

Catalog 2012



Fiber Optic Sensors

How to find the product you're looking for

The series/product group overview pages ...

Leuze electronic

OVERVIEW OF FIBER OPTIC AMPLIFIERS

Dimensioned drawing

Further details can be found in the respective data sheet.

A Fiber optics fixing screw
B Indicator diodes
C Sensitivity adjustment
D Fiber optics input

Additional products:

Product	Page
Fiber optic amplifier LV461, LV462	68
Glass fiber optics GF	46
Plastic fiber optics KF	6

Common technical data

Electrical data	Value
Operating voltage U_0	10 ... 30VDC
Residual ripple	$\leq 10\%$ of U_0
Open-circuit current	$\leq 25\text{mA}$
Signal voltage high/low	$\geq (U_0/2)V$; 2V

Indicators	Function
Green LED	Ready/Teach-in
Yellow LED	Switching output
Red LED	Performance res./Teach-in

Mechanical data	Value
Housing	Plastic
Fiber optic connection	Screw connection
Weight (without cable)	30g

Environmental data	Value
Ambient temperature (operation)	-20°C ... +70°C
Protection class	IP 65

Features

- For glass fiber optics
- Teach-in for optimum sensitivity adjustment
- Activation or teach input
- Warning output

Fiber optic ABC

- Glass fiber optics

Page 62

Accessories

Part no.	Designation	Features
50104525	K - D MBW - 4P - 2m - PVC	Connection cable 2000mm, M8 angular, 4-pin, PVC
50104524	K - D MBA - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC
50104527	K - D MBW - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC
50104526	K - D MBA - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC
50104529	K - D MBW - 4P - 10m - PVC	Connection cable 10000mm, M8 angular, 4-pin, PVC
50104528	K - D MBA - 4P - 10m - PVC	Connection cable 10000mm, M8 axial, 4-pin, PVC

Options

1 Teach-in via buttons

Current subchapter

Web link

www.leuze.com/fibre_optical/

Current chapter

Available function principles

Other products in this series/product group

Technical data

Special features

Leuze electronic

LVSR 325

Fiber optic amplifiers

Fiber optic amplifiers

Fiber optic amplifiers	Fiber optics	Page
Fiber optic amplifier LVSR 325	Glass fiber	66

Additional products:

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Options

1 Teach-in via buttons

Reference to explanations in fiber optics ABC

Web link

www.leuze.com/fibre_optical/

Current chapter

Available function principles

Other products in this series/product group

Technical data

Special features

The product selection tables ...

Leuze electronic

FIBER OPTIC AMPLIFIERS

Part description

Part No.	Fiber optics	Light source	Output	Switching	Connection	Option	Accessories
LVSR 325 K / P - 402 - S8 50081301	Glass fiber GF, Ø 4mm	Red light	PNP	Light/dark configurable	M8 connector	1	a, b, c, d, e, f
LVSR 325 K / P - 401 50081300	Glass fiber GF, Ø 4mm	Red light	PNP	Light/dark configurable	Cable, 2m	1	
LVSR 325 K / N - 402 - S8 50033278	Glass fiber GF, Ø 4mm	Red light	NPN	Light/dark configurable	M8 connector	1	a, b, c, d, e, f
LVSR 325 K / N - 401 50033280	Glass fiber GF, Ø 4mm	Red light	NPN	Light/dark configurable	Cable, 2m	1	

Accessories / connection cables

Part no.	Designation	Features
50104525	K - D MBW - 4P - 2m - PVC	Connection cable 2000mm, M8 angular, 4-pin, PVC
50104524	K - D MBA - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC
50104527	K - D MBW - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC
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50104529	K - D MBW - 4P - 10m - PVC	Connection cable 10000mm, M8 angular, 4-pin, PVC
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Options

1 Teach-in via buttons

Current subchapter

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Leuze electronic

LVSR 325

Fiber optic amplifiers

Fiber optic amplifiers

Fiber optic amplifiers	Fiber optics	Page
Fiber optic amplifier LVSR 325	Glass fiber	66

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Options

1 Teach-in via buttons

Reference to explanations in fiber optics ABC

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Current chapter

Available function principles

Other products in this series/product group

Technical data

Special features

- ① Dimensioned drawing
- ② Current subchapter
- ③ Current chapter
- ④ Available function principles
- ⑤ Other products in this series/product group
- ⑥ Technical data
- ⑦ Special features

- ⑧ Reference to explanations in fiber optics ABC
- ⑨ Web link
- ⑩ Product selection table with specific data
- ⑪ Table with connection accessories
- ⑫ Electrical connection diagrams
- ⑬ Product-specific options

COMPANY PORTRAIT



At Leuze electronic, we are "the sensor people": For almost 50 years we have been the specialists for innovative and practical solutions in the area of optical sensors for factory automation. Our systems are used in the automobile industry and in conveyor and storage technology as well as in printing machines and in packing material and analysis technologies.

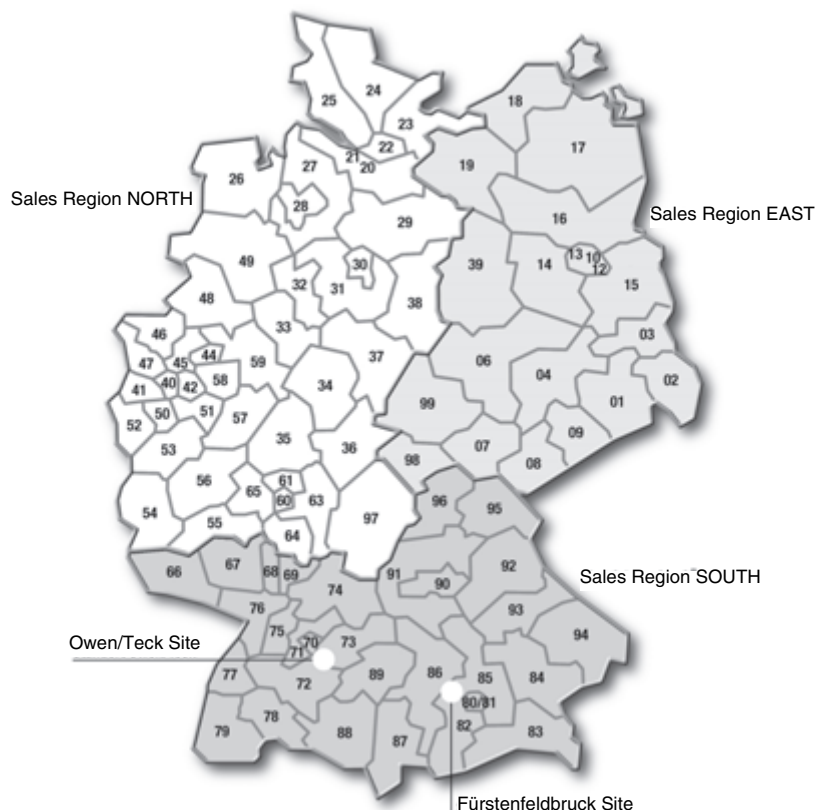
Our dedicated employees are characterised, above all, by their customer focus. There's one thing Leuze electronic customers can count on – on us.

The range of products extends from optical electronic sensors, inductive switches and identification and data transmission systems to image processing systems and optical electronic solutions for workplace safety.

On the basis of extensive research and development work and the large application know-how possessed by our engineers, we are constantly further developing our systems. All with the goal of being able to offer our customers increasingly efficient and higher performance solutions at an optimal price / performance ratio.

We are the right partner for both standard applications as well as for custom, high-end solutions, and with an extensive sales and service network we can always be reached quickly.

GERMAN SALES



With a staff of qualified field representatives and our capable Customer Support Center, we are able to provide you with service around the clock. Our dedication to qualified service and focus on the customer have always been among our distinguishing characteristics.

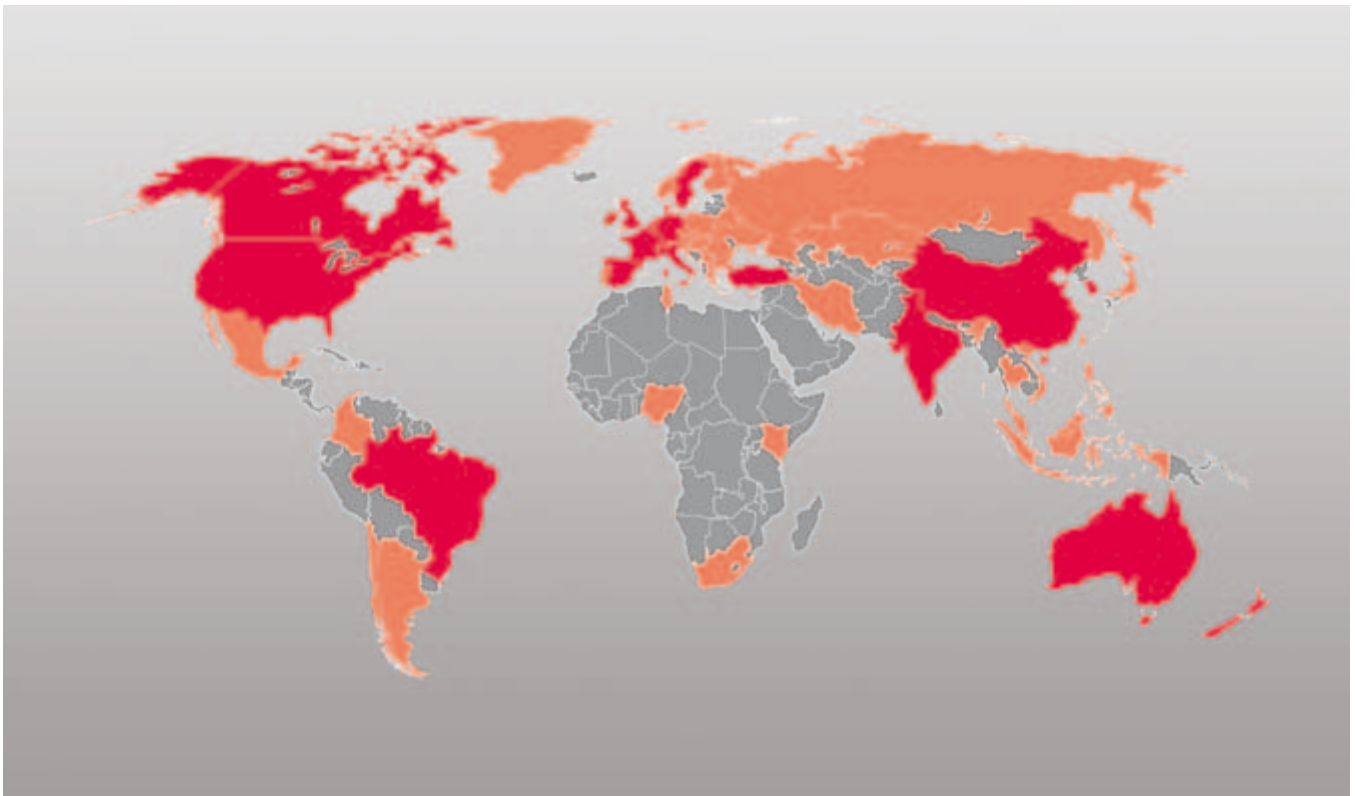
Customer Support Center Sales / Germany

Sales Region North	Tel. +49 7021 / 573-306
Sales Region South	Tel. +49 7021 / 573-307
Sales Region East	Tel. +49 7021 / 573-308
	Tel. +49 35027 / 629-106

Technical Hotline

Optical Sensors Division	Tel. +49 7021 / 573-217
Logistics Division	Tel. +49 7021 / 573-123
Workplace Safety Division	Tel. +49 8141 / 5350-111

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Through our constantly growing number of subsidiaries and sales partners around the world, we can guarantee you a uniform level of qualified advice, fast delivery times and reliable support during mounting and commissioning of your systems at nearly every location on earth.

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ISRAEL	SOUTH AFRICA
JAPAN	TAIWAN
KENYA	THAILAND
LEBANON	UKRAINE
MACEDONIA	UNITED ARAB EMIRATES
MALAYSIA	VIETNAM

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SELECTION TABLE KF SERIES

Throughbeam	Operating principle	Scanner	Fastening of the probe	Optical outlet		Laying		Fiber core		Area of application				
				On front	Lateral	Flexible	Highly flexible	Coaxial fiber structure	Multiple fiber core	General applications	Precise object detection	Highly precise object detection	High operating range	
			Ø 2mm											
			Ø 2mm											
			Ø 3mm											
			Ø 3mm											
			3 x M2											
			2 x M2											
			3 x M3											
			2 x Ø 2.1mm											
			2 x Ø 3.2mm											
			2 x Ø 3.2mm											
			2 x Ø 2.1mm											
			Ø 3.5mm											
			M4											
			2 x M3											

FIBER OPTIC SENSORS

Fiber optics
KF / KFX

	Special characteristics			Fiber length [mm]	Fiber head configu- ration/image	Typical operating range limit	Type designation Part no.	Details
	Heat resistant -55 °C ... +105 °C	Metal probe	Adapted for attachment lens		Fiber optics, can be shortened	(LV463 expected to be available for delivery in the third quarter of 2012) in mm with amplifier		on page
				1030		 LV463 100 LV462 60 LV461 35	KF-LD-210-32 50117741	16
				2015		 LV463 54 LV462 30 LV461 18	KF-LE-220 50117738	16
				2035		 LV463 600 LV462 250 LV461 200	KF-L-320-D-T14L 50117739	16
				520		 LV463 450 LV462 260 LV461 150	KF-LH-305-D 50117740	16
				1010		 LV463 360 LV462 210 LV461 120	KF-L-10ML-10 50117742	18
				2010		 LV463 450 LV462 260 LV461 150	KF-L-10MLD-20 50117743	18
				1015		 LV463 540 LV462 310 LV461 180	KF-L-15MLD-10 50117744	18
				2010		 LV463 150 LV462 85 LV461 50	KF-LW-FU57-20 50117745	18
				2038		 LV463 750 LV462 430 LV461 250	KF-L-30ML-20 50117746	20
				2055		 LV463 750 LV462 430 LV461 250	KF-L-50ML-20 50117747	20
				2007		 LV463 40 LV462 26 LV461 15	KF-LW-FU53-20 50117748	20
				902		 LV463 750 LV462 430 LV461 250	KF-LC32-12 50117749	20
				2008		 LV463 750 LV462 430 LV461 250	KF-LY-77TZ-20 50117750	22
				2031		 LV463 9 LV462 9 LV461 9 Mouth width	KF-LY-U09-20 50117751	22

Fiber optics
GF

Fiber optic
amplifiers

Accessories

Services

Fiber optic ABC

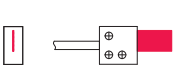
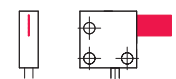
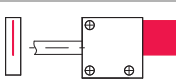
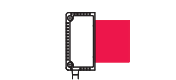
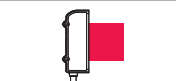
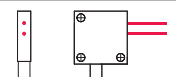
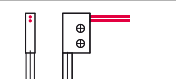
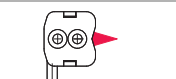
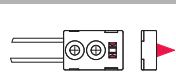
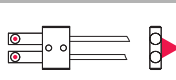
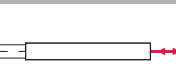
Part
directories

SELECTION TABLE KF SERIES

Operating principle	Scanner	Fastening of the probe	Optical outlet		Laying		Fiber core		Area of application			
			On front	Lateral	Flexible	Highly flexible	Coaxial fiber structure	Multiple fiber core	General applications	Precise object detection	Highly precise object detection	High operating range
Throughbeam		3 x M2										
		3 x M3										
		3 x M3										
		2 x Ø 3.2mm										
		2 x Ø 3.2mm										
		3 x M3										
		2 x Ø 2.1mm										
		2 x Ø 3.2mm										
		2 x Ø 3.2mm										
		2 x M3										
		Ø 2mm										

FIBER OPTIC SENSORS

Fiber optics
KF / KFX

Special characteristics			Fiber length [mm]	Fiber head configu- ration/image	Typical operating range limit (LV463 expected to be available for delivery in the third quarter of 2012)	Type designation Part no.	Details on page
Heat resistant -55 °C ... +105 °C	Metal probe	Adapted for attachment lens		Fiber optics, can be shortened	in mm with amplifier		
			2010	 	LV463 120 LV462 70 LV461 40	KF-ET-10ML-20 50117727	24
			1015	 	LV463 120 LV462 70 LV461 40	KF-ET-15MLD-20 50117728	24
			2020	 	LV463 210 LV462 120 LV461 70	KF-ET-20MLS-20 50117729	24
			2038	 	LV463 210 LV462 120 LV461 70	KF-ET-30ML-20 50117730	24
			2055	 	LV463 210 LV462 120 LV461 70	KF-ET-50ML-20 50117731	26
			2020	 	LV463 210 LV462 120 LV461 70	KF-ETY-20MLSD-20 50117732	26
			2010	 	LV463 48 LV462 28 LV461 16	KF-ETW-FU47-20 50117733	26
			2018	 	LV463 20 LV462 10 LV461 10	KF-ETW-K10-20 50117734	26
			2020	 	LV463 18 LV462 10 LV461 6	KF-ETB-38V-20 50117735	28
			2027	 	LV463 54 LV462 30 LV461 18	KF-ETH-38H-20 50117736	28
			2015	 	LV463 8 LV462 5 LV461 3	KF-ETE-220 50117737	28

Fiber optics
GF

Fiber optic
amplifiers

Accessories

Services

Fiber optic ABC

Part
directories

SELECTION TABLE KFX SERIES

Operating principle	Throughbeam	Scanner	Fastening of the probe	Optical outlet		Laying		Fiber core		Area of application					
				On front	Lateral	Flexible	Highly flexible	Coaxial fiber structure	Multiple fiber core	General applications	Precise object detection	Highly precise object detection	High operating range		
            			M4												
			M4												
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			M4												
			M3												
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			M3												
			M3												
			M3												
			M3												
			Ø 2mm												
			Ø 1.5mm												
			2 x M3												

FIBER OPTIC SENSORS

Fiber optics
KF / KFX

Special characteristics	Heat resistant -55 °C ... +105 °C	Metal probe	Adapted for attachment lens	Fiber length [mm]	Fiber optics, can be shortened	Fiber head configu- ration/image	Typical operating range limit (LV463 expected to be available for delivery in the third quarter of 2012) in mm with amplifier	Type designation Part no.	Details on page
				2014			LV463 900	KFX-L-420 50117766	30
							LV462 525		
							LV461 300		
				2014			LV463 300	KFX-LD-420 50117767	30
							LV462 175		
							LV461 100		
				2014			LV463 900	KFX-LH-420 50117768	30
							LV462 525		
							LV461 300		
				2014			LV463 900	KFX-LY-420 50117769	30
							LV462 525		
							LV461 300		
				2012			LV463 900	KFX-L-320 50117770	32
							LV462 525		
							LV461 300		
				2012			LV463 300	KFX-LD-320 50117771	32
							LV462 175		
							LV461 100		
				2012			LV463 900	KFX-LH-320 50117772	32
							LV462 525		
							LV461 300		
				2012			LV463 900	KFX-LY-320 50117773	32
							LV462 525		
							LV461 300		
				2015			LV463 900	KFX-L-320-Q 50117774	34
							LV462 525		
							LV461 300		
				2015			LV463 300	KFX-LD-320-Q 50117775	34
							LV462 175		
							LV461 100		
				2015			LV463 60	KFX-LA-220 50117776	34
							LV462 30		
							LV461 20		
				2015			LV463 300	KFX-LD-120 50117777	34
							LV462 175		
							LV461 100		
				2025			LV463 1050	KFX-L-20ML-20 50117778	36
							LV462 600		
							LV461 350		
									

Fiber optics
GF

Fiber optic
amplifiers

Accessories

Services

Fiber optic ABC

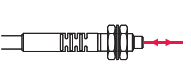
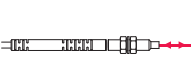
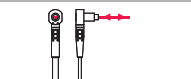
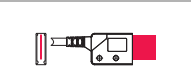
Part
directories

SELECTION TABLE KFX SERIES

Operating principle	Scanner	Fastening of the probe	Optical outlet		Laying		Fiber core		Area of application			
			On front	Lateral	Flexible	Highly flexible	Coaxial fiber structure	Multiple fiber core	General applications	Precise object detection	Highly precise object detection	High operating range
		M6										
		M6										
		M6										
		M4										
		M4										
		M4										
		M3										
		M3										
		M3										
		Ø 3mm										
		Ø 3mm										
		Ø 1.5mm										
		M6										
		2 x M3										

FIBER OPTIC SENSORS

Fiber optics
KF / KFX

Special characteristics	Heat resistant -55 °C ... +105 °C	Metal probe	Adapted for attachment lens	Fiber length [mm]		Fiber head configuration/image	Typical operating range limit (LV463 expected to be available for delivery in the third quarter of 2012)		Type designation Part no.	Details on page
					Fiber optics, can be shortened			in mm with amplifier		
				2015			LV463 240 LV462 140 LV461 80		KFX-ET-620 50117752	38
				2015			LV463 270 LV462 150 LV461 90		KFX-ETC-620 50117753	38
				2015			LV463 240 LV462 140 LV461 80		KFX-ETH-620 50117754	38
				2019			LV463 14 LV462 8 LV461 5		KFX-ETA-420 50117755	38
				2019			LV463 90 LV462 60 LV461 30		KFX-ETC-420 50117756	40
				2019			LV463 70 LV462 40 LV461 25		KFX-ETD-420 50117757	40
				2019			LV463 14 LV462 8 LV461 5		KFX-ETA-320 50117758	40
				2019			LV463 90 LV462 60 LV461 30		KFX-ETC-320 50117759	40
				2019			LV463 70 LV462 40 LV461 25		KFX-ETD-320 50117760	42
				2016			LV463 90 LV462 60 LV461 30		KFX-ETC-320-Q 50117761	42
				2016			LV463 70 LV462 40 LV461 25		KFX-ETD-320-Q 50117762	42
				2019			LV463 60 LV462 35 LV461 20		KFX-ETC7-120 50117763	42
				2015			LV463 210 LV462 120 LV461 70		KFX-ETY-67TZ-20 50117764	44
				2025			LV463 210 LV462 120 LV461 70		KFX-ET-20ML-20 50117765	44

Fiber optics
GF

Fiber optic
amplifiers

Accessories

Services

Fiber optic ABC

Part
directories

KF SERIES

OVERVIEW



Features

- Extensive and highly-specialized range for universal application
- Special fiber types with extraordinary characteristics
- Highly-flexible types for the smallest bending radii
- Extra small cross sections for the detection of very small parts
- V-optics
- Light-bands with active cross section of 5.55 ... 46.5mm

Fiber optic ABC

- Plastic fiber optics Page 82
- Throughbeam sensors Page 85
- Diffuse reflection scanners Page 85

Operating principle	Typ. operating range limits	Page
 Throughbeam sensors	0 60 mm	16
 Diffuse reflection scanners	0 30 mm	24

Additional products - fiber optic sensors:

 Glass fiber optics	GF series...	46
 Fiber optic amplifier	LV series...	64

Common technical data

Mechanical data	Fiber material	PMMA
	Fiber type	Multimode fiber (step index fiber)
	Numerical aperture (NA)	0.5
	Damping at $\lambda = 650\text{nm}$	210 dB/km (RH < 95 %)
	Fiber sheathing material	PE
	Weight	4g/m
Environmental data	Ambient temperature (operation/storage)	-55°C ... +70°C

Accessories for this series can be found from page 78 onwards



KF
Page 14



KFX
Page 30



GF
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LV
Page 64

OVERVIEW

Operating principle	Typ. operating range limits	Page
 Throughbeam sensors	0 60 mm	30
 Diffuse reflection scanners	0 30 mm	38

Additional products - fiber optic sensors:

  Glass fiber optics	GF series...	46
  Fiber optic amplifier	LV series...	64

KFX SERIES



Fiber optics
GF

Fiber optic
amplifiers

Accessories

Features

- **NEW:** high-quality fibers with molded bending protection – prevents fiber breakage on the critical transition point between the head and fiber connection area
- Special fiber types with extraordinary characteristics
- Highly-flexible types for the smallest bending radii
- Extra small cross sections for the detection of very small parts
- Coaxial structure for object detection independent from the entry direction
- Attachment lenses for focusing the light spot (scanning fiber optics) or for increasing range (throughbeam systems)

Services

Fiber optic ABC

Part
directories

Common technical data

Mechanical data	Fiber material	PMMA
	Fiber type	Multimode fiber (step index fiber)
	Numerical aperture (NA)	0.5
	Damping at $\lambda = 650\text{nm}$	210dB/km (RH < 95 %)
	Fiber sheathing material	PE
	Bending protection material	PVC ¹⁾
	Weight	4g/m
Environmental data	Ambient temperature (operation/storage)	-55°C ... +70°C

1) corresponds to category 2 ZLS / ZEK 01.2-08

Accessories for this series can be found from page 78 onwards

Fiber optic ABC

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- Throughbeam sensors Page 85
- Diffuse reflection scanners Page 85

THROUGHBEAM SENSORS

Part description Part no.: ¹⁾	Dimensioned drawing	Typ. scanning range limits [mm] Total length	
KF-LD-210-32 50117741		LV463 ²⁾ 0 ... 100 LV462 0 ... 60 LV461 0 ... 35 1030mm, can be shortened ³⁾ Smallest bending radius: R15	
KF-LE-220 50117738		LV463 ²⁾ 0 ... 54 LV462 0 ... 30 LV461 0 ... 18 2015mm, can be shortened ³⁾ Smallest bending radius: R10	
KF-L-320-D-T14L 50117739		LV463 ²⁾ 0 ... 600 LV462 0 ... 250 LV461 0 ... 200 2035mm, can be shortened ³⁾ Smallest bending radius: R25	
KF-LH-305-D 50117740		LV463 ²⁾ 0 ... 450 LV462 0 ... 260 LV461 0 ... 150 520mm, can be shortened ³⁾ Smallest bending radius: R25	

- 1) PU: 2 pieces (transmitter and receiver)
 2) Expected to be available for delivery in the third quarter of 2012
 3) Cutter/bending tool included in delivery contents



KF SERIES

Plastic fiber optics



	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	Lateral	0.05	Ø 1.25 Ø 0.5 (transmitter) Ø 0.5 (receiver)	1	
	On front	0.03	Ø 1.0 Ø 0.25 (transmitter) Ø 0.25 (receiver)	2	
	Lateral	0.1	Ø 2.2 Ø 1.0 (transmitter) Ø 1.0 (receiver)		
	Lateral	0.1	Ø 2.2 Ø 1.0 (transmitter) Ø 1.0 (receiver)	3	



Fiber optic ABC

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- Throughbeam sensors Page 85
- Installation Page 83
- Area of app./characteristics Page 86

Options

- 1 Precise object detection
- 2 Highly precise object detection
- 3 High-temperature version -55°C ... +105°C

THROUGHBEAM SENSORS

Part description Part no.: ¹⁾	Dimensioned drawing	Typ. scanning range limits [mm] Total length	
KF-L-10ML-10 50117742		LV463 ²⁾ 0 360 LV462 0 210 LV461 0 ... 150	1010mm, can be shortened ³⁾ Smallest bending radius: R25
KF-L-10MLD-20 50117743		LV463 ²⁾ 0 450 LV462 0 260 LV461 0 ... 150	2010mm, can be shortened ³⁾ Smallest bending radius: R25
KF-L-15MLD-10 50117744		LV463 ²⁾ 0 540 LV462 0 310 LV461 0 180	1015mm, can be shortened ³⁾ Smallest bending radius: R25
KF-LW-FU57-20 50117745		LV463 ²⁾ 0 ... 150 LV462 0 ... 85 LV461 0 ... 50	2010mm, can be shortened ³⁾ Smallest bending radius: R1

- 1) PU: 2 pieces (transmitter and receiver)
2) Expected to be available for delivery in the third quarter of 2012
3) Cutter/bending tool included in delivery contents



KF SERIES

Plastic fiber optics



	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	On front	1.0	Ø 2.2 16 x Ø 0.265 (transmitter) 16 x Ø 0.265 (receiver)	1, 2	
	Lateral	1.0	Ø 2.2 16 x Ø 0.265 (transmitter) 16 x Ø 0.265 (receiver)	1, 2	
	Lateral	1.0	Ø 2.2 16 x Ø 0.265 (transmitter) 16 x Ø 0.265 (receiver)	1, 2	
	Lateral	0.1	Ø 1.0 Ø 0.5 (transmitter) Ø 0.5 (receiver)	3	



Fiber optic ABC

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- Throughbeam sensors Page 85
- Installation Page 83
- Area of app./characteristics Page 86

Options

- 1 Multiple fiber core
- 2 Surface detection, light field detection = 5.44mm
- 3 Highly flexible fiber optics, operating temperature range -40°C ... +70°C

THROUGHBEAM SENSORS

Part description Part no.: ¹⁾	Dimensioned drawing	Typ. scanning range limits [mm] Total length	
KF-L-30ML-20 50117746		LV463 ²⁾ 0 750 LV462 0 430 LV461 0 250	2038mm, cannot be shortened Smallest bending radius: R60
KF-L-50ML-20 50117747		LV463 ²⁾ 0 750 LV462 0 430 LV461 0 250	2055mm, cannot be shortened Smallest bending radius: R60
KF-LW-FU53-20 50117748		LV463 ²⁾ 0 ... 40 LV462 0 ... 26 LV461 0 ... 15	2007mm, can be shortened ³⁾ Smallest bending radius: R1
KF-LC32-12 50117749		LV463 ²⁾ 0 750 LV462 0 430 LV461 0 250	902mm, cannot be shortened Smallest bending radius: R60

- 1) PU: 2 pieces (transmitter and receiver)
2) Expected to be available for delivery in the third quarter of 2012
3) Cutter/bending tool included in delivery contents



KF SERIES

Plastic fiber optics



	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	Lateral	1.0	Ø 2.8 32 x Ø 0.25 (transmitter) 32 x Ø 0.25 (receiver)	1, 2	
	Lateral	2.0	Ø 2.2 16 x Ø 0.265 (transmitter) 16 x Ø 0.265 (receiver)	1, 3	
	Lateral	0.1	Ø 1.0 Ø 0.5 (transmitter) Ø 0.5 (receiver)	4	
	Lateral	0.1	Ø 2.8 32 x Ø 0.265 (transmitter) 32 x Ø 0.265 (receiver)	1	



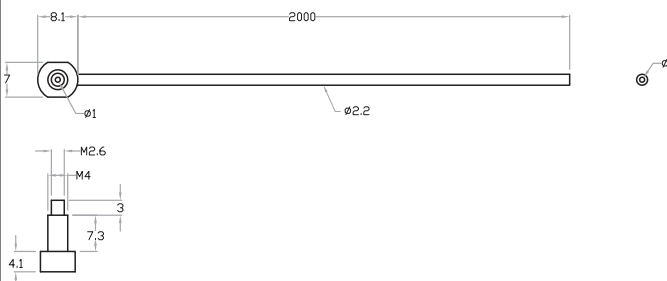
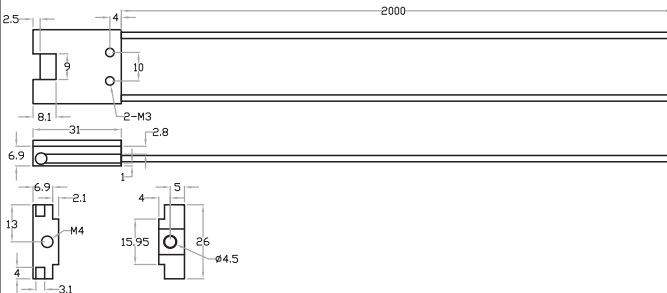
Fiber optic ABC

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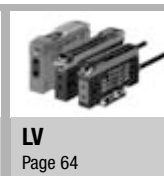
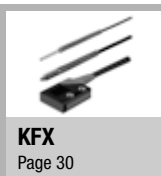
Options

- 1 Multiple fiber core
- 2 Surface detection, light field detection = 24.8mm
- 3 Surface detection, light field detection = 46.5mm
- 4 Highly flexible fiber optics, operating temperature range -40°C ... +70°C

THROUGHBEAM SENSORS

Part description Part No.:	Dimensioned drawing	Typ. scanning range limits [mm] Total length	
KF-LY-77TZ-20 50117750 ¹⁾		LV463 ²⁾ 0 750 LV462 0 430 LV461 0 250 2008 mm, can be shortened ³⁾ Smallest bending radius: R2	
KF-LY-U09-20 50117751		LV463 ²⁾ 9 LV462 9 LV461 9 2031 mm, can be shortened ³⁾ Smallest bending radius: R2	

- 1) PU: 2 pieces (transmitter and receiver)
 2) Expected to be available for delivery in the third quarter of 2012
 3) Cutter/bending tool included in delivery contents



KF SERIES

Plastic fiber optics



Fiber optics
KF / KFX

	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	Lateral	0.5	Ø 2.2 Ø 1.0 (transmitter) Ø 1.0 (receiver)	1	
	Lateral	n/a	2 x Ø 2.2 Ø 1.0 (transmitter) Ø 1.0 (receiver)	1, 2	



Fiber optics
GF

Fiber optic
amplifiers

Accessories

Fiber optic ABC

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- Throughbeam sensors Page 85
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Services

Fiber optic ABC

Part
directories

Options

- 1 Flexible fiber optics, operating temperature range -40°C ... +70°C
- 2 Forked photoelectric sensor with 9mm mouth width

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Dimensioned drawing	Typ. scanning range limits [mm] Total length
KF-ET-10ML-20 50117727		LV463 ¹⁾ 0 120 LV462 0 70 LV461 0 40 2010mm, can be shortened ²⁾ Smallest bending radius: R25
KF-ET-15MLD-20 50117728		LV463 ¹⁾ 0 120 LV462 0 70 LV461 0 40 1015mm, can be shortened ²⁾ Smallest bending radius: R25
KF-ET-20MLS-20 50117729		LV463 ¹⁾ 0 210 LV462 0 120 LV461 0 70 2020mm, can be shortened ²⁾ Smallest bending radius: R25
KF-ET-30ML-20 50117730		LV463 ¹⁾ 0 210 LV462 0 120 LV461 0 70 2038mm, can be shortened ²⁾ Smallest bending radius: R25

- 1) Expected to be available for delivery in the third quarter of 2012
 2) Cutter/bending tool included in delivery contents



KF SERIES

Plastic fiber optics



	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	On front	1.0	2 x Ø 1.25 9 x Ø 0.25 (transmitter) 9 x Ø 0.25 (receiver)	1, 3	
	Lateral	1.0	2 x Ø 1.25 9 x Ø 0.25 (transmitter) 9 x Ø 0.25 (receiver)	1, 2	
	On front	1.0	2 x Ø 2.2 16 x Ø 0.265 (transmitter) 16 x Ø 0.265 (receiver)	1, 4	
	Lateral	1.0	2 x Ø 2.2 16 x Ø 0.265 (transmitter) 16 x Ø 0.265 (receiver)	1, 5	



Fiber optic ABC

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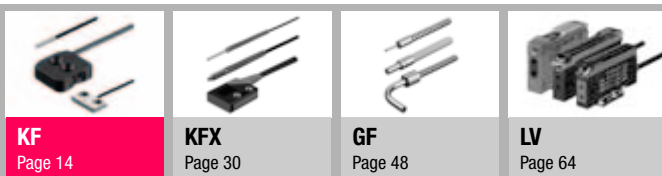
Options

- 1 Multiple fiber core
- 2 Surface detection, light field detection = 5.44 mm
- 3 Surface detection, light field detection = 6.14 mm
- 4 Surface detection, light field detection = 11 mm
- 5 Surface detection, light field detection = 24.8 mm

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Dimensioned drawing	Typ. scanning range limits [mm] Total length
KF-ET-50ML-20 50117731		LV463 ¹⁾ 0 ... 210 LV462 0 ... 120 LV461 0 ... 70 2055 mm, can be shortened ²⁾ Smallest bending radius: R25
KF-ETY-20MLSD-20 50117732		LV463 ¹⁾ 0 ... 210 LV462 0 ... 120 LV461 0 ... 70 2020 mm, can be shortened ²⁾ Smallest bending radius: R2
KF-ETW-FU47-20 50117733		LV463 ¹⁾ 0 ... 48 LV462 0 ... 28 LV461 0 ... 16 2010 mm, can be shortened ²⁾ Smallest bending radius: R1
KF-ETW-K10-20 50117734		LV463 ¹⁾ 0 ... 20 LV462 0 ... 10 LV461 0 ... 10 2018 mm, can be shortened ²⁾ Smallest bending radius: R1

1) Expected to be available for delivery in the third quarter of 2012
 2) Cutter/bending tool included in delivery contents



KF SERIES

Plastic fiber optics



Fiber optics
KF / KFX

	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	Lateral	2.0	2 x Ø 2.2 16 x Ø 0.265 (transmitter) 16 x Ø 0.265 (receiver)	1, 2	
	Lateral	0.5	2 x Ø 2.2 Ø 1.0 (transmitter) Ø 1.0 (receiver)	3	
	Lateral	0.1	2 x Ø 1.0 Ø 0.5 (transmitter) Ø 0.5 (receiver)	4	
	Lateral	0.1	2 x Ø 1.0 Ø 0.5 (transmitter) Ø 0.5 (receiver)	4, 5	



Fiber optic ABC

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Options

- 1 Multiple fiber core
- 2 Surface detection, light field detection = 46.5mm
- 3 Flexible fiber optics, operating temperature range -40°C ... +70°C
- 4 Highly flexible fiber optics, operating temperature range -40°C ... +70°C
- 5 V-optics

www.leuze.com/fibre_optics/

Fiber optics
GF

Fiber optic
amplifiers

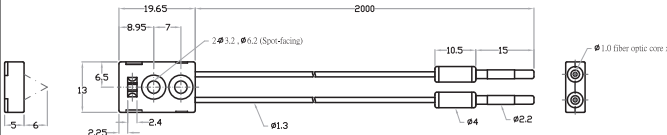
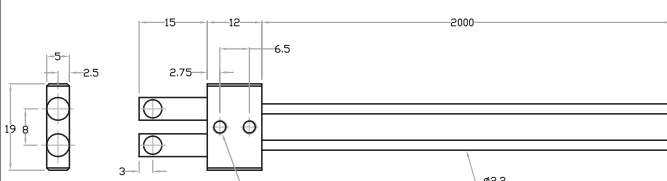
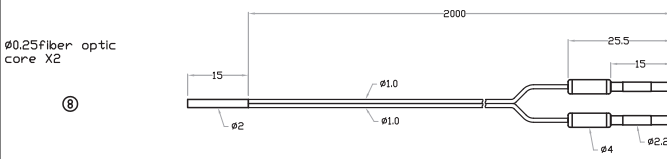
Accessories

Services

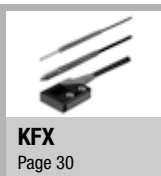
Fiber optic ABC

Part
directories

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Dimensioned drawing	Typ. scanning range limits [mm] Total length	
KF-ETB-38V-20 50117735		LV463 ¹⁾ 0 ... 18 LV462 0 ... 10 LV461 0 ... 6 2020mm, can be shortened ²⁾ Smallest bending radius: R25	
KF-ETH-38H-20 50117736		LV463 ¹⁾ 0 ... 54 LV462 0 ... 30 LV461 0 ... 18 2027mm, can be shortened ²⁾ Smallest bending radius: R25	
KF-ETE-220 50117737		LV463 ¹⁾ 0 ... 8 LV462 0 ... 5 LV461 0 ... 3 2015mm, can be shortened ²⁾ Smallest bending radius: R10	

- 1) Expected to be available for delivery in the third quarter of 2012
2) Cutter/bending tool included in delivery contents



KF SERIES

Plastic fiber optics



	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	Lateral	n/a	2 x Ø 1.3 Ø 1.0 (transmitter) Ø 1.0 (receiver)	1	
	Lateral	n/a	2 x Ø 2.2 Ø 1.0 (transmitter) Ø 1.0 (receiver)	1, 2	
	On front	0.05	2 x Ø 1.0 Ø 0.25 (transmitter) Ø 0.25 (receiver)	3	



Fiber optic ABC

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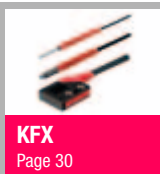
Options

- 1 V-optics
- 2 High-temperature version -55°C ... +105°C
- 3 Highly precise object detection

THROUGHBEAM SENSORS

Part description Part no.: ¹⁾	Dimensioned drawing	Typ. scanning range limits [mm] Total length	
KFX-L-420 50117766		LV463 ²⁾ 0 900 LV462 0 525 LV461 0 300 2014mm, can be shortened ³⁾ Smallest bending radius: R25	
KFX-LD-420 50117767		LV463 ²⁾ 0 300 LV462 0 ... 175 LV461 0 ... 100 2014mm, can be shortened ³⁾ Smallest bending radius: R15	
KFX-LH-420 50117768		LV463 ²⁾ 0 900 LV462 0 525 LV461 0 300 2014mm, can be shortened ³⁾ Smallest bending radius: R25	
KFX-LY-420 50117769		LV463 ²⁾ 0 900 LV462 0 525 LV461 0 300 2014mm, can be shortened ³⁾ Smallest bending radius: R2	

- 1) PU: 2 pieces (transmitter and receiver)
 2) Expected to be available for delivery in the third quarter of 2012
 3) Cutter/bending tool included in delivery contents



KFX SERIES

Plastic fiber optics



Fiber optics
KF / KFX

	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	On front	0.5	2 x Ø 2.2 Ø 1.0 (transmitter) Ø 1.0 (receiver)	4	
	On front	0.05	2 x Ø 1.25 Ø 0.5 (transmitter) Ø 0.5 (receiver)	1, 4	
	On front	0.5	2 x Ø 2.2 Ø 1.0 (transmitter) Ø 1.0 (receiver)	2, 4	
	On front	0.5	2 x Ø 2.2 Ø 1.0 (transmitter) Ø 1.0 (receiver)	3, 4	



Fiber optics
GF

Fiber optic
amplifiers

Accessories

Fiber optic ABC

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Services

Fiber optic ABC

Part
directories

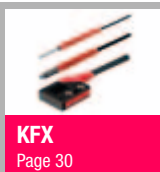
Options

- 1 Precise object detection
- 2 High-temperature version -55°C ... +105°C
- 3 Flexible fiber optics, operating temperature range -40°C ... +70°C
- 4 Adapted for attachment lens KL-SM02, KL-M02, KL-M06

THROUGHBEAM SENSORS

Part description Part no.: ¹⁾	Dimensioned drawing	Typ. scanning range limits [mm] Total length
KFX-L-320 50117770		LV463 ²⁾ 0 900 LV462 0 525 LV461 0 300 2012mm, can be shortened ³⁾ Smallest bending radius: R25
KFX-LD-320 50117771		LV463 ²⁾ 0 300 LV462 0 ... 175 LV461 0 ... 100 2012mm, can be shortened ³⁾ Smallest bending radius: R15
KFX-LH-320 50117772		LV463 ²⁾ 0 900 LV462 0 525 LV461 0 300 2012mm, can be shortened ³⁾ Smallest bending radius: R25
KFX-LY-320 50117773		LV463 ²⁾ 0 900 LV462 0 525 LV461 0 300 2012mm, can be shortened ³⁾ Smallest bending radius: R2

- 1) PU: 2 pieces (transmitter and receiver)
 2) Expected to be available for delivery in the third quarter of 2012
 3) Cutter/bending tool included in delivery contents



KFX SERIES

Plastic fiber optics



Fiber optics
KF / KFX

	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	On front	0.5	2 x Ø 2.2 Ø 1.0 (transmitter) Ø 1.0 (receiver)		
	On front	0.05	2 x Ø 1.25 Ø 0.5 (transmitter) Ø 0.5 (receiver)	1	
	On front	0.5	2 x Ø 2.2 Ø 1.0 (transmitter) Ø 1.0 (receiver)	2	
	On front	0.5	2 x Ø 2.2 Ø 1.0 (transmitter) Ø 1.0 (receiver)	3	



Fiber optics
GF

Fiber optic
amplifiers

Accessories

Fiber optic ABC

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Services

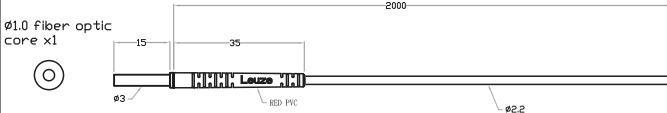
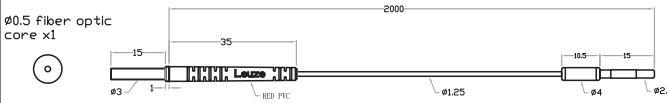
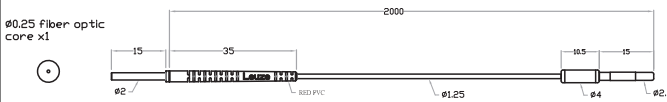
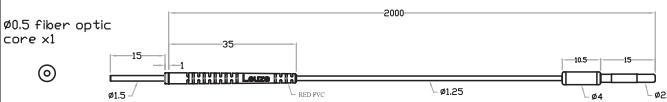
Fiber optic ABC

Part
directories

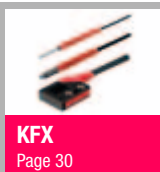
Options

- 1 Precise object detection
- 2 High-temperature version -55°C ... +105°C
- 3 Flexible fiber optics, operating temperature range -40°C ... +70°C

THROUGHBEAM SENSORS

Part description Part no.: ¹⁾	Dimensioned drawing	Typ. scanning range limits [mm] Total length	
KFX-L-320-Q 50117774		LV463 ²⁾ 0 900 LV462 0 525 LV461 0 300	2015mm, can be shortened ³⁾ Smallest bending radius: R25
KFX-LD-320-Q 50117775		LV463 ²⁾ 0 300 LV462 0 ... 175 LV461 0 ... 100	2015mm, can be shortened ³⁾ Smallest bending radius: R15
KFX-LA-220 50117776		LV463 ²⁾ 0 ... 60 LV462 0 ... 30 LV461 0 ... 20	2015mm, can be shortened ³⁾ Smallest bending radius: R10
KFX-LD-120 50117777		LV463 ²⁾ 0 300 LV462 0 ... 175 LV461 0 ... 100	2015mm, can be shortened ³⁾ Smallest bending radius: R15

- 1) PU: 2 pieces (transmitter and receiver)
 2) Expected to be available for delivery in the third quarter of 2012
 3) Cutter/bending tool included in delivery contents



KFX SERIES

Plastic fiber optics



Fiber optics
KF / KFX

	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	On front	0.5	2 x Ø 2.2 Ø 1.0 (transmitter) Ø 1.0 (receiver)		
	On front	0.05	2 x Ø 1.25 Ø 0.5 (transmitter) Ø 0.5 (receiver)	1	
	On front	0.03	2 x Ø 1.25 Ø 0.25 (transmitter) Ø 0.25 (receiver)	2	
	On front	0.05	2 x Ø 1.25 Ø 0.5 (transmitter) Ø 0.5 (receiver)	1	



Fiber optic ABC

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Fiber optics
GF

Fiber optic
amplifiers

Accessories

Services

Fiber optic ABC

Part
directories

Options

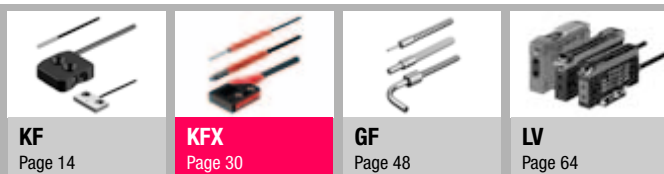
- 1 Precise object detection
- 2 Highly precise object detection

THROUGHBEAM SENSORS

Part description Part no.: ¹⁾	Dimensioned drawing	Typ. scanning range limits [mm] Total length	
KFX-L-20ML-20 50117778		LV463 ²⁾ 0 1050 LV462 0 600 LV461 0 350 2025mm, cannot be shortened Smallest bending radius: R60	

1) PU: 2 pieces (transmitter and receiver)

2) Expected to be available for delivery in the third quarter of 2012



KFX SERIES

Plastic fiber optics



Fiber optics
KF / KFX

	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	On front	1.0	2 x Ø 2.8 32 x Ø 0.265 (transmitter) 32 x Ø 0.265 (receiver)	1, 2	



Fiber optics
GF

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Fiber optic ABC

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- Throughbeam sensors Page 85
- Installation Page 83
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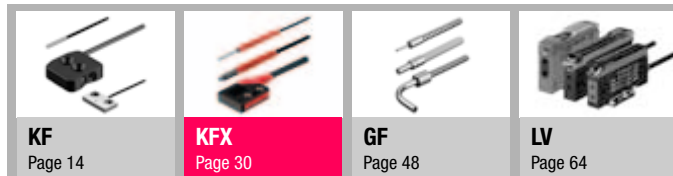
- 1 Multiple fiber core
- 2 Surface detection, light field detection = 14.5mm

www.leuze.com/fibre_optics/

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Dimensioned drawing	Typ. scanning range limits [mm] Total length
KFX-ET-620 50117752		LV463 ¹⁾ 0 ... 240 LV462 0 ... 140 LV461 0 ... 80 2015mm, can be shortened ²⁾ Smallest bending radius: R25
KFX-ETC-620 50117753		LV463 ¹⁾ 0 ... 270 LV462 0 ... 150 LV461 0 ... 90 2015mm, can be shortened ²⁾ Smallest bending radius: R25
KFX-ETH-620 50117754		LV463 ¹⁾ 0 ... 240 LV462 0 ... 140 LV461 0 ... 80 2015mm, can be shortened ²⁾ Smallest bending radius: R25
KFX-ETA-420 50117755		LV463 ¹⁾ 0 ... 14 LV462 0 ... 8 LV461 0 ... 5 2019mm, can be shortened ²⁾ Smallest bending radius: R10

- 1) Expected to be available for delivery in the third quarter of 2012
 2) Cutter/bending tool included in delivery contents



KFX SERIES

Plastic fiber optics



Fiber optics
KF / KFX

	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	On front	0.2	2 x Ø 2.2 Ø 1.0 (transmitter) Ø 1.0 (receiver)		
	On front	0.1	2 x Ø 2.2 Ø 1.0 (transmitter) 16 x Ø 0.265 (receiver)	1	
	On front	0.2	2 x Ø 2.2 Ø 1.0 (transmitter) Ø 1.0 (receiver)	2	
	On front	0.05	2 x Ø 1.25 Ø 0.25 (transmitter) Ø 0.25 (receiver)	3, 4	



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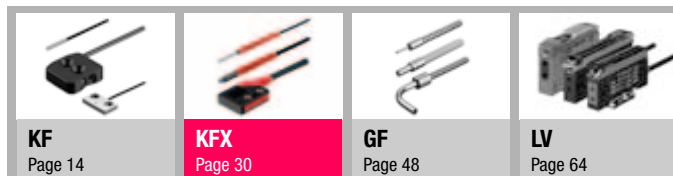
Options

- Multiple fiber core with coaxial fiber configuration
- High-temperature version -55°C ... +105°C
- Highly precise object detection
- Adapted for attachment lens KL-M04

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Dimensioned drawing	Typ. scanning range limits [mm] Total length	
KFX-ETC-420 50117756		LV463 ¹⁾ 0 ... 90 LV462 0 ... 60 LV461 0 ... 30 2019mm, can be shortened ²⁾ Smallest bending radius: R15	
KFX-ETD-420 50117757		LV463 ¹⁾ 0 ... 70 LV462 0 ... 40 LV461 0 ... 25 2019mm, can be shortened ²⁾ Smallest bending radius: R15	
KFX-ETA-320 50117758		LV463 ¹⁾ 0 ... 14 LV462 0 ... 8 LV461 0 ... 5 2019mm, can be shortened ²⁾ Smallest bending radius: R10	
KFX-ETC-320 50117759		LV463 ¹⁾ 0 ... 90 LV462 0 ... 60 LV461 0 ... 30 2019mm, can be shortened ²⁾ Smallest bending radius: R15	

- 1) Expected to be available for delivery in the third quarter of 2012
 2) Cutter/bending tool included in delivery contents



KFX SERIES

Plastic fiber optics



	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	On front	0.05	2 x Ø 1.25 1 x Ø 0.5 (transmitter) 10 x Ø 0.25 (receiver)	1, 4	
	On front	0.1	2 x Ø 1.25 Ø 0.5 (transmitter) Ø 0.5 (receiver)	2, 4	
	On front	0.05	2 x Ø 1.25 Ø 0.25 (transmitter) Ø 0.25 (receiver)	3, 5	
	On front	0.05	2 x Ø 1.25 1 x Ø 0.5 (transmitter) 10 x Ø 0.25 (receiver)	1, 5	



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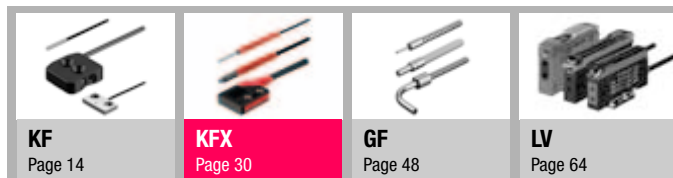
Options

- 1 Multiple fiber core with coaxial fiber configuration
- 2 Precise object detection
- 3 Highly precise object detection
- 4 Adapted for attachment lens KL-M04
- 5 Adapted for attachment lens KL-M03, KL-M03-1

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Dimensioned drawing	Typ. scanning range limits [mm] Total length	
KFX-ETD-320 50117760		LV463 ¹⁾ 0 70 LV462 0 ... 40 LV461 0 ... 25 2019mm, can be shortened ²⁾ Smallest bending radius: R15	
KFX-ETC-320-Q 50117761		LV463 ¹⁾ 0 90 LV462 0 60 LV461 0 ... 30 2016mm, can be shortened ²⁾ Smallest bending radius: R15	
KFX-ETD-320-Q 50117762		LV463 ¹⁾ 0 70 LV462 0 ... 40 LV461 0 ... 25 2016mm, can be shortened ²⁾ Smallest bending radius: R15	
KFX-ETC7-120 50117763		LV463 ¹⁾ 0 70 LV462 0 ... 40 LV461 0 ... 25 2019mm, can be shortened ²⁾ Smallest bending radius: R15	

- 1) Expected to be available for delivery in the third quarter of 2012
 2) Cutter/bending tool included in delivery contents



KFX SERIES

Plastic fiber optics



Fiber optics
KF / KFX

	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	On front	0.1	2 x Ø 1.25 Ø 0.5 (transmitter) Ø 0.5 (receiver)	1, 3	
	On front	0.05	2 x Ø 1.25 1 x Ø 0.5 (transmitter) 10 x Ø 0.25 (receiver)	2	
	On front	0.1	2 x Ø 1.25 Ø 0.5 (transmitter) Ø 0.5 (receiver)	1	
	On front	0.05	2 x Ø 1.25 1 x Ø 0.25 (transmitter) 6 x Ø 0.25 (receiver)	2	



Fiber optics
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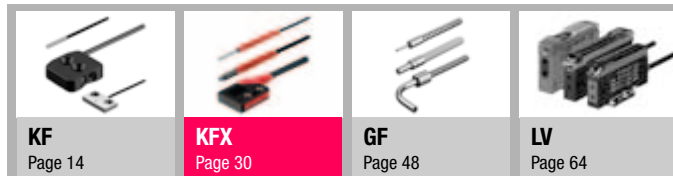
Options

- 1 Precise object detection
- 2 Multiple fiber core with coaxial fiber configuration
- 3 Adapted for attachment lens KL-M03, KL-M03-1

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Dimensioned drawing	Typ. scanning range limits [mm] Total length	
KFX-ETY-67TZ-20 50117764		LV463 ¹⁾ 0 210 LV462 0 120 LV461 0 70 2015mm, can be shortened ²⁾ Smallest bending radius: R2	
KFX-ET-20ML-20 50117765		LV463 ¹⁾ 0 210 LV462 0 120 LV461 0 70 2025mm, can be shortened ²⁾ Smallest bending radius: R25	

- 1) Expected to be available for delivery in the third quarter of 2012
 2) Cutter/bending tool included in delivery contents



KFX SERIES

Plastic fiber optics



Fiber optics
KF / KFX

	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	Lateral	0.2	2 x Ø 2.2 Ø 1.0 (transmitter) Ø 1.0 (receiver)	1	
	On front	1.0	2 x Ø 2.2 16 x Ø 0.265 (transmitter) 16 x Ø 0.265 (receiver)	2, 3	



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Options

- 1 Flexible fiber optics, operating temperature range -40°C ... +70°C
- 2 Multiple fiber core
- 3 Surface detection, light field detection = 14.5mm

SELECTION TABLE GF SERIES

Operating principle		Fastening of the probe	Optical outlet		Laying		Fiber core		Area of application			
Throughbeam	Scanner		On front	Lateral	Flexible	Highly flexible	Active fiber diameter [mm]	Multiple fiber core	General applications	Precise object detection	Highly precise object detection	High operating range
		Ø 4 mm / Ø 6 mm					Ø 1.14					
		Ø 4 mm / Ø 6 mm					Ø 1.14					
		Ø 4 mm / Ø 6 mm					Ø 1.3					
		Ø 4 mm / Ø 6 mm					Ø 2.28					
		Ø 4 mm / Ø 6 mm					Ø 2.28					
		Ø 4 mm / Ø 6 mm					Ø 2.3					
		Ø 3 mm / Ø 6.5 mm					Ø 1.8					
		Ø 1.5 mm / Ø 5 mm					Ø 1.0					
		Ø 1.5 mm / Ø 6.5 mm					Ø 1.0					
		Ø 3 mm / Ø 6.5 mm					Ø 1.8					
		Ø 3 mm / Ø 6.5 mm					Ø 1.8					
		Ø 1.5 mm / Ø 6 mm					Ø 1.0					
		Ø 5.5 mm / Ø 6.5 mm					Ø 3.5					
		Ø 5.5 mm / Ø 8 mm					Ø 3.5					
		Ø 5.5 mm / Ø 8 mm					Ø 3.5					

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FIBER OPTIC SENSORS

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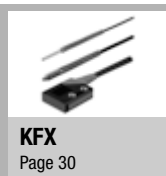
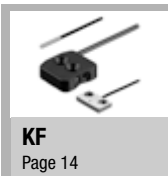
Fiber optic ABC

Part
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Special characteristics	Fiber sheathing material	Adapted for attachment lens	Fiber length [mm]		Fiber head configuration/image	Typical operating range limit in mm with amplifier	Type designation	Details on page
				Fiber optics, can be shortened				
			500 ... 1000			LVS 325 250	GF.../1 LS-MS	50
			500 ... 1000			LVS 325 250	GF.../1 LS-VA	50
			500 ... 1000			LVS 325 250	GF.../1 LS-SI	50
			500 ... 5000			LVS 325 300	GF.../4 LS-MS	52
			500 ... 5000			LVS 325 300	GF.../4 LS-VA	52
			500 ... 3000			LVS 325 300	GF.../4 LS-SI	54
			500 ... 1500			LVS 325 50	GF.../1 RT-MS	56
			600			LVS 325 20	GF.../1 RT-MS-D5-L10	56
			1000			LVS 325 20	GF.../1 RT-MS.1	56
			500 ... 1000			LVS 325 50	GF.../1 RT-VA	56
			500 ... 1000			LVS 325 50	GF.../1 RT-SI	58
			600			LVS 325 20	GF.../1 RT-SI-W-1,5	58
			500 ... 6000			LVS 325 80	GF.../4 RT-MS	60
			500 ... 3500			LVS 325 80	GF.../4 RT-VA	62
			500 ... 3000			LVS 325 80	GF.../4 RT-SI	62

OVERVIEW

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GF series

Operating principle	Typ. operating range limits	Page
 Throughbeam sensors	0  60 mm	50
 Diffuse reflection scanners	0  30 mm	56

Additional products - fiber optic sensors:

  Plastic fiber optics	KF/KFX series	6
  Fiber optic amplifier	LVS series	64



Common technical data

Mechanical data	Fiber material	Glass
	Fiber type	Multimode fiber (step index fiber)
	Core diameter	Individual fiber: 50µm
	Ratio Ø core/exterior	95%
	Numerical aperture (NA)	0.54
	Damping at $\lambda = 900\text{nm}$	700dB/km
Environmental data	Ambient temperature (operation)	Brass sheathing: -30°C ... +200°C
		Stainless steel sheathing: -30°C ... +200°C (for short periods +300°C)
		Silicone sheathing: -30°C ... +180°C (for short periods +200°C)

Features

- Wide variety of types
- Mechanically robust metal sheathing designs, partially from corrosion-proof stainless steel
- Use also possible at high temperatures
- Special solutions for vacuum-sealed light feed-throughs



Fiber optic ABC

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- Diffuse reflection scanners Page 85

Accessories for this series can be found from page 78 onwards

THROUGHBEAM SENSORS

Part description Part no.: ¹⁾	Dimensioned drawing	Typ. operating range limits [mm] Total length	
GF 500 / 1 LS - MS 50001030 GF 1000 / 1 LS - MS 50001032		LVSR 325 0 250 500mm, 1000mm, cannot be shortened Smallest bending radius: R15 (static) R30 (in motion)	
GF 500 / 1 LS - VA 50000042 GF 1000 / 1 LS - VA 50000044		LVSR 325 0 250 500mm, 1000mm, cannot be shortened Smallest bending radius: R15 (static) R30 (in motion)	
GF 500 / 1 LS - SI 50006779 GF 1000 / 1 LS - SI 50000036		LVSR 325 0 250 500mm, 1000mm, cannot be shortened Smallest bending radius: R15 (static) R30 (in motion)	

1) PU: 2 pieces (transmitter and receiver)



GF series
Glass fiber optics



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	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	On front	n/a	Ø 4.5 Ø 1.14 (transmitter) Ø 1.14 (receiver) Sheathing material: nickel-faced brass	1, 2, 3	
	On front	n/a	Ø 4.5 Ø 1.14 (transmitter) Ø 1.14 (receiver) Sheathing material: AISI 303 stainless steel (1.4305)	1, 2, 3	
	On front	n/a	Ø 4.4 ... 4.6 Ø 1.3 (transmitter) Ø 1.3 (receiver) Sheathing material: silicone	1, 2, 3	



Fiber optic ABC

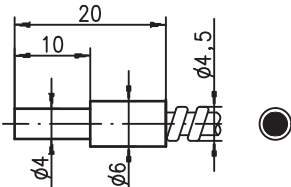
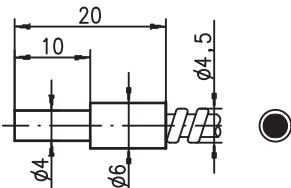
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Options

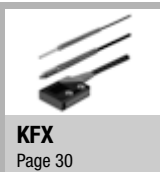
- Multiple fiber core
- Heat resistant

Brass:	-30°C ... +200°C
Stainless steel:	-30°C ... +200°C, for short periods +300°C
Silicone:	-30°C ... +180°C, for short periods +200°C
- Adapted for attachment lens GF-L1 or 90° deflection GF-U1

THROUGHBEAM SENSORS

Part description Part no.: ¹⁾	Dimensioned drawing	Typ. operating range limits [mm] Total length
GF 500 / 4 LS - MS 50001031 GF 1000 / 4 LS - MS 50001033 GF 1500 / 4 LS - MS 50021192 GF 2000 / 4 LS - MS 50000051 GF 3000 / 4 LS - MS 50024604		LVSR 325 0 300 500mm, 1000mm, 1500mm, 2000mm, 3000mm, cannot be shortened Smallest bending radius: R15 (static) R30 (in motion)
GF 500 / 4 LS - VA 50000043 GF 1000 / 4 LS - VA 50000045 GF 1500 / 4 LS - VA 50018698 GF 2000 / 4 LS - VA 50009331 GF 3000 / 4 LS - VA 50039145 GF 5000 / 4 LS - VA 50022139		LVSR 325 0 300 500mm, 1000mm, 1500mm, 2000mm, 3000mm, 5000mm, cannot be shortened Smallest bending radius: R15 (static) R30 (in motion)

1) PU: 2 pieces (transmitter and receiver)



GF series
Glass fiber optics



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Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
On front	n/a	Ø 4.5 Ø 2.28 (transmitter) Ø 2.28 (receiver) Sheathing material: nickel-faced brass	1, 2, 3	
On front	n/a	Ø 4.5 Ø 2.28 (transmitter) Ø 2.28 (receiver) Sheathing material: AISI 303 stainless steel (1.4305)	1, 2, 3	



Fiber optic ABC

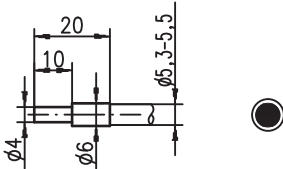
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Options

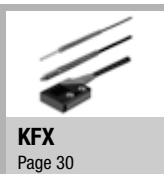
- Multiple fiber core
- Heat resistant

Brass:	-30°C ... +200°C
Stainless steel:	-30°C ... +200°C, for short periods +300°C
Silicone:	-30°C ... +180°C, for short periods +200°C
- Adapted for attachment lens GF-L1 or 90° deflection GF-U1

THROUGHBEAM SENSORS

Part description Part no.: ¹⁾	Dimensioned drawing	Typ. operating range limits [mm] Total length	
GF 500 / 4 LS - SI 50000035 GF 1000 / 4 LS - SI 50000037 GF 2000 / 4 LS - SI 50041611 GF 3000 / 4 LS - SI 50036128		LVSR 325 0 300 500mm, 1000mm, 2000mm, 3000mm, cannot be shortened Smallest bending radius: R20 (static) R40 (in motion)	

1) PU: 2 pieces (transmitter and receiver)



GF series

Glass fiber optics



Fiber optics
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	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	On front	n/a	$\varnothing$ 5.3 ... 5.5 $\varnothing$ 2.3 (transmitter) $\varnothing$ 2.3 (receiver) Sheathing material: silicone	1, 2, 3	



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Options

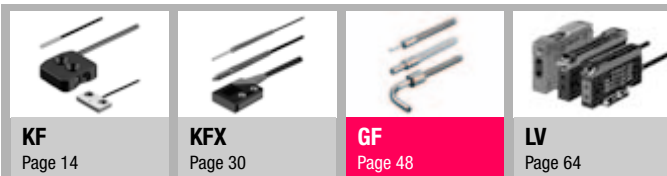
- Multiple fiber core
- Heat resistant

Brass:	-30°C ... +200°C
Stainless steel:	-30°C ... +200°C, for short periods +300°C
Silicone:	-30°C ... +180°C, for short periods +200°C
- Adapted for attachment lens GF-L1 or 90° deflection GF-U1

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Dimensioned drawing	Typ. scanning range limits [mm] Total length	
GF 500/1 RT-MS 50001034 GF 1000/1 RT-MS 50001036 GF 1500/1 RT-MS 50019341		LVSR 325 0 50 500 mm, 1000 mm, 1500 mm, cannot be shortened Smallest bending radius: R20 (static) R40 (in motion)	
GF 600/1 RT-MS-D5-L10 50105340		LVSR 325 0 ... 20 600 mm, cannot be shortened Smallest bending radius: R15 (static) R30 (in motion)	
GF 1000/1 RT-MS.1 50011508		LVSR 325 0 ... 20 1000 mm, cannot be shortened Smallest bending radius: R20 (static) R40 (in motion)	
GF 500/1 RT-VA 50000046 GF 1000/1 RT-VA 50000048		LVSR 325 0 50 500 mm, 1000 mm, cannot be shortened Smallest bending radius: R20 (static) R40 (in motion)	

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GF series
Glass fiber optics



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	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	On front	n/a	Ø 6 Ø 1.8 (transmitter + receiver) Sheathing material: nickel-faced brass	1, 2	
	On front	n/a	Ø 4.5 Ø 1.0 (transmitter + receiver) Sheathing material: nickel-faced brass	1, 2	
	Lateral	n/a	Ø 6.5 Ø 1.0 (transmitter + receiver) Sheathing material: nickel-faced brass	1, 2	
	On front	n/a	Ø 6 Ø 1.8 (transmitter + receiver) Sheathing material: AISI 303 stainless steel (1.4305)	1, 2	



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Options

- | | | |
|---|---------------------|--|
| 1 | Multiple fiber core | |
| 2 | Heat resistant | Brass: -30°C ... +200°C
Stainless steel: -30°C ... +200°C, for short periods +300°C
Silicone: -30°C ... +180°C, for short periods +200°C |

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Dimensioned drawing	Typ. scanning range limits [mm] Total length	
GF 500 / 1 RT - SI 50000038 GF 1000 / 1 RT - SI 50000040		LVSR 325 0 50 500mm, 1000mm, cannot be shortened Smallest bending radius: R20 (static) R40 (in motion)	
GF 600/1 RT-Si-W-1,5 50034368		LVSR 325 0 ... 20 600mm, cannot be shortened Smallest bending radius: R15 (static) R30 (in motion)	



GF series

Glass fiber optics



Fiber optics
KF / KFX

	Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option	
	On front	n/a	$\varnothing$ 5.3 ... 5.5 $\varnothing$ 1.8 (transmitter + receiver) Sheathing material: silicone	1, 2	
	Lateral	n/a	$\varnothing$ 4.5 $\varnothing$ 1.0 (transmitter + receiver) Sheathing material: silicone	1, 2	



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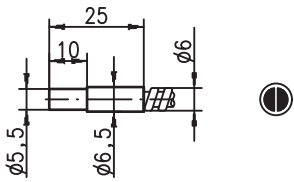
Fiber optic ABC

Part
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Options

- | | | |
|---|---------------------|--|
| 1 | Multiple fiber core | |
| 2 | Heat resistant | Brass: -30°C ... +200°C
Stainless steel: -30°C ... +200°C, for short periods +300°C
Silicone: -30°C ... +180°C, for short periods +200°C |

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Dimensioned drawing	Typ. scanning range limits [mm] Total length	
GF 500/4 RT-MS 50001035 GF 1000/4 RT-MS 50001037 GF 1500/4 RT-MS 50023019 GF 2000/4 RT-MS 50000053 GF 2500/4 RT-MS 50039392 GF 3000/4 RT-MS 50022551 GF 5000/4 RT-MS 50105274 GF 6000/4 RT-MS 50041477		LVSR 325 0 80 500 mm, 1000 mm, 1500 mm, 2000 mm, 2500 mm, 3000 mm, 5000 mm, 6000 mm, cannot be shortened Smallest bending radius: R20 (static) R40 (in motion)	



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Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option
On front	n/a	Ø 6 Ø 3.5 (transmitter + receiver) Sheathing material: nickel-faced brass	1, 2



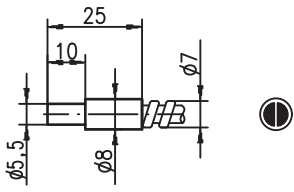
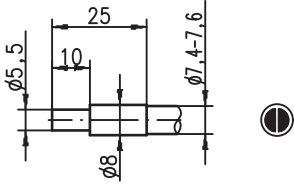
Fiber optic ABC

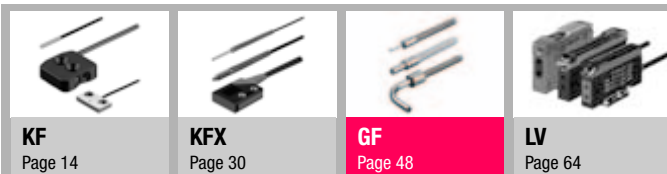
- Glass fiber optics Page 82
- Diffuse reflection scanners Page 85
- Area of app./characteristics Page 86

Options

- | | | |
|---|---------------------|---|
| 1 | Multiple fiber core | |
| 2 | Heat resistant | <p>Brass: -30°C ... +200°C</p> <p>Stainless steel: -30°C ... +200°C, for short periods +300°C</p> <p>Silicone: -30°C ... +180°C, for short periods +200°C</p> |

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Dimensioned drawing	Typ. scanning range limits [mm] Total length	
GF 500 / 4 RT - VA 50000047 GF 1000 / 4 RT - VA 50000049 GF 1500 / 4 RT - VA 50010567 GF 2000 / 4 RT - VA 50000054 GF 2500 / 4 RT / VA 50041741 GF 3500 / 4 RT / VA 50041742		LVSR 325 0 80 500 mm, 1000 mm, 1500 mm, 2000 mm, 2500 mm, 3500 mm, cannot be shortened Smallest bending radius: R25 (static) R50 (in motion)	
GF 500 / 4 RT - SI 50000039 GF 1000 / 4 RT - SI 50000041 GF 2000 / 4 RT - SI 50010820 GF 3000 / 4 RT - SI 50060384		LVSR 325 0 80 500mm, 1000mm, 2000mm, 3000mm, cannot be shortened Smallest bending radius: R25 (static) R50 (in motion)	



GF series

Glass fiber optics



Fiber optics
KF / KFX

Fiber optics
GF

Fiber optic
amplifiers

Accessories

Services

Fiber optic ABC

Part
directories

Optical outlet	Smallest part [mm]	Outer diameter [mm] Active fiber diameter [mm]	Option
On front	n/a	Ø 7 Ø 3.5 (transmitter + receiver) Sheathing material: AISI 303 stainless steel (1.4305)	1, 2
On front	n/a	Ø 7.4 ... 7.6 Ø 3.5 (transmitter + receiver) Sheathing material: silicone	1, 2



Fiber optic ABC

- Glass fiber optics Page 82
- Diffuse reflection scanners Page 85
- Area of app./characteristics Page 86

Options

- | | | |
|---|---------------------|---|
| 1 | Multiple fiber core | |
| 2 | Heat resistant | <p>Brass: -30°C ... +200°C</p> <p>Stainless steel: -30°C ... +200°C, for short periods +300°C</p> <p>Silicone: -30°C ... +180°C, for short periods +200°C</p> |

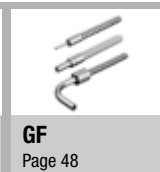
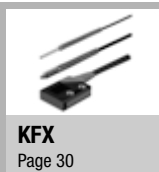
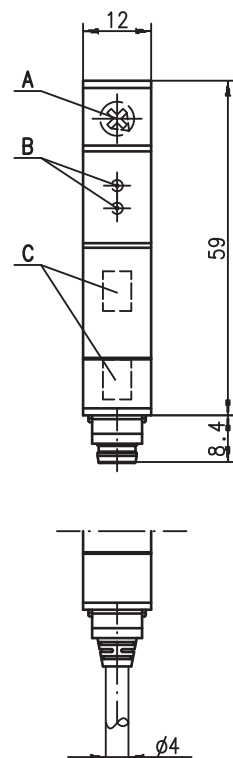
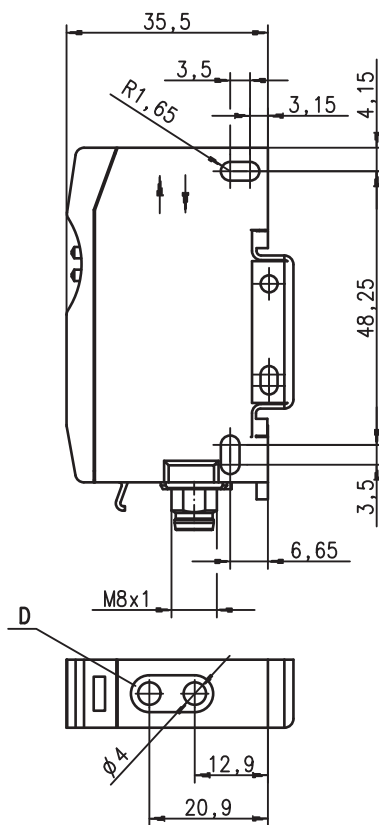
OVERVIEW OF FIBER OPTIC AMPLIFIERS

Dimensioned drawing



Further details can be found in the respective data sheet.

- A** Fiber optics fixing screw
- B** Indicator diodes
- C** Sensitivity adjustment
- D** Fiber optics input



LVSR 325

Fiber optic amplifiers	Fiber optics	Page
 Fiber optic amplifier LVSR 325	Glass fiber	66

Additional products:

	Fiber optic amplifier	LV461, LV462	68
	Glass fiber optics	GF	46
	Plastic fiber optics	KF	6



Common technical data

Electrical data	Operating voltage U_B	10 ... 30VDC
	Residual ripple	$\leq 10\%$ of U_B
	Open-circuit current	$\leq 25\text{mA}$
	Signal voltage high/low	$\geq (U_B - 2\text{V}) / \leq 2\text{V}$
Indicators	Green LED	Ready/Teach-in
	Yellow LED	Switching output
	Red LED	Performance res./Teach-in
Mechanical data	Housing	Plastic
	Fiber optic connection	Screw connection
	Weight (without cable)	30g
Environmental data	Ambient temperature (operation)	-20°C ... +70°C
	Protection class	IP 65

Features

- For glass fiber optics
- Teach-in for optimum sensitivity adjustment
- Activation or teach input
- Warning output



Fiber optic ABC

- Glass fiber optics Page 82

FIBER OPTIC AMPLIFIERS

Part description Part No.:	Fiber optics	Light source	Output	Switching	
Fiber optic amplifiers for glass and plastic fiber opticss					
LVSr 325 K / P - 402 - S8 50081301	Glass fiber GF, Ø 4mm	Red light	PNP	Light/dark configurable	
LVSr 325 K / P - 401 50081300	Glass fiber GF, Ø 4mm	Red light	PNP	Light/dark configurable	
LVSr 325 K / N - 402 - S8 50033578	Glass fiber GF, Ø 4mm	Red light	NPN	Light/dark configurable	
LVSr 325 K / N - 401 50033580	Glass fiber GF, Ø 4mm	Red light	NPN	Light/dark configurable	

Accessories / connection cables

More accessories can be found from **page 77** onwards

Part no.	Designation	Features	
a 50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000mm, M8 angular, 4-pin, PVC	
b 50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC	
c 50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC	
d 50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC	
e 50104529	K - D M8W - 4P - 10m - PVC	Connection cable 10000mm, M8 angular, 4-pin, PVC	
f 50104528	K - D M8A - 4P - 10m - PVC	Connection cable 10000mm, M8 axial, 4-pin, PVC	



KF
Page 14



KFX
Page 30



GF
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LV
Page 64

LVSR 325

Fiber optic amplifiers

Fiber optics
KF / KFX

Fiber optics
GF

Fiber optic
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Fiber optic ABC

Part
directories

	Connection	Option	Accessories	
	M8 connector	1	a, b, c, d, e, f	
	Cable, 2 m	1		
	M8 connector	1	a, b, c, d, e, f	
	Cable, 2 m	1		



Fiber optic ABC

- Glass fiber optics

Page 82

Electrical connection

LVSR 325K/P-401

10-30V DC +	br/BN
in/out	ws/WH
GND	bl/BU
0/●	sw/BK

LVSR 325K/N-401

10-30V DC +	br/BN
in/out	ws/WH
GND	bl/BU
0/●	sw/BK

LVSR 325K/P-402-S8

10-30V DC +	1- br/BN
in/out	2- ws/WH
GND	3- bl/BU
0/●	4- sw/BK

LVSR 325K/N-402-S8

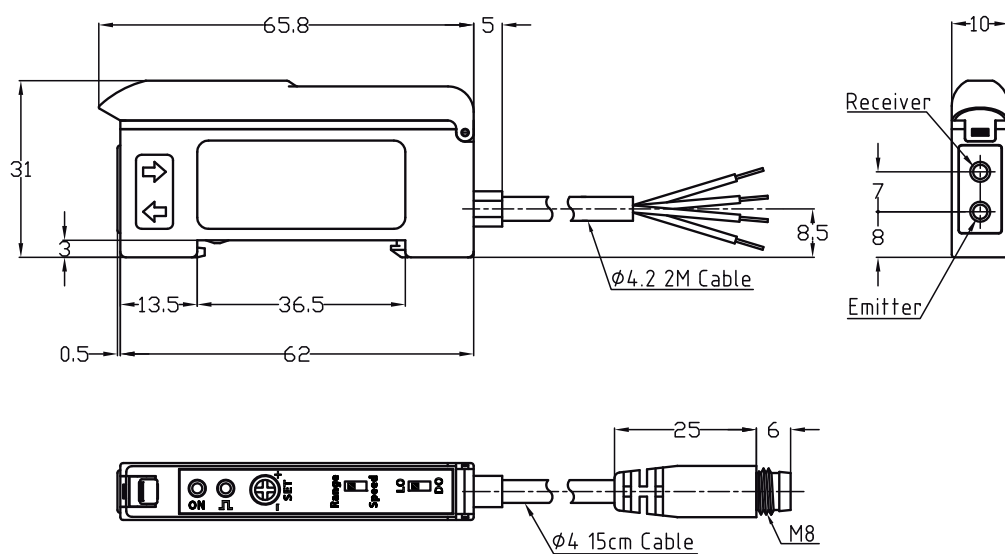
10-30V DC +	1- br/BN
in/out	2- ws/WH
GND	3- bl/BU
0/●	4- sw/BK

Options

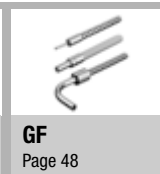
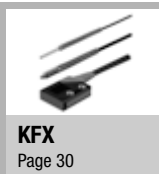
- 1 Teach-in via buttons

OVERVIEW OF FIBER OPTIC AMPLIFIERS

Dimensioned drawing



i Further details can be found in the respective data sheet.



LV461

Fiber optic amplifiers	Fiber optics	Page
 Fiber optic amplifier LV461	KF / KFX	70

Additional products:

	Fiber optic amplifier	LVS 325	64
	Glass fiber optics	GF	46
	Plastic fiber optics	KF	6



Common technical data

Electrical data	Operating voltage U_B	12 ... 24VDC $\pm 10\%$
	Residual ripple	$\leq 10\%$ of U_B
	Open-circuit current	$\leq 40\text{mA}$
	Signal voltage high/low	$\geq (U_B - 2\text{V}) / \leq 2\text{V}$
Indicators	Green LED	Ready to operate
	Red LED	Switching output active
Mechanical data	Housing	Plastic (ABS)
	Fiber optic connection	Clamp
	Weight (with cable)	35g
Environmental data	Ambient temperature (operation)	$-10^\circ\text{C} \dots +60^\circ\text{C}$
	Protection class	IP 54
	Standards applied	IEC 60947-5-2

Features

- For plastic fiber optics
- 1 x PNP and 1 x NPN switching output each, antivalent switching
- Switch for changing between light and dark switching
- Switch for changing between short response time or higher range
- 20-turn potentiometer for sensitivity adjustment for optimal adjustment to the application
- Operation and switching output indicator diode



Fiber optic ABC

- Plastic fiber optics Page 82
- Fiber optic installation Page 83

FIBER OPTIC AMPLIFIERS

Part description Part No.:	Fiber optics	Light source	Output	Switching	
Fiber optic amplifiers for plastic fiber optics					
LV 461.1 / P2 50118398	Plastic KF/KFX, Ø 2.2mm	Red light	1 x PNP/DC 1 x NPN/DC	Light/dark reversible	
LV 461.1 / P2 - 150 - M8 50118399	Plastic KF/KFX, Ø 2.2mm	Red light	1 x PNP/DC 1 x NPN/DC	Light/dark reversible	

Accessories / connection cables			More accessories can be found from page 77 onwards
Part no.	Designation	Features	
a 50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000mm, M8 angular, 4-pin, PVC	
b 50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC	
c 50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC	
d 50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC	
e 50104529	K - D M8W - 4P - 10m - PVC	Connection cable 10000mm, M8 angular, 4-pin, PVC	
f 50104528	K - D M8A - 4P - 10m - PVC	Connection cable 10000mm, M8 axial, 4-pin, PVC	



LV461

Fiber optic amplifiers

Fiber optics
KF / KFX

Fiber optics
GF

Fiber optic
amplifiers

Accessories

Services

Fiber optic ABC

Part
directories

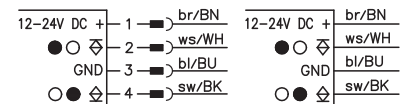
Connection	Option	Accessories	
Cable, 2m	1		
Cable, 150mm with M8 connector 4-pin	1, 2	a, b, c, d, e, f	



Fiber optic ABC

- Plastic fiber optics Page 82
- Fiber optic installation Page 83

Electrical connection

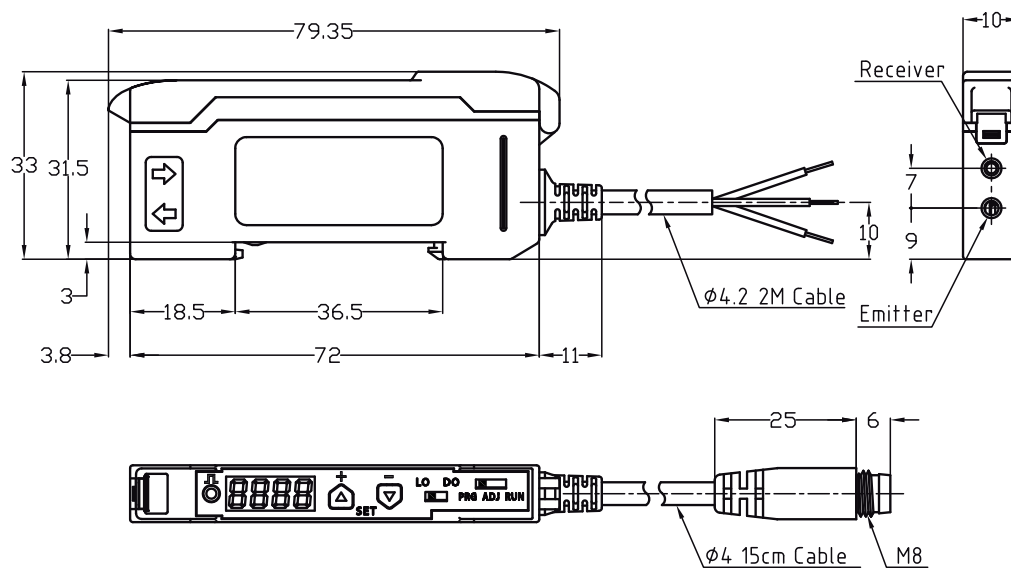


Options

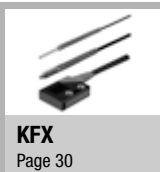
- 1 Sensitivity adjustment via 20-turn potentiometer
- 2 Selector switch for 'Range' / 'Speed' operating mode

OVERVIEW OF FIBER OPTIC AMPLIFIERS

Dimensioned drawing



Further details can be found in the respective data sheet.



LV462

Fiber optics
KF / KFX

Fiber optics
GF

Fiber optic
amplifiers

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Fiber optic ABC

Part
directories

Fiber optic amplifiers		Fiber optics	Page
	Fiber optic amplifier LV462	KF / KFX	74

Additional products:

	Fiber optic amplifier	LVSR 325	64
	Glass fiber optics	GF	46
	Plastic fiber optics	KF	6



Common technical data

Electrical data	Operating voltage U_B	12 ... 24VDC $\pm$ 10 %
	Residual ripple	$\leq$ 10 % of U_B
	Open-circuit current	$\leq$ 45mA
	Signal voltage high/low	$\geq (U_B - 2V) / \leq 2V$
Indicators	Green LED	Ready to operate
	Yellow LEDs	Switching output active
	Display	7-segment, 4-digit
Mechanical data	Housing	Plastic (ABS)
	Fiber optic connection	Clamp
	Weight (with cable)	63g
Environmental data	Ambient temperature (operation)	-10°C ... +60°C
	Protection class	IP 54
	Standards applied	IEC 60947-5-2

Features

- For plastic fiber optics
- 3-digit display for showing/adjusting the switching threshold
- NEW: AutoSet function for easy sensor adjustment
- Menu functions for adjusting ranges and different time functions
- PNP or NPN switching output
- Switch for changing between light and dark switching
- Operation and switching output indicator diode



Fiber optic ABC

- Plastic fiber optics Page 82
- Fiber optic installation Page 83

FIBER OPTIC AMPLIFIERS

Part description Part No.:	Fiber optics	Light source	Output	Switching	
Fiber optic amplifiers for plastic fiber optics					
LV462.4 / 4 50118400	Plastic KF/KFX, Ø 2.2mm	Red light	1 xPNP/DC	Light/dark reversible	
LV462.4 / 4X - 150 - M8 50118401	Plastic KF/KFX, Ø 2.2mm	Red light	1 xPNP/DC	Light/dark reversible	
LV462.4 / 2 50118402	Plastic KF/KFX, Ø 2.2mm	Red light	1 xNPN/DC	Light/dark reversible	
LV462.4 / 2X - 150 - M8 50118403	Plastic KF/KFX, Ø 2.2mm	Red light	1 xNPN/DC	Light/dark reversible	

Accessories / connection cables			More accessories can be found from page 76 onwards
Part no.	Designation	Features	
a 50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000mm, M8 angular, 4-pin, PVC	
b 50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC	
c 50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC	
d 50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC	
e 50104529	K - D M8W - 4P - 10m - PVC	Connection cable 10000mm, M8 angular, 4-pin, PVC	
f 50104528	K - D M8A - 4P - 10m - PVC	Connection cable 10000mm, M8 axial, 4-pin, PVC	



LV462

Fiber optic amplifiers

Fiber optics
KF / KFX

Fiber optics
GF

Fiber optic
amplifiers

Accessories

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Fiber optic ABC

Part
directories

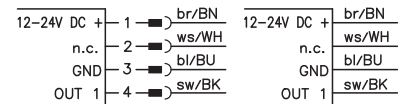
	Connection	Option	Accessories	
	Cable, 2m	1, 2, 3, 4		
	Cable, 150mm with M8 connector 4-pin	1, 2, 3, 4	a, b, c, d, e, f	
	Cable, 2m	1, 2, 3, 4		
	Cable, 150mm with M8 connector 4-pin	1, 2, 3, 4	a, b, c, d, e, f	



Fiber optic ABC

- Plastic fiber optics Page 82
- Fiber optic installation Page 83

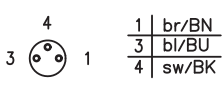
Electrical connection



Options

- 1 3-digit display for showing/adjusting the switching threshold
- 2 Selector switch for 'Range' / 'Speed' operating mode
- 3 Menu-driven sensor adjustment using display and +/- buttons
- 4 Time functions configurable (switch-on/off delay, pulse contact)

ACCESSORIES / CONNECTION TECHNOLOGY

Contact assignment	Part description Part No.:	Feature
Connection cables with M8 connector, 3-pin socket, open cable end		
	K - D M8A - 3P - 2m - PVC 50104520	Connection cable 2000 mm, M8 axial, 3-pin, PVC
	K - D M8W - 3P - 2m - PVC 50104521	Connection cable 2000 mm, M8 angular, 3-pin, PVC
	K - D M8A - 3P - 5m - PVC 50104522	Connection cable 5000 mm, M8 axial, 3-pin, PVC
	K - D M8W - 3P - 5m - PVC 50104523	Connection cable 5000 mm, M8 angular, 3-pin, PVC
	K - D M8A - 3P - 10m - PVC 50110556	Connection cable 10000 mm, M8 axial, 3-pin, PVC
	K - D M8W - 3P - 10m - PVC 50110559	Connection cable 10000 mm, M8 angular, 3-pin, PVC
	K - D M8A - 3P - 2m - PUR 50110555	Connection cable 2000 mm, M8 axial, 3-pin, PUR
	K - D M8W - 3P - 2m - PUR 50110557	Connection cable 2000 mm, M8 angular, 3-pin, PUR
	K - D M8A - 3P - 5m - PUR 50106691	Connection cable 5000 mm, M8 axial, 3-pin, PUR
	K - D M8W - 3P - 5m - PUR 50106692	Connection cable 5000 mm, M8 angular, 3-pin, PUR
	K - D M8A - 3P - 10m - PUR 50106693	Connection cable 10000 mm, M8 axial, 3-pin, PUR
	K - D M8W - 3P - 10m - PUR 50110558	Connection cable 10000 mm, M8 angular, 3-pin, PUR



ACCESSORIES / CONNECTION TECHNOLOGY

Contact assignment	Part description Part No.:	Feature								
Connection cables with M8 connector, 4-pin socket, open cable end										
 <table><tr><td>1</td><td>br/BN</td></tr><tr><td>2</td><td>ws/WH</td></tr><tr><td>3</td><td>bl/BU</td></tr><tr><td>4</td><td>sw/BK</td></tr></table>	1	br/BN	2	ws/WH	3	bl/BU	4	sw/BK	K - D M8A - 4P - 2m - PVC 50104524	Connection cable 2000mm, M8 axial, 4-pin, PVC
	1	br/BN								
	2	ws/WH								
	3	bl/BU								
	4	sw/BK								
	K - D M8W - 4P - 2m - PVC 50104525	Connection cable 2000mm, M8 angular, 4-pin, PVC								
	K - D M8A - 4P - 5m - PVC 50104526	Connection cable 5000mm, M8 axial, 4-pin, PVC								
	K - D M8W - 4P - 5m - PVC 50104527	Connection cable 5000mm, M8 angular, 4-pin, PVC								
	K - D M8A - 4P - 10m - PVC 50104528	Connection cable 10000mm, M8 axial, 4-pin, PVC								
	K - D M8W - 4P - 10m - PVC 50104529	Connection cable 10000mm, M8 angular, 4-pin, PVC								
	K - D M8A - 4P - 20m - PVC 50115424	Connection cable 20000mm, M8 axial, 4-pin, PVC								
	K - D M8A - 4P - 2m - PUR 50104530	Connection cable 2000mm, M8 axial, 4-pin, PUR								
	K - D M8W - 4P - 2m - PUR 50104531	Connection cable 2000mm, M8 angular, 4-pin, PUR								
K - D M8A - 4P - 5m - PUR 50104532	Connection cable 5000mm, M8 axial, 4-pin, PUR									
K - D M8W - 4P - 5m - PUR 50104761	Connection cable 5000mm, M8 angular, 4-pin, PUR									
K - D M8A - 4P - 10m - PUR 50104533	Connection cable 10000mm, M8 axial, 4-pin, PUR									
K - D M8W - 4P - 10m - PUR 50104534	Connection cable 10000mm, M8 angular, 4-pin, PUR									

Fiber optics
KF / KFX

Fiber optics
GF

Fiber optic
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Fiber optic ABC

Part
directories

ACCESSORIES / FIBER OPTICS

Dimensioned drawing	Part description Part No.:	Feature
Optic attachments for plastic fiber optics		
	KL-M02 50117779	Collimated attachment lens for throughbeam systems for larger ranges or performance reserves, easy mounting with screws
	PU = 2 pieces	Only for KFX-L...-420, KF-LY-77TZ-20!
	KL-M03 50117780	Attachment lens for scanning plastic fiber optics, for focusing the light spot to Ø 0.5 mm at 8 mm distance
		Only for KFX-ET...-320!
	KL-M03-1 50117783	Attachment lens for scanning plastic fiber optics, for focusing the light spot to Ø 2 mm at 8 mm distance
		Only for KFX-ET...-320!
	KL-M04 50117781	Attachment lens for scanning plastic fiber optics, for focusing the light spot to Ø 0.7 mm at 10 mm distance
		Only for KFX-ET...-420!
	KL-M06 50117784	Collimated attachment lens for throughbeam systems for larger ranges or performance reserves, easy mounting with screws
	PU = 2 pieces	Only for KFX-L...-420, KF-LY-77TZ-20!
	KL-SM02 50117782	90° deflection for plastic fiber optic throughbeam systems, easy mounting with screws
	PU = 2 pieces	Only for KFX-L...-420, KF-LY-77TZ-20!

We reserve the right to make changes • FOS_Accessories_1_EN.fm



Connection technology
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Fiber optics - Accessories
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Fiber optics
GF

Fiber optic amplifiers

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Services

Fiber optic ABC

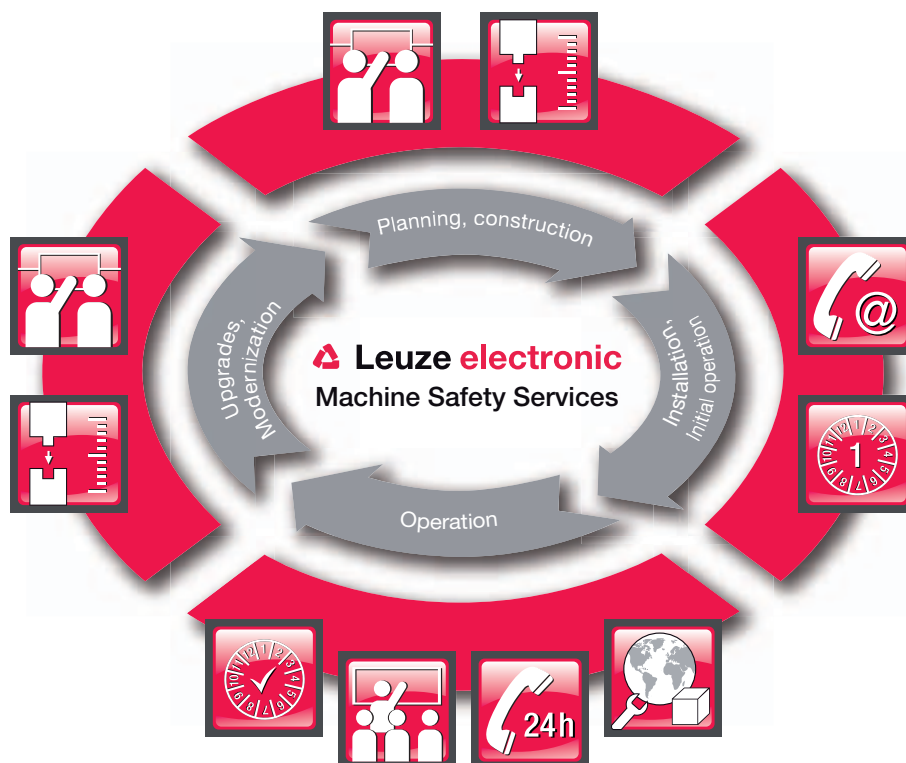
Part directories

SERVICES

Overview

Our services – Your benefits, at a glance

Whether it's planning, engineering, commissioning or repair, the use of complex industrial automation technology requires a keen intellectual grasp and well-established expertise.



Part description Part no.	Feature	
Services on-site in Germany and abroad		
LOS daily rate S50000100	Includes up to 10 hours, plus expenses/travel costs	
LOS labor per hour S50000101		
LOS travel time per hour S50000102		
LOS price per km for travel by car S50000103	Plus toll charges, vignettes, etc.	
LOS flight costs S50000104	Invoicing according to expenditure	
LOS accommodation expenses S50000105	Invoicing according to expenditure	



Service calls on Saturdays, Sundays and holidays will incur a surcharge of a factor of 1.5.

Service work, such as fault analysis, fault rectification, installation and fine adjustment, test installations etc. are invoiced on a time and material cost basis.

Software adjustments, creation of customer-specific software, log adjustments etc. are calculated according to time and effort. Prices on request.

FIBER OPTIC ABC

Introduction

The fiber optic ABC shall assist you in selecting the right sensor system. You will find here explanations on the different fiber optic switch types, the additional functions and a lot of information for the practitioner.

Fiber optics

Fiber optics are cables for the transmission of light, e.g. from the transmitter of a fiber optic amplifier to an object or from an object to the receiver of a fiber optic amplifier. The evaluating electronics are therefore decoupled spatially from optical outlet side.

Due to the low damping effect in comparison to copper cables, fiber optics can also be advantageous for long cable lengths. Depending on the head shape, application is possible even when space is very tight.

Plastic fiber optics

The KF and KFX plastic fiber optics have an active fiber core made of plastic, usually PMMA.

It is typically constructed from a compound of several individual optical fibers.

Depending on the material, the standard fibers have an operating temperature range of $-55^{\circ}\text{C} \dots +70^{\circ}\text{C}$, heat-resistant plastic fibers up to max. 105°C .

Advantages:

- very flexible fiber structure
- smallest possible bending radius
- also suitable for low temperatures
- economical

Disadvantages:

- not for temperatures $> 105^{\circ}\text{C}$
- low mechanical stability
- not for vacuum applications

Glass fiber optics

The GF glass fiber optics have an active fiber core made of glass, mostly quartz glass.

It is typically constructed from a compound of several individual optical fibers.

Glass fiber can also be used at very high temperatures. When the sheathing material is brass, the operating temperature is $-30^{\circ}\text{C} \dots +200^{\circ}\text{C}$, when it is stainless steel or silicone, $+300^{\circ}\text{C}$ can be reached for short periods.

Advantages:

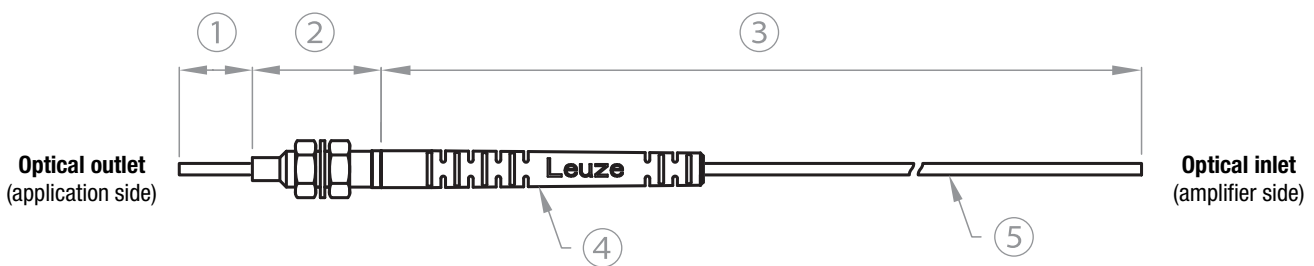
- high-temperature resistant
- robust
- suitable for vacuum applications

Disadvantages:

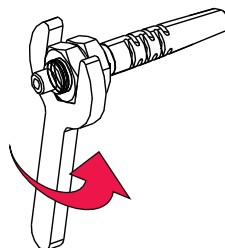
- not suitable for low temperatures
- larger bending radius
- higher material and production costs

General information and notices

Fiber optics structure / designations



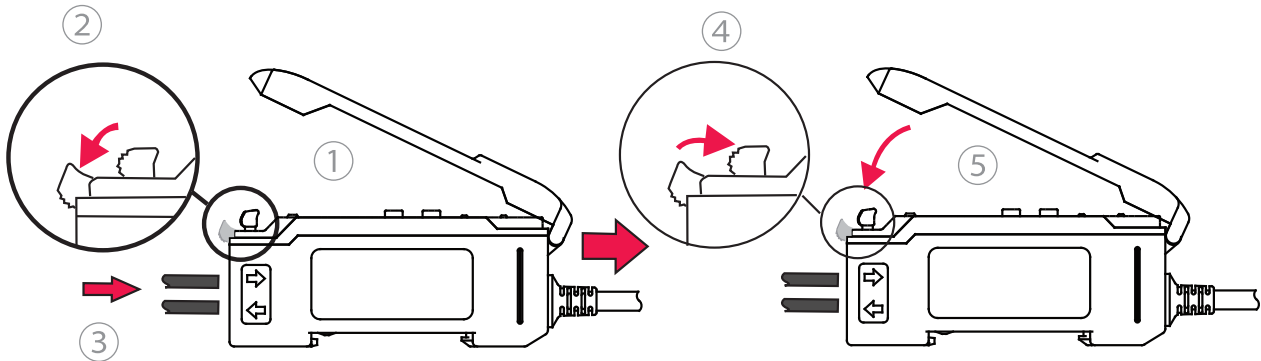
- ① Sleeve length
- ② Probe
- ③ Fiber length
- ④ Bending protection (only KFX)
- ⑤ Fiber optic outer diameter



Mounting

Thread on probe	Nut tightening torque
M3	max. 0.78Nm
M4	max. 0.78Nm
M6	max. 0.98Nm

Install fiber optics on the amplifier (example KF/KFX series)



- ① Open the transparent protective cover.
- ② Push down the lever of the fiber optic clamp to open.
- ③ Lead the **KF/KFX** type fiber optics in completely as far as they will go (ca. 12mm deep) into the fiber optic intake.
When doing so, observe the transmitter/receiver assignment on the amplifier (transmitter on bottom / receiver on top).
- ④ Pull up the lever of the fiber optic clamp to close.
Check if the clamp is secure by pulling lightly on the fiber optics.
- ⑤ Close the transparent protective cover.

Shorten fiber optics

Plastic fiber optics which do not have metal sleeves on the light inlet side can be shortened to any length. Fiber optics which can be shortened are always delivered with a suitable cutter/bending tool.



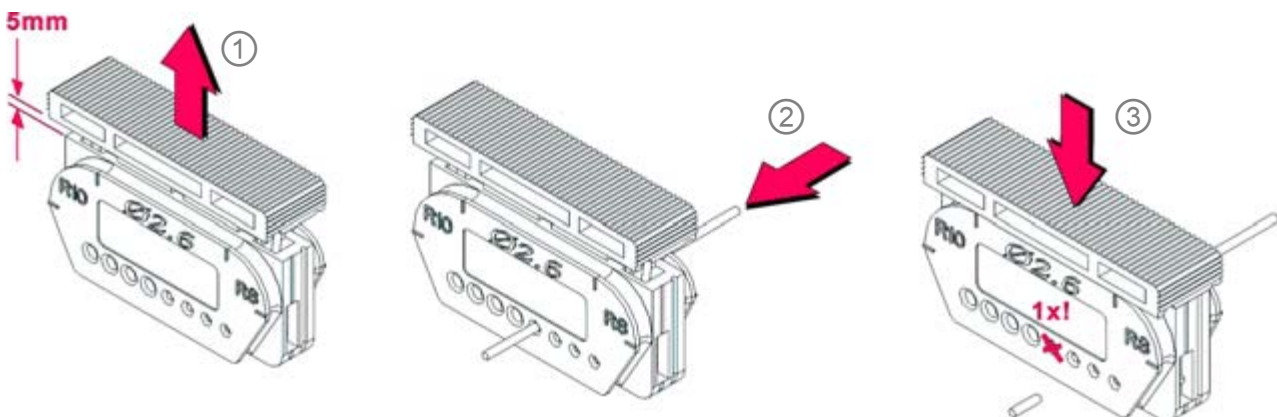
Attention!

To achieve an even cutting surface with low coupling loss, any cutting position can only be used once.



Notice!

For fiber optics with an outer diameter $< \varnothing 2.2\text{mm}$ (e.g. $\varnothing 1.0\text{mm}$ or $\varnothing 1.3\text{mm}$), adaptor sleeves are used. If these fibers are shortened, the sleeve must then be re-attached; otherwise the fiber optics cannot be clamped into the amplifier.

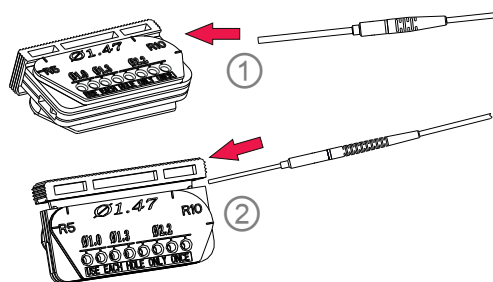


- ① Open the cutter/bending tool completely.
- ② Lead in fiber – when doing so, make sure the correct cross section is observed (designation on the tool)!
- ③ Close cutter/bending tool:
Press the brackets together with light pressure until the fiber is completely cut through.

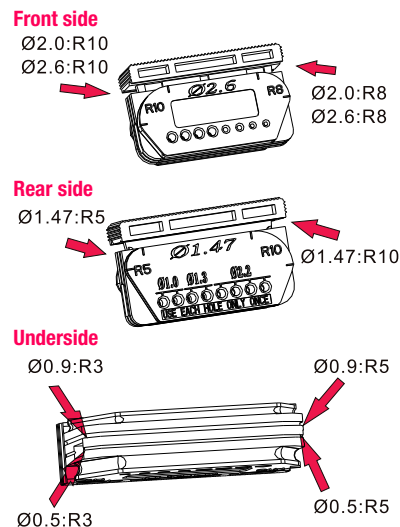
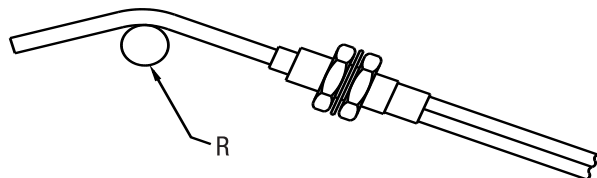
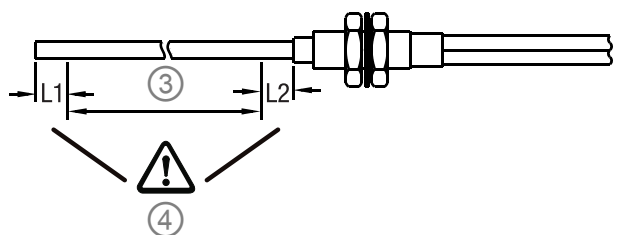
INSTALLATION

Bend fiber optics (KF/KFX series)

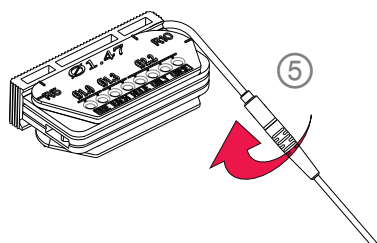
The cutter/bending tool included in delivery makes it easy to create a defined curve in long head sleeves. Depending on the diameter of the sleeves, the following bending radii are available for selection.



Sleeve diameter	Available bending radius
Ø 0.5mm	R3, R5
Ø 0.9mm	R3, R5
Ø 0.75mm	R5, R10
Ø 2.0mm	R8, R10
Ø 2.6mm	R8, R10

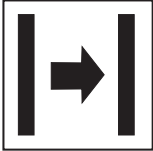


Bending radius R	Dimensions L1 ±1 mm	Dimensions L2 ±1 mm	Fiber type (throughbeam and scanner) see part number code on
R5	10mm	5mm	W, Y, Z, W2
	15mm	10mm	A, E
R10	15mm	10mm	S, D, S2
	20mm	20mm	J, T, H, B, X



- ① Select bending radius.
- ② Lead the sleeve into the bending tool.
- ③ Bendable area of the sleeve.
- ④ **Attention! Non-bendable areas of the sleeve** – observe L1 and L2 dimensions acc. to the table!
- ⑤ Bend the sleeve to the desired angle.

Throughbeam sensors



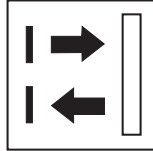
The system consists of 2 identical fiber optic cables which are aligned exactly in a mutually opposing manner.

One fiber optic cable is connected with the transmitter, the other with the receiver on the fiber optic amplifier. With throughbeam systems, the transmitter and receiver can be assigned in any manner.

Depending on the setting on the amplifier, a switching signal is produced when the light path is partially or fully shadowed.

Throughbeam systems has a large range, a high performance reserve and are characterized by excellent operational safety.

Diffuse reflection scanners



On the connector side (optical inlet), the system consists of two fibers which are merged on the head side (optical outlet).

The scanners function according to the energetic principle, i.e. the emitted light beam is reflected by the object surface to be detected and led through the fiber optics to the receiver in the amplifier.

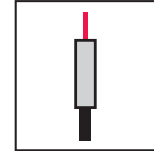
Bright, highly reflective surfaces achieve higher ranges in comparison to dark, poorly reflective surfaces.

For fiber optics with coaxial fiber structure, the connection to the fiber optic amplifier is done in a way that the transmitter fibers are in the center (observe the label on the fiber optics!).

Scanners with two adjacent fibers for the transmitter and receiver feature a switching behavior which depends on the entry direction. This results from the temporally differing shadowing effect when objects are moved into the light beam. To optimize the switching behavior, it may be necessary to switch the transmitter and receiver connections. A fiber sheathing is always labeled for identification purposes.

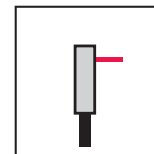
Optical outlet

On front:



The optical outlet on the head side of the fiber optics points in the direction of the fibers.

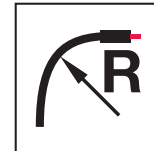
Lateral:



The optical outlet on the head side of the fiber optics points at a right angle to the direction of the fibers.

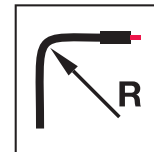
Laying

Flexible:



The active fiber core is composed of several thin single fibers. The minimum laying radius is **R = 2mm**.

Highly flexible:



The active fiber core is composed of many thin single fibers. The minimum laying radius is **R = 1mm**.

AREA OF APPLICATION

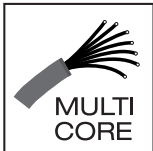
Fiber core

Active fiber diameter:

The light is lead through the active fiber cross section. The larger the cross section, the larger the operation or scanning range achieved.

Depending on the application, a smaller fiber cross section may be advantageous (→ Area of application).

Multiple fiber core:



The active fiber core is composed of several or many thin single fibers. This structure is what allows for a variety of features such as:

- fiber laying with very small laying radius (→ Laying).
- coaxial fiber configuration (→ Fiber core).
- surface detection (→ Area of application).

Multiple fiber cores are found in scanning and throughbeam systems.

Coaxial:



A coaxial fiber structure is only found in the scanning fiber optics.

One or several fibers are aligned in the center of the probe. The light from the transmitter is injected into the fiber(s). The fiber is equipped with a white label for easy identification.

Several fibers are configured around the transmitter fibers which lead the light from the object to the receiver on the fiber optic amplifier. The advantage of the coaxial configuration is that the detection behavior is independent of the entry direction of an object.

Area of application

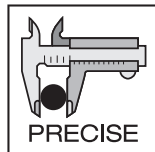
Standard applications:



The fiber optics with this label can be used for countless applications. If the specified operating range is observed, the scanners have a sufficient performance reserve and level of operational safety.

If, however, it is necessary to realize very precise object positioning or to detect very small objects, we recommend looking into using one of the following fiber types.

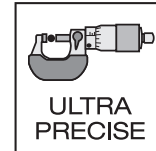
Precision applications:



These fiber optics have a smaller active fiber cross section than the standard fiber optics. This makes it possible to realize precise object positioning or the detection of parts with small cross sections.

However, the operating range which can be achieved is also reduced. Information on the smallest part detectable and the range that can be achieved can be found in our detailed data sheets.

High-precision application:

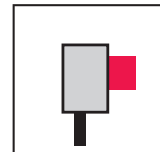
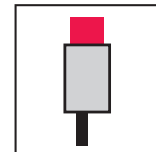


These fiber optics have an even smaller active fiber cross section than the fiber optics for precision applications.

This makes it possible to realize highly precise object positioning or the detection of parts with very small cross sections.

However, the operating range which can be achieved is also greatly reduced. Information on the smallest part detectable and the range that can be achieved can be found in our detailed data sheets.

Surface detection:



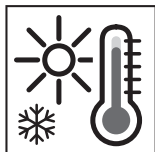
Small light curtains exist as through-beam system and scanner models.

Many individual fibers in the probe are configured side by side so that a continuous light-band is formed. Depending on the number of individual beams, the light-band has a higher or lower resolution.

These fiber optics can be used, for example, to sort small parts when passing through the light-band or to scan nonhomogeneous surfaces.

Special characteristics

Heat resistance:



For heat-resistant plastic fiber optics of the KF and KFX series, the maximum permissible operating temperature is +105°C. Depending on the sheathing material, the following values apply for GF glass fiber optics:

Brass:

-30°C ... +200°C

Stainless steel:

-30°C ... +200°C (for short periods +300°C)

Silicone:

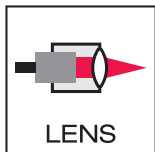
-30°C ... +180°C (for short periods +200°C)

Metal probe:



The probe is made of metal, e.g. nickel-plated brass or stainless steel. This enables permanent mounting, for example.

Adapted for attachment lens:



Some fiber optics can be equipped with an attachment lens.

In the case of KFX plastic fiber optics with metric thread, the lens is screwed on; in the case of GF glass fiber optics with cylindrical sleeve, the lens is affixed in accordance with regulations.

KFX plastic fiber optics:

Lenses for focusing the light beam are available for scanners, collimated lenses for increasing the operating range or performance reserve or for beam deflection by 90° are available for throughbeam systems (always use in pairs!).

GF glass fiber optics:

For throughbeam systems, lenses are available for increasing the operating range or for beam deflection by 90° (always use in pairs!).

+49 (0) 7021 573 0

Fiber length

Dimensions in [mm]:

For plastic fiber optics of the KF and KFX series, the length information refers to the total length of the fiber optics, i.e. fiber length (2000mm as a rule) plus probe length.

For the glass fiber optics of the GF series, the length information only refers to the fibers without the probe.

Fiber optics, can be shortened:



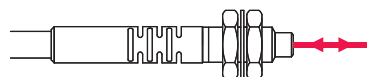
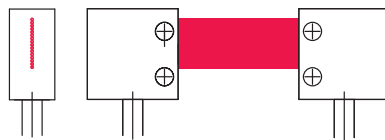
With a few exceptions, plastic fiber optics can be shortened on the light inlet side.

A cutter/bending tool is included in the delivery contents for this purpose.

Detailed information on this topic:
→ Shorten fiber optics

Fiber head configuration/ image

Principle images:



The simplified images with the most important selection criteria make selecting products quicker.

In the image, difference is made between the probe as well as the throughbeam system (above) and the scanner (below).

Typ. operating range limit

On front:

LV463 ¹⁾	900
LV462	525
LV461	300

1) Expected to be available for delivery in the third quarter of 2012

The information on the typical scanning range limit for scanners refers to a white object with 90 % diffuse reflection.

The information on the operating range for throughbeam systems refers to an optimally aligned throughbeam path.

The table values are typical values and always refer to the maximum possible scanning or operating range.

The scanning or operating ranges are always dependent on the amplifier type used.

Attention!

Additional settings for sensitivity adjustments can be made in the menu for some amplifiers.

Due to tolerance-related fluctuations, we recommend complying with a safety factor of at least 20 %. In addition we always recommend performing checks with several identical test items when carrying out application tests.

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Inductive Switches
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Optical Distance Measurement/Positioning
Mobile Code Readers

Safety Sensors

Safety Systems

Safety Services

Safety Laser Scanners
Safety Light Curtains
Transceiver and Multiple Light Beam Safety Devices
Single Light Beam Safety Devices
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Safety Relays
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Safety Engineering Software
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