



# Fibre optics & sensors for fibre optics

Customised application solutions





## FL 70 in use

### **Congestion control with fibre optics**

Small plastic stoppers are conveyed by a vibro-conveyor and separated on a conveyor belt. Congestion is controlled by a sensor such as FL 70 R-PSD in combination with the Sensport plastic fibre optic K2L-34.

The FL 70 R-PSD sensor is installed in the control cabinet in this particular application. This is not essential as thanks to a robust housing and a high IP 64 protection system, it is possible to fit the sensor directly on to the machine.

**NEW**



**FL 70 R-..D**

The FL 70 R-..D is the high-end sensor for fibre optics with a 4 digit display. It is characterised by simple settings and many additional functions, e.g. fine adjustment of the switch point, inversion of the switch output, adjustment of accuracy and speed, window programming, time functions and tamper-proof protection. The display is always clearly visible thanks to a 180° rotatable screen.

**FL 70 RA-..D**

The FL 70 RA-..D has an analogue output, which is of particular advantage for complex applications such as the connection of a so-called cross-section transformer. This enables e.g. checks with regard to object size and automatic edge control.

**FL 70 R**

The FL 70 R version operates without a display and is a cheap alternative for standard applications. An easy teach-in function is common to all of the sensor versions. Teach-in is carried out at the touch of a key and external teach-in is possible via a teach cable. The keys can also be locked.

**Informative display**



LOC – locking function provides reliable protection from intentional or unintentional tampering

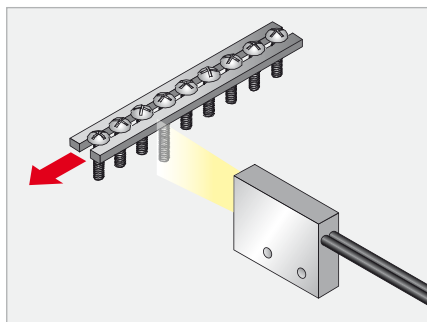


ADJ – Adjustment – the sensor is in adjustment mode



SPI – Switching Point I – switch point I has been taught.

**Analogue output**



The sensor supplies an analogue signal, which is proportional to the reflectivity of the object being detected and which in turn is proportional to the distance, size, surface, etc, when reflectivity from the object is identical. The FL 70 RA-D sensor enables analogue output of the length of screws.

**Product advantages**

- High user comfort – Teach-in
- High level of accuracy
- High switching frequency
- No mutual interference thanks to automatic communication
- Mode of operation selectable (types R-..D and RA-..D)
- Assembly on DIN rails
- Robust IP 64 protection system
- Top quality price/performance ratio

Product	Max. scanning range (depends on fibre optic)	Max. working range (depends on fibre optic)	Switching frequency	Output			Display	Connection		Size (mm)	DIN rail assembly
				NPN	PNP	Analogue		Plug	Cable		
FL 70 R	300 mm	2,000 mm	1,500 Hz	•	•		•	•	10 x 35 x 84	•	
FL 70 R-..D	300 mm	2,000 mm	8,000 Hz	•	•		•	•	10 x 35 x 84	•	
FL 70 RA-..D	300 mm	2,000 mm	8,000 Hz	•	•	•	•	•	10 x 35 x 84	•	



**The David amongst the Goliaths:**  
It covers all the requirements of optical sensor technology in small spaces, offering high-precision detection with extreme ease of use.

**Product advantages**

- Size 32 x 20 x 12 mm
- Teach-in with button or control input
- Dynamic setting possibility
- High switching frequency
- Red light 660 nm
- Reversible N.O. – N.C.
- For Ø 2.2 mm fibre optics



**Connecting fibre optics**

- Simple replacement of fibre optics even when sensors are installed.
- No tools necessary
- Secure clamp
  1. Open clamping saddle
  2. Insert fibre into holder until stop is reached (push past resistance from O-ring)
  3. Close clamping saddle



**Teach-in**

1. Point fibre optic at object
2. Press key for approx. 3 sec.
3. Remove object
4. Press key for approx. 1 sec.

**Display/Operating elements**

Yellow LED – light reception indicator  
Green LED – stability indicator

Product	Max. scanning range (depends on fibre optic)	Max. working range (depends on fibre optic)	Switching frequency	Output		Connection		Size (mm)
				NPN	PNP	Plug	Cable	
FL 20 R	100 mm	1,000 mm	1,000 Hz	•	•	•	•	32 x 20 x 12



**FMS 18**

The photoelectric sensor FMS 18-4 U covers small to medium switching distances and ranges. Due to its high switching frequency of 1 kHz, the sensor is particularly suitable for reliable, non-contact measurement of fast processes. It is even possible to invert the output signal on this small device due to a plug-in bridge circuit on the front end. The sensor is also equipped with two separate P and N switching outputs

**FMS 30**

The photoelectric sensor FMS 30-4 U covers the entire range from small to very large switching distances and ranges. A switch on the front of the device makes it possible to reduce the switching distance by half. This facilitates precise adjustment of the switching point in close-up range and improves detection of small parts. A second switch on the front of the sensor inverts the output signal. The sensor thus prepares the logical, correct signal, as N.O. or N.C., according to the type of application. Each device is also equipped with two separate P and N switching outputs.

**Product advantages**

- ❖ **Working range proximity switch max. 800 mm (depending on fibre optic used)**
- ❖ **Working range light barrier max. 4800 mm (depending on fibre optic used)**
- ❖ **Robust metal housing**
- ❖ **Exclusive switch output**
- ❖ **Reversible N.O/N.C.**
- ❖ **Different sheathings for glass fibres**
- ❖ **Fibre optics for temperatures up to 160°C**
- ❖ **Analogue output 0...10 V/0...20 mA (FAV 30)**
- ❖ **Cross-section converter adaptable (recommended for FAV 30)**



**Sn und Sn/2 reversibility**

N.O./N.C. function is set via the sliding switch on the front end. Switch position "Sn/2" reduces the scanning distance by 50% and thus enables better detection of small parts.

**Uncomplicated connection of sensor/fibre optics**

The glass fibre optics can be fitted to FMS sensors (in this case FMS 30) by means of a simple screw connection.

Product	Max. scanning range (depends on fibre optic)	Max. working range (depends on fibre optic)	Switching frequency	Output		Switching		Connection		Size (mm)
				NPN	PNP	N.O.	N.C.	Plug	Cable	
FMS 18-U	160 mm	700 mm	up to 5,000 Hz	•	•	•	•	•	•	M18 x 1 x 79
FMS 30-U	800 mm	4,800 mm	up to 5,000 Hz	•	•	•	•	•	•	M30 x 1 x 79
FAV 30		500 mm	up to 200 Hz						•	M30 x 1 x 112

# Fibre optics and their applications



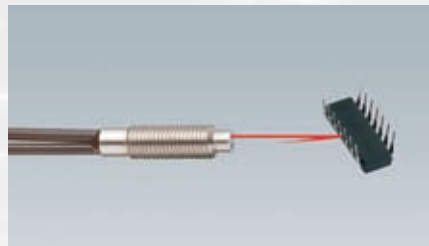
Fibre optics are basically divided into two categories – glass and plastic transmission media. SensoPart offers its products in both versions. Fibre optics with glass are referred to as glass fibres. Use of a very high-quality mineral glass achieves much better performance data compared with plastic fibres. Attenuation is less with glass fibres than with plastic fibres. This makes it possible to cover considerably longer transmission paths. It is also possible to use glass fibres in very high temperatures with the appropriate sheathing.

## Light barriers



Fibre optic transmitters and receivers run in two separate sheaths, which are connected to the sensor's appropriate optical components by means of the glass fibre coupling.

## Proximity switches



In the proximity switch version, fibre optic transmitters and receivers run in one cable and open into a light emission head.

## Flexible scanning heads



Here the bundle of glass fibres ends in a thin, flexible stainless steel tube. The tube can be bent into the necessary shape "on site" when assembled in places which are difficult to access.

## Cross-section converter



Whilst the emitted light is round with standard glass fibre optics, the light takes on the shape of a rectangle or a thin line with the cross-section converter. These lines of light are used for automatic edge control, amongst other applications.

## Radial/axial light emission



When installation conditions are cramped, it can be of advantage to use fibre optics with lateral (radial) light emission. These are available with different branch lengths according to the model.

## Sheathing material



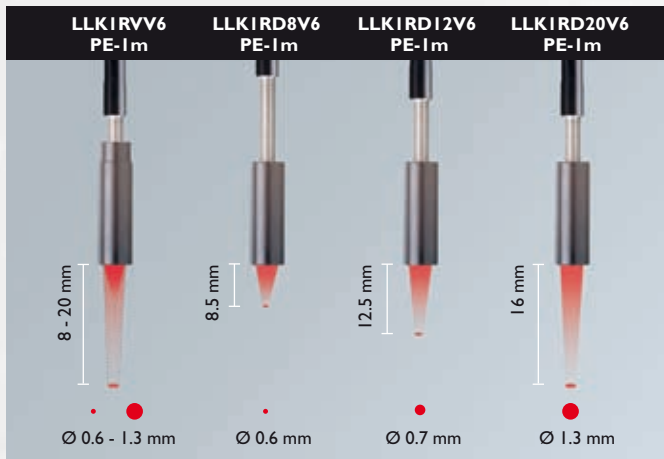
The ambient conditions at the place of application are decisive here. For normal conditions, i.e. with no mechanical movement and strain, no dripping liquid, we recommend the version with metal filament coil, designation MSC. In more difficult operating conditions, in other words continuous mechanical movement and strain, splashes of water, oil, cooling agents as well as temperatures up to 120 degrees and even up to 160 degrees for short periods, a silicon-sheathed steel filament coil must be used, designation Si. This protects the glass fibres from pressure and traction. In such difficult conditions, the area of light emission should also be protected by a screw-on head with glass panel and Teflon seal (SensoPart accessory).

## Fork sensor



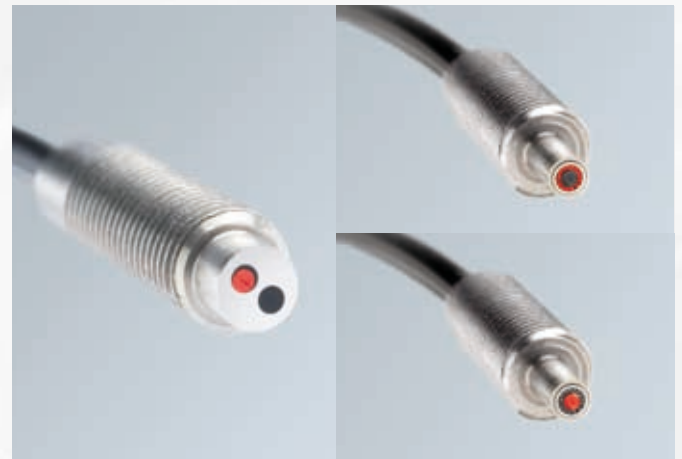
Emitter and receiver are exactly aligned regarding their location and focal position. Easy mounting, reliable detection of markings on web fabrics as well as of small parts > 0.2 mm.

## Ideal for the detection of very small parts



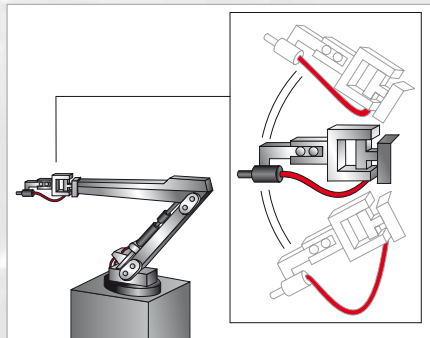
The three fixed focus versions LLKIRDxV6 enable utmost precision in fixed focus distances (8/12/20 mm). The variable focus LLKIRVV6 enables manual adjustment of the focus within the range 8 – 20 mm.

## Conventional fibres Co-axial fibres



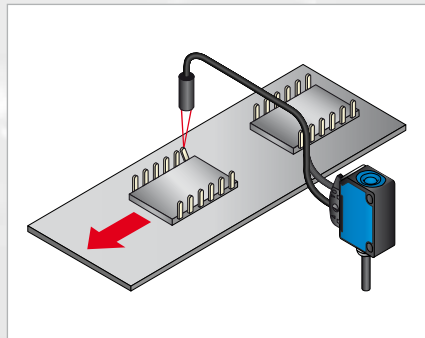
Fibre optic transmitters and receivers run in two separate sheaths, which are connected to the sensor's appropriate optical components by means of the glass fibre coupling. With conventional fibre optics (left-hand picture), both fibres run parallel to one another whilst with co-axial fibre optics the fibre-optic receivers run co-axially around the transmitter fibres. This is of advantage when using an additional optic, e.g. a smaller light spot and a better small part detection.

## Overview of applications



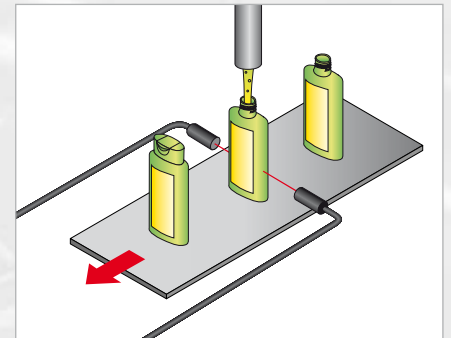
### Flexibility

A proximity switch is fitted to a robot arm and accompanies the arm in every movement. The mechanical strain applied requires a high level of flexibility and as small a bending radius as possible of the connected plastic fibre-optic.



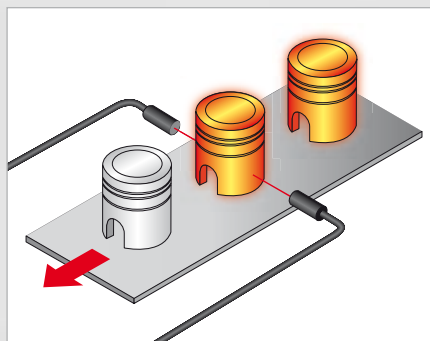
### Detecting small objects

Thanks to light spots of e.g. 0.65 mm in size, even very small objects can be reliably detected.



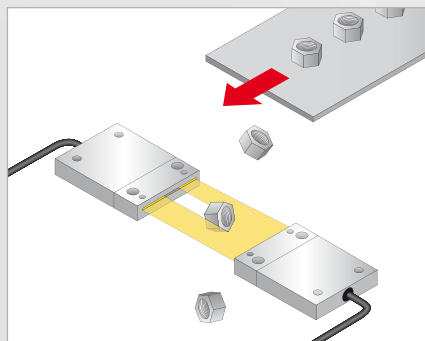
### Robust

When working with aggressive cleaning agents such as those used in the food industry, resistant sheathing is required.



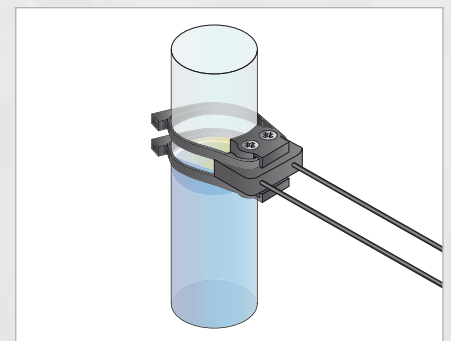
### Heat resistance

Cast iron cylinders are separated immediately after production. This results in high ambient temperatures.



### Area detection with the cross-section converter (Analogue output)

Objects (nuts) fall through the area monitored by a cross-section converter and can thus be counted.



### Level measuring

Can be mounted on transparent tubes with Ø from 6 to 26 mm. Used for level measuring in tubes inside water tanks or other containers. Reliable detection is guaranteed, even for non-transparent liquids.

# Fibre optics for FL 70/FL 20

## Proximity switch version



Fibre optic	Fibre arrangement light exit	FL 70 Typ. scanning/working range (mm) Standard / Fine / High	FL 20 Typ. working range (mm) factory setting	Fibre Arrangement	Adapted for ancillary lens	Core Ø (mm) Material (S=Emitter E=Receiver)	Sheath Ø (mm) Material (PE=Polyethylene, (PA=Polyamide)	Ambient temperature (fixed mounting)	Fibre bending radius (mm)	Fibre length	Collar bushing
<b>STANDARD</b>											
<b>K1R-101</b> 	mono/axial	60 / 25 / 95	--		LVLf6-M3	2x0.5 PMMA	1.0 / PE	-40 to +70°C	25	2 m free cut	M3 nickel-plated brass
<b>K2R-102</b> 	mono/axial	150 / 85 / 295	80		--	2x1.0 PMMA	2.2 / PE	-40 to +70°C	25	2 m free cut	M6x0.75 nickel-plated brass
<b>K1R-103</b> 	mono/axial bendable top	60 / 20 / 105	--		--	2x0.5 PMMA	1.0 / PE	-40 to +70°C	25	2 m free cut	M3 nickel-plated brass
<b>K2R-100</b> 	mono/axial	140 / 70 / 290	70		--	2x1.0 PMMA	2.2 / PE	-40 to +70°C	25	2 m free cut	M6x0.75 nickel-plated brass
<b>K2R-6</b> 	mono/axial	100 / 55 / 265	50		--	2x1.0 PMMA	2.2 / PE	-40 to +70°C	25	2 m free cut	M6x0.75 nickel-plated brass
<b>K2R-67</b> 	mono/axial	120 / 70 / 295	60		--	2x1.0 PC	2.2 / PE	-40 to +85°C	25	2 m free cut	M6x0.75 nickel-plated brass
<b>LLK1RM3-PE-1m</b> 	mono/axial	50 / 20 / 55	--		LVLf6-M3	2x0.5 PMMA	1.3 / PE	-20 to +60°C	15	1 m free cut	M3 Al
<b>LLK2RM6-PE-1m</b> 	mono/axial	150 / 90 / 280	80		--	2x1.0 PMMA	2.2 / PE	-20 to +60°C	25	1 m free cut	M3 Al
<b>MULTIFIBRE</b>											
<b>K1R-68</b> 	axial	100 / 40 / 200	50		LVLf6-M4	8x0.25 (S) 8x0.25 (E) PMMA	1.3 / PE	-40 to +70°C	3	2 m free cut	M4 nickel-plated brass
<b>33RI/500-MSC</b> 	axial	100 / 55 / 210	50		--	(S)/(E) glass	4.6 chromed brass	-20 to +160°C	15	0.5 / 1+2 m on request	M6x0.75 plastic/nickel-plated brass
<b>CO-AXIAL</b>											
<b>K1R-35</b> 	co-axial	50 / 20 / 80	--		LVLf6-M4	1x0.5 (S) 4x0.25 (E) PMMA	1.0 / PE	-40 to +70°C	15	2 m free cut	M4 nickel-plated brass
<b>K2R-25</b> 	co-axial	130 / 60 / 240	70		--	1x1.0 (S) 16x0.25 (E) PMMA	2.2 / PE	-40 to +70°C	25	2 m free cut	M6x0.75 nickel-plated brass
<b>LLK1RM3-PE-1m</b> 	co-axial	70 / 35 / 150	--		LVLf6-M3	1x0.5 (S) 9x0.25 (E) PMMA	1.3 / PE	-20 to +60°C	15	2 m free cut	M3 Al
<b>LLK2RM6-PE-1m</b> 	co-axial	150 / 80 / 310	80		--	1x1.0 (S) 16x0.25 (E) PMMA	2.2 / PE	-20 to +60°C	25	1 m free cut	M6x0.75 Al
<b>CO-AXIAL OPTICS / FOCUSED</b>											
<b>LLK1RD8V6-PE-1m</b> 	co-axial focused 8mm Ø spot 0,6mm	8 / 8 / 8	--		--	1x0.5 (S) 9x0.25 (E) PMMA	1.3 / PE	-20 to +60°C	15	1 m free cut	Ø 6.0mm ALU
<b>LLK1RD12V6-PE-1m</b> 	co-axial focused 12mm Ø spot 0,7mm	12 / 12 / 12	--		--	1x0.5 (S) 9x0.25 (E) PMMA	1.3 / PE	-20 to +60°C	15	1 m free cut	Ø 6.0mm ALU
<b>LLK1RD20V6-PE-1m</b> 	co-axial focused 16mm Ø spot 1,3mm	16 / 16 / 16	--		--	1x0.5 (S) 9x0.25 (E) PMMA	1.3 / PE	-20 to +60°C	15	1 m free cut	Ø 6.0mm ALU
<b>LLK1RV6-PE-1m</b> 	co-axial variable focus 8-20mm Ø spot 0,6-1,3mm	8-20	--		--	1x0.5 (S) 9x0.25 (E) PMMA	1.3 / PE	-20 to +60°C	15	1 m free cut	Ø 6.0mm ALU
<b>K1R-104</b> 	spherical optics	80 / 45 / 205	--		--	2x0.5 PMMA	1.0 / PE	-40 to +70°C	15	2 m free cut	Ø 4.0mm V2A
<b>RADIAL</b>											
<b>K1RZ-31</b> 	mono/radial	20 / 10 / 30	--		--	2x0.5 PMMA	1.0 / PE	-40 to +70°C	15	2 m free cut	Ø 1.5mm ALU
<b>LLK2RZ (LS=10)</b> 	radial	200 / 50 / 300	100		--	16x0.25 (S) 16x0.25 (E) PMMA	2.2 Ø / PE	-40 to +70°C	15	2 m free cut	Ø 8.0mm ALU



Fibre optic	Fibre arrangement light exit	FL 70 Typ. scanning/working range (mm) (mm) Standard / Fine / High	FL 20 Typ. working range (mm) factory setting	Fibre Arrangement	Adapted for ancillary lens	Core Ø (mm) Material (S=Emitter E=Receiver)	Sheath Ø (mm) Material (PE=Polyethylene, PA=Polyamide)	Ambient temperature (fixed mounting)	Fibre bending radius (mm)	Fibre length	Collar bushing
<b>SPECIAL DESIGN</b>											
<b>LLK1QRR10x10-PE-2m</b>	cross-section converter 6mm line	1-15	1-15		--	9x0.25 (S) 9x0.25 (E) PMMA	1.3 / PE	-40 to +70°C	25	2 m free cut	10x10x5mm M3 nickel-plated brass
<b>LLK2QRR19x25-PE-2m</b>	cross-section converter 11mm line	1-15	1-15		--	16x0.25 (S) 16x0.25 (E) PMMA	2.2 / PE	-40 to +70°C	25	2 m free cut	19x25x6mm M3 nickel-plated brass
<b>LLK1VRF5-PE-2m</b>	V-switch transp. media radial	4 / 4 / 4	4		--	2x1.0(S;E) PMMA	1.3 / PE	-40 to +70°C	25	2 m free cut	19.6x13x5mm M3 ABS
<b>LLK1VRR22x15-PE-2m</b>	V-switch level detection glass tubes Ø 6-26mm	Ø 4-20	Ø 4-20		--	2x0.5 (S;E) PMMA	1.3 / PE	-40 to +70°C	15	2 m free cut	15.5x22x11mm polycarbonate
<b>LLK1VRF17x18-PE-2m</b>	V-switch high sensitivity	7 / 7 / 7	--		--	2x0.5 (S;E) PMMA	1.3 / PE	-40 to +70°C	1	2 m free cut	17x18x5mm M3 polycarbonate
<b>LLK2PR2-PE-2m</b>	prism switch level detection	--	--		--	1.0 PMMA	2.2 / PE	-40 to +70°C	25	2 m free cut	Ø 8.0mm V2A

## Fibre optics for FL 70/FL 20 ➤ Light barrier version

<b>STANDARD</b>											
<b>K2L-201</b>	mono/axial	120 / 60 / 200	--		LVLf6-M3	0.5 PMMA	2.2 / PE	-40 to +70°C	25	2 m free cut	M3 nickel-plated brass
<b>K2L-202</b>	mono/axial	350 / 200 / 800	180		LVLf6-M4	1.0 PMMA	2.2 / PE	-40 to +70°C	25	2 m free cut	M4 nickel-plated brass
<b>K2L-204</b>	mono/axial bendable top	350 / 195 / 720	180		--	1.0 PMMA	2.2 / PE	-40 to +70°C	25	2 m free cut	M4 nickel-plated brass
<b>K2L-7</b>	mono/axial	350 / 220 / 810	180		LVLf6-M3	1.0 PMMA	2.2 / PE	-40 to +70°C	25	2 m free cut	M3 nickel-plated brass
<b>K2L-77</b>	axial	270 / 145 / 550	140		LVLf6-M3	1.0 PMMA	2.2 / PE	-40 to +85°C	25	2 m free cut	M3 nickel-plated brass
<b>K2L-203</b>	mono/axial bendable top	120 / 60 / 190	--		--	0.5 PMMA	2.2 / PE	-40 to +70°C	15	2 m free cut	M3 nickel-plated brass
<b>LLK2LM3-PE-1m</b>	mono/axial	150 / 60 / 240	80		LVLf6-M3	1.0 PMMA	2.2 / PE	-20 to +60°C	25	1 m free cut	M3 Al
<b>LLK2LM4-PE-1m</b>	mono/axial	400 / 240 / 780	200		LVLf6-M4	1.0 PMMA	2.2 / PE	-20 to +60°C	25	1 m free cut	M4 Al
<b>MULTIFIBRE</b>											
<b>K1L78</b>	axial	200 / 120 / 405	100		LVLf6-M3	8x0.25 PMMA	1.0 / PE	-40 to +70°C	3	2 m free cut	M3 nickel-plated brass
<b>33L1/500-MS</b>	axial	270 / 165 / 550	140		LVLf6-M4	glass	2.2 chromed brass	-20 to +160°C	15	0.5 / 1+2 m on request	M4 plastic/nickel-plated brass
<b>OPTICS / FOCUSED</b>											
<b>LLK2LV6-PE-1m</b>	optic	>2000	1000		--	1.0 PMMA	2.2 / PE	-20 to +60°C	25	1 m free cut	Ø 6mm ALU
<b>RADIAL</b>											
<b>LLK2LZ (LS=10)</b>	radial	300 / 150 / 600	150		--	16x0.25 PMMA	2.2 / PE	-40 to +70°C	15	2 m free cut	Ø 8mm ALU
<b>K2L-34</b>	mono/radial bendable top	100 / 35 / 150	50		--	1.0 PMMA	2.2 / PE	-40 to +70°C	15	2 m free cut	Ø 1.5mm V2A
<b>SPECIAL DESIGN</b>											
<b>K2Q-12</b>	cross-section converter	250 / 155 / 550	130		--	16x0.25 PMMA	2.2 / PE	-40 to +70°C	15	2 m free cut	20x10mm nickel-plated brass
<b>LLK1GL10-PE-2m</b>	fork sensor 10 mm	10	10		--	0.25 PMMA	1.3 / PE	-40 to +70°C	10	2 m free cut	40.7x15x7mm M3 ABS
<b>LLK1GL5-PE-2m</b>	fork sensor 5 mm	5	5		--	0.25 PMMA	1.3 / PE	-40 to +70°C	10	2 m free cut	31.7x20x7mm M3 ABS
<b>LLK1L10x10-PE-2m</b>	flat sensing head	120 / 50 / 220	--		--	0.5 PMMA	1.0 / PE	-40 to +70°C	1	2 m free cut	10x10mm M2 nickel-plated brass

# Fibre optics for FMS 18/FMS 30

## Proximity switch version




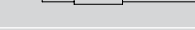
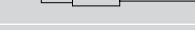
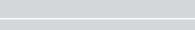


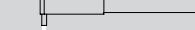
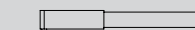




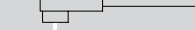


Fibre optic	Light exit	Light exit Ø in mm	FMS 18 Typ. scanning range/ working range in mm	FMS 30 Typ. scanning range/ working range in mm	Fibre bundle Ø in mm	Core material	Sheathing material	Ambient temperature (fixed mounting)	Bending radius in mm	Collar bushing <sup>1)</sup> Ø in mm
<b>STANDARD</b>										
<b>18/30 R 1/1000 PVC</b> 	axial	1	5	15	1	glass	PVC	-20 to +80°C	5	4.5
<b>18/30 R 1/1000 MSC</b> 	axial	0.7	5	15	1	glass	chromed brass	-20 to +160°C	15	6
<b>18/30 R 1/1000 Si</b> 	axial	0.7	5	15	1	glass	silicone	-20 to +160°C	15	6
<b>18/30 R 3/1000 PVC</b> 	axial	2.8	160	200	2 x 2.0	glass	PVC	-20 to +80°C	35	6
<b>18/30 R 3/1000 MSC</b> 	axial	2.8	160	200	2 x 2.0	glass	chromed brass	-20 to +160°C	25	8
<b>18/30 R 3/1000 Si</b> 	axial	2.8	160	200	2 x 2.0	glass	silicone	-20 to +160°C	25	8
<b>30 R 12/1000 Si</b> 	axial	5	-	800	2 x 3.5	glass	silicone	-20 to +160°C	25	12
<b>30 R 12/1000 MSC</b> 	axial	5	-	800	2 x 3.5	glass	chromed brass	-20 to +160°C	25	12
<b>RADIAL</b>										
<b>18/30 RZ 1/1000 MSC LS=10</b> 	radial	0.8	5	15	1	glass	chromed brass	-20 to +160°C	15	6
<b>18/30 RZ 1/1000 Si LS=10</b> 	radial	0.8	5	15	1	glass	silicone	-20 to +160°C	15	6
<b>18/30 RZ 3/1000 PVC LS=10</b> 	radial	2.8	160	200	2 x 2.0	glass	PVC	-20 to +80°C	35	7
<b>18/30 RZ 3/1000 MSC LS=10</b> 	radial	2.8	160	200	2 x 2.0	glass	chromed brass	-20 to +160°C	25	8
<b>18/30 RZ 3/1000 Si LS=10</b> 	radial	2.8	160	200	2 x 2.0	glass	silicone	-20 to +160°C	25	8
<b>30 RZ 12/1000 Si LS=16</b> 	radial	5	--	800	2 x 3.5	glass	silicone	-20 to +160°C	25	12
<b>30 RZ 12/1000 MSC LS=16</b> 	radial	5	--	800	2 x 3.5	glass	chromed brass	-20 to +160°C	25	12
<b>SPECIAL DESIGN</b>										
<b>18/30 RP2/-Si</b> 	prism switch level detection	--	--	--	3	glass	V2A	-30 to +160°C	25	8

<sup>1)</sup>Material collar bushing:  
standard = aluminium; special models possible, e.g. made of 1.4305

# Fibre optics for FMS I8/FMS 30

## Light barrier version

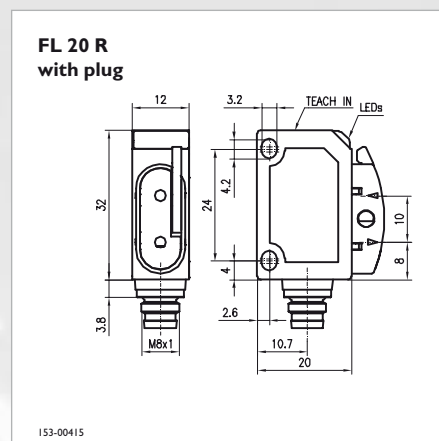
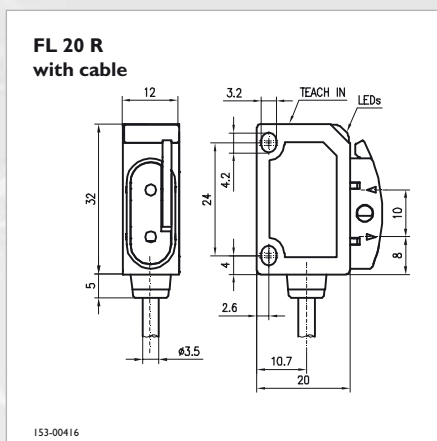
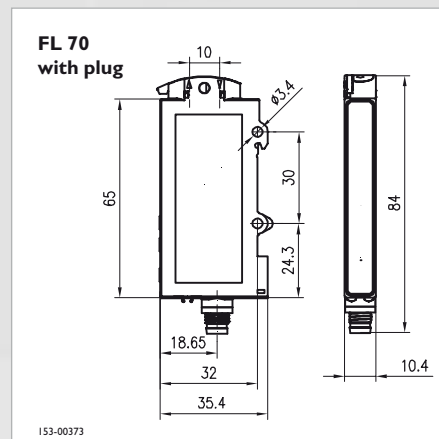
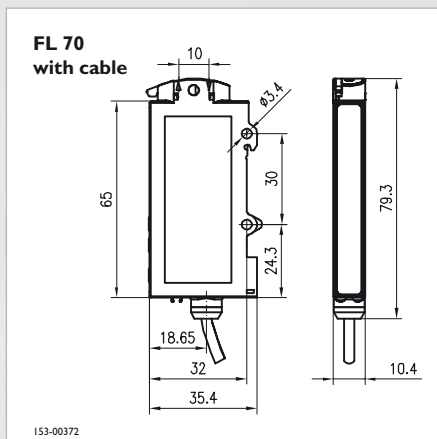
Fibre optic	Light exit	Light exit Ø in mm	FMS I8 Typ. scanning range/ working range in mm	FMS 30 Typ. scanning range/ working range in mm	Fibre bundle Ø in mm	Core material	Sheathing material	Ambient temperature (fixed mounting)	Bending radius in mm	Collar bushing <sup>1)</sup> Ø in mm
<b>STANDARD</b>										
<b>18/30 L 1/1000 PVC</b> 	axial	1	80	100	1	glass	PVC	-20 to +80°C	5	4.5
<b>18/30 L 1/1000 MSC</b> 	axial	0.7	80	100	1	glass	chromed brass	-20 to +160°C	15	6
<b>18/30 L 1/1000 Si</b> 	axial	0.7	80	100	1	glass	silicone	-20 to +160°C	15	6
<b>18/30 L 3/1000 PVC</b> 	axial	2	700	1000	2.0	glass	PVC	-20 to +80°C	35	4.5
<b>18/30 L 3/1000 MSC</b> 	axial	2	700	1000	2.0	glass	chromed brass	-20 to +160°C	25	8
<b>18/30 L 3/1000 Si</b> 	axial	2	700	1000	2.0	glass	silicone	-20 to +160°C	25	8
<b>30 L 12/1000 MSC</b> 	axial	3.5	--	4800	3.5	glass	chromed brass	-20 to +160°C	25	10
<b>30 L 12/1000 Si</b> 	axial	3.5	--	4800	3.5	glass	silicone	-20 to +160°C	25	10
<b>RADIAL</b>										
<b>18/30 LZ 1/1000 MSC LS=10</b> 	radial	0.8	80	100	1	glass	chromed brass	-20 to +160°C	15	6
<b>18/30 LZ 1/1000 Si LS=10</b> 	radial	0.8	80	100	1	glass	silicone	-20 to +160°C	15	6
<b>18/30 LZ 3/1000 PVC LS=10</b> 	radial	2	700	1000	2.0	glass	PVC	-20 to +80°C	35	6
<b>18/30 LZ 3/1000 MSC LS=10</b> 	radial	2	700	1000	2.0	glass	chromed brass	-20 to +160°C	25	8
<b>18/30 LZ 3/1000 Si LS=10</b> 	radial	2	700	1000	2.0	glass	silicone	-20 to +160°C	25	8
<b>30 LZ 12/1000 MSC LS=16</b> 	radial	3.5	--	4800	3.5	glass	chromed brass	-20 to +160°C	25	10
<b>30 LZ 12/1000 Si LS=16</b> 	radial	3.5	--	4800	3.5	glass	silicone	-20 to +160°C	25	10

<sup>1)</sup>Material collar bushing:  
standard = aluminium; special models possible, e.g. made of I.4305

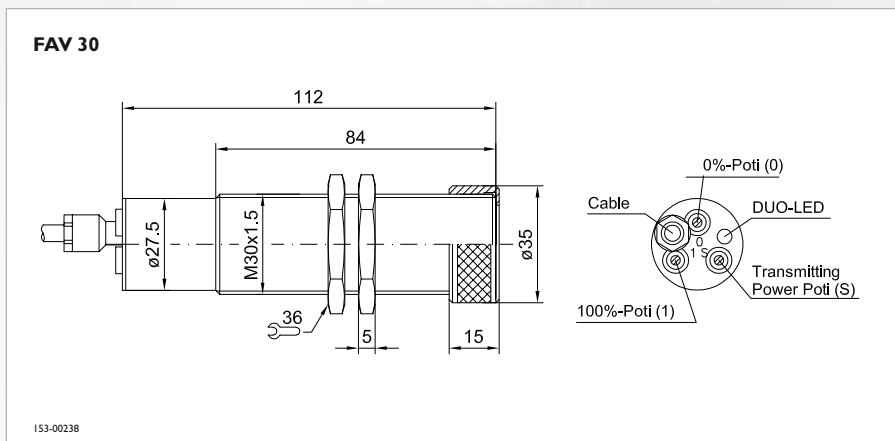
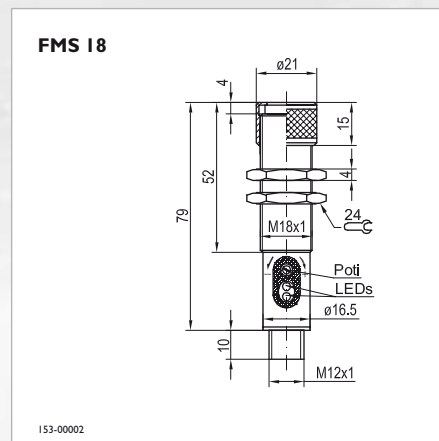
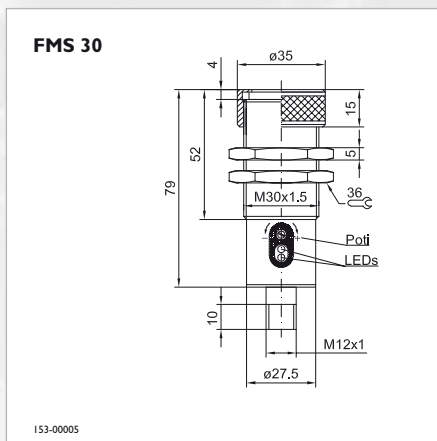
# Dimensional drawings

## Sensors for fibre optics

### Sensors for plastic fibre optics



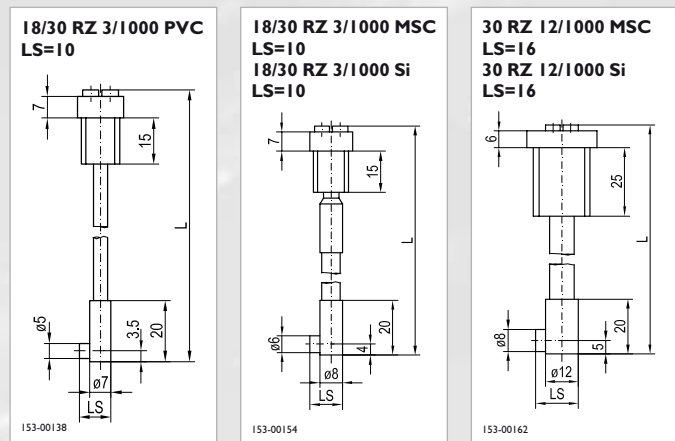
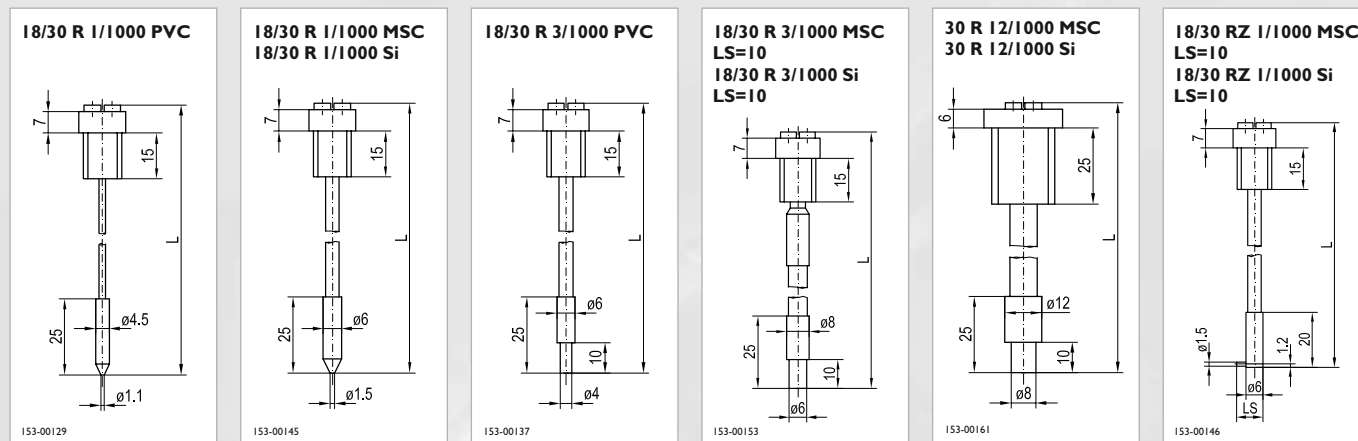
### Sensors for glass fibre optics



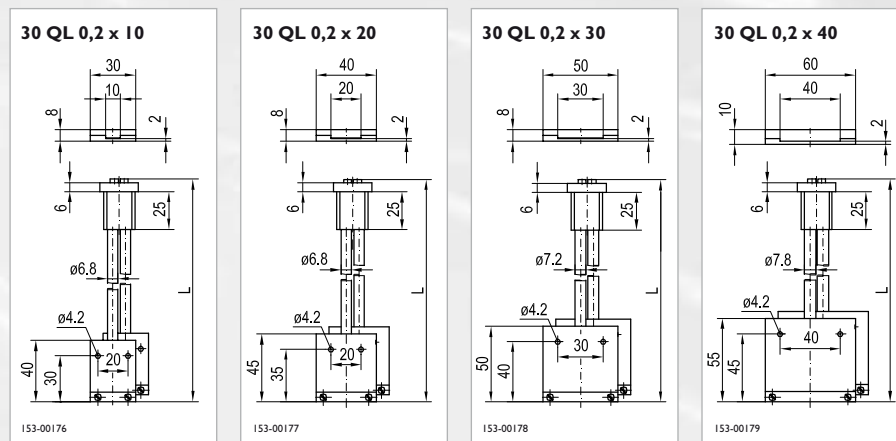
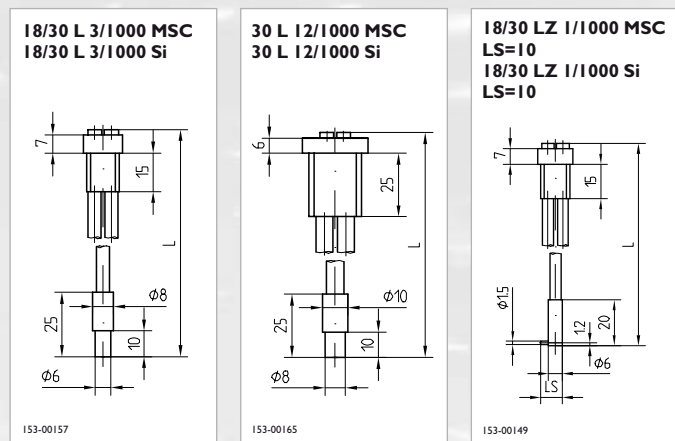
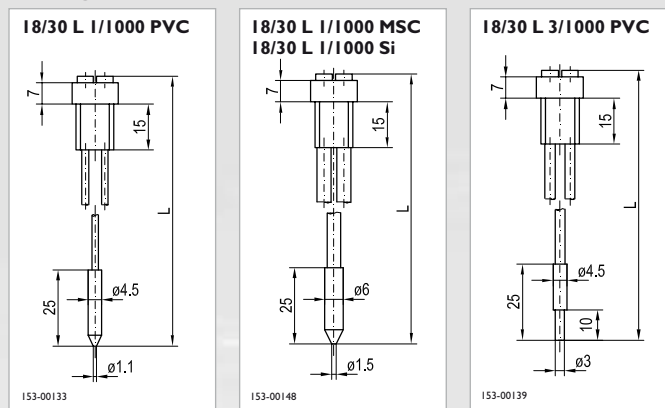
# Dimensional drawings

## Fibre optics for FMS I8/FMS 30

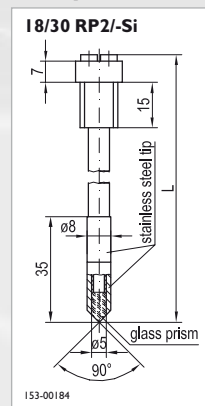
### Proximity switches



### Light barriers



### Special design



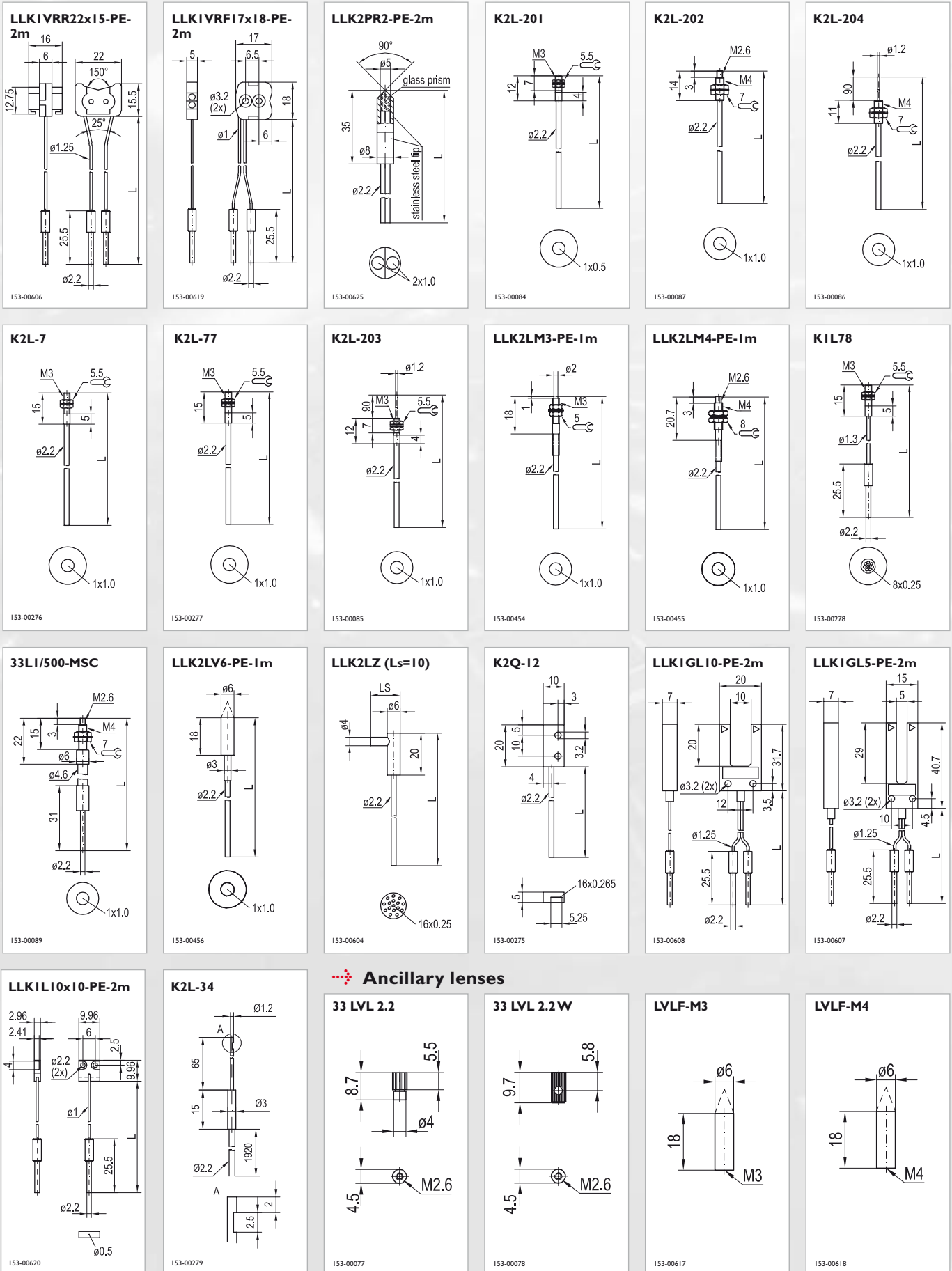
# Dimensional drawings

## Fibre optics for FL 70/FL 20

### Proximity switches

<p><b>KIR-101</b></p> <p>153-00079</p>	<p><b>K2R-102</b></p> <p>153-00083</p>	<p><b>KIR-103</b></p> <p>153-00080</p>	<p><b>K2R-100</b></p> <p>153-00081</p>	<p><b>K2R-6</b></p> <p>153-00269</p>	<p><b>K2R-67</b></p> <p>153-00270</p>
<p><b>LLKIRM3-PE-1m</b></p> <p>153-00450</p>	<p><b>LLK2RM6-PE-1m</b></p> <p>153-00453</p>	<p><b>KIR-68</b></p> <p>153-00271</p>	<p><b>33R1/500-MSC</b></p> <p>153-00088</p>	<p><b>KIR-35</b></p> <p>153-00274</p>	<p><b>K2R-25</b></p> <p>153-00273</p>
<p><b>LLKIRKM3-PE-1m</b></p> <p>153-00451</p>	<p><b>LLK2RKM6-PE-1m</b></p> <p>153-00453</p>	<p><b>LLKIRD8V6-PE-1m</b></p> <p>153-00362</p>	<p><b>LLKIRD12V6-PE-1m</b></p> <p>153-00362</p>	<p><b>LLKIRD20V6-PE-1m</b></p> <p>153-00362</p>	<p><b>LLKIRVV6-PE-1m</b></p> <p>153-00361</p>
<p><b>KIR-104</b></p> <p>153-00305</p>	<p><b>KIRZ-31</b></p> <p>153-00272</p>	<p><b>LLK2RZ (Ls=10)</b></p> <p>153-00605</p>	<p><b>LLKIQRRI0x10-PE-2m</b></p> <p>153-00609</p>	<p><b>LLK2QRRI9x25-PE-2m</b></p> <p>153-00610</p>	<p><b>LLKIVRF5-PE-2m</b></p> <p>153-00611</p>

## Light barriers



## From our product range

- » Anti-collision sensors
- » Capacitive sensors
- » Colour sensors
- » Contrast sensors
- » Distance sensors
- » Fibre optics
- » Inductive sensors
- » Laser sensors
- » Line cameras
- » Miniature sensors
- » Optical windows
- » Proximity switches
- » Retroreflective sensors
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- » Slot sensors
- » Through-beam sensors
- » Ultrasonic sensors
- » Vision sensors

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- » German Sensor Application Prize 2003
- » German Sensor Application Prize 2004
- » Dr Rudolph-Eberle Prize for Innovation 2006

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