pack
- HT### high temperature use
- TM pulse modulation technique (High noise immune)
- ## / FS(A) max sensing distance / Fill-level switch (adaptive)
- M30 model and/or dimension
- P output stage PNP, NPN, X (switchable)
- B mounting B=flush NB=non-flush
- S S=N.O. Ö=N.C. X=function switchable
- (C)PTFE Housing material, e.g. PTFE CPTFE=complete PTFE
- 1M2-Y2 cable & connector: Y# = connector 1M2 = 1.2m cable length



	13001	13002	13003	13004
	ø18	ø22	ø30	ø34
A	18	22	30	34
B	30	30	45	45
C	45	45	60	60
D	30	30	45	45

Typ / Type
 MB-18
 MB-22
 MB-30
 MB-34



Typ / Type
 Z10
 Z11

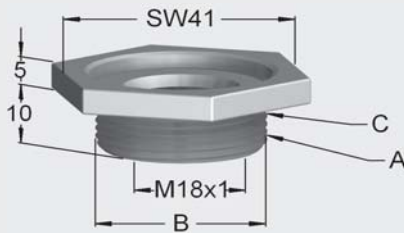
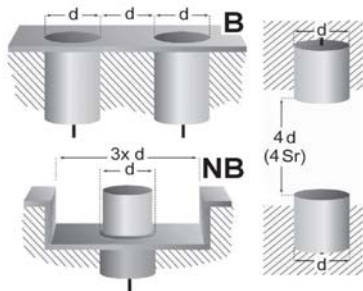
Mounting [flush / nonflush]	[B / NB]		
Operating distance	Sn [mm]		
Hysteresis	H [%SR]		
Frequency of operating cycles	f [Hz]		
Repeat accuracy	R [%SR]		
Operating temperature range	Ta [C°]	-30... 60	-30... 70
Temperature drift [range]	[%SR]		
Protection class			
Rated insulation voltage	Ui [V]		
Material of housing		PVC	PUR
Utilisation category			
Connection			2m / 3x 0,14mm ² PUR
Supply voltage range UB	Ub [V]		
No-load supply current	Iomax. [mA]		
Minimum operational current	Im [mA]		
Operational current	Ie [mA]		
Off-state current	Ir [mA]		
Voltage drop	Ud @ Ie [V]		
Time delay before availability	tv [ms]		
Indicator [UB / Output]			
Short circuit- overload-protection			
Reverse polarity protection			
Conformity	EMC EEC-direct.		
EMC			
Associated equipment			
Additional functionality			
Application			

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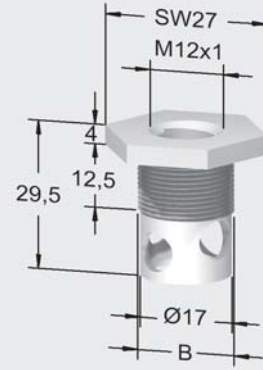
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- 1M2-Y2 cable & connector: Y# = connector 1M2 = 1.2m cable length



	90092	90093	90109
B	M30+1,5	M32x1,5	R1"

Typ / Type
 MA-M18/M30/10-VA
 MA-M18/M32/10-VA
 MA-M18/R1/10-VA



	13014	13016
B	M18x1	G1/2"

Typ / Type
 MSA-MLM12/M18x1-VA
 MSA-MLM12/G1/2-VA

Mounting [flush / nonflush]	[B / NB]	
Operating distance	Sn [mm]	
Hysteresis	H [%SR]	
Frequency of operating cycles	f [Hz]	
Repeat accuracy	R [%SR]	
Operating temperature range	Ta [C°]	
Temperature drift [range]	[%SR]	
Protection class		
Rated insulation voltage	Ui [V]	
Material of housing		A: V2A;C: O-Ring
Utilisation category		V2A
Connection		
Supply voltage range UB	Ub [V]	
No-load supply current	Iomax. [mA]	
Minimum operational current	Imin [mA]	
Operational current	Ie [mA]	
Off-state current	Ir [mA]	
Voltage drop	Ud @ Ie [V]	
Time delay before availability	tv [ms]	
Indicator [UB / Output]		
Short circuit- overload-protection		
Reverse polarity protection		
Conformity	EMC EEC-direct.	
EMC		
Associated equipment		
Additional functionality		
Application		

100308

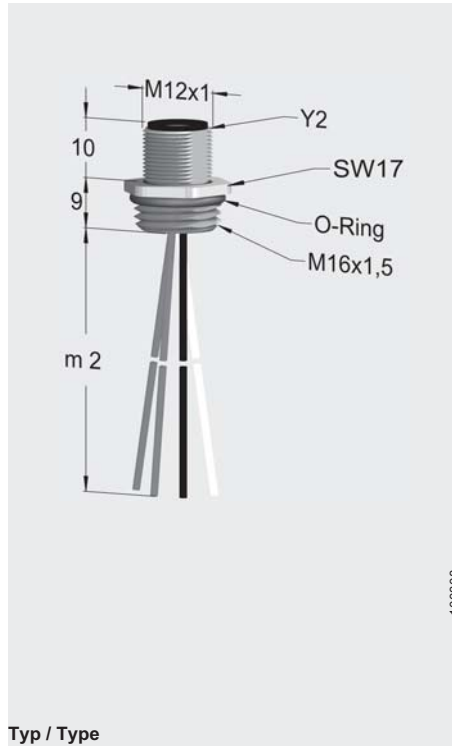
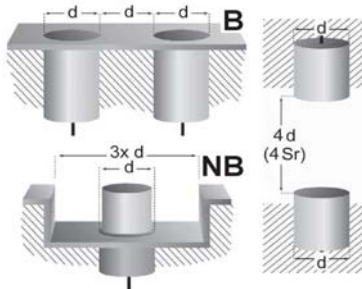
100308



application notes

Type code (abstract)

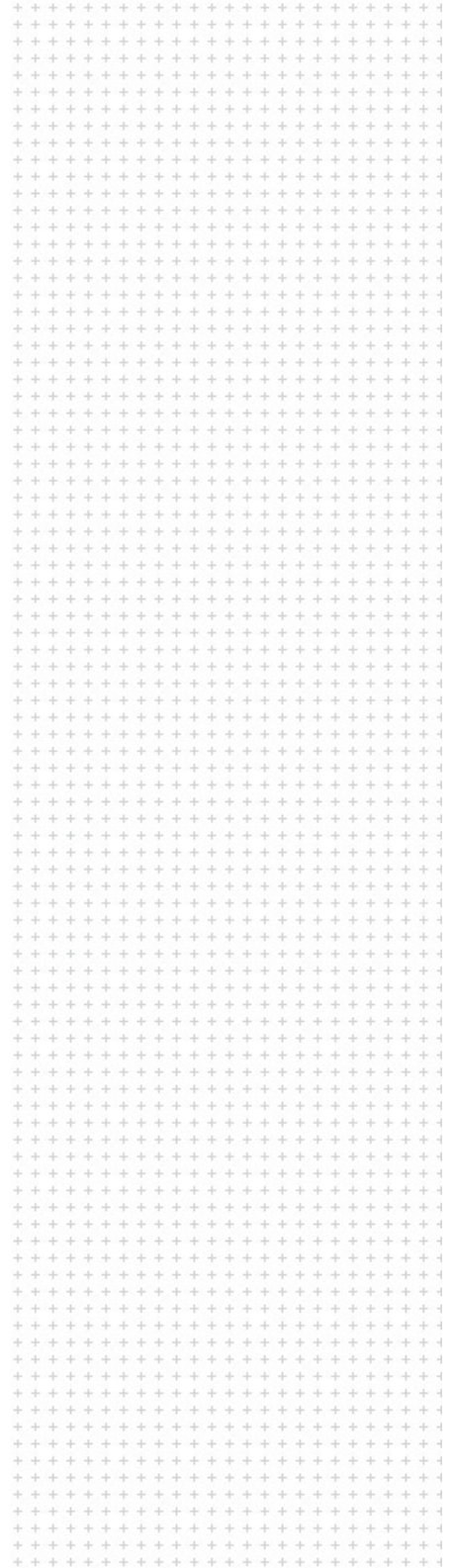
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- S S=N.O. Ö=N.C. X=function switchable
- (C)PTFE Housing material, e.g. PTFE CPTFE=complete PTFE
- 1M2-Y2 cable & connector: Y# = connector 1M2 = 1.2m cable length



Typ / Type
Y2-M16

General note:
Application notes not available. Please follow the general requirements given in the product catalog.

Notes:



100308

Mounting [flush / nonflush]	[B / NB]	
Operating distance	Sn	[mm]
Hysteresis	H	[%SR]
Frequency of operating cycles	f	[Hz]
Repeat accuracy	R	[%SR]
Operating temperature range	Ta	[C°] -30... 70
Temperature drift [range]		[%SR]
Protection class		
Rated insulation voltage	Ui	[V]
Material of housing		PA / MS/Ni
Utilisation category		
Connection		0,2m / 3x 0,25mm ² PVC
Supply voltage range UB	Ub	[V]
No-load supply current	Iomax.	[mA]
Minimum operational current	Im	[mA]
Operational current	Ie	[mA]
Off-state current	Ir	[mA]
Voltage drop	Ud @ Ie	[V]
Time delay before availability	tv	[ms]
Indicator [UB / Output]		
Short circuit- overload-protection		
Reverse polarity protection		
Conformity	EMC	EEC-direct.
EMC		
Associated equipment		
Additional functionality		
Application		



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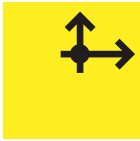
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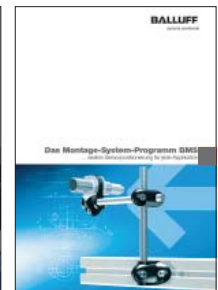
Mechanical Accessories



Fasteners



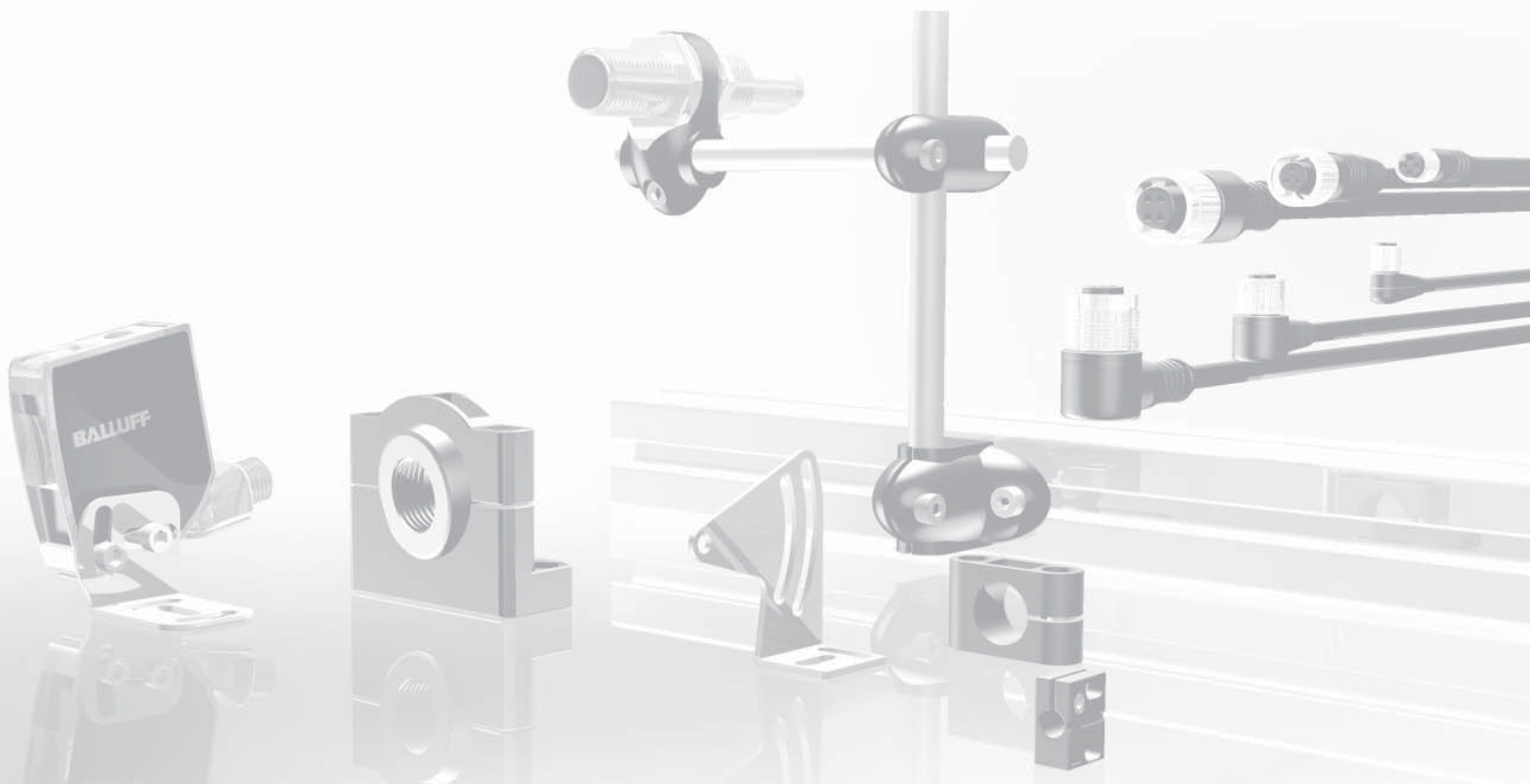
Mounting System



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www.balluff.com

Additional accessories can be found in the Internet, our "Accessories" catalog or the "Object Detection" catalog.



Object Detection



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Linear Position Sensing



Linear Position Sensing

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 Magnetoinductive Linear Position Sensors BIL
 Photoelectric Distance Sensors BOD

Industrial Identification



Industrial Identification

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 Industrial RFID Systems BIS L
 Industrial RFID Systems BIS M
 Industrial RFID Systems BIS S
 Vision Sensor BVS

Industrial Networking and Connectivity



Industrial Networking and Connectivity

Connectors BKS
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 IO-Link
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Mechanical Accessories



Mechanical Accessories

Attachments
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