

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.

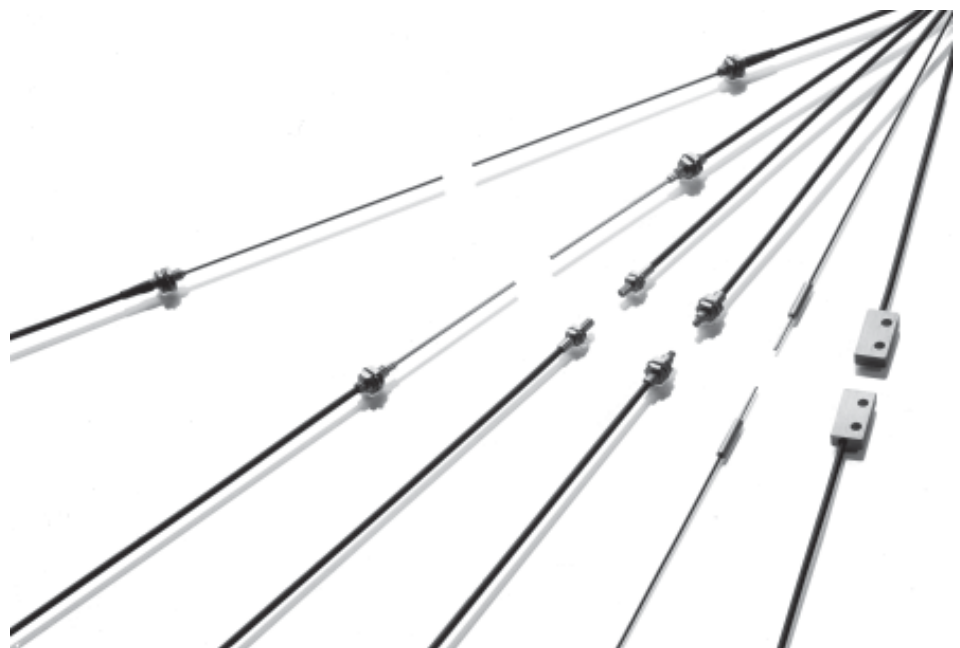
It's easy to see why fiber optics are so commonly used: The variety of end configurations, with straight or angled light exit, flexible optical head or coaxial fibers, the various fiber diameters and the ability to trim them to the desired length.



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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Photoelectric sensors
accessories
page 2.3.2 ...

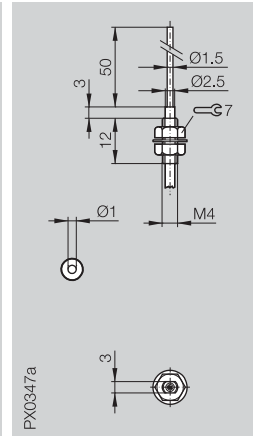
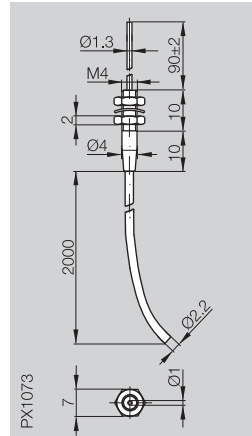
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Connectors
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Photoelectric Sensors

BFO Plastic Fiber Optics Through-beam

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

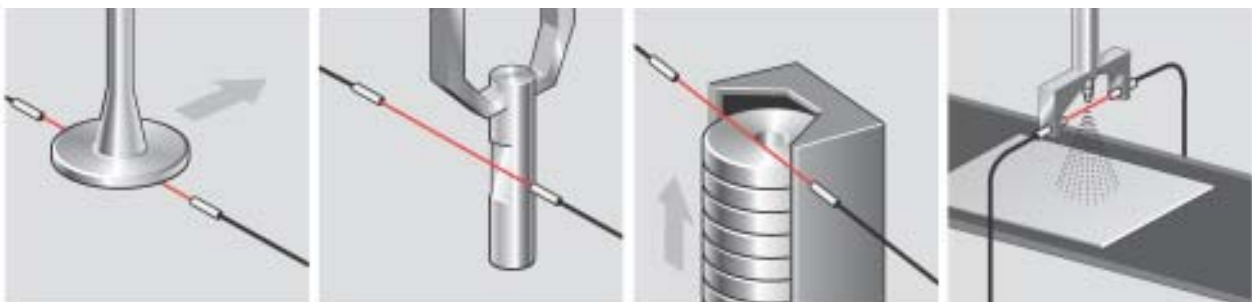
*Range is reduced by 30 % when using the BOS 74K-UU-1FS-.. base unit.

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



Plastic Fiber Optics

Photoelectric Sensors

BFO
Plastic Fiber Optics
Through-beam

	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
	PX0348a	PX0645a	PX1466	PX1682	PX1272
	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	straight	90°	90°	straight
	M3 thread	M4 thread	Clamp	Clamp	M3 screws
	-35...+65 °C	-35...+65 °C	-35...+65 °C	-40...+70 °C	-35...+65 °C
	6 N	6 N	6 N	6 N	6 N

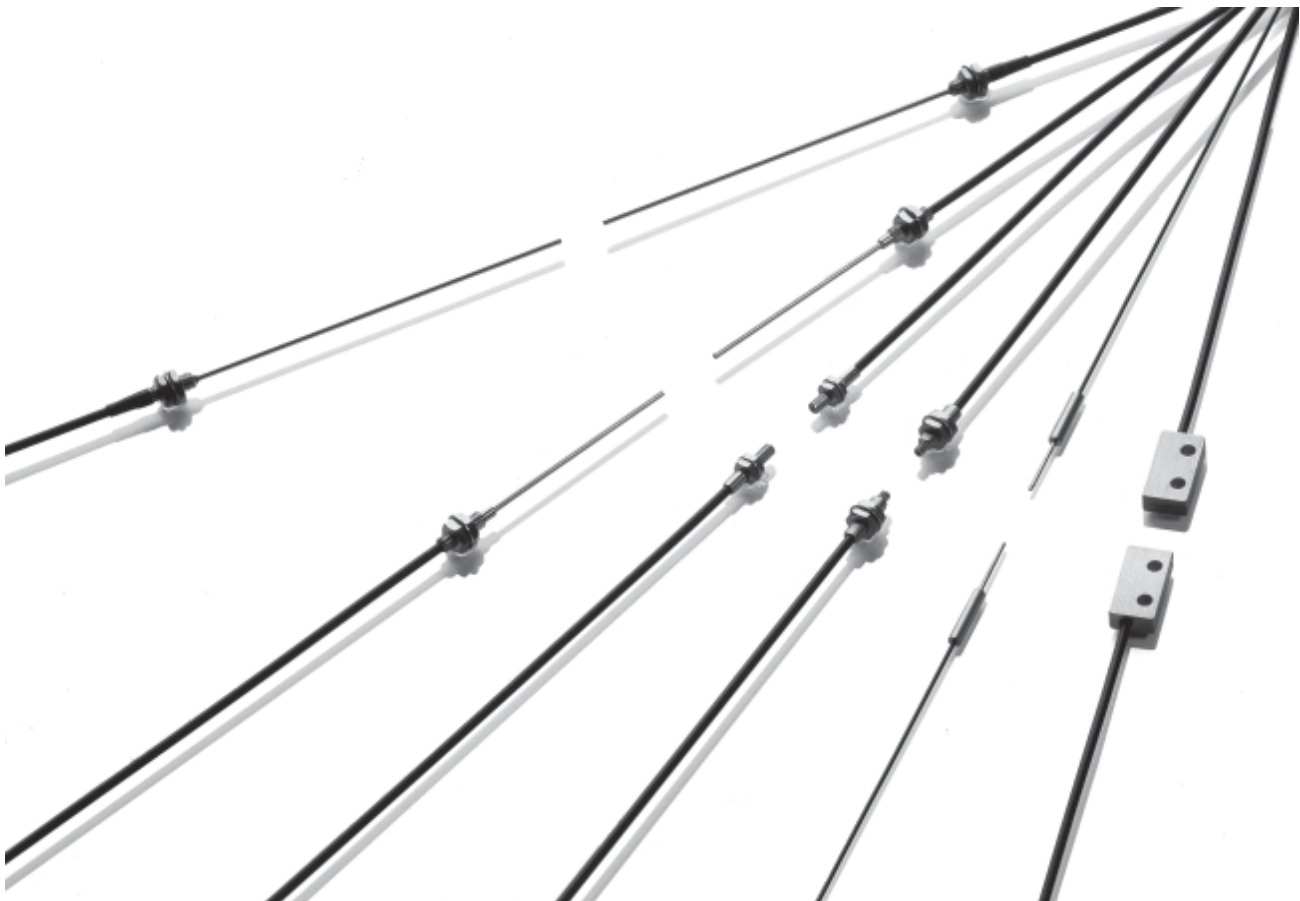
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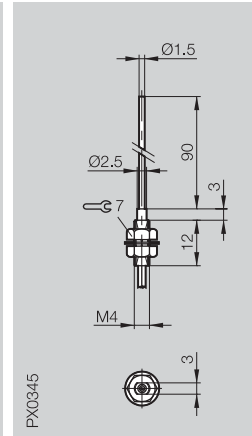
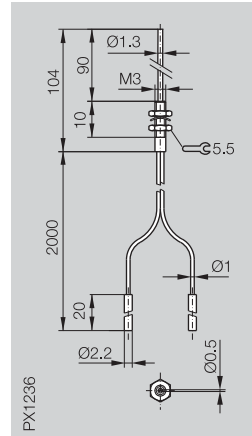
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Diffuse	with BOS 15K	Range	15 mm	
	with BOS 20K	Range	15 mm	10 mm
	with BOS 73K	Range	35 mm	35 mm
	with BOS 74K	Range*	20 mm	20 mm



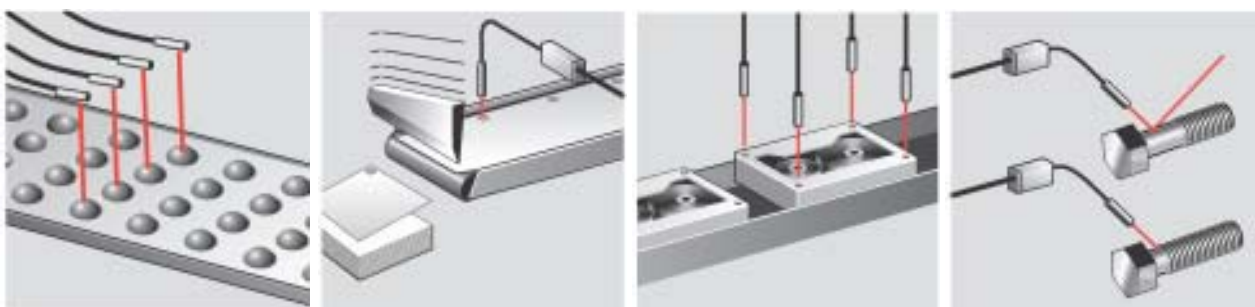
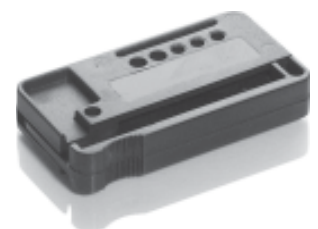
Ordering code	BFO N22-XA-VB-EAK-10-02	BFO 74A-XA-HB-PZK-10-02
Fibers		
Cable length	2 m	2 m
Can be trimmed	no	yes
Fiber arrangement	duplex	duplex
Jacket Ø	2 x 1 mm	2 x 1 mm
Core Ø	2 x 0.5 mm	2 x 0.5 mm
Fiber bending radius	≥ 15 mm	≥ 15 mm
End piece		
Light exit	straight	straight
Optical head attachment	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

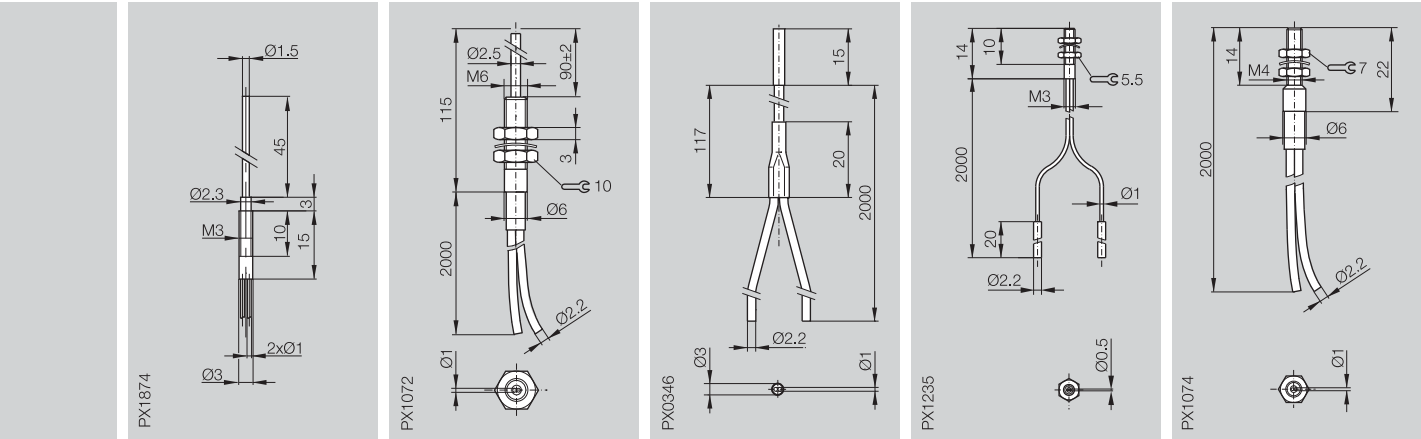


Plastic Fiber Optics

Photoelectric Sensors

BFO
Plastic Fiber Optics
Diffuse

10 mm	60 mm	60 mm	15 mm	60 mm
35 mm	65 mm	65 mm	15 mm	65 mm
20 mm	130 mm	130 mm	35 mm	130 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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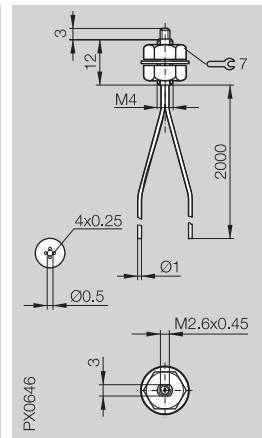
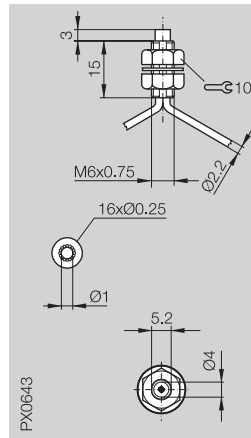
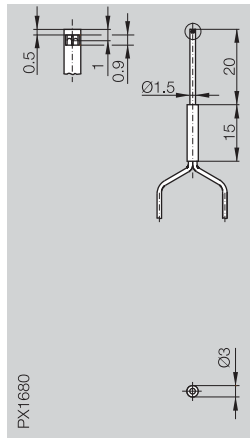
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Diffuse	with BOS 15K	Range			
	with BOS 20K	Range	10 mm	60 mm	15 mm
	with BOS 73K	Range	30 mm	70 mm	70 mm
	with BOS 74K	Range*	15 mm	150 mm	70 mm
				90 mm	25 mm



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.

Plastic Fiber Optics

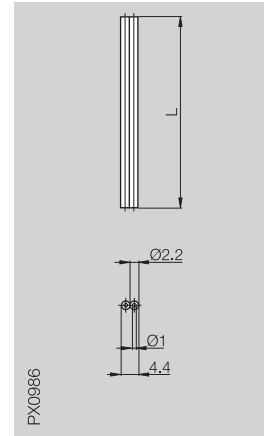
Photoelectric Sensors

BFO
Plastic Fiber Optics
for user assembly

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	2.2x4.4 mm duplex cable
Through-beam	
Range for L = 2 m	150 mm
Cable length	20 m

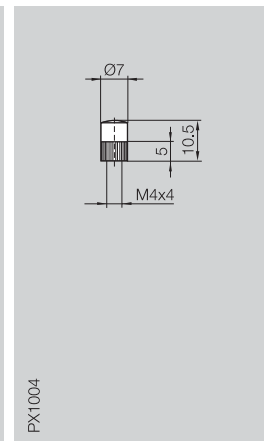
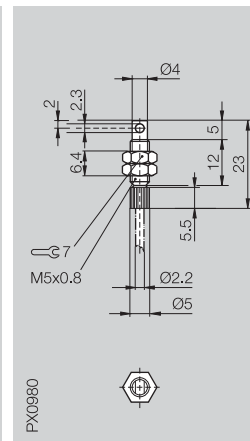
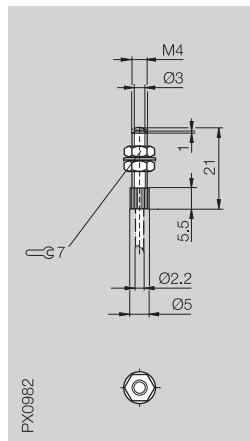
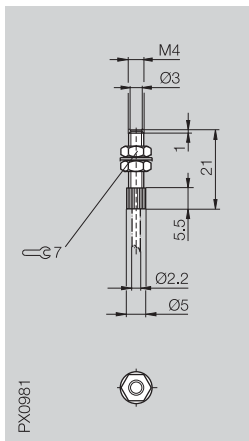


Ordering code	BFO D22-LD-EAK-10-20
Ambient operating temperature T_a	-40...+70 °C
Pull force on fiber optics and connection parts at 20 °C	6 N
Jacket Ø	2x1 mm
Core Ø	2.2 mm
Cutting tool BFO CT is included.	



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

Range when used with 2 m plastic fiber cable.



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

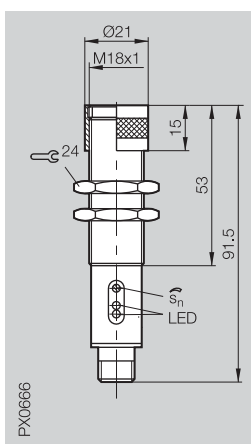
SMG type

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

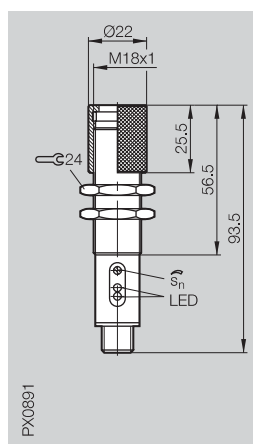
- Extended temperature range -40...+150 °C
- Very flexible
- Crush-resistant

Recommended diffuse base units

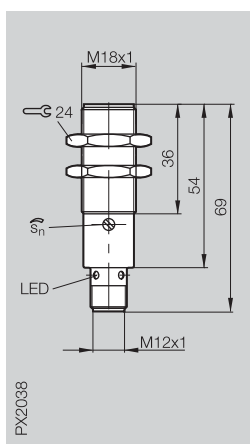
(see page 2.1.19/20/21 and 2.1.68)



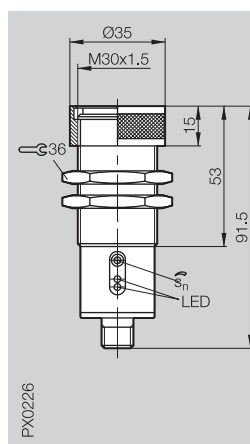
BOS 18M-GU-1PF-...




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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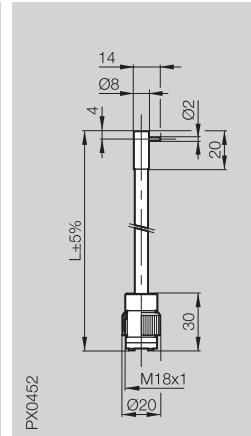
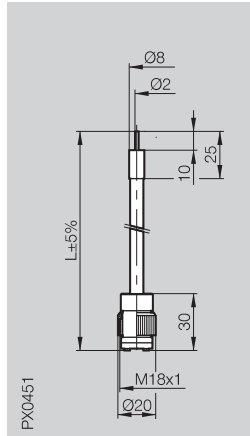
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Diffuse with	BOS 18M-...-PD-.../BOS 18M-...-1PF-... BOS 30M-...	Range Range
Retroreflective with	BOS 18M-...-PD-.../BOS 18M-...-1PF-... BOS 30M-...	Range Range

10 mm/50 mm	10 mm/50 mm
300 mm/1000 mm	300 mm/1000 mm



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	yes
	BOS 18M-PU-1PD-SA 1.../-SA 4.../-SA 5...	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)
	BOS 18M-GU-1PF-S4-Y	yes (remove adapter disk)	yes (remove adapter disk)	yes (remove adapter disk)
	BOS 18M-PA-1PF-...	yes	yes	yes
	BOS 30M-...	no	no	no
Range with	BOS 18M-PA-1PD-...	10 mm	10 mm	10 mm
	BOS 18M-PU-1PD-SA 1.../-SA 4.../-SA 5...	10 mm	10 mm	10 mm
	BOS 18M-...-1PF-...	50 mm	50 mm	50 mm
	BOS 30M-...			
Range with	BOS 18M-PA-1PD-...	300 mm	300 mm	300 mm
	BOS 18M-PU-1PD-SA 1.../-SA 4.../-SA 5...	300 mm	300 mm	300 mm
	BOS 18M-...-1PF-...	1000 mm	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

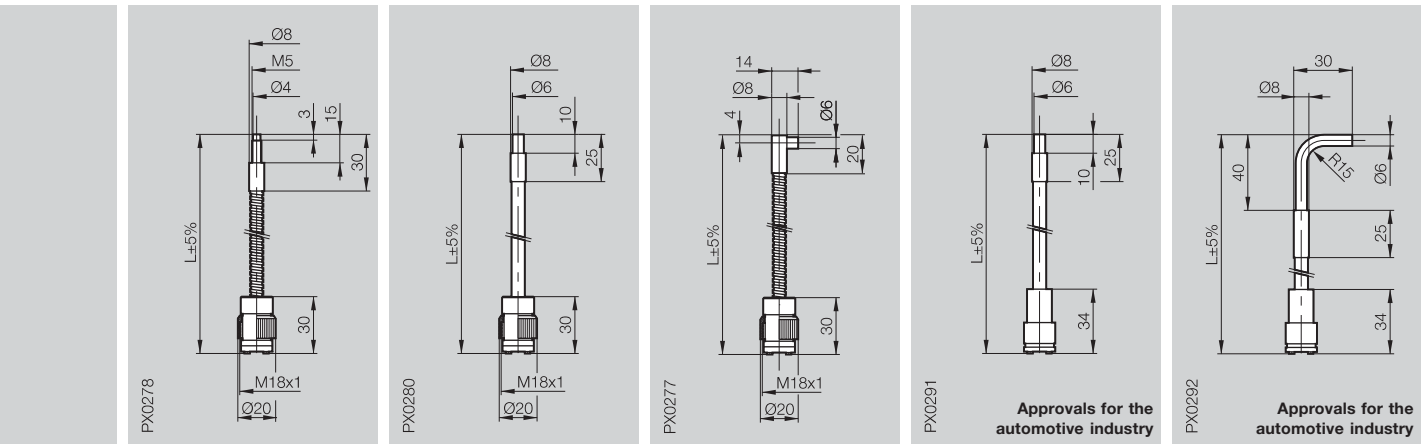
BFO 18...-30-**2** for **2 m** fiber length

Glass Fiber Optics

Photoelectric Sensors

BFO 18
Glass Fiber Optics
Diffuse

20 mm/100 mm	20 mm/100 mm	20 mm/100 mm	20 mm 200 mm 500 mm 2000 mm	20 mm 200 mm 500 mm 2000 mm
500 mm/1000 mm	500 mm/1000 mm	500 mm/1000 mm		

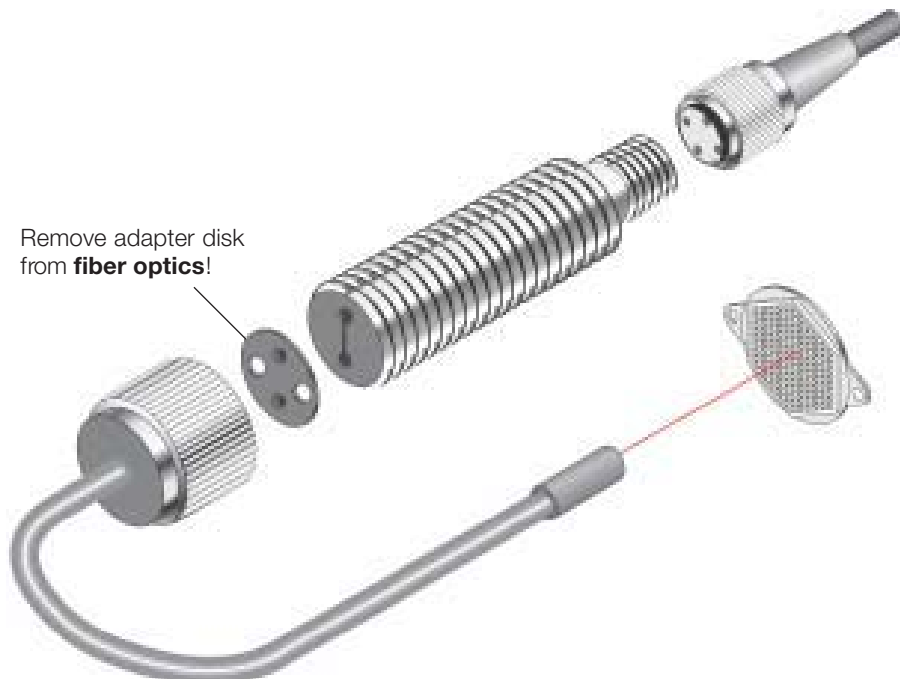


BFO 18A-XAA-UZG-30-		BFO 18A-XAE-UZG-30-	BFO 18V-XAC-MZG-30-	BFO 18V-XAD-MZG-30-
BFO 18A-XAA-MZG-30-		BFO 18A-XAE-MZG-30-	BFO 18V-XAC-SMG-30-	BFO 18V-XAD-MZG-30-
BFO 18A-XAA-SMG-30-	BFO 18A-XAC-SMG-30-	BFO 18A-XAE-SMG-30-		BFO 18V-XAD-SMG-30-
3 mm	3 mm	3 mm	3 mm	3 mm
80 N	80 N	80 N	80 N	80 N
60 mm	60 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	200 mm	200 mm
100 mm	100 mm	100 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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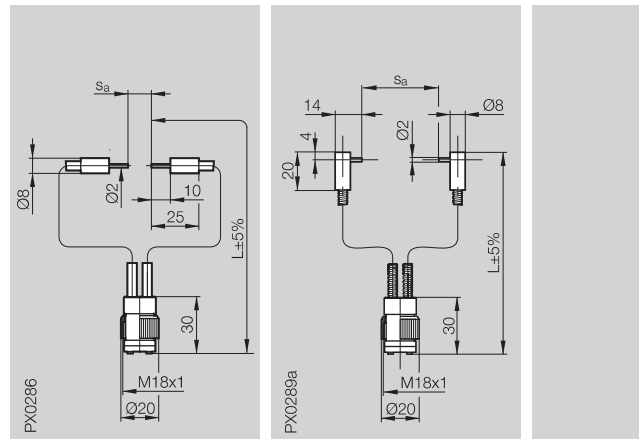
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Through-beam with	BOS 18M-...-PD-...	Range	100 mm	100 mm
	BOS 18M-...-1PF-...	Range	400 mm	400 mm
	BOS 30M-...	Range		



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!



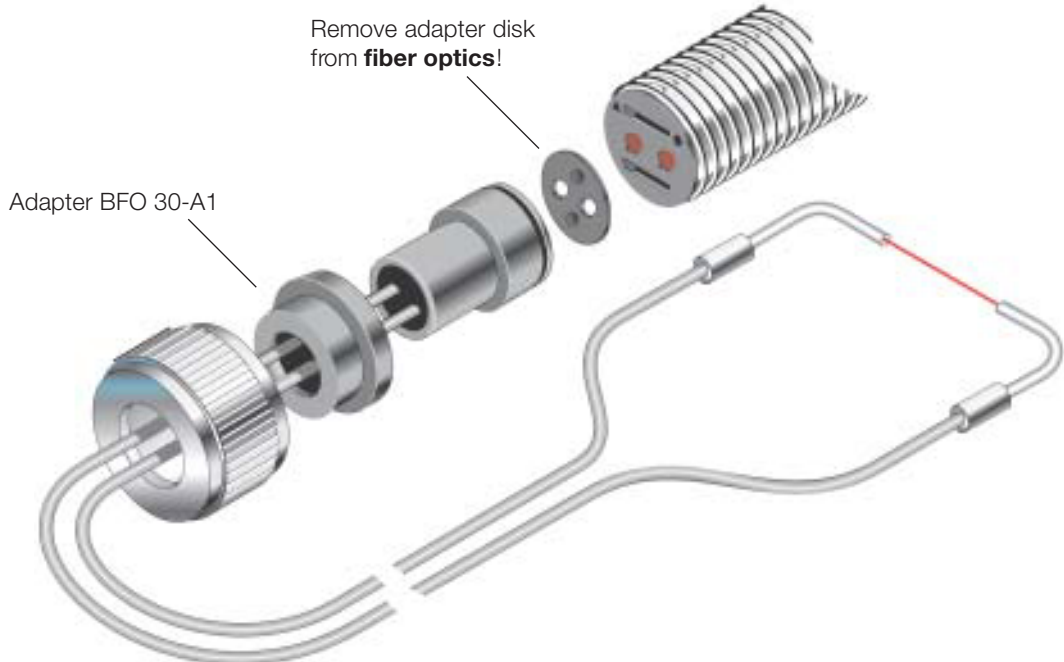
Glass Fiber Optics

Photoelectric Sensors

BFO 18
Glass Fiber Optics
Through-beam

	200 mm 700 mm	200 mm 700 mm	200 mm 700 mm	200 mm 2000 mm	200 mm 2000 mm
	PX0380	PX0285	PX0288	PX0284 Approvals for the automotive industry	PX0294 Approvals for the automotive industry
	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



2.2

2.3

Photoelectric sensors accessories page 2.3.2 ...

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Connectors page 6.2 ...