7.13 –
7.22

Sensors for level sensing
smartLEVEL-Technology

Series SK1-FSA 0710

- For aqueous media
- No adjustment in standard application
- Self-compensating
- Through glass or plastic walls
- Versions for flush and non-flush mounting

DIN EN ISO 9001:2000
QA 05 100 1050

BALLUFF
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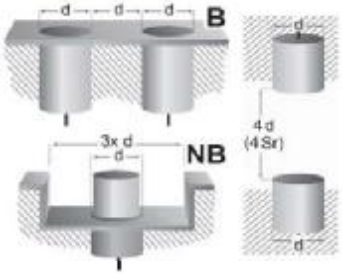
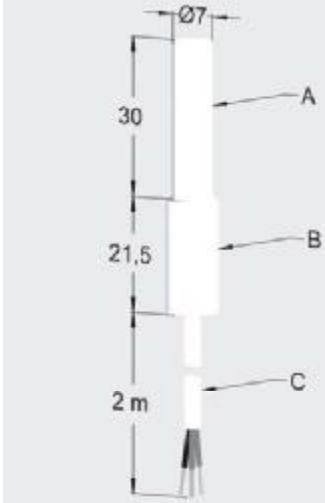
application notes

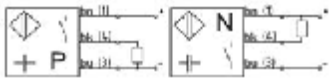
Type code (abstract)

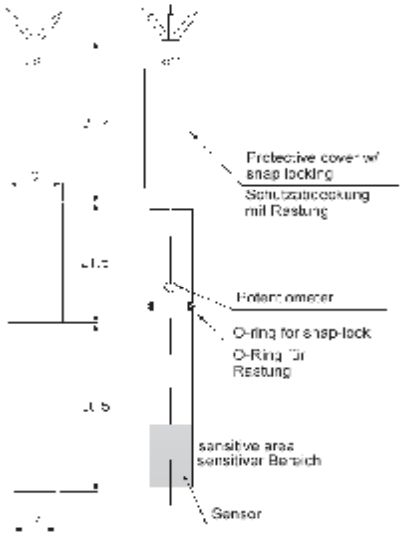
SK	sensor capacitive, w/o amplifier
SKF	sensor cap., w/o amplifier, flexible
SK1	sensor capacitive, self-contained
SV(D)	sensor amplifier (dynamic)
SNG	sensor power pack
HT###	high temperature use
TM	pulse modulation technique (High noise immune)
## / FS(A)	max sensing distance / Fill-level switch (adaptive)
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



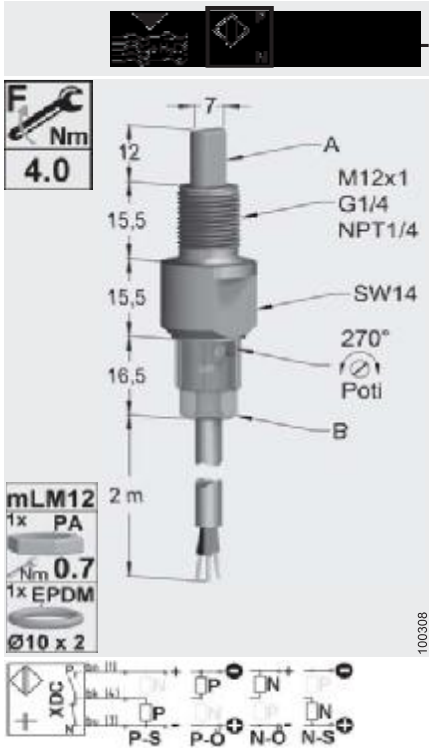


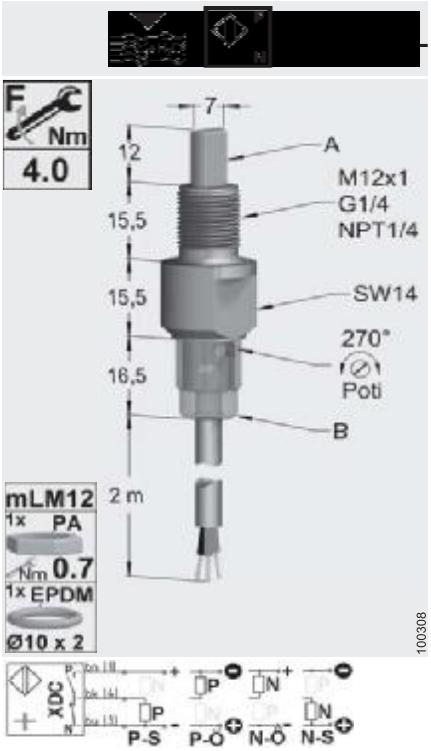
100308





			SK1-FSA-D7B9/52-PNBS-CPTFE SK1-FSA-D7B9/52-PNBO-CPTFE SK1-FSA-D7B9/52-NNBS-CPTFE SK1-FSA-D7B9/52-NNBO-CPTFE	
Mounting [flush / nonflush]		[B / NB]	NB	
Operating distance	Sn	[mm]	FSA	
Hysteresis	H	[%SR]	-	
Frequency of operating cycles	f	[Hz]	10	
Repeat accuracy	R	[%SR]	-	
Operating temperature range	Ta	[C°]	5...100	
Temperature drift [range]		[%SR]	-	
Protection class			IP 66 / A: IP 68	
Rated insulation voltage	Ui	[V]	75 d. c.	
Material of housing			A-B: PTFE	
Utilisation category			DC13	
Connection			2m / 3x 0,2mm^2 PTFE	
Supply voltage range UB	Ub	[V]	10... 30	
No-load supply current	Iomax.	[mA]	< 10	
Minimum operational current	Im	[mA]	-	
Operational current	Ie	[mA]	50	O.C.
Off-state current	Ir	[mA]	< 10	
Voltage drop	Ud @ Ie	[V]	< 1,5	
Time delay before availability	tv	[ms]	< 100	
Indicator [UB / Output]			– / –	
Short circuit- overload-protection			– / –	
Reverse polarity protection			●	+/- UB
Conformity		EMC EEC-direct.	IEC 609	
EMC			IEC 61000-4-6 (Testlevel 3V) Functional errors may occur in partition of working frequency 1-14.1 Mhz.	
Associated equipment				
Additional functionality				
Application				





Typ / Type	Typ / Type
SK1-FSA-MLM12-XDC-PSU SK1-FSA-MLG1/4-XDC-PSU SK1-FSA-MLNPT1/4-XDC-PSU	SK1-FSA-MLM12-XDCS-PSU SK1-FSA-MLG1/4-XDCS-PSU SK1-FSA-MLNPT1/4-XDCS-PSU
NB	NB
FSA	FSA
5	100
-10... 105	-10... 105
A : IP 68 / 10bar; B : IP 69K	A : IP 68 / 10bar; B : IP 69K
75 d. c.	75 d. c.
PSU	PSU
DC13	DC13
2m / 3x 0,34mm^2 PUR	2m / 3x 0,34mm^2 PUR
10... 35	10... 35
20	20
–	–
50 / 50 XDC	50 / 50 XDC CST I
–	–
3	3
< 300	< 300
• / •	• / •
• / •	• / •
!	!
IEC	IEC

IEC 61000-4-6 (Testlevel 3V) Functional errors may occur in partition of working frequency 1.95-13.1 Mhz.

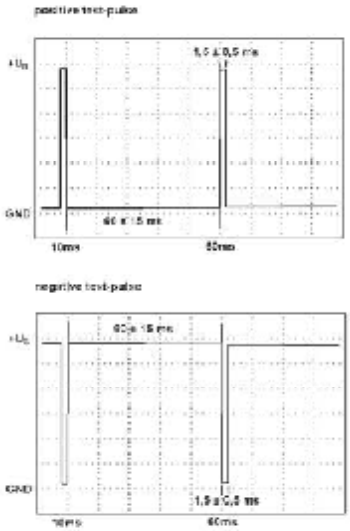
IEC 61000-4-6 (Testlevel 3V) Functional errors may occur in partition of working frequency 1.95-13.1 Mhz.

CST

application notes

The microLEVEL in Smart Level FSA-Technology have been adjusted in the factory for most applications.
With this setting, the Smart Level Sensors are suitable for detecting water based media without any further adjustment.
The setting compensates within wide limits for foaming, condensation and product filming.

The continuous self test signal (CST) overlaps the output signal.



Specialized applications
Sensors in Smart Level FSA-Technology can also be used with water based media in until now unsolved and critical applications. For this purpose, the factory setting can be altered by the user.
Adjustment instructions are supplied with the sensor.

N.B.!
The cable can not be wound for the sensor to function properly.
Excess length cable has to be shortened or wound in meander windings.

Mounting
Standard through hole mounting can be done using the enclosed nut. It is not required but recommended while mounted in a female thread. Sealing can be done using an O-ring or flat type gasket.
We recommend to close the pot access hole by the use of the circular clip.

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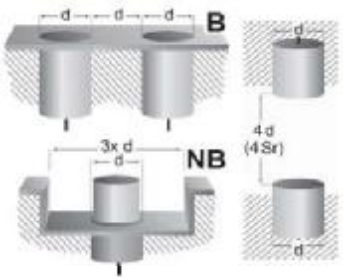
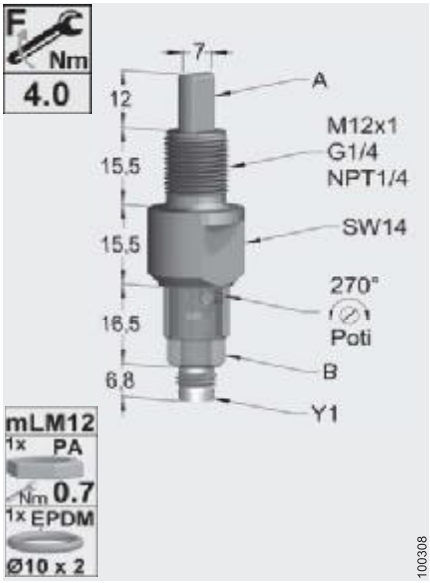
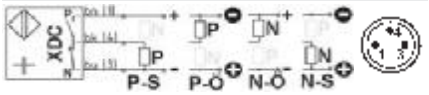
Type code (abstract)

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







Typ / Type
SK1-FSA-MLM12-XDC-PSU-Y1
SK1-FSA-MLG1/4-XDC-PSU-Y1
SK1-FSA-MLNPT1/4-XDC-PSU-Y1

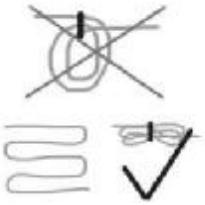
Mounting [flush / nonflush]		[B / NB]	NB
Operating distance	Sn	[mm]	FSA
Hysteresis	H	[%SR]	
Frequency of operating cycles	f	[Hz]	5
Repeat accuracy	R	[%SR]	
Operating temperature range	Ta	[C°]	-10... 105
Temperature drift [range]		[%SR]	
Protection class			A : IP 68 / 10bar; B : IP 69K
Rated insulation voltage	Ui	[V]	75 d. c.
Material of housing			PSU
Utilisation category			DC13
Connection			Z10; Z11
Supply voltage range UB	Ub	[V]	10... 35
No-load supply current	Iomax.	[mA]	20
Minimum operational current	Im	[mA]	–
Operational current	Ie	[mA]	50 / 50 XDC
Off-state current	Ir	[mA]	–
Voltage drop	Ud @ Ie	[V]	3
Time delay before availability	tv	[ms]	< 300
Indicator [UB / Output]			• / •
Short circuit- overload-protection			• / •
Reverse polarity protection			!
Conformity		EMC EEC-direct.	IEC
EMC			IEC 61000-4-6 (Testlevel 3V) Functional errors may occur in partition of working frequency 2.1-13.5 Mhz.
Associated equipment			
Additional functionality			
Application			

application notes

The **microLEVEL** in Smart Level FSA-Technology have been adjusted in the factory for most applications.
With this setting, the Smart Level Sensors are suitable for detecting water based media without any further adjustment.
The setting compensates within wide limits for foaming, condensation and product filming.

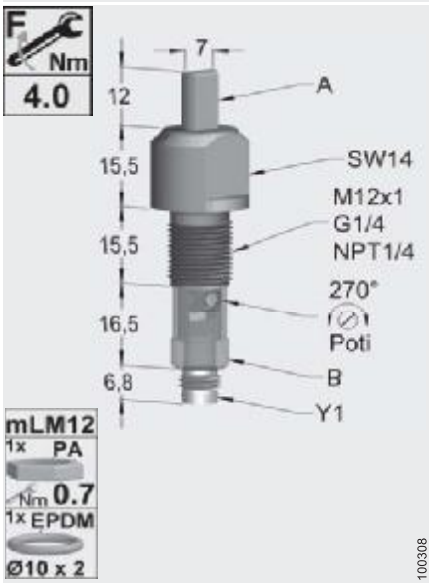
Specialized applications
Sensors in Smart Level FSA-Technology can also be used with water based media in until now unsolved and critical applications. For this purpose, the factory setting can be altered by the user.
Adjustment instructions are supplied with the sensor.

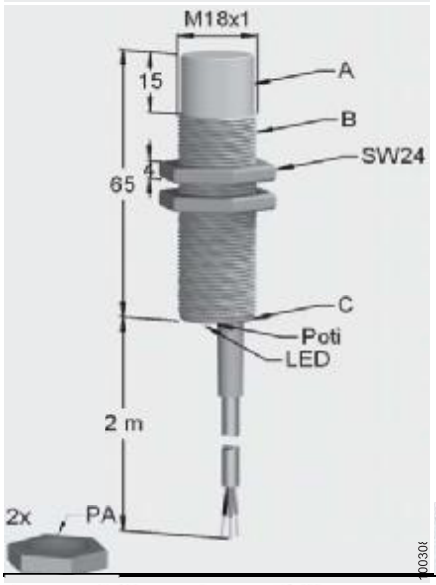
N.B.!
The cable can not be wound for the sensor to function properly.
Excess length cable has to be shortened or wound in meander windings.

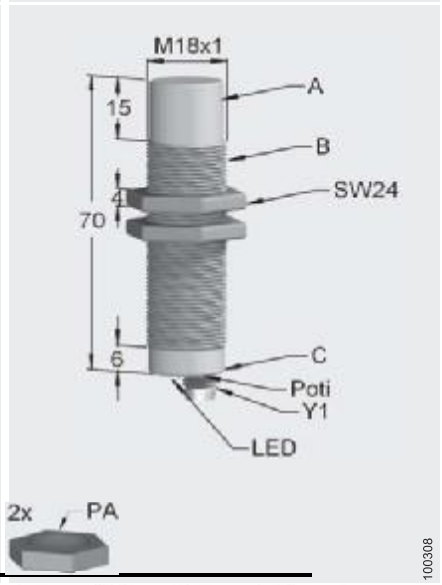


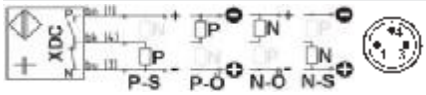
Mounting
Standard through hole mounting can be done using the enclosed nut. It is not required but recommended while mounted in a female thread. Sealing can be done using an O-ring or flat type gasket.
We recommend to close the pot access hole by the use of the circular clip.

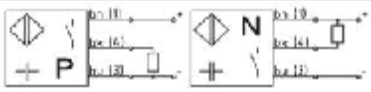
A liquid limit switch of any length can be realized by the use of a **reverse mount sensor**. Sealing can be done using an O-ring or flat type gasket.









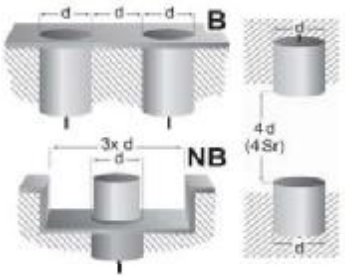


Typ / Type	Typ / Type	Typ / Type
SK1-FSA-MLRM12-XDC-PSU-Y1 SK1-FSA-MLRG1/4-XDC-PSU-Y1 SK1-FSA-MLRNPT1/4-XDC-PSU-Y1	SK1-FSA-M18-PNBS-PVC SK1-FSA-M18-PNBO-PVC SK1-FSA-M18-NNBS-PVC SK1-FSA-M18-NNBO-PVC	SK1-FSA-M18-PNBS-PVC-Y1 SK1-FSA-M18-PNBO-PVC-Y1 SK1-FSA-M18-NNBS-PVC-Y1 SK1-FSA-M18-NNBO-PVC-Y1
NB	NB	NB
FSA	FSA	FSA
5	2	2
-10... 105	-10... 60	-10... 60
A : IP 68 / 10bar; B : IP 64	A, B: IP 66 / IP 68; C: IP 64	A, B: IP 66 / IP 68; C: IP 64
75 d. c.	75 d. c.	75 d. c.
PSU	A: PVC; B: PVC; C: PBT	A: PVC; B: PVC; C: PVC
DC13	DC13	DC13
Z10; Z11	2m / 3x 0,25mm² PVC	Z10; Z11
10... 35	10... 35	10... 35
20	20	20
–		
50 / 50 XDC	300	300
–		
3	1,8	1,8
< 300		
• / •	– / •	– / •
• / •	• / •	• / •
!	•	•
IEC	IEC 60947-5-2 : 2004	IEC 60947-5-2 : 2004
IEC 61000-4-6 (Testlevel 3V) Functional errors may occur in partition of working frequency 2.1-13.5 Mhz.	IEC 61000-4-6 (Testlevel 3V) Functional errors may occur in partition of working frequency 2.65-14.9 Mhz. SNG-###AC...	IEC 61000-4-6 (Testlevel 3V) Functional errors may occur in partition of working frequency 2.65-11 Mhz. SNG-###AC...

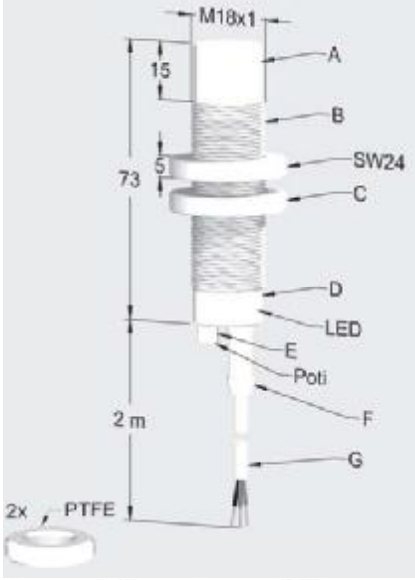
BALLUFF
SIESENSORIK

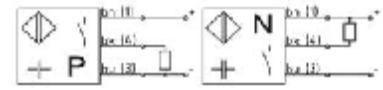
Type code (abstract)

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	ouput 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



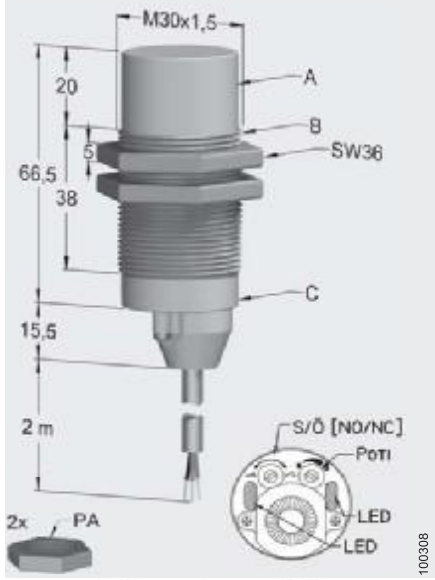
M18

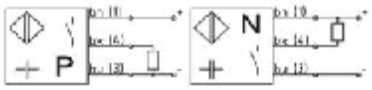




Typ / Type
SK1-FSA-M18-PNBS-CPTFE
SK1-FSA-M18-PNBO-CPTFE
SK1-FSA-M18-NNBS-CPTFE
SK1-FSA-M18-NNBO-CPTFE

M30

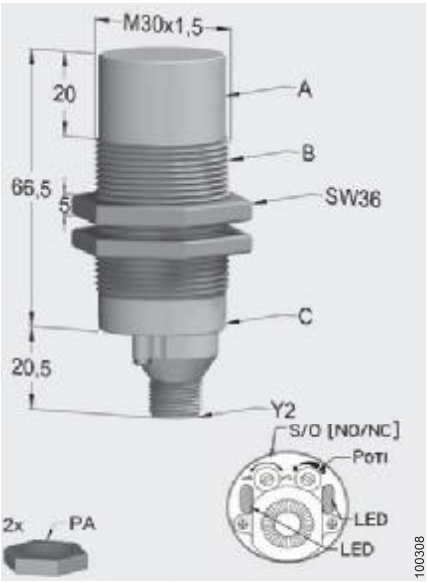




Typ / Type
SK1-FSA-M30-PNBX-PBT
SK1-FSA-M30-NNBX-PBT

			M18	M30
Mounting [flush / nonflush]		[B / NB]	NB	NB
Operating distance	Sn	[mm]	FSA	FSA
Hysteresis	H	[%SR]		
Frequency of operating cycles	f	[Hz]	2	2
Repeat accuracy	R	[%SR]		
Operating temperature range	Ta	[C°]	-10... 60	-10... 60
Temperature drift [range]		[%SR]		
Protection class			A, B: IP 66 / IP 68; D: IP 64	A, B: IP 66 / IP 68; C: IP 64
Rated insulation voltage	Ui	[V]	75 d. c.	75 d. c.
Material of housing			A-G : PTFE	A: PBT; B: PBT; C: PBT/PE
Utilisation category			DC13	DC13
Connection			2m / 3x 0,2mm² PTFE	2m / 3x 0,34mm² PUR
Supply voltage range UB	Ub	[V]	10... 35	10... 35
No-load supply current	Iomax.	[mA]	20	20
Minimum operational current	Im	[mA]		
Operational current	Ie	[mA]	300	300
Off-state current	Ir	[mA]		
Voltage drop	Ud @ Ie	[V]	1,8	1,8
Time delay before availability	tv	[ms]		
Indicator [UB / Output]			– / • LED int.	• / •
Short circuit- overload-protection			• / •	• / •
Reverse polarity protection			•	•
Conformity		EMC EEC-direct.	IEC 60947-5-2 : 2004 CE	IEC 60947-5-2 : 2004 CE
EMC			IEC 61000-4-6 (Testlevel 3V) Functional errors may occur in partition of working frequency 2.65-11 Mhz.	IEC 61000-4-6 (Testlevel 3V) Functional errors may occur in partition of working frequency 1.15-14.9 Mhz.
Associated equipment			SNG-###AC...	SNG-###AC...
Additional functionality				S / Ö NO / NC
Application				

M30

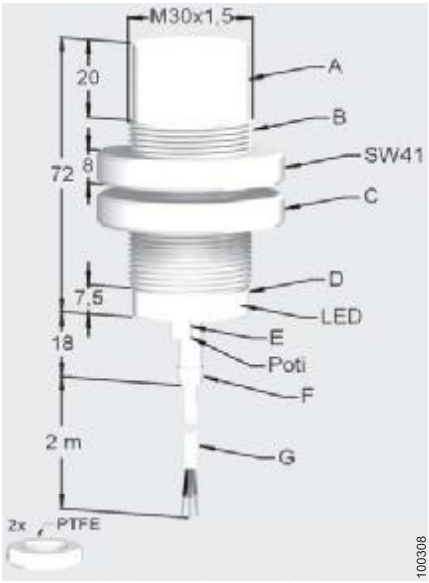


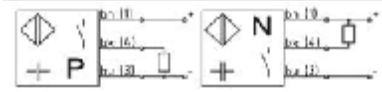
Typ / Type	
SK1-FSA-M30-PNBX-PBT-Y2 SK1-FSA-M30-NNBX-PBT-Y2	
NB	
FSA	
2	
-10... 60	
A, B: IP 66 / IP 68; C: IP 64	
75 d. c.	
A: PBT; B: PBT; C: PBT/PE	
DC13	
Z20; Z21	
10... 35	
20	
300	
1,8	
• / •	
• / •	
•	
IEC 60947-5-2 : 2004	

IEC 61000-4-6 (Testlevel 3V) Functional errors may occur in partition of working frequency 1.15-14.9 Mhz.
SNG-###AC...

S / Ö NO / NC

M30





Typ / Type		
SK1-FSA-M30-PNBS-CPTFE SK1-FSA-M30-PNBO-CPTFE SK1-FSA-M30-NNBS-CPTFE SK1-FSA-M30-NNBO-CPTFE		
NB		
FSA		
2		
-10... 60		
A, B: IP 66 / IP 68; D: IP 64		
75 d. c.		
A-G : PTFE		
DC13		
2m / 3x 0,2mm² PTFE		
10... 35		
20		
300		
1,8		
– / •		LED int.
• / •		
•		
IEC 60947-5-2 : 2004		

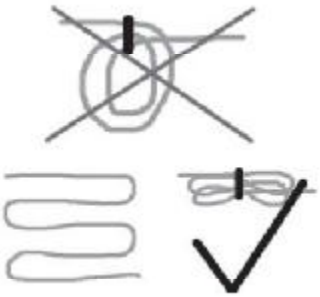
IEC 61000-4-6 (Testlevel 3V) Functional errors may occur in partition of working frequency 1.15-14.9 Mhz.
SNG-###AC...

application notes

The Smart Level Sensors of the SK1-FSA... series have been adjusted in the factory for standard applications.
With this setting, the Smart Level Sensors are suitable for detecting water based liquids through glass or plastic walls without any further adjustment.
The factory setting can automatically mask out glass or plastic walls (approx. 0.5 mm to 6 mm), and compensates within wide limits for foam, moisture and dirt adhering to the inside and outside of the tank concerned.

Specialized applications
The Smart Level Sensors of the SK1-FSA... series can also be used with water based liquids in hitherto insoluble and critical applications, e.g. with glass or plastic walls thicker than 6 mm. For this purpose, the factory setting can be altered by the user.

N.B.!
The cable can not be wound for the sensor to function properly.
Excess length cable has to be shortened or wound in meander windings.

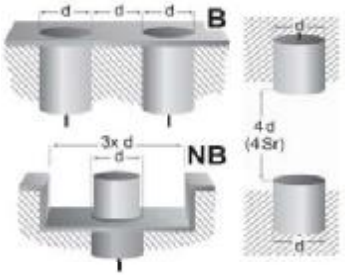


cPTFE-Sensors
Output state indicator: LED red fully covered (inside the housing)

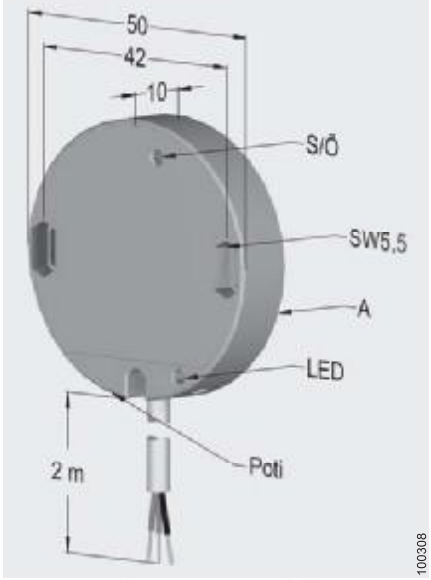
BALLUFF
SIESENSORIK

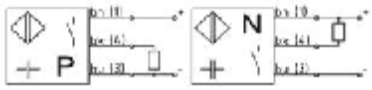
Type code (abstract)

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	ouput 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



50Ø/10





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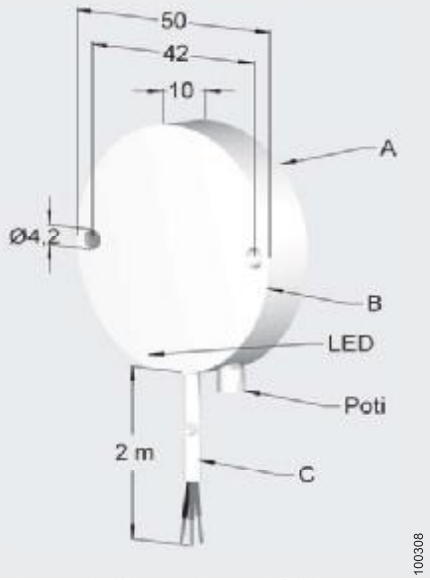
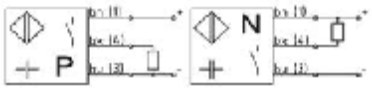
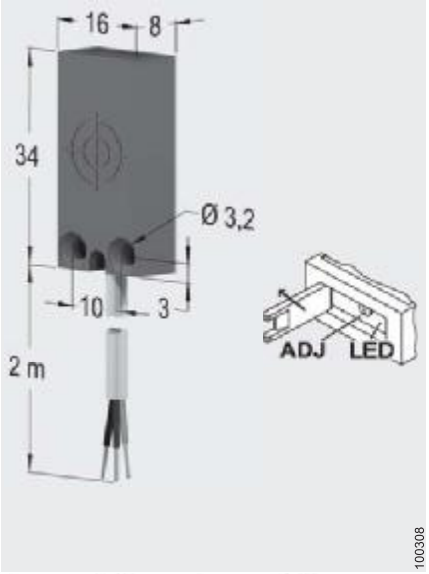
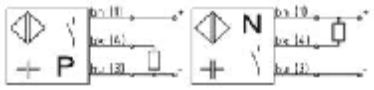




			Typ / Type	**Typ / Type**	
			SK1-FSA-50/10-PBX-POM SK1-FSA-50/10-NBX-POM	SK1-FSA-50/10-PBS-CPTFE SK1-FSA-50/10-PBO-CPTFE SK1-FSA-50/10-NBS-CPTFE SK1-FSA-50/10-NBO-CPTFE	
Mounting [flush / nonflush]		[B / NB]	B	B	
Operating distance	Sn	[mm]	FSA	FSA	
Hysteresis	H	[%SR]			
Frequency of operating cycles	f	[Hz]	2	2	
Repeat accuracy	R	[%SR]			
Operating temperature range	Ta	[C°]	-10... 60	-10... 60	
Temperature drift [range]		[%SR]			
Protection class			IP 67	IP 67	
Rated insulation voltage	Ui	[V]	75 d. c.	75 d. c.	
Material of housing			POM	A-C : PTFE	
Utilisation category			DC13	DC13	
Connection			2m / 3x 0,25mm^2 PVC	2m / 3x 0,2mm^2 PTFE	
Supply voltage range UB	Ub	[V]	10... 35	10... 35	
No-load supply current	Iomax.	[mA]	20	20	
Minimum operational current	Im	[mA]			
Operational current	Ie	[mA]	300	300	
Off-state current	Ir	[mA]			
Voltage drop	Ud @ Ie	[V]	1,8	1,8	
Time delay before availability	tv	[ms]			
Indicator [UB / Output]			– / •	– / •	LED int.
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 (Testlevel 3V) Functional errors may occur in partition of working frequency 0.8-9.8 Mhz.	IEC 61000-4-6 (Testlevel 3V) Functional errors may occur in partition of working frequency 0.8-9.8 Mhz.	
Associated equipment			SNG-###AC...	SNG-###AC...	
Additional functionality			S / Ö NO / NC		
Application				 	

microBOX





Typ / Type
SK1-FSA-34/16/8-PBS-PP
SK1-FSA-34/16/8-PBO-PP
SK1-FSA-34/16/8-NBS-PP
SK1-FSA-34/16/8-NBO-PP
B
FSA
2
5
-30... 70
IP 67
75 d. c.
PP
DC13
2m / 3x 0,14 mm² / PUR
12... 30
< 10
-
50 O.C.
1,5
< 100
– / •
• / •
•
IEC 60947-5-2 : 2004

IEC 61000-4-6 (Testlevel 3V) Functional errors may occur in partition of working frequency 0.85-8.3 Mhz. SNG-###AC...

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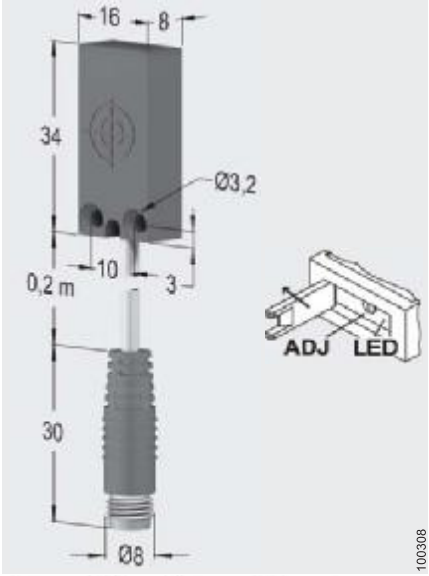
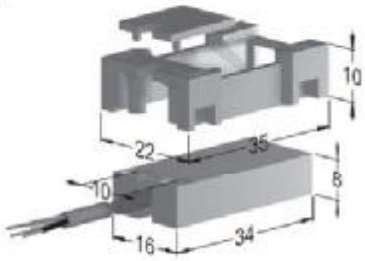


Typ / Type
SK1-FSA-34/16/8-PBS-PP-M2/Y1
SK1-FSA-34/16/8-PBO-PP-M2/Y1
SK1-FSA-34/16/8-NBS-PP-M2/Y1
SK1-FSA-34/16/8-NBO-PP-M2/Y1
B
FSA
2
5
-30... 70
IP 67
75 d. c.
PP
DC13
0,2m / 3x 0,14mm² PUR; Z10; Z11
12... 30
< 10
-
50 O.C.
1,5
< 100
– / •
• / •
•
IEC 60947-5-2 : 2004

IEC 61000-4-6 (Testlevel 3V) Functional errors may occur in partition of working frequency 0.85-8.3 Mhz. SNG-###AC...

application notes

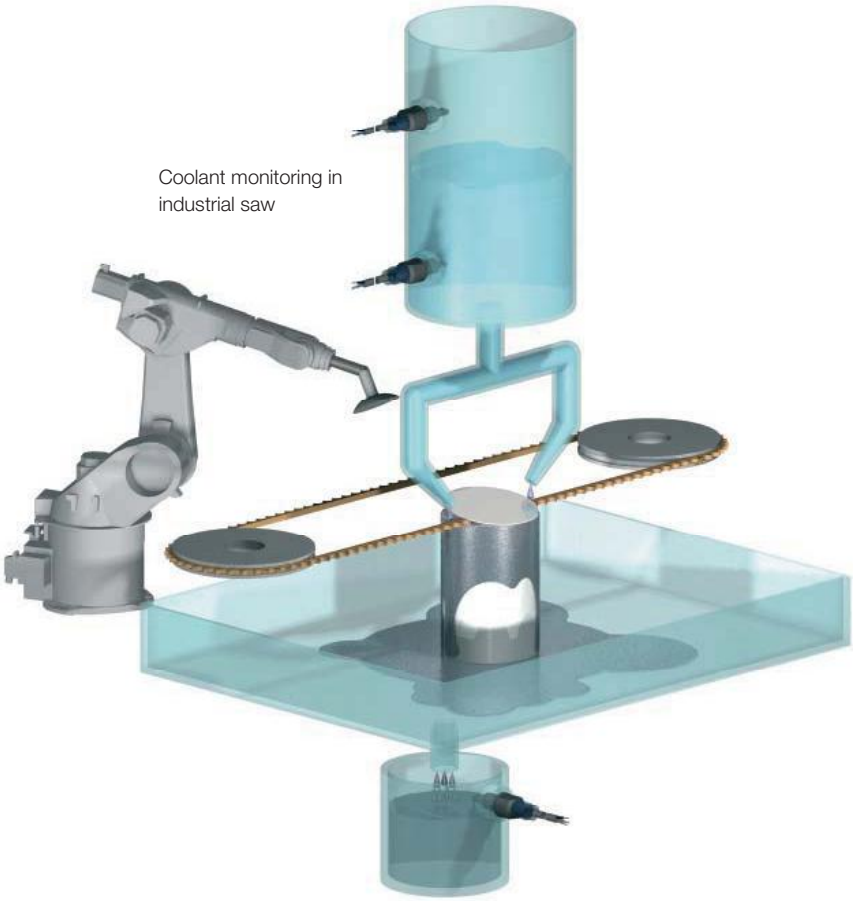
Usage of mounting bracket and optional name plate



Sensor mounting using cable ties. Recommended up to 50mm tube or tank diameter.

Use of a mounting strap recommended for fastening when diameter is more than 50mm.

Coolant monitoring in industrial saw



Fill level monitoring of holding tank for polishing