Leuze

Fiber optic sensors

Flexible fiber optics made of plastic or glass and amplifiers

The Sensor People

Plastic fiber selection guide

Fiber type	Operating principle	Light beam exit	Head design	Fastening
Plastic fiber	**Throughbeam**	Front beam exit	Cylindrical fiber head	Threaded
				Sleeve
				Smooth
			Cubic fiber head	
		Lateral beam exit	Cylindrical fiber head	Threaded
				Smooth
			Cubic fiber head	

Special version	Bending protection	Article
Heat resistant (105 °C)[1]	Bending protection	KFX-LH-320; KFX-LH-420
Flexible fiber optics[2]		KFX-LY-320; KFX-LY-420
Precise object detection[3]		KFX-LD-320, KFX-LD-420
Standard		KFX-L-320; KFX-L-420
		KF-L-320; KF-L-420; KF-L-450
Precise object detection[3]	Bending protection	KFX-LD-120; KFX-LD-320-Q
Standard		KFX-L-320-Q
Precise object detection[3]	Standard	KF-LE-220
Chemical resistant		KF-LP-FU92-520-Q
Area detection	Bending protection	KFX-L-20ML-20
Flexible fiber optics[2]	Standard	KF-LY-77TZ-20; KF-LY-77TZ-30
Chemical resistant	Standard	KF-LP-FU96-520-Q
Heat resistant (105 °C)[1]		KF-LH-305-D; KF-LH-320-D
Standard	Standard	KF-L-320-D-T14L; KF-LC32-12
Area detection	Bending protection	KFX-L-10MLD-20
		KF-L-30ML-20; KF-L-50ML-20; KF-L-100MLD-20
Flexible fiber optics[2]	Standard	KF-LY-U09-20; KFLW-FU53-20; KF-LW-FU57-20

[1] Standard 70 °C
[2] Bending radius R1 or R2, standard R10 or greater
[3] Minimum object diameter 0.05 mm or 0.1 mm, standard >0.1 mm

Plastic fiber selection guide

Fiber type	Operating principle	Light beam exit	Head design	Fastening
Plastic fiber	**Detecting**	Front beam exit	Cylindrical fiber head	Threaded
				Sleeve
				Smooth
			Cubic fiber head	
		Lateral beam exit	Cylindrical fiber head	Sleeve
				Threaded
			Cubic fiber head	

Special version	Bending protection	Article
Precise object detection[3]	Bending protection	KFX-ETA-320; KFX-ETD-320; KFX-ETA-420; KFX-ETD-420
Standard	Bending protection	KFX-ETC-320; KFX-ETC-420; KFX-ET-605; KFX-ET-620: KFX-ETC-620
		KF-ET-620; KF-ET-650; KF-ETC-420
Precise object detection[3]	Bending protection	KFX-ETD-320-Q
Standard		KFX-ETC-320-Q; KFX-ETC7-120
Standard	Standard	KF-ETE-220
Area detection	Bending protection	KFX-ET-20ML-20
	Standard	KF-ET-20MLS-20
Flexible fiber optics[2]	Standard	KF-ETW-FU44-20
Precise fiber optics[2]	Standard	KF-ETW-FU31-20
Flexible fiber optics[2]	Bending protection	KFX-ETY-67TZ-20
Area detection	Standard	KF-ET-30ML-20; KF-ET-50ML-20
Heat resistant (105 °C)[1]		KF-ETH-38H-20
Flexible fiber optics[2]		KF-ETW-K10-20; KF-ETW-FU47-20
Standard		KF-ETB-38V-20

[1] Standard 70 °C
[2] Bending radius R1 or R2, standard R10 or greater
[3] Minimum object diameter 0.05 mm or 0.1 mm, standard >0.1 mm

Fiber optic selection guide

Fiber type	Operating principle	Light beam exit	Head design	Fastening
Glass fiber	**Throughbeam**	Front beam exit	Cylindrical fiber head	Threaded
				Smooth
		Lateral beam exit	Cylindrical fiber head	Smooth
	Detecting	Front beam exit	Cylindrical fiber head	Threaded
				Sleeve
				Smooth
		Lateral beam exit	Cylindrical fiber head	Smooth

Sheath material	Special version	Article
Stainless steel sheath	Heat-resistant (250°C)	GF-LB-SS-405-SM; GF-LB-SS-410-SM GF-LB-SS-430-SM; GF-LB-SS-830-SM
Stainless steel sheath	Heat-resistant (300°C)	GF-LB-SS-405-IQ; GF-LB-SS-410-IQ GF-LB-SS-430-IQ; GF-LB-SS-450-IQ
Silicone sheath	Heat-resistant (180°C)/ chemical-resistant	GF-LB-SI-430-IQ; GF-LB-SI-450-IQ
Stainless steel sheath	Heat-resistant (300°C)	GF-LB-SS-610-SD; GF-LB-SS-630-SD; GF-LB-SS-810-SF; GF-LB-SS-820-SF; GF-LB-SS-830-SF; GF-LB-SS-840-SF
Silicone sheath	Heat-resistant (180°C)/ chemical-resistant	GF-LB-SI-610-SD
Stainless steel sheath	Heat-resistant (250°C)	GF-ETM-SS-402-IM; GF-ETB-SS-305-SM; GF-ETB-SS-310-SM; GF-ETB-SS-605-SM; GF-ETB-SS-610-SM; GF-ETB-SS-630-SM
Stainless steel sheath	Heat-resistant (250°C)	GF-ETB-SS-305-S50M
Stainless steel sheath	Heat-resistant (300°C)	GF-ETG-SS-305-IQ; GF-ETG-SS-310-IQ; GF-ETG-SS-605-IQ; GF-ETG-SS-610-IQ; GF-ETG-SS-630-IQ; GF-ETG-SS-650-IQ
Silicone sheath	Heat-resistant (180°C)/ chemical-resistant	GF-ETG-SI-305-IQ; GF-ETG-SI-310-IQ; GF-ETG-SI-605-IQ; GF-ETG-SI-610-IQ; GF-ETG-SI-630-IQ; GF-ETG-SI-650-IQ
Brass sheath	Heat-resistant (160°C)	GF-ETG-BR-305-IQ; GF-ETG-BR-310-IQ; GF-ETG-BR-605-IQ; GF-ETG-BR-610-IQ; GF-ETG-BR-630-IQ; GF-ETG-BR-650-IQ
Stainless steel sheath	Heat-resistant (300°C)	GF-ETG-SS-710-SU

For more detailed information on the individual types as well as operating range information in combination with the corresponding fiber optic amplifiers, please visit the details page on the website.

Amplifier selection guide

Setting type	Special version
Display with rocker switch	Large operating range
	Short response time (0.05 ms / 50,000 Hz)
	Standard

Setting type	Special version
Display with buttons	None

Setting type	Special version
Potentiometer	None

Light source	Extra features	Article
Infrared	Multifunction input	LV463I.XR7/4T; LV463I.XR7/2T; LV463I.XR7/4T4; LV463I.XR7/4T-150-M12; LV463I.XR7/4T4-150-M12
	IO-Link	LV463I.XR7/L4-M8
	Analog output voltage + multifunction input	LV463I.XR7/4TV; LV463I.XR7/4TV-150-M12
	Analog output current + multifunction input	LV463I.XR7/4TC; LV463I.XR7/4TC-150-M12
Red light	Multifunction input	LV463.XR7/4T; LV463.XR7/2T; LV463.XR7/4T-M8; LV463.XR7/2T-M8; LV463.XR7/4T4; LV463.XR7/2T2; LV463.XR7/4T-150-M12; LV463.XR7/4T4-150-M12
	IO-Link	LV463.XR7/L4; LV463.XR7/L4-M8 LV463.XR7/L4-150-M12
	Analog output voltage + multifunction input	LV463.XR7/4TV; LV463.XR7/2TV; LV463.XR7/4TV-150-M12
	Analog output current + multifunction input	LV463.XR7/4TC; LV463.XR7/2TC; LV463.XR7/4TC-150-M12
Red light	Multifunction input	LV463.XV7/4T; LV463.XV7/2T; LV463.XV7/4T-M8; LV463.XV7/2T-M8; LV463.XV7/4T-150-M12
	IO-Link	LV463.XV7/L4; LV463.XV7/L4-M8 LV463.XV7/L4-150-M12
Red light	Multifunction input	LV463.7/4T; LV463.7/2T; LV463.7/4T-M8; LV463.7/2T-M8; LV463.7/4T-150-M8; LV463.7/4T-150-M12
	IO-Link	LV463.7/L4; LV463.7/L4-M8; LV463.7/L4-150-M8; LV463.7/L4-150-M12
	M8 3-pin	LV463.7/4-150-M8.3; LV463.7/2-150-M8.3
Red light	None	LV462C/24; LV462C/24-150-M8; LV462C/42-150-M8
Red light	None	LV461.1/P2; LV461.1/P2-150-M8

After preselecting the amplifier, the connection (M8 connector, open cable end, 150 mm M8 or M12 pigtail) and the output circuit (PNP or NPN) can be selected via the details page on the website.

Applications

Confectionery and bakery packaging

Requirement: For food packaged in film, a correctly executed sealed seam ensures the shelf life of the packaged products. For this purpose, the sealed seam must be continuously checked in the horizontal process. The sensors used must be adapted to the space available in the machine.

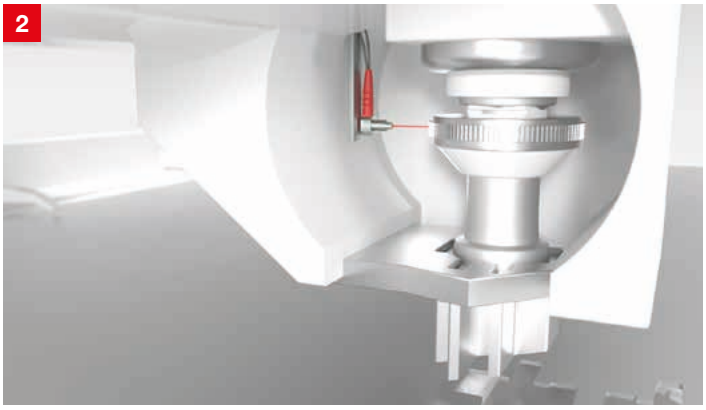
1

Solution: The KF and KFX fiber optics with different optical outlets and mounting options can be used flexibly in confined installation situations. Combined with amplifiers with high optical power, LV463.XR is a solution tailored to the application. Further advantages are the analog output and the IO-Link interface.

Punching machines and laser-cutting machines

Requirement: On a punching machine, the presence of the punching head in the tool holder is to be checked following the tool change. The check is performed before the actual punching process is started. This serves to avoid downtime and ensures an optimum punching process.

2



Solution: The fiber optic sensors of the LV/KF series are particularly well suited for use in constrained spaces thanks to their flexible fiber optics. Depending on the contour of the punching head, various beam exits are available. The parallel display of signal and switching threshold on the amplifier ensures fast commissioning.

Pharmaceutical packaging

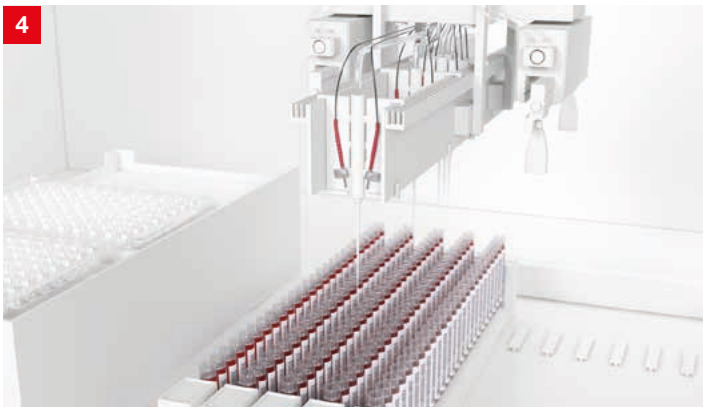
Requirement: After filling the vials in a packaging machine, the containers are often transported in confined spaces at high speeds and with minimal spacing. Due to the limited space available, the sensors used have to be particularly small and easy to integrate into the machine.

3

Solution: Plastic fiber optics KF and glass fiber optics GF with different beam exits, together with the LV 463 amplifiers, offer variable solutions for detecting vials. The amplifiers, which can be conveniently set via the menu, are available with analog output as well as IO-Link interface.

Fill level monitoring of the samples

Requirement: The fill level monitoring of the containers in the rack must be attached to the gripper and have a very precise detection range within the samples.



Solution: This application can be solved with fiber optics of the KF series with various beam exits, separate LV 46x amplifier with menu navigation, or with RKU 420 ultrasonic sensor and narrow sound cone.

Web edge control

Requirement: Film webs must be precisely aligned laterally before further processing. Sensors ensure a precise web guide, both for the bottom and top film. Suitable sensor solutions are required in each case for transparent or printed film webs.

Solution: Different solutions are available for the web guide – with plastic fiber optic cables from the KF series or with switching retro-reflective photoelectric sensors, e.g. PRK 18B, two-point control can be realized. With a GS 754 measuring fork sensor, a high-precision analog web guide is possible.

Detection of bottle orientation

Requirement: For applying labels to embossed areas on bottles or multiple labels, the correct orientation of the bottles must be detected at the applicator.

Solution: The precise beam emission of the flexibly integrable fiber optic sensors (fiber GF and amplifier LV46x) allows a marking to be detected. Even seam detection at the labeling station is possible in order to reliably detect the exact alignment.

Fiber optic sensors

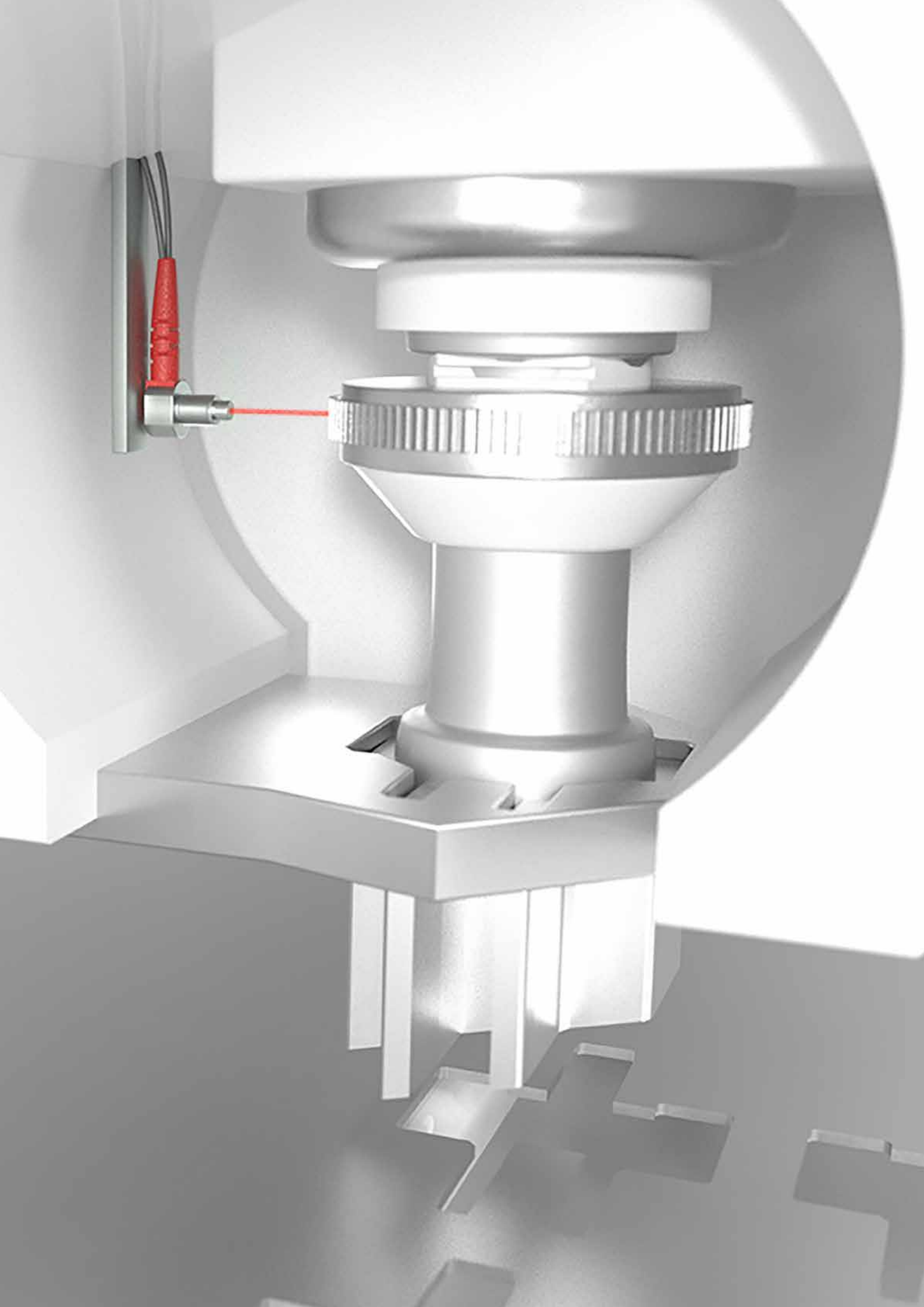
When space for sensors is particularly limited or extreme environmental conditions prevail, conventional cubic or cylindrical sensors quickly reach their limits. This is precisely where fiber optic sensors offer an elegant solution. They consist of a two-part structure: flexible fiber optics made of plastic or glass, which are available in various lengths, and separate amplifiers with a wide range of evaluation options. This design makes it possible to place the amplifier outside the critical environment and install it in suitable locations while the fiber runs to the detection point. This ensures reliable performance even under demanding conditions.

Fiber optics

- Various optical outlets with and without bending protection
- Models for higher temperatures, use in contact with chemicals, in food-related areas
- Fibers with an extremely fine fiber head for the detection of the smallest parts, fiber arrays

Amplifiers for fiber optics

- Red light and infrared light models, devices with large operating range, devices with very short response time
- Universal for plastic and glass fiber optics with a 2.2 mm diameter
- Adjustment via teach, signal sequence and IO-Link
- Variants with menu navigation and display as in throughbeam or reflective principle in one type



Technical data

		Fiber optic amplifiers
		
		LV46x
		CE UKCA cULus
Technical data	Dimensions without connector (W x H x D)	10 mm x 31 mm x 62 mm | 10 mm x 31.5 mm x 72 mm | 10 mm x 33 mm x 79.4 mm
	Supply voltage U_B	10 V DC ... 24 V DC
	Switching frequency	250 Hz ... 50,000 Hz
	Connection type	Cable | Cable with connector, M8 | Cable with connector, M12 | Connector, M8
	Degree of protection	IP 50 | NEMA 1
	Interface	IO-Link
	Switching outputs	NPN | PNP | Push-pull
	Switching principle	Dark switching | IO-Link / light switching (PNP)/dark switching (NPN) | Light/dark switchable | Light switching
	Analog outputs	Current | Voltage
	Selectable inputs/outputs	Activation input | Multiplex operation | Teach input
	Light source	LED, Infrared | LED, Red
	Operational controls	Control buttons | Multiturn potentiometer | Rocker pressure switch | Slide switch
	Housing	Plastic
Features	Special version	Large operating range | Short response time | Time function

		Fiber optics	
			
		GF Glass fiber optics	**KF / KFX** Plastic fiber optics
Technical data	Operating principle	Diffuse reflection principle | Throughbeam principle	Diffuse reflection principle | Throughbeam principle
	Design	Cylindrical	Cubic | Cylindrical
	Outer diameter	2.9 mm ... 7 mm	1 mm ... 4 mm
	Fiber length	200 mm ... 5,000 mm	210 mm ... 5,000 mm
	Fiber sheathing	Nickel-plated brass | Silicone | Stainless steel | Stainless steel (SUS303)	PE | PTFE
	Fiber head	Aluminum | Stainless steel | Stainless steel (SUS303)	Metal | Plastic | Stainless steel | Zinc
	Light beam exit	bent 90° | Front | Lateral with lens | Lateral without lens | On face	bent 90° | Front | Lateral
	Laying	standard	Flexible | Highly flexible | standard
	Smallest bending radius	R23 | R40	R1 | R2 | R10 | R15 | R25 | R60
	Area of application	General applications | Oil and chemical resistant	General applications | Highly precise object detection | Oil and chemical resistant | Precise object detection
	Ambient temperature, operation	–40 °C ... 300 °C	–55 °C ... 105 °C
Features	Special version	Heat resistant	Area detection | Heat resistant | V-optics | Single core fiber, multiple core fiber | Coaxial fiber core

Our portfolio at a glance

Switching sensors
- Optical sensors
- Inductive sensors
- Capacitive sensors
- Ultrasonic sensors
- Laser scanners
- Fiber optic sensors
- Fork sensors
- Light curtains
- Special sensors

Measuring sensors
- Distance sensors
- Positioning sensors
- 3D sensors
- Laser scanners
- Light curtains
- Bar code positioning systems
- Fork sensors

Safety
- Safety Solutions
- Safety Laser Scanners
- Safety Light Curtains
- Single and Multiple Light Beam Safety Devices
- Safety Radar Sensors
- Secure Locking Devices, Switches and Proximity Sensors
- Safety Controllers and Relays
- Machine Safety Services

Identification
- Bar Code Identification
- 2D-Code Identification
- RF Identification

Data Transmission
- Optical data transmission systems

Network and Connection Technology
- Connection technology
- Modular connection units

Industrial Image Processing
- Light section sensors
- Industrial IP cameras
- Vision sensors

Accessories and add-on products
- Signaling devices
- Mounting systems
- Reflectors

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