CONTRINEX

3 Optical fibers

Synthetic optical fibers

At a glance:

- Very small dimensions
- Long operating distances
- Low bending radii
- Can be cut on site
- Visible light, hence easy alignment
- Wide range of types
- High degree of protection of the sensor head: IP 67
- Cost efficient
- For difficult environments, glass fibers are available for the 3030/3031 and 3060 series switches (LFG-1022-050 and LFG-3022-050, page 111)

Data sheets

Detailed data sheets with additional technical information are available for all models. These may be retrieved from the CONTRINEX website (www.contrinex.com), or ordered cost-free from our sales offices.

Drawings

The mechanical drawings may be downloaded as data files from the CONTRINEX website, and imported directly into construction drawings.

Technical data

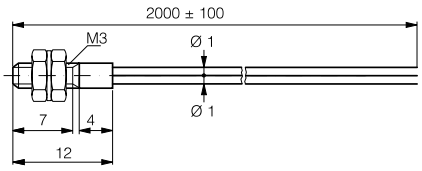
Ambient temperature range	-25 ... +70 °C
Protection degree of sensor head	IP 67
Standard length	2 m ± 0.1 m
Fiber bending radii:	
miniature	15 mm
standard	25 mm
flexible	2 mm
luminous	40 mm
Bending radius of light-outlet tube	25 mm
Tensile load	30 N max.
Fiber material	PMMA
Sleeve material	Polyethylene
Sensor head material	Nickel-plated brass / stainless steel*
Sensor head light-outlet tube material	Stainless steel
Optical attenuation:	
miniature / flexible	0.6 dB / m max. at 660 nm
standard / luminous	0.4 dB / m max. at 660 nm
Angle of incidence	± 28° / ± 5°*

* LFP-1006/1007-020

Diffuse sensors

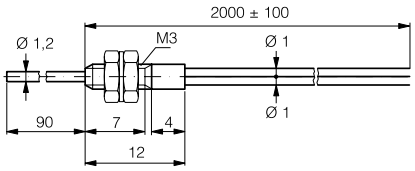
*Part references (**bold** = preferred types)*

Size	*Part ref. / max. operating distance*	*Characteristics*
M3	**Miniature**	– Operating distance: – with series 3030 40 mm – with series 3031 20 mm – with series 3060 70 mm – 1 separable double fiber, outside diameter 1 mm – Fine inner fiber Ø 0.5 mm for highest resolution – Can be cut



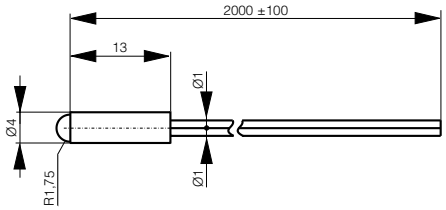
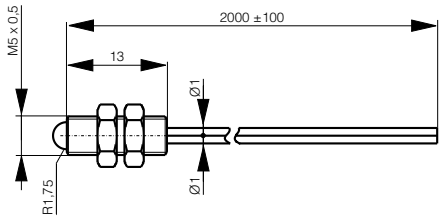
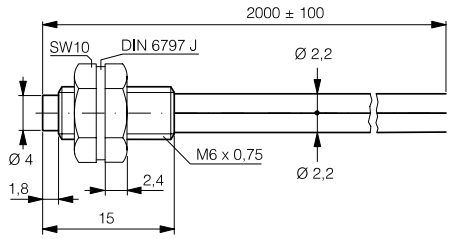
LFP-1001-020
40 mm

	Miniature	– Operating distance: – with series 3030 40 mm – with series 3031 20 mm – with series 3060 70 mm – 1 separable double fiber, outside diameter 1 mm – Sensor head with bendable light-outlet tube for ease of positioning – Fine inner fiber Ø 0.5 mm for highest resolution – Can be cut

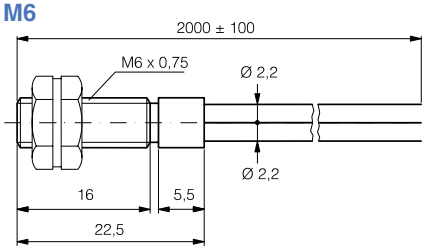
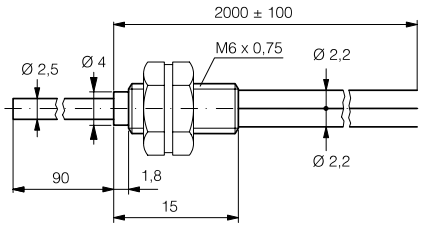


LFP-1004-020
40 mm

*Part references (**bold** = preferred types)*

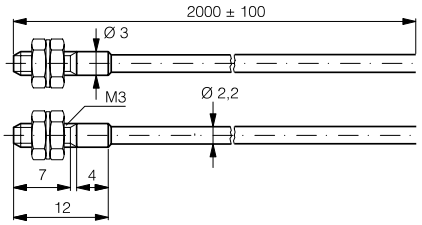
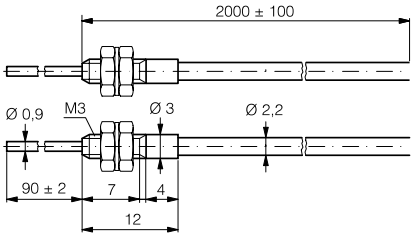
Size	*Part ref. / max. operating distance*	*Characteristics*
∅4 	**Miniature / spherical optics** **LFP-1006-020** **100 mm**	– Operating distance: – with series 3030 100 mm – with series 3031 60 mm – with series 3060 140 mm – 1 separable double fiber, outside diameter 1 mm – Fine inner fiber Ø 0.5 mm for highest resolution – Spherical optics for cylindrical light beam – Can be cut
M5 	**Miniature / spherical optics** **LFP-1007-020** **100 mm**	– Operating distance: – with series 3030 100 mm – with series 3031 60 mm – with series 3060 140 mm – 1 separable double fiber, outside diameter 1 mm – Fine inner fiber Ø 0.5 mm for highest resolution – Spherical optics for cylindrical light beam – Can be cut
M6 	**Standard** **LFP-1002-020** **120 mm**	– Operating distance: – with series 3030 120 mm – with series 3031 60 mm – with series 3060 200 mm – 1 separable double fiber, outside diameter 2.2 mm – Inner fiber Ø 1.0 mm – Long operating distance – Can be cut
	Flexible LFP-1102-020 **90 mm**	– Operating distance: – with series 3030 90 mm – with series 3031 45 mm – with series 3060 150 mm – 1 separable double fiber, outside diameter 2.2 mm – Extremely fine inner fibers 151 x Ø 75 µm – Very small bending radius – Can be cut
	Luminous LFP-1202-020 **160 mm**	– Operating distance: – with series 3030 160 mm – with series 3031 80 mm – with series 3060 260 mm – 1 separable double fiber, outside diameter 2.2 mm – Inner fiber Ø 1.5 mm – Longest operating distance – Can be cut

*Part references (**bold** = preferred types)*

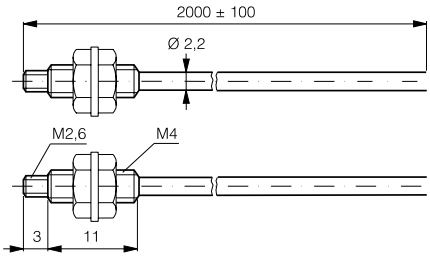
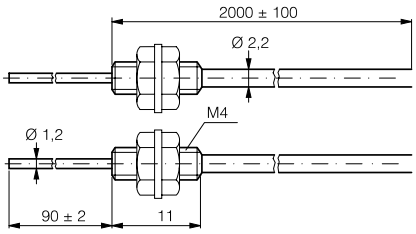
Size	*Part ref. / max. operating distance*	*Characteristics*
M6	**Standard**	– Operating distance: – with series 3030 120 mm – with series 3031 60 mm – with series 3060 200 mm – 1 separable double fiber, outside diameter 2.2 mm – Inner fiber Ø 1.0 mm – Coaxial arrangement of fibers, thus axially symmetric beam – Can be cut
	LFP-1003-020 **120 mm**	
	**Standard** **LFP-1005-020** **120 mm**	– Operating distance: – with series 3030 120 mm – with series 3031 60 mm – with series 3060 200 mm – 1 separable double fiber, outside diameter 2.2 mm – Inner fiber Ø 1.0 mm – Sensor head with bendable light-outlet tube for ease of positioning – Long operating distance – Can be cut
	Flexible LFP-1105-020 **90 mm**	– Operating distance: – with series 3030 90 mm – with series 3031 45 mm – with series 3060 150 mm – 1 separable double fiber, outside diameter 2.2 mm – Extremely fine inner fibers 151 x Ø 75 µm – Sensor head with bendable light-outlet tube for ease of positioning – Very small bending radius – Can be cut

Through-beam sensors

*Part references (**bold** = preferred types)*

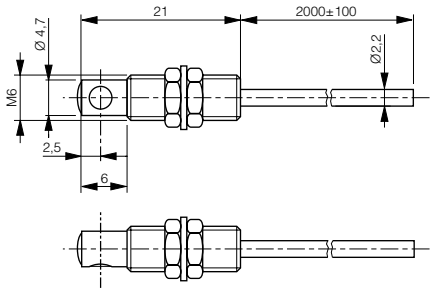
Size	*Part ref. / max. operating distance*	*Characteristics*
M3	**Standard**	– Operating distance: – with series 3030 120 mm – with series 3031 60 mm – with series 3060 200 mm – 2 individual fibers, outside diameter 2.2 mm – Fine inner fiber Ø 0.5 mm for highest resolution – Can be cut
	**LFP-2001-020** **120 mm**	
	**Standard** **LFP-2003-020** **120 mm**	– Operating distance: – with series 3030 120 mm – with series 3031 60 mm – with series 3060 200 mm – 2 individual fibers, outside diameter 2.2 mm – Sensor head with bendable light-outlet tube for ease of positioning – Fine inner fiber Ø 0.5 mm for highest resolution – Can be cut

*Part references (**bold** = preferred types)*

Size	*Part ref. / max. operating distance*	*Characteristics*
M4	**Standard**	– Operating distance: – with series 3030 400 mm – with series 3031 200 mm – with series 3060 700 mm – 2 individual fibers, outside diameter 2.2 mm – Inner fiber Ø 1.0 mm – Long operating distance – Can be cut
	**LFP-2002-020** **400 mm**	
	Flexible	– Operating distance: – with series 3030 300 mm – with series 3031 150 mm – with series 3060 550 mm – 2 individual fibers, outside diameter 2.2 mm – Extremely fine inner fibers 151 x Ø 75 µm – Very small bending radius – Can be cut
	LFP-2102-020 **300 mm**	
	Luminous	– Operating distance: – with series 3030 500 mm – with series 3031 250 mm – with series 3060 900 mm – 2 individual fibers, outside diameter 2.2 mm – Inner fiber Ø 1.5 mm – Longest operating distance – Can be cut
	LFP-2202-020 **500 mm**	
	**Standard**	– Operating distance: – with series 3030 400 mm – with series 3031 200 mm – with series 3060 700 mm – 2 individual fibers, outside diameter 2.2 mm – Inner fiber Ø 1.0 mm – Sensor head with bendable light-outlet tube for ease of positioning – Long operating distance – Can be cut
	LFP-2004-020 **400 mm**	
	Flexible	– Operating distance: – with series 3030 300 mm – with series 3031 150 mm – with series 3060 500 mm – 2 individual fibers, outside diameter 2.2 mm – Extremely fine inner fibers 151 x Ø 75 µm – Sensor head with bendable light-outlet tube for ease of positioning – Very small bending radius – Can be cut
	LFP-2104-020 **300 mm**	

*Part references (**bold** = preferred types)*

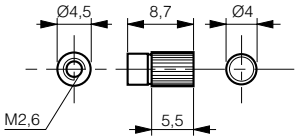
Size	*Part ref. / max. operating distance*	*Characteristics*
M6	**Standard 90°**	– Operating distance: – with series 3030 1100 mm – with series 3031 550 mm – with series 3060 1800 mm – 2 individual fibers, outside diameter 2.2 mm – Inner fiber Ø 1.0 mm – Sensor head for right-angle light emission – Long operating distance – Can be cut

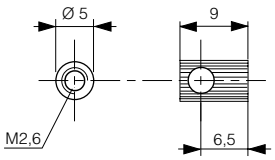


Accessories

*Part references (**bold** = preferred types)*

Size	*Part ref. / max. operating distance*	*Characteristics*
For M4	**Axial front lens** **LFP-0001-000** **3000 mm**	– Can be used with LFP-2#02-020 and LFG-3022-050 fibers – Delivery includes 1 pair – Operating distance: – with series 3030 3000 mm – with series 3031 1500 mm – with series 3060 5000 mm (with 5 m fiber)
	90° front lens **LFP-0002-000** **1000 mm**	– Can be used with LFP-2#02-020 and LFG-3022-050 fibers – Delivery includes 1 pair – Operating distance: – with series 3030 1000 mm – with series 3031 500 mm – with series 3060 1700 mm





Glass optical fibers

At a glance:

- For high ambient temperatures (models with chrome-plated brass and silicone sleeves)
- Executions for extreme environmental conditions
- Small dimensions
- Long operating distances
- Suitable for the detection of smallest objects
- Wide range of types

Characteristics

Depending on the type involved, glass optical fibers consist of 200 to 5,000 individual fibers with diameters of 30 to 50 µm. The fiber bundle is surrounded by a sleeve, which can be selected according to the application:

- PVC sleeve: the economical solution if no special stresses are to be expected.
- Wound sleeve of chrome-plated brass: for permanent operating temperatures of up to 250 °C, and maximum protection against crushing.
- Silicone sleeve with stainless steel braiding for strain relief: for use in corrosive media, at temperatures of up to +150 °C, and where mechanical strain relief is required.

The sensor heads are available with straight or right-angle light outlets. The range comprises models for use as diffuse sensors (emitting and receiving fiber bundles in the same sleeve) and as through-beam sensors (the fiber bundles are in separate sleeves). In order to cover various application needs, a number of different bundle cross-sections are available: large cross-sections for long operating distances, small cross-sections for short distances, high resolutions, and detection of small objects.

Technical data

Ambient temperature range	PVC sleeve	0 ... +70 °C
	Wound brass sleeve	-25 ... +250 °C
	Silicone sleeve	-25 ... +150 °C
Protection degree of sensor head	IP 65 (optional up to IP 68)	
Protection degree of optical fiber	PVC sleeve	IP 67
	Wound brass sleeve	IP 54
	Silicone sleeve	IP 67
Standard lengths	250 mm, 500 mm, 1000 mm	
Sensor head material	Aluminum	
Sensor head light-outlet tube material	Stainless steel	
Optical attenuation	10 dB / km max. at 880 nm	
Angle of incidence	± 18°	

Data sheets

Detailed data sheets with additional technical information are available for all models. These may be retrieved from the CONTRINEX website (www.contrinex.com), or ordered cost-free from our sales offices.

Drawings

The mechanical drawings may be downloaded as data files from the CONTRINEX website, and imported directly into construction drawings.

Special executions

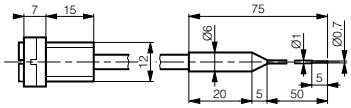
A broad range of special executions are available in small quantities and with short delivery times, e.g.:

- Higher degree of protection of the sensor head (on request).
- Special sensor heads (on request).
- Non-standard fiber lengths; maximum length is 10 m.
- Non-standard sleeves (chrome-plated brass, silicone, PVC) on request.

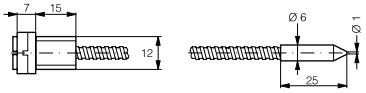
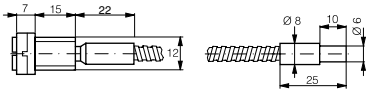
Axial diffuse sensors

length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)

***bold** = preferred types (-### **only 500 mm length**)*

Size	*Part ref. / max. operating distance*	*Characteristics*
∅6 	**LFG-1005-###** **5 mm**	– Operating distance: - with series 4040 5 mm – With bendable light-outlet tube – For the detection of smallest objects – Silicone sleeve Ø 4.7 mm – Min. bending radius 20 mm – Min. bending radius of light-outlet tube 5 mm (do not bend the inner and outer 10 mm) – Max. tensile load 10 N

length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)
***bold**= preferred types (-### **only 500 mm length**)*

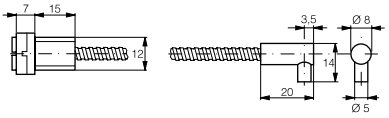
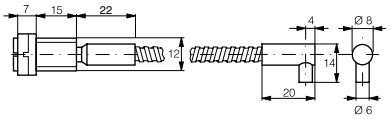
Size	*Part ref. / max. operating distance*	*Characteristics*
∅6	**LFG-1015-###** **15 mm**	– Operating distance: - with series 4040 15 mm – With bendable light-outlet tube – For places difficult to access – Silicone sleeve Ø 4.7 mm – Min. bending radius 20 mm – Min. bending radius of light-outlet tube 5 mm (do not bend the inner and outer 10 mm) – Max. tensile load 10 N
	**LFG-1010-###** **15 mm**	– Operating distance: – with series 4040 15 mm – For the detection of smallest objects in places difficult to access – Wound sleeve of chrome-plated brass Ø 4.7 mm – Min. bending radius 23 mm – Max. tensile load 20 N
∅8	**LFG-1020-###** **50 mm**	– Operating distance: – with series 4040 50 mm – Multi-purpose medium-range model – Wound sleeve of chrome-plated brass Ø 4.7 mm – Min. bending radius 25 mm – Max. tensile load 50 N
	**LFG-1030-###** **150 mm**	– Operating distance: – with series 4040 150 mm – For long operating distance – Wound sleeve of chrome-plated brass Ø 6.7 mm – Min. bending radius 25 mm – Max. tensile load 50 N

Radial diffuse sensors

length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)
***bold**= preferred types (-### **only 500 mm length**)*

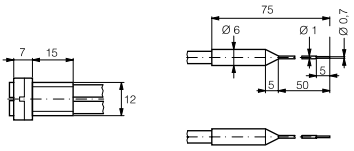
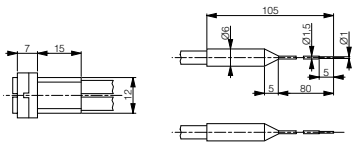
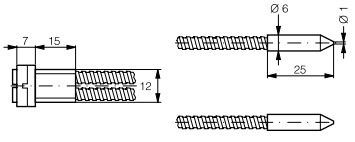
Size	*Part ref. / max. operating distance*	*Characteristics*
∅6	**LFG-2010-###** **15 mm**	– Operating distance: – with series 4040 15 mm – For the detection of smallest objects in places difficult to access – Leg length 14 mm – Wound sleeve of chrome-plated brass Ø 4.7 mm – Min. bending radius 23 mm – Max. tensile load 20 N

length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)
***bold**= preferred types (-### **only 500 mm length**)*

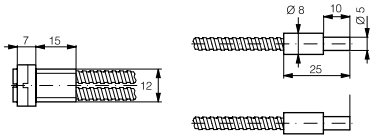
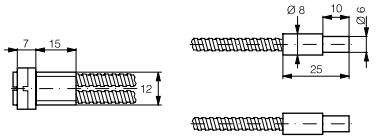
Size	*Part ref. / max. operating distance*	*Characteristics*
∅8 	**LFG-2020-###** **30 mm**	– Operating distance: – with series 4040 30 mm – Multi-purpose medium-range model – Leg length 14 mm – Wound sleeve of chrome-plated brass Ø 4.7 mm – Min. bending radius 25 mm – Max. tensile load 50 N
	**LFG-2030-###** **150 mm**	– Operating distance: – with series 4040 150 mm – For long operating distance – Leg length 14 mm – Wound sleeve of chrome-plated brass Ø 6.7 mm – Min. bending radius 25 mm – Max. tensile load 50 N

Axial through-beam sensors

length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)
***bold**= preferred types (-### **only 500 mm length**)*

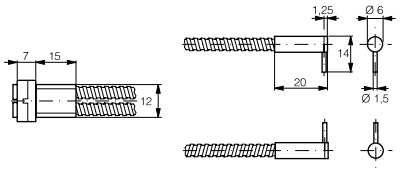
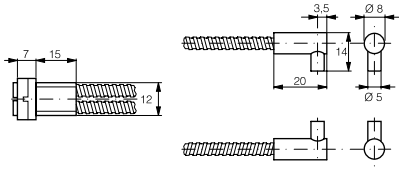
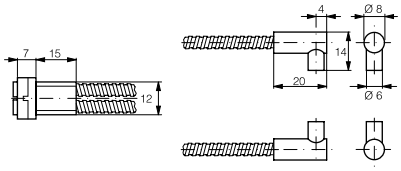
Size	*Part ref. / max. operating distance*	*Characteristics*
∅6 	**LFG-3005-###** **50 mm**	– Operating distance: – with series 4040 50 mm – With bendable light-outlet tube – For the detection of smallest objects – Silicone sleeve Ø 4.7 mm – Min. bending radius 20 mm – Min. bending radius of light-outlet tube 5 mm (do not bend the inner and outer 10 mm) – Max. tensile load 10 N
	**LFG-3015-###** **200 mm**	– Operating distance: – with series 4040 200 mm – With bendable light-outlet tube – For places difficult to access – Silicone sleeve Ø 4.7 mm – Min. bending radius 20 mm – Min. bending radius of light-outlet tube 5 mm (do not bend the inner and outer 10 mm) – Max. tensile load 10 N
	**LFG-3010-###** **200 mm**	– Operating distance: – with series 4040 200 mm – For the detection of smallest objects in places difficult to access – Wound sleeve of chrome-plated brass Ø 4.7 mm – Min. bending radius 23 mm – Max. tensile load 20 N

length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)
***bold** = preferred types (-### **only 500 mm length**)*

Size	*Part ref. / max. operating distance*	*Characteristics*
∅8 	**LFG-3020-###** **800 mm**	– Operating distance: – with series 4040 800 mm – Multi-purpose medium-range model – Wound sleeve of chrome-plated brass Ø 4.7 mm – Min. bending radius 25 mm – Max. tensile load 50 N
	**LFG-3030-###** **1500 mm**	– Operating distance: – with series 4040 1500 mm – For long operating distance – Wound sleeve of chrome-plated brass Ø 4.7 mm – Min. bending radius 25 mm – Max. tensile load 50 N

Radial through-beam sensors

length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)
***bold**= preferred types (-### **only 500 mm length**)*

Size	*Part ref. / max. operating distance*	*Characteristics*
∅6 	**LFG-4010-###** **200 mm**	– Operating distance: – with series 4040 200 mm – For the detection of smallest objects in places difficult to access – Leg length 14 mm – Wound sleeve of chrome-plated brass Ø 4.7 mm – Min. bending radius 23 mm – Max. tensile load 20 N
∅8 	**LFG-4020-###** **800 mm**	– Operating distance: – with series 4040 800 mm – Multi-purpose medium-range model – Leg length 14 mm – Wound sleeve of chrome-plated brass Ø 4.7 mm – Min. bending radius 25 mm – Max. tensile load 50 N
	**LFG-4030-###** **1500 mm**	– Operating distance: – with series 4040 1500 mm – For long operating distance – Leg length 14 mm – Wound sleeve of chrome-plated brass Ø 4.7 mm – Min. bending radius 25 mm – Max. tensile load 50 N

Glass optical fibers for series 3030, 3031 and 3060 switches (connection as with synthetic fibers)

*Part reference (**bold** = preferred types)*

Size	*Part ref. / max. operating distance*	*Characteristics*
M6	**Diffuse sensor**	– Operating distance: – with series 3030 120 mm – with series 3031 60 mm – with series 3060 200 mm – For difficult environmental conditions – Wound sleeve of chrome-plated brass Ø 4.6 mm – Min. bending radius 25 mm – Max. tensile load 20 N
	LFG-1022-050 **120 mm**	
M4	**Through-beam sensor**	– Operating distance: – with series 3030 500 mm – with series 3031 250 mm – with series 3060 800 mm – For difficult environmental conditions – Wound sleeve of chrome-plated brass Ø 4.6 mm – Min. bending radius 25 mm – Max. tensile load 20 N
	LFG-3022-050 **500 mm**	

Accessories for glass optical fibers

*Part reference (**bold** = preferred types)*

Size	*Part reference*	*Characteristics*
For Ø 6 mm heads	**Fiber mounting clamp**	Mounting clamps for axial and radial light-outlet tubes. Material: nickel-plated brass. Suitable for the following fibers: – LFG-1005-### / LFG-1015-### – LFG-1010-### / LFG-2010-### – LFG-3005-### / LFG-3015-### – LFG-3010-### / LFG-4010-###
	LXG-0000-060	
For Ø 8 mm heads	**Fiber mounting clamp**	Mounting clamps for axial and radial light-outlet tubes. Material: nickel-plated brass. Suitable for the following fibers: – LFG-1020-### / LFG-1030-### – LFG-2020-### / LFG-2030-### – LFG-3020-### / LFG-3030-### – LFG-4020-### / LFG-4030-###
	LXG-0000-080	