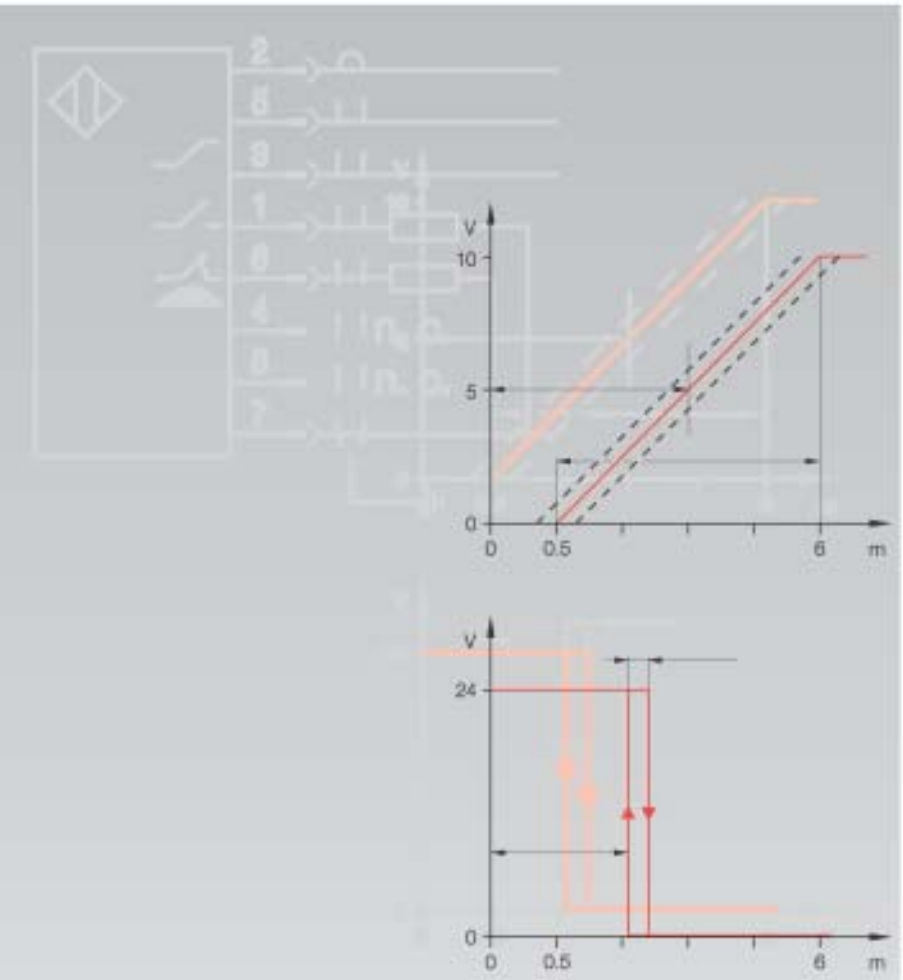
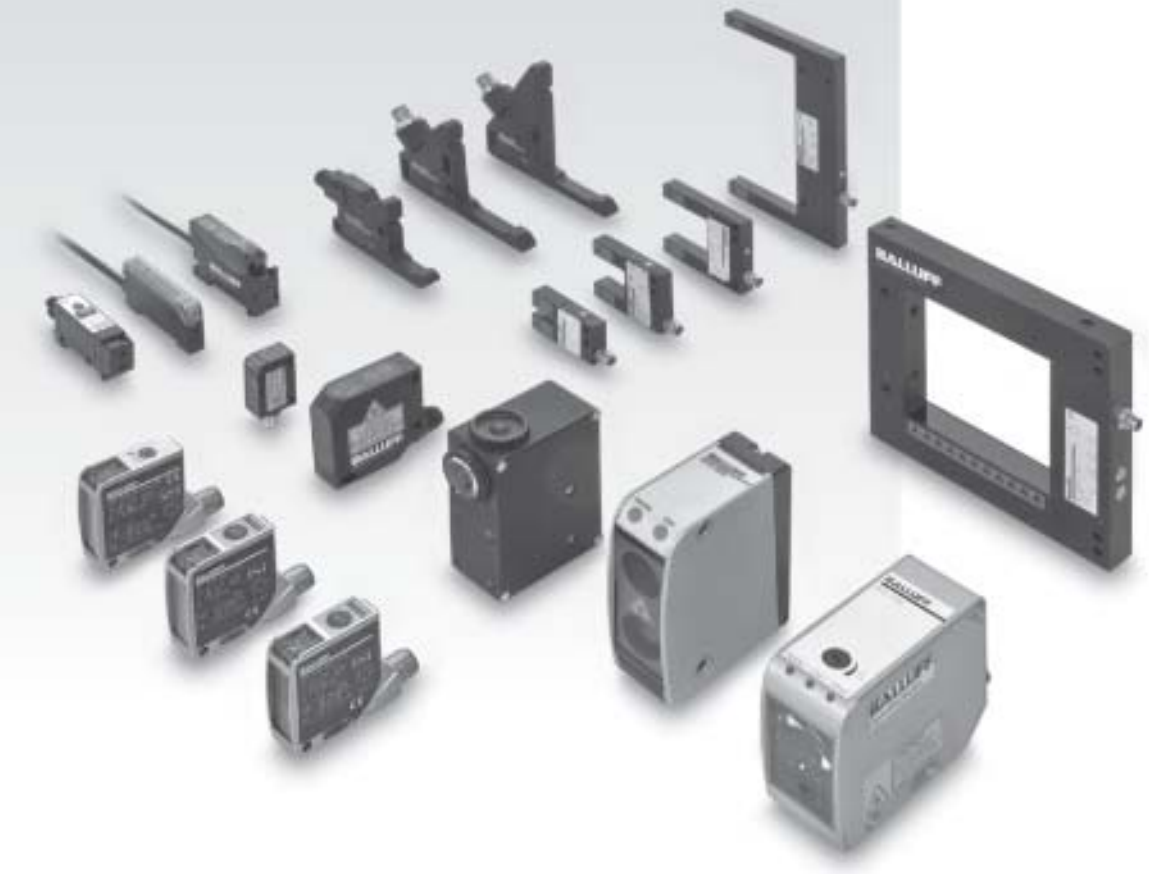
Photoelectric Sensors for Special Applications





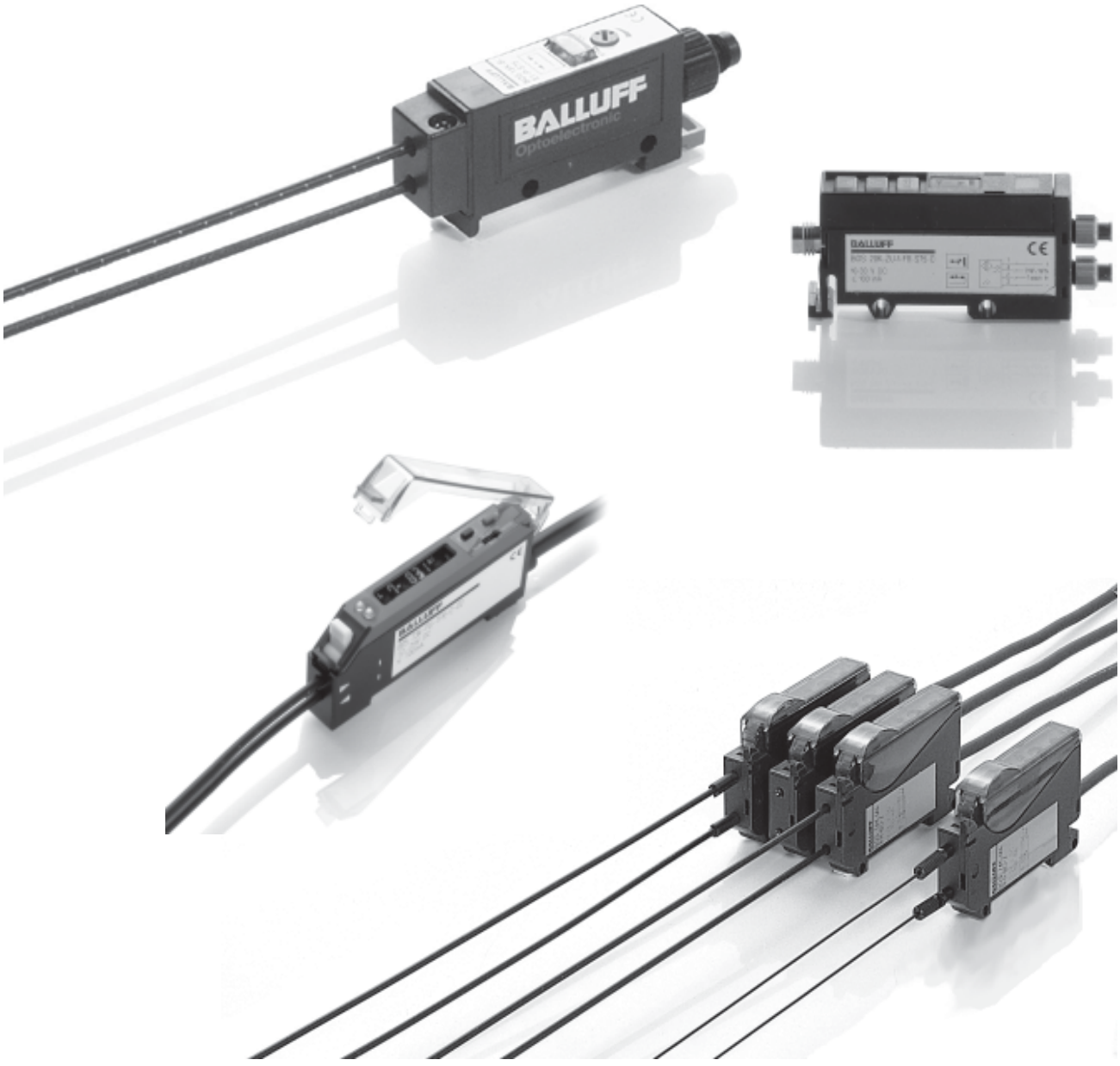
When there's no space for a photoelectric sensor, there is only one solution: user fiber optics!

If there are no particular demands for ruggedness, ambient temperature or chemical resistance, then plastic fiber optics are the right choice.

A wide range of special base units with various performance and function features is available for using the fiber optics. From the simple version with potentiometer to the high-end unit with display.

Applications

- Small parts detection
- Suitable for tight mounting conditions
- Inspecting parts features
- Counting tasks (e.g. counting drops)
- Precise parts positioning
- Handling and assembly
- Robotics



Type	Light type		Output			Output function		Switching frequency	U_B		Connection			Features		Page
	Red light		PNP-Transistor	NPN-Transistor	Alarm output	Light-on	Dark-on		10...30 V DC	11...26 V DC	M8 connector, 3-pin	M8 connector, 4-pin	Cable	Teach-in	Test input	
Fiber optic base units																
BOS 15K-S-E1-P-S75	■		■			■	■	500 Hz	■			■				**2.2.**5
BOS 15K-S-E1-02	■		■	■		■	■	500 Hz	■				■			**2.2.**5
BOS 20K-ZU-1FR-S75-C	■		■	■		■	■	1 kHz	■			■		■		**2.2.**7
BOS 20K-ZU-1FR-C-PU-02	■		■	■		■	■	1 kHz	■				■	■		**2.2.**7
BOS 73K-PU-1FR-C-02	■		■		■	■	■	1 kHz		■			■	■		**2.2.**9
BOS 73K-PU-1FR-C-S75-0,1	■		■		■	■	■	1 kHz		■		■		■		**2.2.**9
BOS 74K-UU-1FR-B0-Z-S49-0,2	■		■	■		■	■	1 kHz	■		■					**2.2.**11
BOS 74K-UU-1FR-B0-Z-02	■		■	■	■	■	■	1 kHz	■				■		■	**2.2.**11
BOS 74K-UU-1FS-B0-Z-02	■		■	■	■	■	■	8 kHz	■				■		■	**2.2.**11

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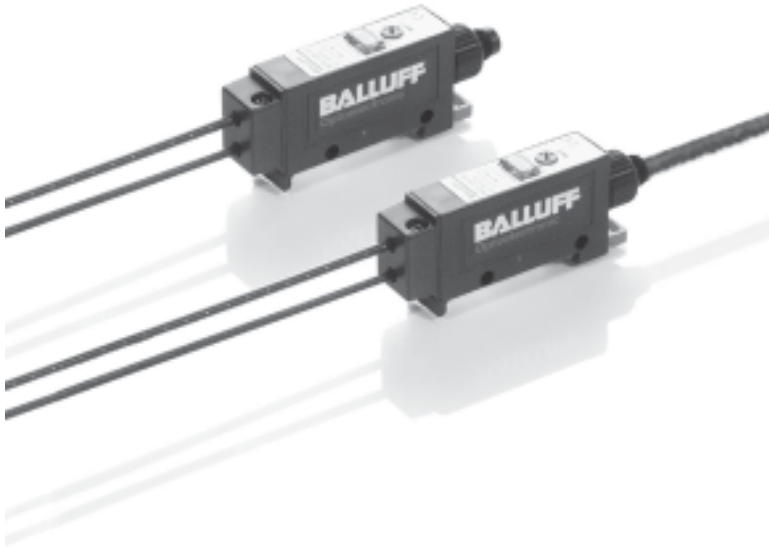
For standard applications, choose the **BOS 15K**. Its main features are cost-effectiveness and ease of handling.

Features

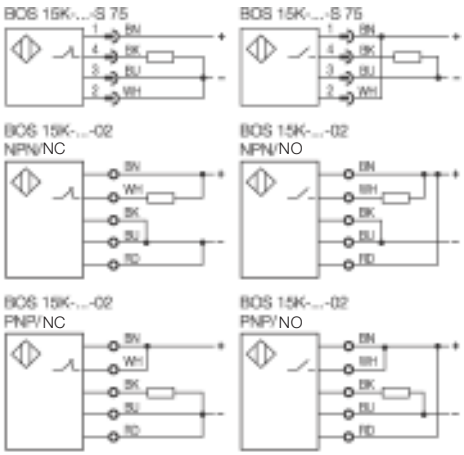
- Sensitivity setting with a 270° potentiometer
- Contamination indicator
- PNP/NPN wiring (cable version)



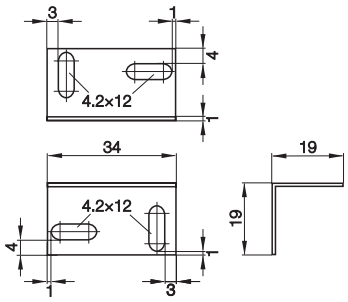
Mounting notes for fiber optics

The resistance of the sealing ring must be overcome when connecting the fiber optics to the base unit.

Wiring diagrams



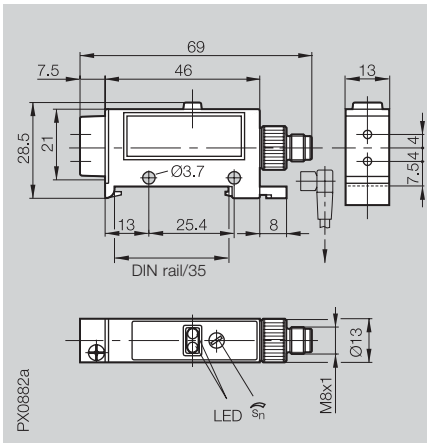
Mounting bracket
(included)

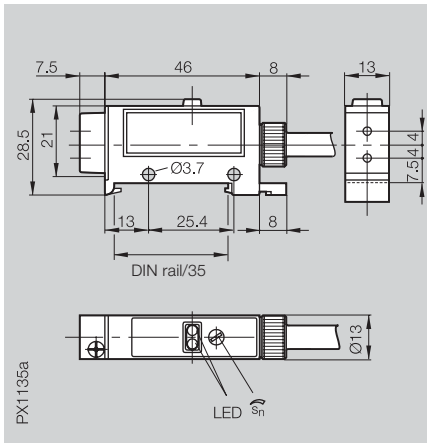


Recommended accessories
please order separately

Connector
BKS-S 74/BKS-S 75

Series	BOS 15K	BOS 15K
Plastic fiber optic base unit	for plastic fiber optics with outside diameter 2.2 mm	for plastic fiber optics with outside diameter 2.2 mm
Range	depends on fiber optic cable	depends on fiber optic cable





Base unit		
PNP	BOS 15K-S-E1-P-S 75	
PNP/NPN		BOS 15K-S-E1-02
Electrical data		
Supply voltage U_B	10...30 V DC	10...30 V DC
Ripple	≤ 10 %	≤ 10 %
No-load supply current I_0 max.	≤ 30 mA	≤ 30 mA
Switching output	PNP-Transistor	PNP and NPN Transistor
Switching type	Light-/dark-on (selectable)	Light-/dark-on (selectable)
Output current	100 mA	100 mA
Voltage drop U_d at I_e	≤ 1.5 V	≤ 1.5 V
Settings	Potentiometer 270°	Potentiometer 270°
Optical data		
Emitter, light type	LED, red light	LED, red light
Wavelength	660 nm	660 nm
Light spot diameter	depends on fiber optic cable	depends on fiber optic cable
Time data		
Response time	≤ 1 ms	≤ 1 ms
Switching frequency f	500 Hz	500 Hz
Indicators		
Output function indicator	LED red	LED red
Stability indicator	LED green	LED green
Mechanical data		
Connection	M8 connector, 4-pin	2 m cable, PVC
No. of wires × cross-section		5×0.25 mm²
Housing material	ABS	ABS
Optical surface	depends on fiber optic cable	depends on fiber optic cable
Weight	30 g	110 g
Ambient data		
Degree of protection per IEC 60529	IP 66	IP 66
Polarity reversal protected	yes	yes
Short circuit protected	yes	yes
Ambient light rejection	3 kLux	3 kLux
Ambient temperature range T_a	–15...+55 °C	–15...+55 °C

Connector orientation

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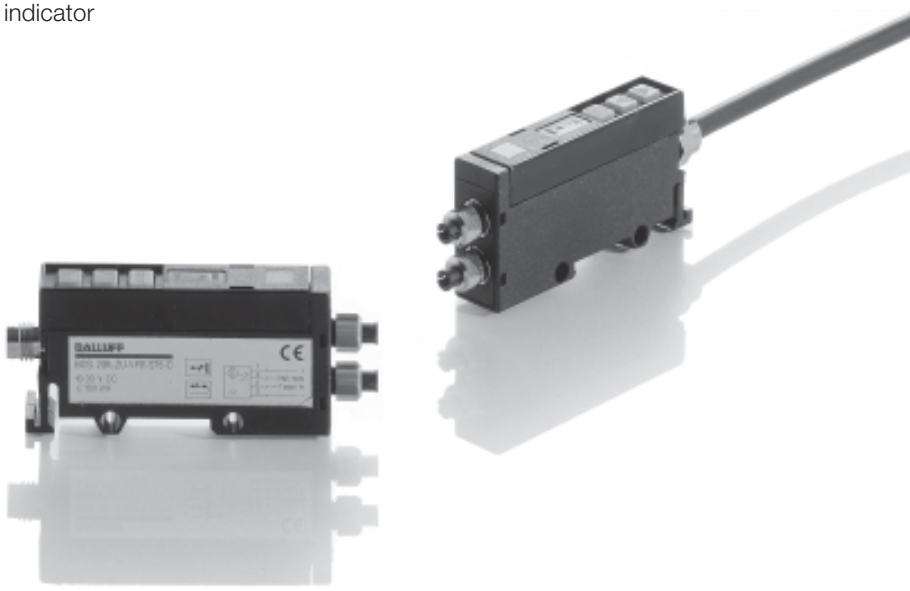
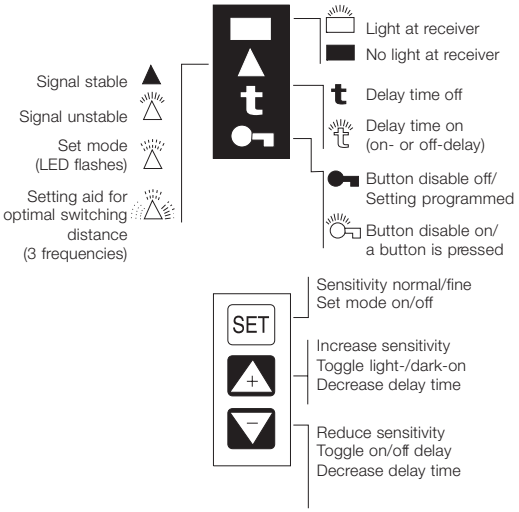
The **BOS 20K** is programmed using teach-in or manually with buttons. It combines automatic setting with the simple press of a button for using additional functions (e.g., time delay) as needed.
2 sensitivity levels are directly available, which can be changed as needed using 2 buttons. A control line can be also used to teach the sensor remotely.

Features

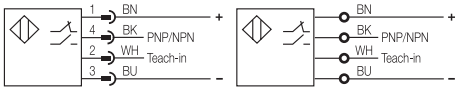
- Teach-in (self-setting) also remotely
- Contamination indicator
- Time functions
- Button disable



Indicators and operating elements



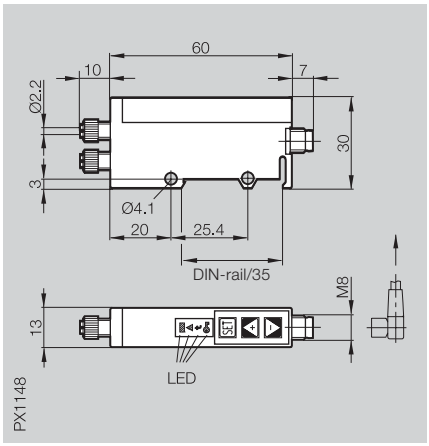
Wiring diagrams

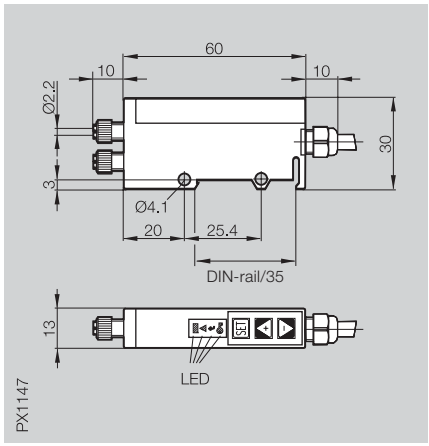


Recommended accessories
please order separately

Connector
BKS-S 74/BKS-S 75

Series	BOS 20K	BOS 20K
Plastic fiber optic base unit	for plastic fiber optics mit with outside diameter 2.2 mm	for plastic fiber optics with outside diameter 2.2 mm
Range	depends on fiber optic cable	depends on fiber optic cable





Base unit

PNP/NPN	BOS 20K-ZU-1FR-S 75-C	BOS 20K-ZU-1FR-C-PU-02
Electrical data		
Supply voltage U_B	10...30 V DC	10...30 V DC
Ripple	≤ 10 %	≤ 10 %
No-load supply current I_0 max.	≤ 45 mA	≤ 45 mA
Switching output	PNP and NPN Transistor	PNP and NPN Transistor
Switching type	Light-/dark-on (selectable)	Light-/dark-on (selectable)
Output current	100 mA	100 mA
Voltage drop U_d at I_e	≤ 2 V	≤ 2 V
Settings	teach-in/manually using buttons	teach-in/manually using buttons
Optical data		
Emitter, light type	LED, red light	LED, red light
Wavelength	660 nm	660 nm
Light spot diameter	depends on fiber optic cable	depends on fiber optic cable
Time data		
Response time	≤ 500 µs	≤ 500 µs
Switching frequency f	1 kHz	1 kHz
Time functions	On-/off-delay 0…5 s in 11 steps	On-/off-delay 0…5 s in 11 steps
Indicators		
Output function indicator	LED green	LED green
Stability indicator	LED red	LED red
Mechanical data		
Connection	M8 connector, 4-pin	2 m cable, PVC
No. of wires × cross-section		4×0.25 mm²
Housing material	ABS	ABS
Optical surface	depends on fiber optic cable	depends on fiber optic cable
Weight	50 g	145 g
Ambient data		
Degree of protection per IEC 60529	IP 65	IP 65
Polarity reversal protected	yes	yes
Short circuit protected	yes	yes
Ambient light rejection	10 kLux	10 kLux
Ambient temperature range T_a	0...+60 °C	0...+60 °C

Connector orientation

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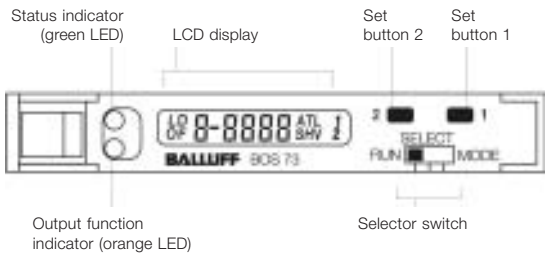
The **BOS 73K** with indicators simplifies operation of the sensor and gives an accurate overview of the settings. The display shows sensitivity, signal strength as well as ancillary functions. The switching point and hysteresis can be automatically acquired but also manually set. The powerful red light emitter permits very long sensing and detection ranges. Both a switching and alarm output are provided. Time functions can also be set. Two transmission channels are provided for using multiple sensors without mutual interference.

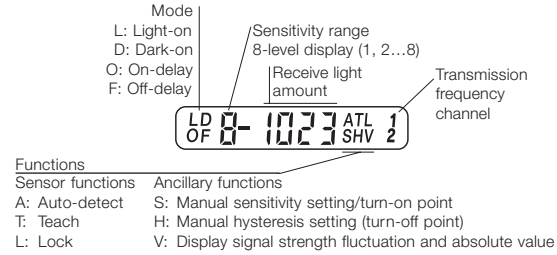
Features

- LCD display with backlighting
- Teach-in calibration
- Powerful red light emitter for long ranges
- Contamination output
- All time functions can be set from 10…120 ms
- Two transmission channels

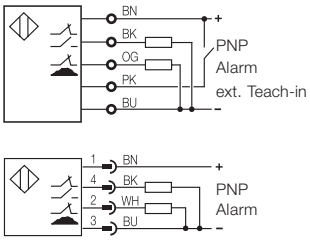
Control panel



Display



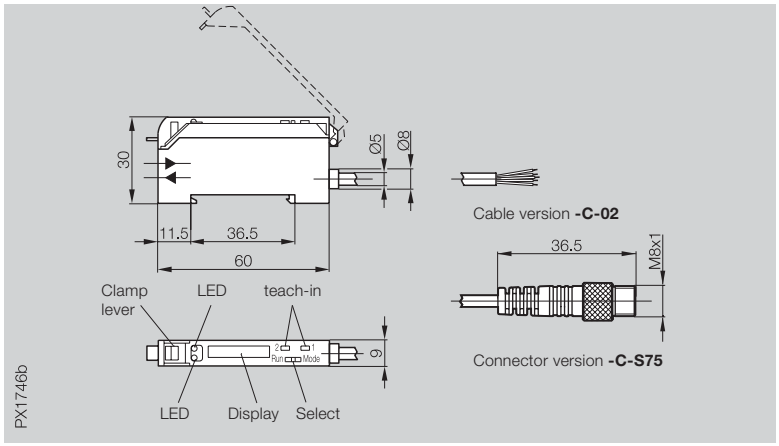
Wiring diagrams



Recommended accessories
please order separately

Connector
BKS-S 74/BKS-S 75

Series	BOS 73K
Plastic fiber optic base unit	for plastic fiber optics with outside diameter 2.2 mm
Range	depends on fiber optic cable



Base unit

PNP		BOS 73K-PU-1FR-C-02	BOS 73K-PU-1FR-C-S75-0,1
Electrical data			
Supply voltage U_B		11...26 V DC	
Ripple		≤ 10 %	
No-load supply current I_0 max.		≤ 50 mA	
Switching output		PNP-Transistor, open collector	
Switching type		Light-/dark-on (selectable)	
Output current	Switching output	100 mA	
	Alarm output	50 mA	
Voltage drop U_d at I_e		≤ 2 V	
Settings		teach-in/manually using buttons	
Optical data			
Emitter, light type		LED, red light	
Wavelength		660 nm	
Light spot diameter		depends on fiber optic cable	
Time data			
Response time		Channel 1 0.5 ms	Channel 2 0.6 ms
Switching frequency f (standard)		1 kHz	833 Hz
Time functions		On- and/or off-delay 10…120 ms selectable	
Indicators			
Output function indicator		LED orange	
Stability indicator		LED green	
Display		Backlit LCD	
Mechanical data			
Connection		2m cable, PVC	M8 connector, 4-pin
No. of wires × cross-section		5×0.2 mm²	
Housing material		PC	
Optical surface		depends on fiber optic cable	
Weight (incl. holder)		80 g	
Ambient data			
Degree of protection per IEC 60529		IP 54	
Polarity reversal protected		yes	
Short circuit protected		yes	
Ambient temperature range T_a		–25...+55 °C	
Ambient light rejection		Artificial light ≤ 10 kLux, sunlight ≤ 20 kLux	

Mounting materials included!

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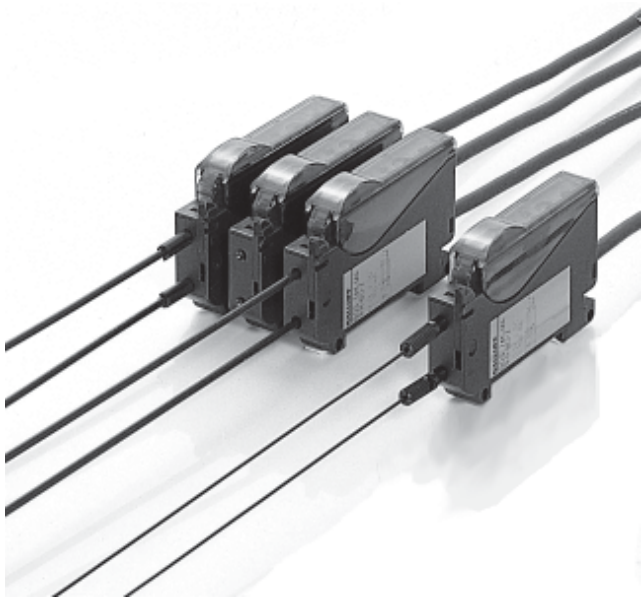
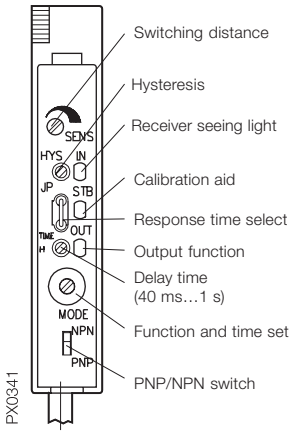
The **BOS 74K** offers maximum performance and adjusting flexibility (time functions, switching hysteresis) in various models for mastering even difficult applications.

Features

- Extended range
- 12-turn potentiometer for sensitivity setting
- Contamination indicator and alarm output
- Adjustable switching hysteresis
- Time functions (can be set from 40 ms…1 s)
- High-frequency version available (8 kHz)



Indicators and operating elements



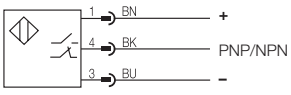
BOS 74K function table

Position	KV	EV	AV	WF	HS	DS	AE	AA
0			■			■	■	
1				■		■	■	
2	■					■	■	
3		■				■	■	
4			■		■		■	
5				■	■		■	
6	■				■		■	
7		■			■		■	
8			■			■		■
9				■		■		■
A	■					■		■
B		■				■		■
C			■		■			■
D				■	■			■
E	■				■			■
F		■			■			■

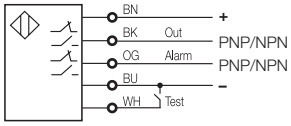
Function
KV: No delay
EV: On-delay
AV: Off-delay
WF: Wipe function
HS: Light-on
DS: Dark-on
AE: Alarm output normally open
AA: Alarm output normally closed
■: Enabled

Wiring diagrams

BOS 74K...S49-0,2



BOS 74K...Z-02



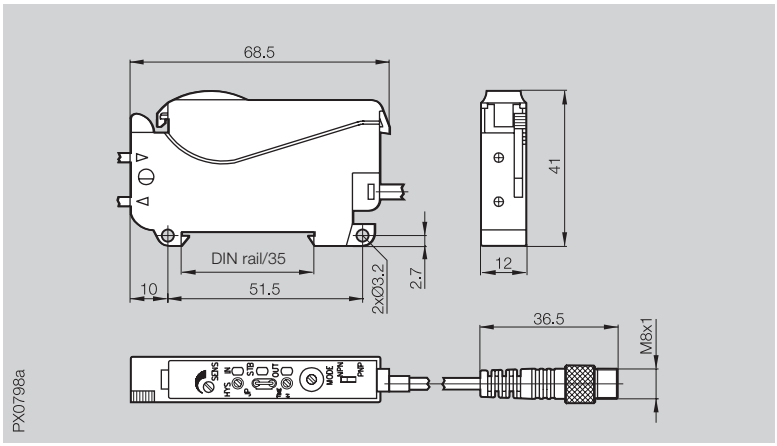
Recommended accessories

please order separately

Mounting bracket
BOS 74-HW-1

Connector
BKS-_ 48/BKS-_ 49

Series	BOS 74K	BOS 74K	BOS 74K
Plastic fiber optic base unit	for plastic fiber optics with outside diameter 2.2 mm	for plastic fiber optics with outside diameter 2.2 mm	for plastic fiber optics with outside diameter 2.2 mm
Range	depends on fiber optic cable	depends on fiber optic cable	depends on fiber optic cable



Base unit

PNP/NPN		BOS 74K-UU-1FR-B0-Z-S49-0,2	BOS 74K-UU-1FR-B0-Z-02	
PNP/NPN	High-speed*			BOS 74K-UU-1FS-B0-Z-02
Electrical data				
Supply voltage U_B		10...30 V DC	10...30 V DC	10...30 V DC
Ripple		≤ 10 %	≤ 10 %	≤ 10 %
No-load supply current I_0 max.		≤ 40 mA	≤ 40 mA	≤ 40 mA
Switching output		PNP and NPN Transistor	PNP and NPN Transistor	PNP and NPN Transistor
Switching type		Light-/dark-on (selectable)	Light-/dark-on (selectable)	Light-/dark-on (selectable)
Output current	Switching output	200 mA	200 mA	200 mA
	Alarm output		50 mA	50 mA
Voltage drop U_d at I_e		≤ 2.5 V	≤ 2.5 V	≤ 2.5 V
Settings		12-turn potentiometer	12-turn potentiometer	12-turn potentiometer
Help functions			Test input	Test input
Optical data				
Emitter, light type		LED, red light	LED, red light	LED, red light
Wavelength		660 nm	660 nm	660 nm
Light spot diameter		depends on fiber optic cable	depends on fiber optic cable	depends on fiber optic cable
Time data				
Response time		≤ 500 µs	≤ 500 µs	≤ 60 µs
Switching frequency f		1 kHz	1 kHz	8 kHz
Time functions		On-/off-delay selectable 40 ms...1 s	On-/off-delay selectable 40 ms...1 s	On-/off-delay selectable 40 ms...1 s
Indicators				
Output function indicator		LED red	LED red	LED red
Stability indicator		LED green	LED green	LED green
Receive indicator		LED yellow	LED yellow	LED yellow
Mechanical data				
Connection		200 mm cable with M8 connector, 3-pin	2 m cable, PVC	2 m cable, PVC
No. of wires × cross-section			5×0.25 mm²	5×0.25 mm²
Housing material		PBT	PBT	PBT
Optical surface		depends on fiber optics	depends on fiber optics	depends on fiber optics
Weight		50 g	125 g	125 g
Ambient data				
Degree of protection per IEC 60529		IP 66	IP 66	IP 66
Polarity reversal protected		yes	yes	yes
Short circuit protected		yes	yes	yes
Ambient light rejection		10 kLux	10 kLux	10 kLux
Ambient temperature range T_a		–10...+60 °C	–10...+60 °C	–10...+60 °C

*Range reduced by 30 %

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There are basically two types of fiber optics: diffuse or through-beam.
The diffuse models have an integrated emitter and receiver at the cable end. The through-beams use two separate cables.

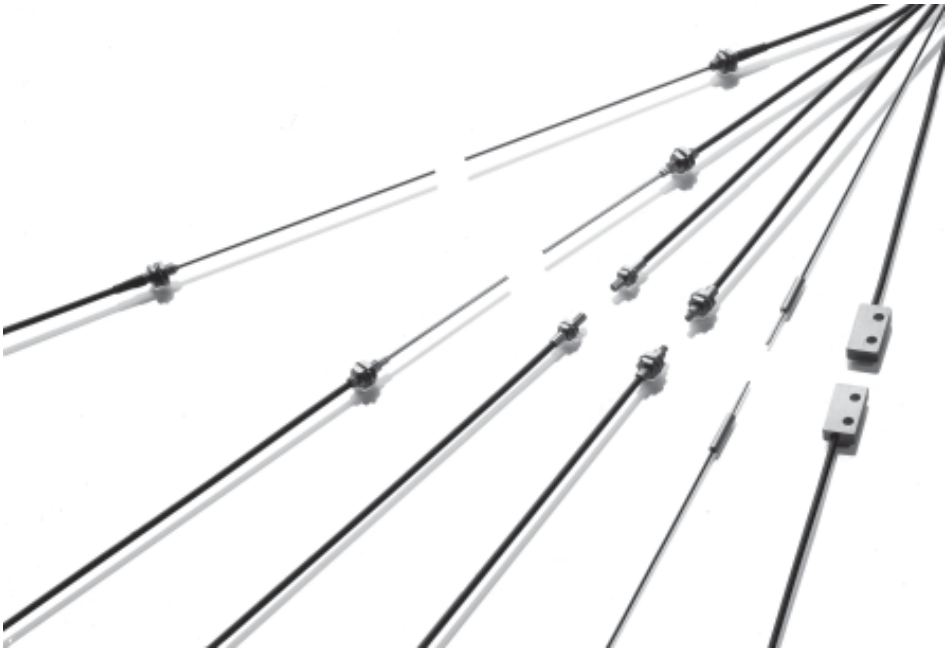
It's easy to see why fiber optics are so commonly used: The variety of end configurations, with straight or angled light exit, flexible optical head or coaxial fibers, the various fiber diameters and the ability to trim them to the desired length.

Another plus

For the ultimate in flexibility, fiber optics for user assembly are also available: any desired combinations are possible with the trim-to-length duplex cable and various end fittings.

Applications

- Small parts detection
- For tight mounting conditions
- Inspecting parts features
- Counting (e.g. counting drops)
- Precise parts positioning
- Handling and assembly
- Robotics



Type	Version		Light exit		Fiber arrangement			Fiber diameter			Features		Page
	Through-beam	Diffuse	Straight	90°	Duplex	Coaxial	Light grid	2.2 mm	1.3 mm	1.0 mm	Bendable optical head	Can be user-assembled	
Plastic Fiber Optics													
BFO 74A-LA-KB-PZK-10-02	■		■					■					**2.2.**15
BFO 74A-LA-NB-PZK-10-02	■		■					■			■		**2.2.**14
BFO 74A-LA-RB-PZK-10-02	■		■					■					**2.2.**15
BFO D22-LA-AD-EAK-52-02	■		■				■	■					**2.2.**15
BFO D22-LA-TB-EAK-10-02	■		■					■			■		**2.2.**14
BFO D13-LA-QB-EAK-05-02	■			■					■				**2.2.**15
BFO D22-LA-QB-PAK-05-02	■			■				■					**2.2.**15
BFO 74A-XA-HB-PZK-10-02		■	■		■					■	■		**2.2.**16
BFO 74A-XB-KB-PZK-10-02		■	■			■				■			**2.2.**18
BFO 74A-XA-JB-PZK-20-02		■	■		■			■					**2.2.**17
BFO 74A-XB-LB-PZK-15-02		■	■			■		■					**2.2.**18
BFO D22-XA-SB-EAK-20-02		■	■		■			■			■		**2.2.**17
BFO D22-XA-UB-EAK-20-02		■	■		■			■					**2.2.**17
BFO N22-XA-VB-EAK-10-02		■	■		■					■	■		**2.2.**16
BFO N22-XA-RB-EAK-10-02		■	■		■					■			**2.2.**17
BFO D10-XA-GB-EAK-10-02		■	■		■					■	■		**2.2.**17
BFO D22-XA-MB-PAK-10-02		■		■	■					■			**2.2.**18
BFO D22-LD-EAK-10-20	■		■	■	■			■				■	**2.2.**19

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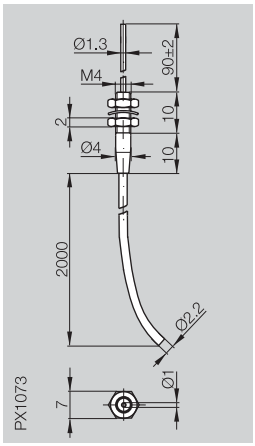
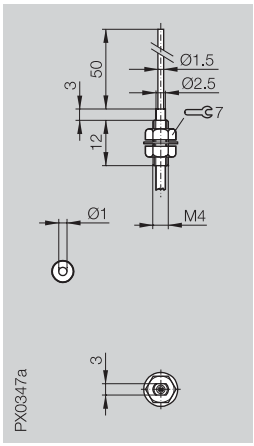
Through-beam	with BOS 15K	Range	**150 mm**	**150 mm**	
	with BOS 20K	Range	**200 mm**	**200 mm**	
	with BOS 73K	Range	**450 mm**	**450 mm**	
	with BOS 74K	Range*	**230 mm**	**230 mm**	





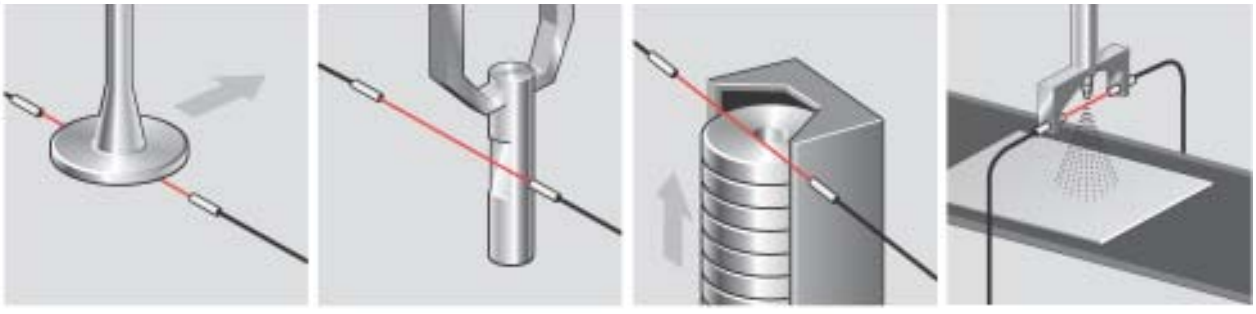
Ordering code	BFO D22-LA-TB-EAK-10-02	BFO 74A-LA-NB-PZK-10-02	
Fibers			
Cable length	2 m	2 m	
Can be trimmed	yes	yes	
Fiber arrangement	Single fiber	Single fiber	
Jacket Ø	2.2 mm	2.2 mm	
Core Ø	1 mm	1 mm	
Fiber bending radius	≥ 25 mm	≥ 25 mm	
End piece			
Light exit	straight	straight	
Optical head attachment	M4 thread	M4 thread	
Head bending radius	≥ 10 mm	≥ 10 mm	
General			
Temperature range	–35...+65 °C	–35...+65 °C	
Max. pull force (at 20 °C)	6 N	6 N	
Special features	bendable optical head	bendable optical head	

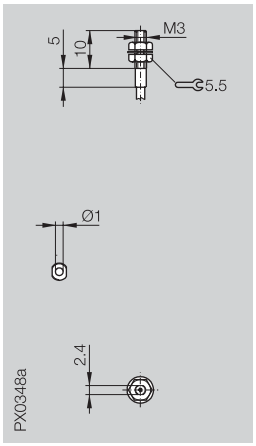
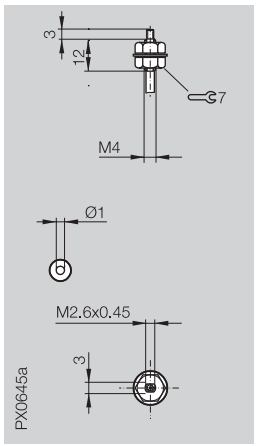
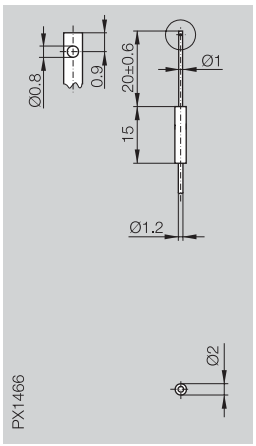
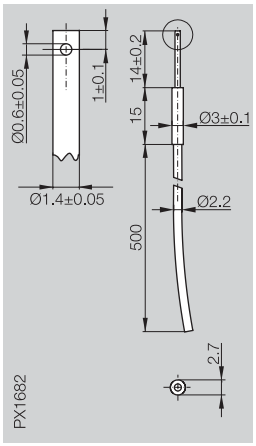
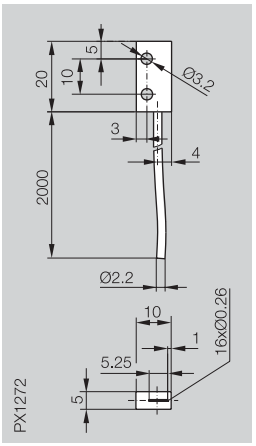
*Range is reduced by 30 % when using the BOS 74K-UU-1FS-.. base unit.

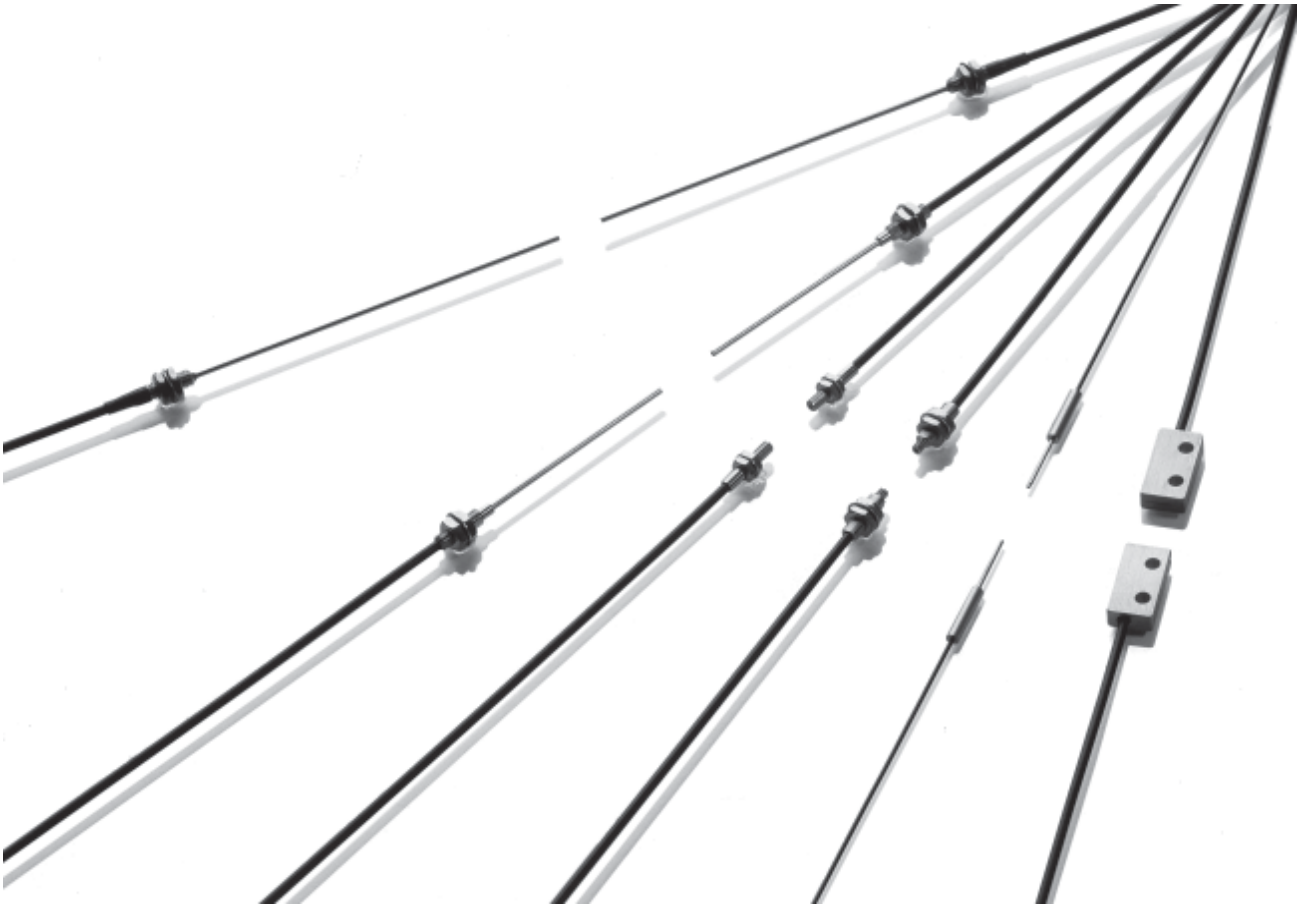
One fiber optic cable each for ermitter and receiver are included.
All user-configurable cables are supplied with the appropriate cutting tool.

Note!
A fiber optic through-beam changes the normally open signal of the base unit into a normally closed signal!

Cutting tool BFO CT and adapter BFO D10-LA-DC-10



	150 mm 200 mm 450 mm 230 mm	150 mm 200 mm 450 mm 230 mm	40 mm 90 mm 60 mm	50 mm 60 mm 95 mm 70 mm	150 mm 200 mm 450 mm 230 mm
					
	BFO 74A-LA-RB-PZK-10-02	BFO 74A-LA-KB-PZK-10-02	BFO D13-LA-QB-EAK-05-02	BFO D22-LA-QB-PAK-05-02	BFO D22-LA-AD-EAK-52-02
	2 m	2 m	2 m	2 m	2 m
	yes	yes	yes	yes	yes
	Single fiber	Single fiber	Single fiber	Single fiber	Light grid
	2.2 mm	2.2 mm	1.3 mm	2.2 mm	2.2 mm
	1 mm	1 mm	0.5 mm	1 mm	16 × 0.26 mm
	≥ 25 mm	≥ 25 mm	≥ 15 mm	≥ 25 mm	≥ 25 mm
	straight M3 thread	straight M4 thread	90° Clamp	90° Clamp	straight M3 screws
	–35...+65 °C 6 N	–35...+65 °C 6 N	–35...+65 °C 6 N	–40...+70 °C 6 N	–35...+65 °C 6 N



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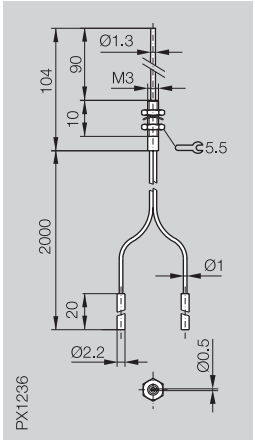
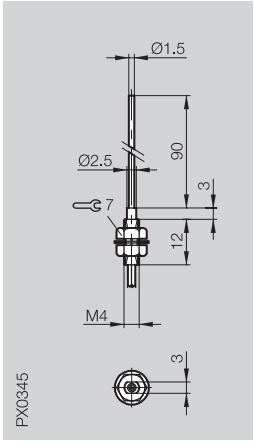
Diffuse	with BOS 15K	Range	**15 mm**		
	with BOS 20K	Range	**15 mm**	**10 mm**	
	with BOS 73K	Range	**35 mm**	**35 mm**	
	with BOS 74K	Range*	**20 mm**	**20 mm**	





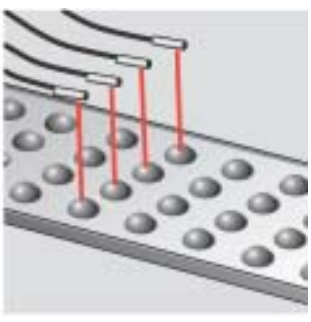
Ordering code	BFO N22-XA-VB-EAK-10-02	BFO 74A-XA-HB-PZK-10-02
Fibers		
Cable length	2 m	2 m
Can be trimmed	no	yes
Fiber arrangement	duplex	duplex
Jacket Ø	2 × 1 mm	2 × 1 mm
Core Ø	2 × 0.5 mm	2 × 0.5 mm
Fiber bending radius	≥ 15 mm	≥ 15 mm
End piece		
Light exit	straight	straight
Optical head attachment	M3 thread	M4 thread
Head bending radius	≥ 10 mm	≥ 10 mm
General		
Temperature range	–35...+65 °C	–35...+65 °C
Max. pull force (at 20 °C)	6 N	6 N
Special features	bendable optical head	bendable optical head

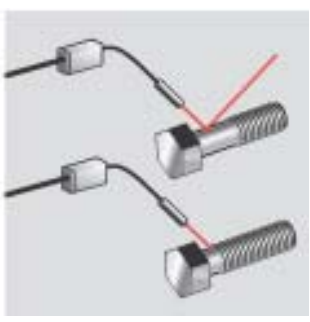
*Range is reduced by 30 % when using the BOS 74K-UU-1FS-.. base unit.

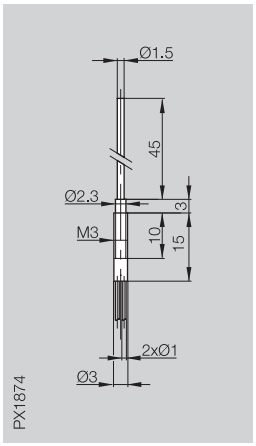
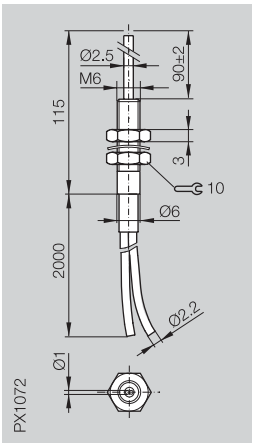
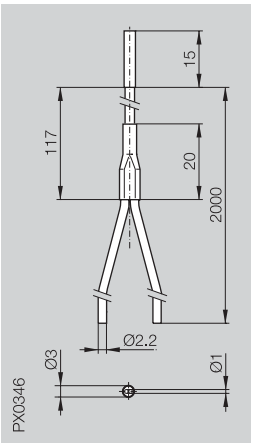
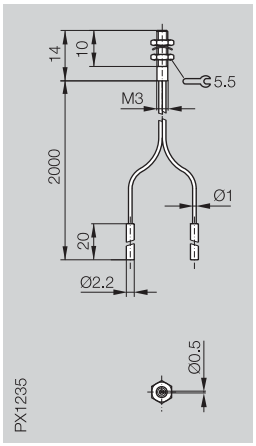
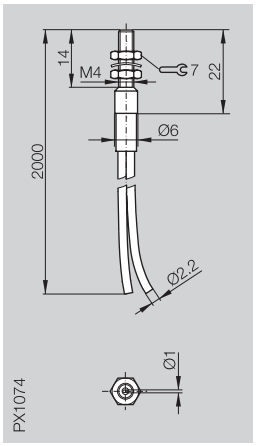
Please note when installing the fiber optic cable:

- Provide mechanical protection
- Observe permissible bending radius
- Avoid crushing the fibers

Cutting tool BFO CT and adapter BFO D10-LA-DC-10





		60 mm	60 mm	15 mm	60 mm
	10 mm	65 mm	65 mm	15 mm	65 mm
	35 mm	130 mm	130 mm	35 mm	130 mm
	20 mm	80 mm	80 mm	20 mm	80 mm
					
	BFO D10-XA-GB-EAK-10-02	BFO D22-XA-SB-EAK-20-02	BFO 74A-XA-JB-PZK-20-02	BFO N22-XA-RB-EAK-10-02	BFO D22-XA-UB-EAK-20-02
	2 m	2 m	2 m	2 m	2 m
	yes	yes	yes	no	yes
	duplex	duplex	duplex	duplex	duplex
	2 × 1 mm	2 × 2.2 mm	2 × 2.2 mm	2 × 1 mm	2 × 2.2 mm
	2 × 0.5 mm	2 × 1 mm	2 × 1 mm	2 × 0.5 mm	2 × 1 mm
	≥ 15 mm	≥ 25 mm	≥ 25 mm	≥ 15 mm	≥ 25 mm
	straight	straight	straight	straight	straight
	M3 thread	M6 thread	Clamp	M3 thread	M4 thread
	≥ 10 mm	≥ 15 mm			
		–35...+65 °C	–35...+65 °C	–35...+65 °C	–35...+65 °C
	6 N	6 N	6 N	6 N	6 N
	bendable optical head				

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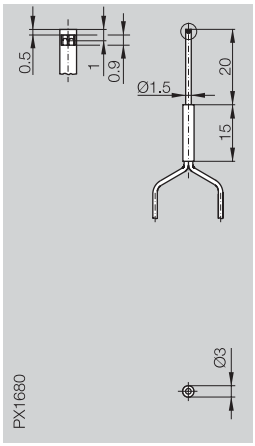
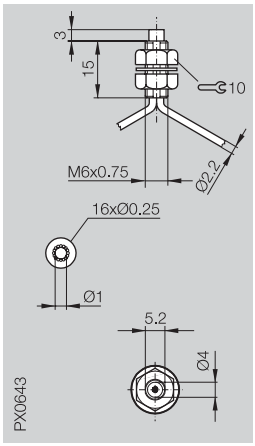
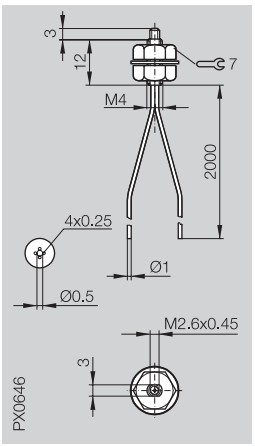
Diffuse	with BOS 15K	Range		**60 mm**	
	with BOS 20K	Range	**10 mm**	**70 mm**	**15 mm**
	with BOS 73K	Range	**30 mm**	**150 mm**	**70 mm**
	with BOS 74K	Range*	**15 mm**	**90 mm**	**25 mm**







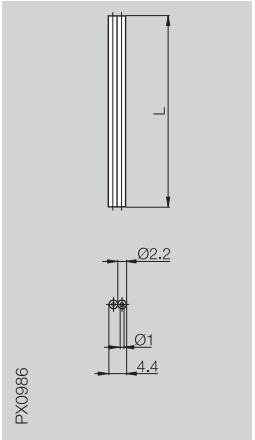
Ordering code	BFO D22-XA-MB-PAK-10-02	BFO 74A-XB-LB-PZK-15-02	BFO 74A-XB-KB-PZK-10-02
Fibers			
Cable length	2 m	2 m	2 m
Can be trimmed	yes	yes	yes
Fiber arrangement	duplex	coaxial	coaxial
Jacket Ø	2 × 1 mm	2 × 2.2 mm	2 × ≥ 1 mm
Core Ø	2 × 0.5 mm	1 × 1 mm/16 × 0.25 mm	1 × 0.5 mm/4 × 0.25 mm
Fiber bending radius	≥ 25 mm	≥ 25 mm	≥ 15 mm
End piece			
Light exit	90°	straight	straight
Optical head attachment	Clamp	M6 thread	M4 thread
General			
Temperature range	–40...+70 °C	–35...+65 °C	–35...+65 °C
Max. pull force (at 20 °C)	6 N	6 N	6 N

*Range is reduced by 30 % when using the BOS 74K-UU-1FS-.. base unit.

Individual solutions with user-assembled plastic fiber optics

If “off-the-rack” solutions aren’t for you, we have the alternative: Trim fiber optic cables to the length you require from a 20 m roll. You will only use exactly as much cable as needed – providing savings especially if you are using multiple sensors.
For simple applications, for example, you may not need an end piece; simply clamp the end. Or for convenience and flexibility, select from among the available end pieces. The plastic fiber optic cable is simply crimped into the end piece. No gluing is necessary, and the end piece can be removed at any time.

Size	**2.2×4.4 mm duplex cable**
Through-beam	
Range for L = 2 m	**150 mm**
Cable length	20 m

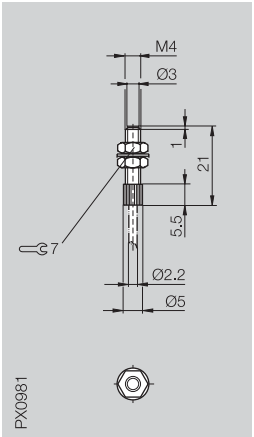


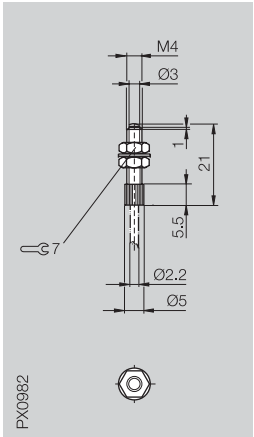
Ordering code	BFO D22-LD-EAK-10-20
Ambient operating temperature T_a	–40...+70 °C
Pull force on fiber optics and connection parts at 20 °C	6 N
Jacket Ø	2×1 mm
Core Ø	2.2 mm

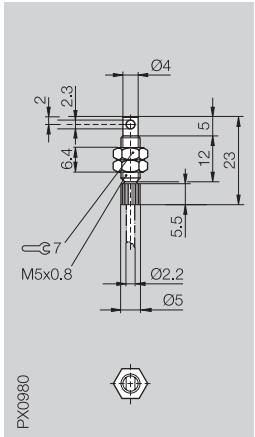
Cutting tool BFO CT is included.

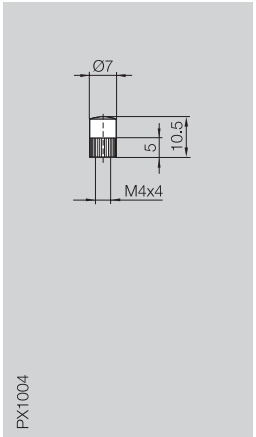
Range when used with 2 m plastic fiber cable.

Size	**M4**	**M4**	**Ø 4 mm**	**Ø 7 mm**
Version	End piece without lens	End piece with lens	90° end piece	Lens
Used with	BFO D22-LD-EAK-10-..	BFO D22-LD-EAK-10-..	BFO D22-LD-EAK-10-..	BFO D22-LA-BC-10
Range	**150 mm**	**450 mm**	**150 mm**	**1500 mm**









Ordering code	BFO D22-LA-BC-10	BFO D22-LA-CC-30	BFO D22-LA-AC-20	BFO 04-PK-1
Material				
– Optical surface	Plastic (fibers)	Glass	Glass	Glass
– Threaded tube	Stainless steel	Stainless steel	Stainless steel	Stainless steel

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Series **BFO 18A** glass fiber optic cables are designed for series BOS 18M tubular sensors and are used wherever a high level of function reserve or chemical resistance is required. Extremely temperatures are also no problem.

Various straight or right-angle versions are available with polyurethane jacket, corrugated metal armor or silicon protective jacket.

Construction from the outside in

UZG type
Polyurethane jacket
Strain relief
Glass fiber bundle

- Flexible
- Excellent chemical resistance
- Does not get brittle from oils and coolant emulsions
- Temperature rated –20...+85 °C

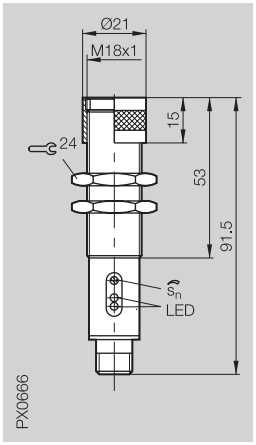
MZG type
Corrugated metal armor
Strain relief
Glass fiber bundle

- High temperature rated –20...+170 °C (if not flexed up to +250 °C)
- Flexible
- Crush-resistant
- Resistant to hot chips

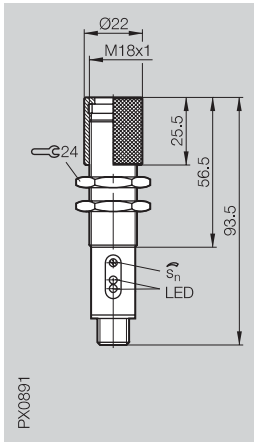
SMG type
Silicon protection jacket
Corrugated metal armor with strain relief
Glass fiber bundle

- Extended temperature range –40...+150 °C
- Very flexible
- Crush-resistant

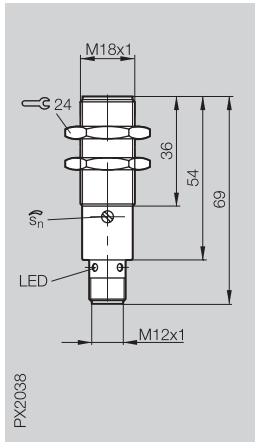
Recommended diffuse base units
(see page **2.1.**19/20/21 and **2.1.**68)



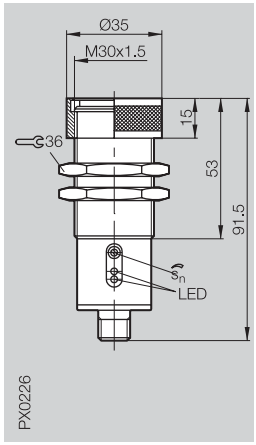
BOS 18M-GU-1PF-...



BOS 18M-PU-1PD-SA...



BOS 18M-PA-1PF-...,
BOS 18M-PA-1PD-...



BOS 30M-GA-1PH-...

Type	Max. range	Version		Light exit		Auto-motive approval	Page
		Through-beam	Diffuse	Straight	Right-angle		
Fiber optics	400 mm						
BFO 18A-LGG-...-10...	400 mm	■		■			**2.2.**24
BFO 18A-LFF-...-10...	700 mm	■			■		**2.2.**24
BFO 18A-LAA-...-20...	700 mm	■		■			**2.2.**25
BFO 18A-LCC-...-20...	700 mm	■		■			**2.2.**25
BFO 18A-LEE-...-20...	2000 mm	■			■		**2.2.**25
BFO 18V-LCC-...-23...	2000 mm	■		■		■	**2.2.**25
BFO 18V-LDD-...-23...		■			■	■	**2.2.**25
	50 mm						
BFO 18A-XAG-...-15...	50 mm		■	■			**2.2.**22
BFO 18A-XAF-...-15...	100 mm		■		■		**2.2.**22
BFO 18A-XAA-...-30...	100 mm		■	■			**2.2.**23
BFO 18A-XAC-...-30...	100 mm		■	■			**2.2.**23
BFO 18A-XAE-...-30...	200 mm		■		■		**2.2.**23
BFO 18V-XAC-...-30...	200 mm		■	■			**2.2.**23
BFO 18V-XAD-...-30...			■		■		**2.2.**23

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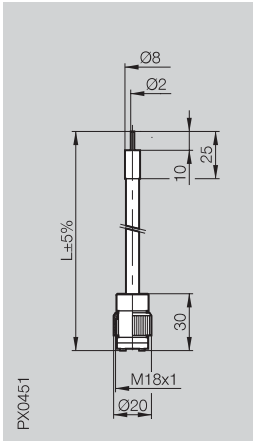
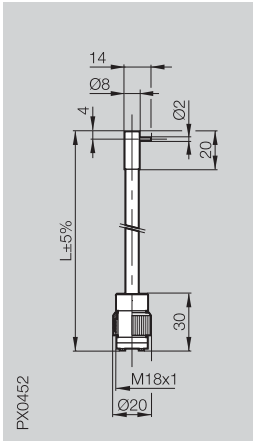
Diffuse with	BOS 18M-...-PD-.../BOS 18M-...-1PF-...	Range	**10 mm/50 mm**	**10 mm/50 mm**	
	BOS 30M-...	Range			
Retroreflective with	BOS 18M-...-PD-.../BOS 18M-...-1PF-...	Range	**300 mm/1000 mm**	**300 mm/1000 mm**	
	BOS 30M-...	Range			





Ordering code	Type	UZG		
	Type	MZG	BFO 18A-XAG-MZG-15-	BFO 18A-XAF-MZG-15-
	Type	SMG		BFO 18A-XAF-SMG-15-

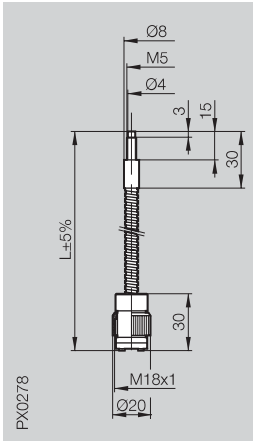
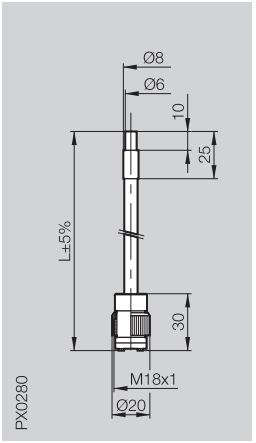
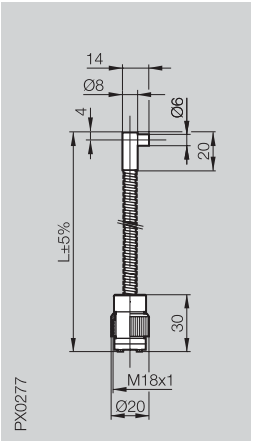
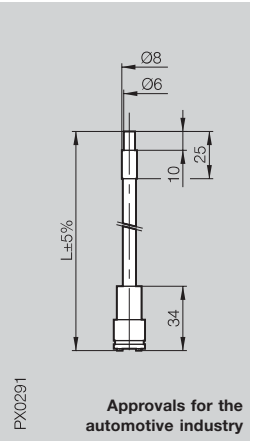
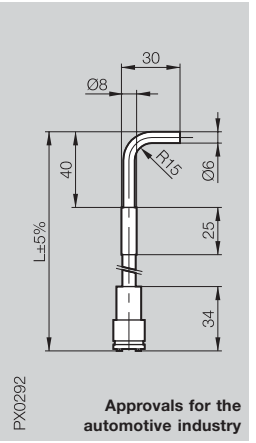
Diameter of glass fiber bundle		1.5 mm	1.5 mm
Max. pull force on fiber optics and connection parts		80 N	80 N
Min. bending radius		60 mm	60 mm
For use with	BOS 18M-PA-1PD-...	yes	yes
	BOS 18M-PU-1PD-SA 1.../-SA 4.../-SA 5...	yes (remove adapter disk)	yes (remove adapter disk)
	BOS 18M-GU-1PF-S4-Y	yes (remove adapter disk)	yes (remove adapter disk)
	BOS 18M-PA-1PF-...	yes	yes
	BOS 30M-...	no	no
Range with	BOS 18M-PA-1PD-...	10 mm	10 mm
	BOS 18M-PU-1PD-SA 1.../-SA 4.../-SA 5...	10 mm	10 mm
	BOS 18M-...-1PF-...	50 mm	50 mm
	BOS 30M-...		
Range with	BOS 18M-PA-1PD-...	300 mm	300 mm
	BOS 18M-PU-1PD-SA 1.../-SA 4.../-SA 5...	300 mm	300 mm
	BOS 18M-...-1PF-...	1000 mm	1000 mm
	BOS 30M-...		

Ranges referenced to Kodak gray card 90 % reflective.

Diffuse with glass fiber optics used as retroreflective:
Ranges are referenced to BOS R1 reflector.

When using as a retroreflective type, twice the switching distance must be used as the object dead zone.

Please append the desired length L of the fiber optics cable to the ordering code.
Increments from 0.5 m to max. 3 m possible.
Example:
BFO 18...-30-**0.5** for **0.5 m** fiber length
BFO 18...-30-**2** for **2 m** fiber length

	20 mm/100 mm	**20 mm/100 mm**	**20 mm/100 mm**	**20 mm**	**20 mm**
				200 mm	**200 mm**
	500 mm/1000 mm	**500 mm/1000 mm**	**500 mm/1000 mm**	**500 mm**	**500 mm**
				2000 mm	**2000 mm**
				 **Approvals for the automotive industry**	 **Approvals for the automotive industry**
	BFO 18A-XAA-UZG-30-		BFO 18A-XAE-UZG-30-		
	BFO 18A-XAA-MZG-30-		BFO 18A-XAE-MZG-30-	BFO 18V-XAC-MZG-30-	BFO 18V-XAD-MZG-30-
	BFO 18A-XAA-SMG-30-	BFO 18A-XAC-SMG-30-	BFO 18A-XAE-SMG-30-	BFO 18V-XAC-SMG-30-	BFO 18V-XAD-SMG-30-
	3 mm	3 mm	3 mm	3 mm	3 mm
	80 N	80 N	80 N	80 N	80 N
	60 mm	60 mm	60 mm	60 mm	60 mm
	yes	yes	yes	no	no
	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)
	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)	no	no
	yes	yes	yes	no	no
	no	no	no	yes (remove adapter disk)	yes (remove adapter disk)
	20 mm	20 mm	20 mm		
	20 mm	20 mm	20 mm	20 mm	20 mm
	100 mm	100 mm	100 mm		
				200 mm	200 mm
	500 mm	500 mm	500 mm		
	500 mm	500 mm	500 mm	500 mm	500 mm
	1000 mm	1000 mm	1000 mm		
				2000 mm	2000 mm
				For BOS 30M use BFO 30-A1 adapter!	

Installation note

When using
BOS 18M-GU-1PF-S4-Y or
BOS 18M-PU-1PD-SA…
sensor please remove adapter disk from the **fiber optic** cable!

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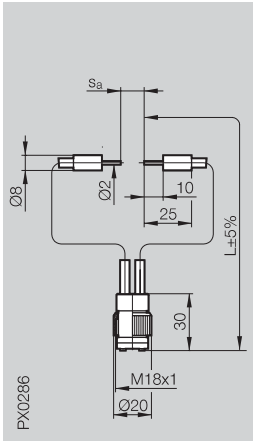
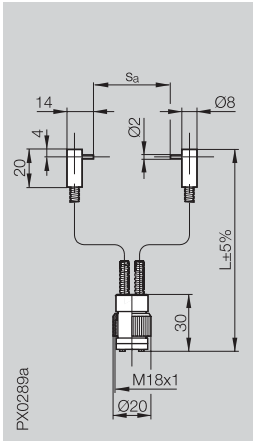
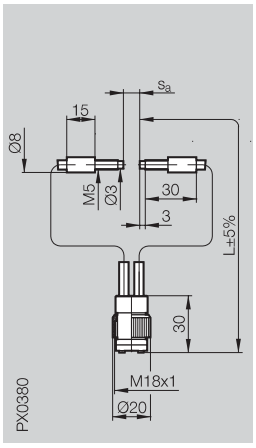
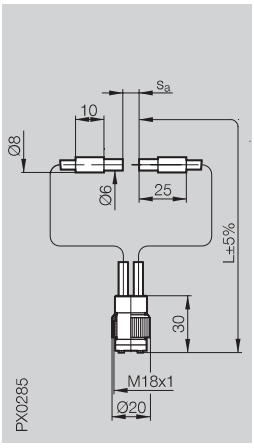
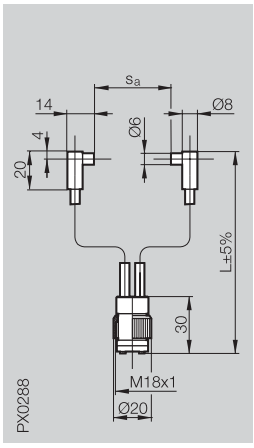
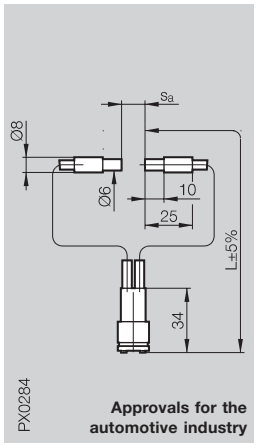
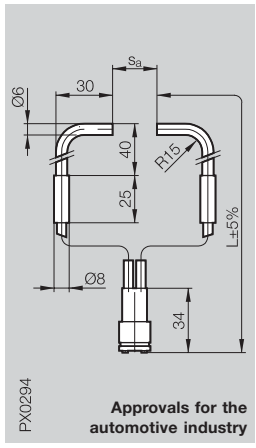
Through-beam with	BOS 18M-...-PD-...	Range	**100 mm**	**100 mm**	
	BOS 18M-...-1PF-...	Range	**400 mm**	**400 mm**	
	BOS 30M-...	Range			
					

Ordering code	Type	UZG		
	Type	MZG	BFO 18A-LGG-MZG-10-	BFO 18A-LFF-MZG-10-
	Type	SMG	BFO 18A-LGG-SMG-10-	BFO 18A-LFF-SMG-10-

Diameter of glass fiber bundle		1 mm	1 mm
Max. pull force on fiber optics and connection parts		80 N	80 N
Min. bending radius		60 mm	60 mm
For use with	BOS 18M-PA-1PD-...	yes	yes
	BOS 18M-PU-1PD-SA 1.../-SA 4.../-SA 5...	yes (remove adapter disk)	yes (remove adapter disk)
	BOS 18M-GU-1PF-...	yes (remove adapter disk)	yes (remove adapter disk)
	BOS 18M-PA-1PF-...	yes	yes
	BOS 30M-...	no	no

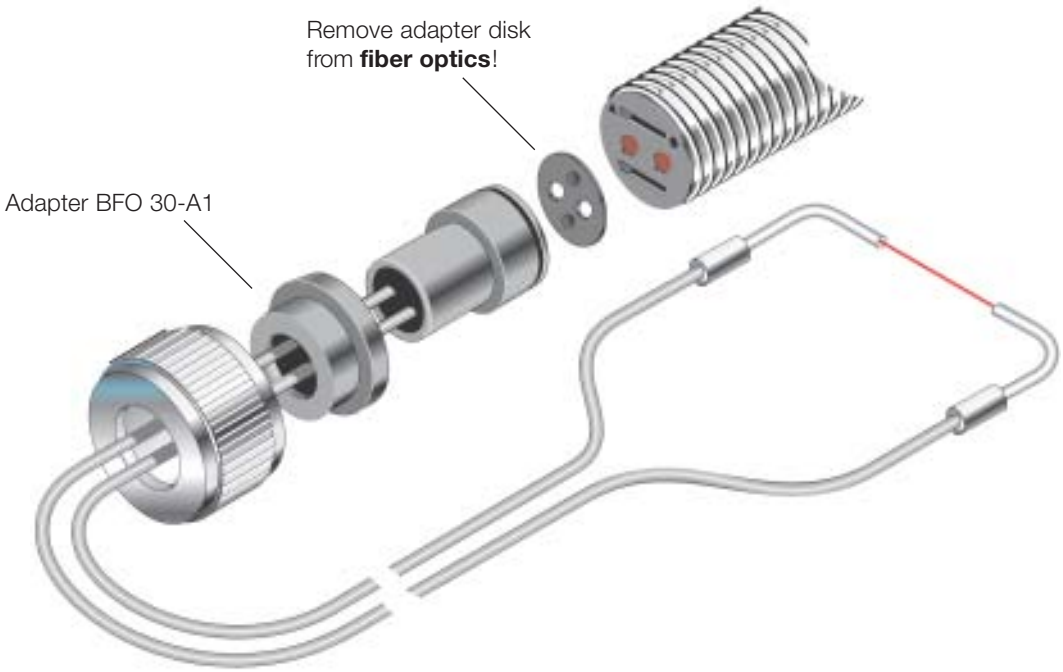
Please append the desired length L of the fiber optics cable to the ordering code.
Increments from 0.5 m to max. 3 m possible.
Example:
BFO 18...-20-**0.5** for **0.5 m** fiber length
BFO 18...-20-**2** for **2 m** fiber length

Note!
A through-beam fiber optic cable changes the normally open signal of the base unit into a normally closed signal!

	200 mm **700 mm**	**200 mm** **700 mm**	**200 mm** **700 mm**	**200 mm** **2000 mm**	**200 mm** **2000 mm**
					
	BFO 18A-LAA-UZG-20- BFO 18A-LAA-MZG-20-	BFO 18A-LCC-UZG-20- BFO 18A-LCC-SMG-20-	BFO 18A-LEE-UZG-20- BFO 18A-LEE-MZG-20- BFO 18A-LEE-SMG-20-	BFO 18V-LCC-MZG-23- BFO 18V-LCC-SMG-23-	BFO 18V-LDD-MZG-23- BFO 18V-LDD-SMG-23-
	2 mm	2 mm	2 mm	2 mm	2 mm
	80 N	80 N	80 N	80 N	80 N
	60 mm	60 mm	60 mm	60 mm	60 mm
	yes	yes	yes	no	no
	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)
	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)	no	no
	yes	yes	yes	no	no
	no	no	no	yes (remove adapter disk)	yes (remove adapter disk)

For BOS 30M use BFO 30-A1 adapter!

Installation note
BOS 30M with BFO 18V



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