

BALLUFF

sensors worldwide

STEELFACE

Inductive Sensors BES

... the rugged Ones for extreme Applications



STEELFACE

more added value

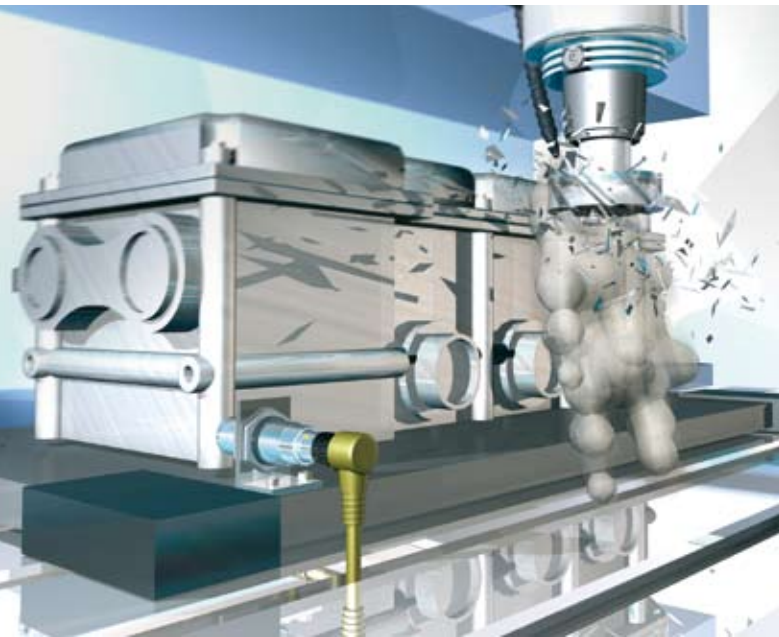
Inductive Steelface sensors with selective response ignore, depending on the version, ferrous or non-ferrous metals.

This property and the especially rugged construction of the Steelface sensors opens up new possibilities in automation technology. You can locate the sensors right where the action is.

Steelface sensors are used especially in harsh environments and applications too extreme for standard sensors.

Here they show their strengths:

- Increase the up-time of your equipment
- Reduce your maintenance and inventory expenses
- Resistant to abrasive media and aggressive coolants and lubricants
- Rugged active surface

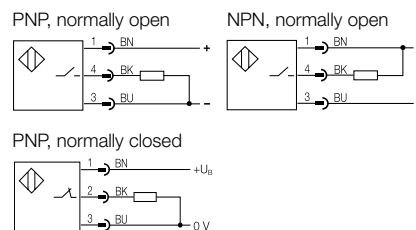


Ferrous/ Non-Ferrous



Housing size	
Installation type	
Rated operating distance s_n	
Assured operating distance s_a	
PNP Ferrous Normally open	
PNP Ferrous Normally closed	
PNP Non-Ferrous Normally open	
NPN Ferrous Normally open	
Rated operating voltage U_e	
Supply voltage U_B	
Voltage drop U_d at I_e	
Rated insulation voltage U_i	
Rated operating current I_e	
Residual current I_r	
Protected against polarity reversal	
Short circuit protected	
Repeat accuracy R	
Ambient temperature range T_a	
Frequency of operating cycles f	
Utilization categories	
Function indication	
Degree of protection per IEC 60529	
Housing material	
Material of active surface	
Connection	
Recommended connector	

Wiring diagrams



Matrix for usability of metal holders

Sensors	BES 08,0-KH-2S	BES 08,0-KH-2S/W	BES 08,0-KB-3-F	BES 08,0-KB-4-F	BES 8,0-KH-6S	BES 12,0-KH-2L	BES 12,0-KH-2L/W	BES 12,0-KH-9L/T/W	BES 12,0-KB-4-F	BES 12,0-KB-3-F	BES 12,0-KH-10S/W	BES 18,0-KH-2L	BES 18,0-KH-2M	BES 18,0-KH-2L/W	BES 18,0-KB-4-F	BES 18,0-KB-3-F	BES 18,0-KH-9S/T/W	BES 30,0-KH-2S	BES 30,0-KH-2S/W	BES 30,0-KB-4-F	BES 30,0-KB-3-F	BES 30,0-KH-9S/T/W	
BES M08-EG1-PSC15S-S04G-S	yes	yes	yes	yes	yes																		
BES M08-EG1-NSC15S-S04G-S	yes	yes	yes	yes	yes																		
BES M12-EG1-PSC20S-S04G-S						yes	yes	yes	yes	yes	yes												
BES M12-EG1-POC20S-S04G-S						yes	yes	yes	yes	yes	yes												
BES M12-EG1-NSC20S-S04G-S						yes	yes	yes	yes	yes	yes												
BES M18-EG1-PSC50S-S04G-S												no	yes	no	yes	yes	yes						
BES M18-EG1-POC50S-S04G-S												no	yes	no	yes	yes	yes						
BES M18-EG1-NSC50S-S04G-S												no	yes	no	yes	yes	yes						
BES M30EG1-PSC80S-S04G-S																		no	no	yes	yes	no	
BES M30EG1-NSC80S-S04G-S																		no	no	yes	yes	no	

When using metal mounts, a reduction in the switching distance can be expected. The matrix is provided as a guide. Always verify the usability of the holders in the application.

more added value

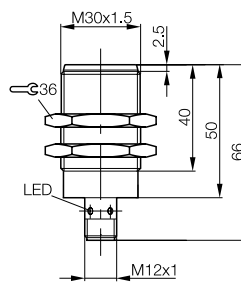
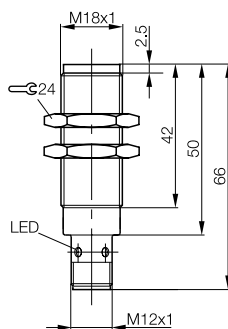
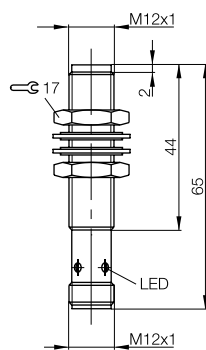
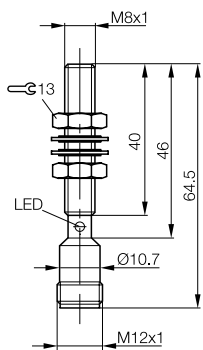
- Extremely rugged and reliable
- Selective response masks the presence of interfering objects

Inductive Sensors

DC 3-wire, M8, M12, M18, M30
 s_n 1.5 mm, 2 mm, 5 mm, 8 mm



M8x1	M12x1	M18x1	M30x1
Flush	Flush	Flush	Flush
1.5 mm	2 mm	5 mm	8 mm
0...1.2 mm	0...1.6 mm	0...4.1 mm	0...6.4 mm
BES M08EG1-PSC15S-S04G-S	BES M12EG1-PSC20S-S04G-S	BES M18EG1-PSC50S-S04G-S	BES M30EG1-PSC80S-S04G-S
	BES M12EG1-POC20S-S04G-S	BES M18EG1-POC50S-S04G-S	
	BES M12EG1-PSC20N-S04G-S	BES M18EG1-PSC50N-S04G-S	BES M30EG1-PSC80N-S04G-S
BES M08EG1-NSC15S-S04G-S	BES M12EG1-NSC20S-S04G-S	BES M18EG1-NSC50S-S04G-S	BES M30EG1-NSC80S-S04G-S
24 V DC	24 V DC	24 V DC	24 V DC
10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
≤ 2 V	≤ 2 V	≤ 2 V	≤ 2 V
75 V DC	75 V DC	75 V DC	75 V DC
100 mA	100 mA	100 mA	100 mA
≤ 10 μA	≤ 10 μA	≤ 10 μA	≤ 10 μA
yes	yes	yes	yes
yes	yes	yes	yes
≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %
-25...+70 °C	-25...+70 °C	-25...+70 °C	-25...+70 °C
20 Hz	50 Hz	15 Hz	15 Hz
DC 13	DC 13	DC 13	DC 13
yes	yes	yes	yes
IP 67	IP 67	IP 67	IP 67
Stainless steel	Stainless steel	Stainless steel	Stainless steel
Stainless steel	Stainless steel	Stainless steel	Stainless steel
Connectors	Connectors	Connectors	Connectors
BKS-S 19-14	BKS-S 19-14	BKS-S 19-14	BKS-S 19-14



Ferrous: Detection of ferromagnetic steels and irons.
Non-Ferrous: Detection of non-magnetizable metals such as aluminum, copper, brass and many stainless steels.

Correction factors

Model	Steel FE 360	Stainless steel	Aluminum	Copper	Brass
DC					
M8 Ferrous	1	0.1...0.7	0	0	0,1
M12 Ferrous	1	0.1...0.7	0	0	0
M12 Non-Ferrous	0	0	1	1.1	0.9
M18 Ferrous	1	0.1...0.7	0	0	0
M18 Non-Ferrous	0	0	1	1.1	0.9
M30 Ferrous	1	0.1...0.7	0	0	0
M30 Non-Ferrous	0	0	1	1.1	0.9

Effective switching distance = Rated switching distance × correction factor

Features

- Steelface with long switching distance
- Extremely rugged, with more function reserve due to the long range
- **Also available in weld splatter resistant version (Teflon coated)**

Long switching distance



Matrix for usability of metal holders

Sensors	BES 08,0-KH-2S	BES 08,0-KH-2SW	BES 08,0-KB-3-F	BES 08,0-KB-4-F	BES 8,0-KH-6S	BES 12,0-KH-2L	BES 12,0-KH-2L/W	BES 12,0-KH-9LT/W	BES 12,0-KB-4-F	BES 12,0-KB-3-F	BES 12,0-KH-10S/W
BES M08-EH1-PSC20B-S04G-S	yes	yes	yes	yes	yes						
BES M08-EH1-PSC20B-S04G-S01	yes	yes	yes	yes	yes						
BES M08-EH1-NSC20B-S04G-S	yes	yes	yes	yes	yes						
BES M08-EH1-NSC20B-S04G-S01	yes	yes	yes	yes	yes						
BES M12-EI-PSC40B-S04G-S						yes	yes	yes	yes	yes	yes
BES M12-EI-NSC40B-S04G-S						yes	yes	yes	yes	yes	yes
BES M12-EI-PSC40B-S04G-S-01						yes	yes	yes	yes	yes	yes
BES M12-EI-NSC40B-S04G-S-01						yes	yes	yes	yes	yes	yes
BES M12EG1-PSC60Z-S04G-S11						no	no	yes	no	yes	yes
BES M12EG1-NSC60Z-S04G-S11						no	no	yes	no	yes	yes

When using metal mounts, a reduction in the switching distance can be expected. The matrix is provided as a guide. Always verify the usability of the holders in the application.

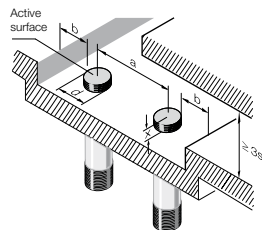
Housing size	M8x1
Installation type	Flush
Rated operating distance s_n	2 mm
Assured operating distance s_a	0...1.6 mm
PNP Normally open	BES M08EH1-PSC20B-S04G-S
NPN Normally open	BES M08EH1-NSC20B-S04G-S
Supply voltage U_B	10...30 V DC
Voltage drop U_d at I_e	≤ 2 V
Rated insulation voltage U_i	75 V DC
Rated operating current I_e	200 mA
No-load current I_0 max.	≤ 12 mA
Protected against polarity reversal	yes
Short circuit protected	yes
Repeat accuracy R	≤ 5 %
Ambient temperature range T_a	-25...+70 °C
Frequency of operating cycles f	750 Hz
Utilization categories	DC 13
Function indicator (flashes between approx. 70 and 100 % of effective operating distance s_e)	yes
Degree of protection per IEC 60529	IP 67
Housing material	Stainless steel
Material of active surface	Stainless steel
Connection	Connectors
Recommended connector	BKS-_ 19/BKS-_ 20/ BKS-S 20E
Pressure rated to	80 bar

Flush mountable sensors

These sensors can be embedded in ferromagnetic material up to the active surface.

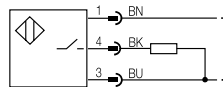
When installing in non-ferrous metals, the values for "x" shown in the table below must be maintained. The result is a maximum deviation of 10 % from the effective operating distance s_e .

Size d	Dimension b	Dimension x
M08	≥ 8 mm	≥ 6 mm
M12	≥ 12 mm	≥ 8 mm

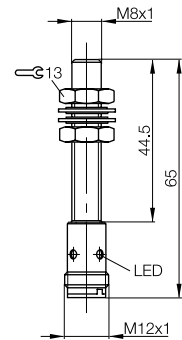
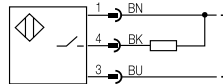


Wiring diagrams

PNP, normally open



NPN, normally open



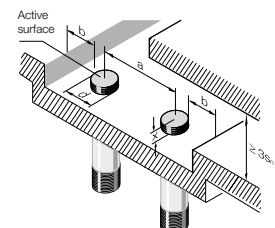
Installation dimensions for quasi-flush mountable sensors (please note)

Housing size	Dimension a	Dimension b	Dimension x	when installed in
M12	≥ 50 mm	≥ 6 mm	≥ 7 mm	Steel Fe 360
			≥ 12 mm	Aluminum
			≥ 12 mm	Brass
			≥ 10 mm	Stainless steel

When the installation dimensions are too close or with flush mounting, there may be a significant reduction in the switching distance!

Reduction factor (referenced to detection object)

Housing size	Factor	when installed in
M12	1	Steel Fe 360
	0.8...1	Aluminum
	0.7...0.85	Copper
	0.85...1.3	Brass
	0.5/0.9	Stainless 1 mm/≥ 2 mm thick



more added value

- Extremely rugged and reliable
- Long switching distance for greater function reserves

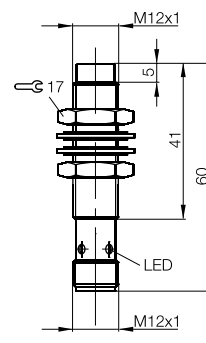
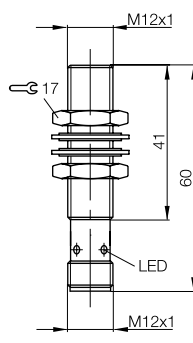
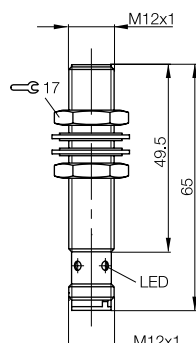
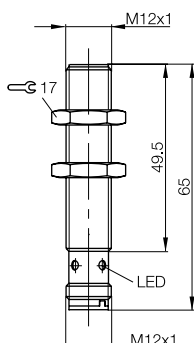
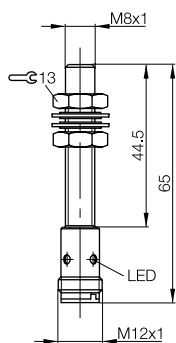
Inductive Sensors

3-wire, M8, M12

s_n 2 mm, 4 mm, 6 mm, 10 mm



M8x1	M12x1	M12x1	M12x1	M12x1
Flush	Flush	Flush	Quasi-flush	Non-flush
2 mm	4 mm	4 mm	6 mm	10 mm
0...1.6 mm	0...3.2 mm	0...3.2 mm	0...4.9 mm	0...8.1 mm
BES M08EH1-PSC20B-S04G-S01	BES M12EI-PSC40B-S04G-S	BES M12EI-PSC40B-S04G-S01	BES M12EG1-PSC60Z-S04G-S11	BES M12EF1-PSC10F-S04G-S
BES M08EH1-NSC20B-S04G-S01	BES M12EI-NSC40B-S04G-S	BES M12EI-NSC40B-S04G-S01	BES M12EG1-NSC60Z-S04G-S11	BES M12EF1-NSC10F-S04G-S
10...30 V DC	12...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
≤ 2 V	≤ 2 V	≤ 2 V	≤ 2 V	≤ 2 V
75 V DC	75 V DC	75 V DC	75 V DC	75 V DC
200 mA	200 mA	200 mA	200 mA	200 mA
≤ 12 mA	≤ 16 mA	≤ 16 mA	≤ 16 mA	≤ 12 mA
yes	yes	yes	yes	yes
yes	yes	yes	yes	yes
≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %
-25...+70 °C	-25...+70 °C	-25...+70 °C	-25...+70 °C	-25...+70 °C
750 Hz	500 Hz	500 Hz	400 Hz	350 Hz
DC 13	DC 13	DC 13	DC 13	DC 13
yes	yes	yes	yes	yes
IP 67	IP 67	IP 67	IP 67	IP 67
Stainless steel/Teflon coated	Stainless steel	Stainless steel/Teflon coated	Stainless steel	Stainless steel
Stainless steel/Teflon coated	Stainless steel	Stainless steel/Teflon coated	Stainless steel	Stainless steel
Connectors	Connectors	Connectors	Connectors	Connectors
BKS-_ 19/BKS-_ 20/ BKS-S 20E	BKS-_ 19/BKS-_ 20/ BKS-S 20E	BKS-_ 19/BKS-_ 20/ BKS-S 20E	BKS-_ 19/BKS-_ 20/ BKS-S 20E	BKS-_ 19/BKS-_ 20/ BKS-S 20E
80 bar	60 bar	60 bar	80 bar	80 bar



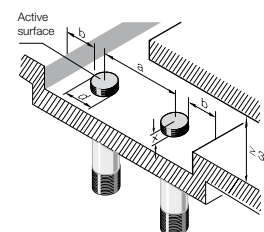
Installation dimensions for non-flush mountable sensors (please note)

Housing size	Dimension a	Dimension b	Dimension x	when installed in
M12	≥ 105 mm	≥ 30 mm	≥ 25 mm	Steel Fe 360
			≥ 15 mm	Aluminum
			≥ 17 mm	Brass
			≥ 25 mm	Stainless steel

When the installation dimensions are too close or with flush mounting, there may be a significant reduction in the switching distance!

Reduction factor (referenced to detection object)

Housing size	Factor	when installed in
M12	1	Steel Fe 360
	1	Aluminum
	0.8	Copper
	1	Brass
	1	Stainless ≥ 5 mm thick



Features

- Steelface with long switching distance
- Extremely rugged, with more function reserve due to the long range
- **Also available in weld splatter resistant version (Teflon coated)**

Long switching distance



Matrix for usability of metal holders

Sensors	BES 18.0-KH-2M	BES 18P-KH-2W	BES 18.0-KB-4-F	BES 18.0-KB-3-F	BES 18.0-KH-9ST/W	BES 30.0-KH-2S	BES 30.0-KH-2SW	BES 30.0-KB-4-F	BES 30.0-KB-3-F	BES 30.0-KH-9ST/W
BES M18-EI-PSC72B-S04G-S	yes	yes	yes	yes	yes					
BES M18-EI-PSC72B-S04G-S-01	yes	yes	yes	yes	yes					
BES M18-EI-NSC72B-S04G-S	yes	yes	yes	yes	yes					
BES M18-EI-NSC72B-S04G-S-01	yes	yes	yes	yes	yes					
BES M18-EG1-PSC10Z-S04G-S11	no	no	no	yes	no					
BES M18-EG1-NSC10Z-S04G-S11	no	no	no	yes	no					
BES M30-EG1-PSC20Z-S04G-S11						yes	yes	no	yes	yes
BES M30-EG1-NSC20Z-S04G-S11						yes	yes	no	yes	yes

When using metal mounts, a reduction in the switching distance can be expected. The matrix is provided as a guide. Always verify the usability of the holders in the application.

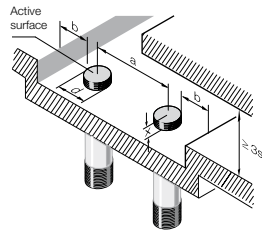
	M18x1
Housing size	Flush
Installation type	Flush
Rated operating distance s_n	7.2 mm
Assured operating distance s_a	0...5.2 mm
PNP Normally open	BES M18EI-PSC72B-S04G-S
NPN Normally open	BES M18EI-NSC72B-S04G-S
Supply voltage U_B	10...30 V DC
Voltage drop U_d at I_e	≤ 2 V
Rated insulation voltage U_i	75 V DC
Rated operating current I_e	200 mA
No-load current I_0 max.	≤ 12 mA
Protected against polarity reversal	yes
Short circuit protected	yes
Repeat accuracy R	≤ 5 %
Ambient temperature range T_a	-25...+70 °C
Frequency of operating cycles f	250 Hz
Utilization categories	DC 13
Function indicator (flashes between approx. 70 and 100 % of effective operating distance s_e)	yes
Degree of protection per IEC 60529	IP 67
Housing material	Stainless steel
Material of active surface	Stainless steel
Connection	Connectors
Recommended connector	BKS-_ 19/BKS-_ 20/ BKS-S 20E
Pressure rated to	60 bar

Flush mountable sensors

These sensors can be embedded in ferromagnetic material up to the active surface.

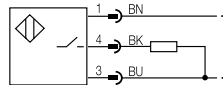
When installing in non-ferrous metals, the values for "x" shown in the table below must be maintained. The result is a maximum deviation of 10 % from the effective operating distance s_e .

Size d	Dimension b	Dimension x
M18	≥ 18 mm	≥ 11 mm

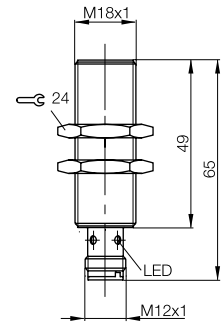
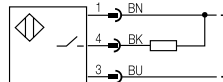


Wiring diagrams

PNP, normally open



NPN, normally open



Installation dimensions for quasi-flush mountable sensors

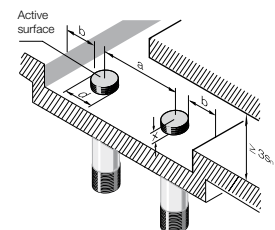
(please note)

Housing size	Dimension a	Dimension b	Dimension x	when installed in
M18	≥ 60 mm	≥ 16 mm	≥ 14 mm	Steel Fe 360
			≥ 12 mm	Aluminum
			≥ 14 mm	Brass
			≥ 16 mm	Stainless steel
M30	≥ 90 mm	≥ 30 mm	≥ 28 mm	Steel Fe 360
			≥ 28 mm	Aluminum
			≥ 28 mm	Brass
			≥ 35 mm	Stainless steel

When the installation dimensions are too close or with flush mounting, there may be a significant reduction in the switching distance!

Reduction factor (referenced to detection object)

Housing size	Factor	when installed in
M18	1	Steel Fe 360
	0.8...1	Aluminum
	0.7...0.85	Copper
	0.85...1.3	Brass
	0.5/0.8	Stainless 1 mm/≥ 2 mm thick
	1	Steel Fe 360
M30	1	Steel Fe 360
	0.7...1	Aluminum
	0.7...0.9	Copper
	0.9...1.2	Brass
	0.5/1	Stainless 1 mm/≥ 2 mm thick



more added value

- Extremely rugged and reliable
- Long switching distance for greater function reserves

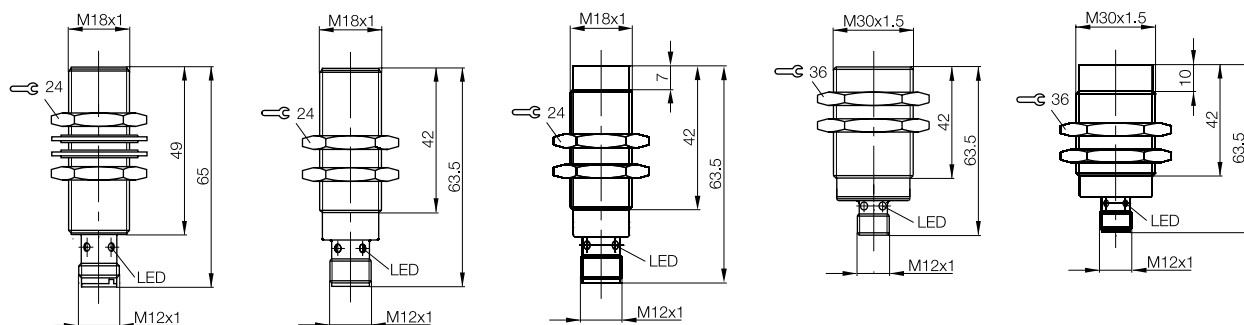
Inductive Sensors

3-wire, M18, M30

s_n 7.2 mm, 10 mm, 20 mm, 40 mm



M18x1	M18x1	M18x1	M30x1.5	M30x1.5
Flush	Quasi-flush	Non-flush	Quasi-flush	Non-flush
7.2 mm	10 mm	20 mm	20 mm	40 mm
0...5.2 mm	0...8.1 mm	0...16.2 mm	0...16.2 mm	0...32.4 mm
BES M18EI-PSC72B-S04G-S01	BES M18EG1-PSC10Z-S04G-S11	BES M18EF1-PSC20F-S04G-S	BES M30EG1-PSC20Z-S04G-S11	BES M30EE1-PSC40F-S04G-S
BES M18EI-NSC72B-S04G-S01	BES M18EG1-NSC10Z-S04G-S11	BES M18EF1-NSC20F-S04G-S	BES M30EG1-NSC20Z-S04G-S11	BES M30EE1-NSC40F-S04G-S
10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
≤ 2 V	≤ 2 V	≤ 2 V	≤ 2 V	≤ 2 V
75 V DC	75 V DC	75 V DC	75 V DC	75 V DC
200 mA	200 mA	200 mA	200 mA	200 mA
≤ 12 mA	≤ 16 mA	≤ 12 mA	≤ 16 mA	≤ 12 mA
yes	yes	yes	yes	yes
yes	yes	yes	yes	yes
≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %
-25...+70 °C	-25...+70 °C	-25...+70 °C	-25...+70 °C	-25...+70 °C
250 Hz	200 Hz	150 Hz	200 Hz	100 Hz
DC 13	DC 13	DC 13	DC 13	DC 13
yes	yes	yes	yes	yes
IP 67	IP 67	IP 67	IP 67	IP 67
Stainless steel/Teflon coated	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Stainless steel/Teflon coated	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Connectors	Connectors	Connectors	Connectors	Connectors
BKS-_ 19/BKS-_ 20/ BKS-S 20E	BKS-_ 19/BKS-_ 20/ BKS-S 20E	BKS-_ 19/BKS-_ 20/ BKS-S 20E	BKS-_ 19/BKS-_ 20/ BKS-S 20E	BKS-_ 19/BKS-_ 20/ BKS-S 20E
60 bar	60 bar	60 bar	40 bar	40 bar



Installation dimensions for non-flush mountable sensors

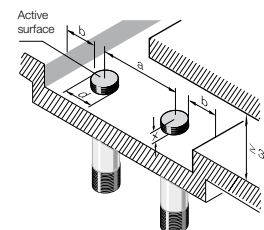
(please note)

Housing size	Dimension a	Dimension b	Dimension x	when installed in
M18	≥ 200 mm	≥ 50 mm	≥ 45 mm	Steel Fe 360
			≥ 25 mm	Aluminum
			≥ 25 mm	Brass
			≥ 45 mm	Stainless steel
M30	≥ 370 mm	≥ 90 mm	≥ 70 mm	Steel Fe 360
			≥ 40 mm	Aluminum
			≥ 40 mm	Brass
			≥ 70 mm	Stainless steel

When the installation dimensions are too close or with flush mounting, there may be a significant reduction in the switching distance!

Reduction factor (referenced to detection object)

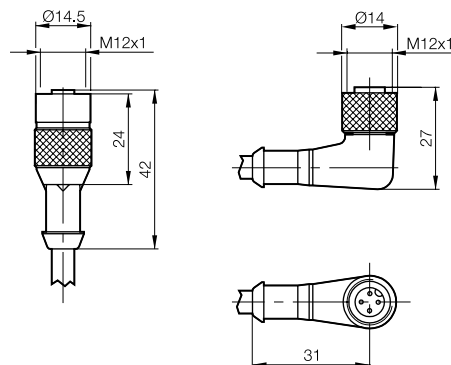
Housing size	Factor	when installed in
M18	1	Steel Fe 360
	0.7	Aluminum
	0.7	Copper
	0.7	Brass
	1	Stainless > 5 mm thick
M30	1	Steel Fe 360
	0.7	Aluminum
	0.7	Copper
	1	Brass
	1	Stainless ≥ 5 mm thick



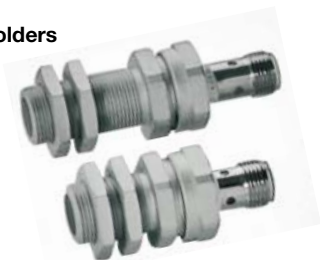


Connectors	BKS-S 19		BKS-S 20
Version	Straight female		Right angle female
Use	S48 connector sensors		S48 connector sensors
no LED, Normally open	BKS-S 19-1-PU-03		BKS-S 20-1-PU-03
no LED, Normally closed	BKS-S 19-3-PU-03		BKS-S 20-2-PU-05
no LED, Complementary	BKS-S 19-4-PU-03		BKS-S 20-3-PU-03
with 2 LED's Normally open PNP	BKS-S 19-4-PU-03		BKS-S 20-4-PU-03
with 2 LED's Normally closed NPN	BKS-S 19-8-PU-03		BKS-S 20-7-PU-05
with 2 LED's Complementary PNP	BKS-S 19-9-PU-03		BKS-S 20-8-PU-03
with 2 LED's Complementary NPN	BKS-S 19-9-PU-03		BKS-S 20-9-PU-05
no LED Complementary Shielded	BKS-S 19-14-PU-05*		
Supply voltage U_b	10...30 V DC		10...30 V DC
Cable	3 m/5 m molded-on PUR		3 m/5 m molded-on PUR
No. of conductors × cross-section	3×0.34 mm ² /4×0.34 mm ²		3×0.34 mm ² /4×0.34 mm ²
Degree of protection per IEC 60529	IP 68 per BWN Pr. 20		IP 68 per BWN Pr. 20
Ambient temperature range T_a	-25...+70 °C		-25...+70 °C

*Knurled ring used for shielding!



Clamp holders



For information, see Object Detection catalog and data sheets.

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