

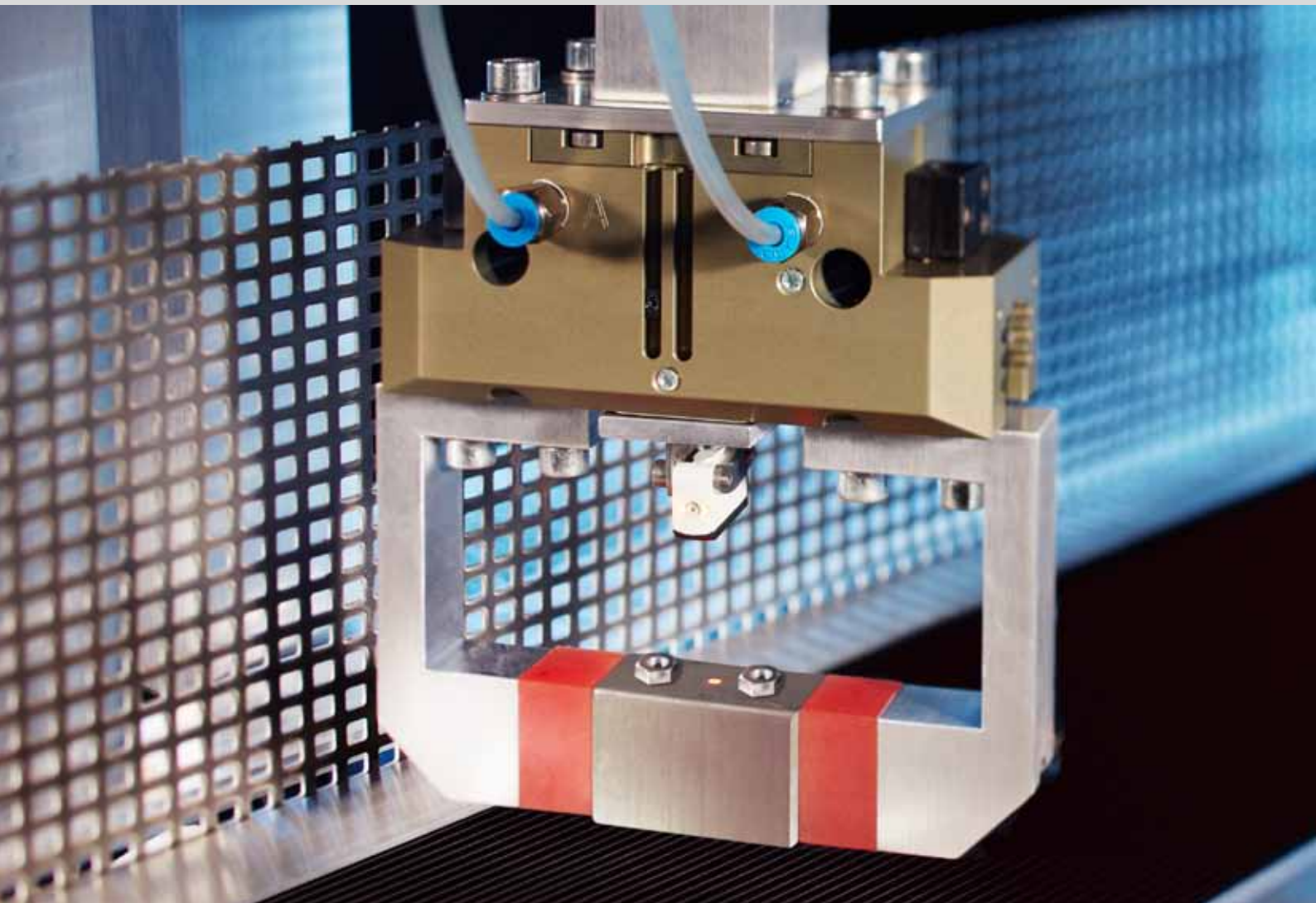
## Our smallest

F 10 – fits in every robot arm



## Small multi-talent

There's always space for a sensor from the F 10 family



*In the robot's arm:* Thanks to its miniaturised housing and low weight the sensors of the F 10 series are predestined for use where space is very limited – integrated in a robot arm, for example.

### Applications

- Where space is limited
- In handling and assembly systems
- In highly integrated machines
- As an alternative to fibre-optic systems

### Typical sectors

- Special machine construction
- Semiconductor and electronics production
- Laboratory automation
- Pharmaceutical industry and medical technology
- Solar industry
- Packaging machines
- Print and paper industry



**Blue light:**

*The new F 10 Bluelight radiates enhanced process stability, especially for monitoring the presence of solar wafers and strongly light-absorbing objects.*



**The smart alternative:**

*Instead of a transmitter and a receiver, as frequently required in a fibre-optic system, the proximity sensors of the F 10 family require no counterpart – and can therefore offer considerably easier and more space-saving mounting.*



**Installation made easy:**

*The sensors of the F 10 series can be sunk into a profile to save space. They are thus protected and perfectly integrated in the machine design.*

There is simply no space for conventional sensors in many applications. No problem for the F 10. It fits into almost any space. Whether in handling and positioning applications, during the production of solar cells, or for the placement of semiconductor components – an F 10 is capable of maximum performance even in the most difficult of installation situations. Thus the photo-electric proximity sensor with background suppression – just 21.1 × 14.6 × 8 mm<sup>3</sup> in size and weighing only 3 grams – even fits into a robot gripper without being a burden. Its precisely adjustable background suppression allows flexible teach-in for the most varied of applications, and nothing can distract it from the target object. Even bright or highly reflective machine parts in the background have no effect on switching behaviour. F 10 sensors have all the robustness of bigger sensors thanks to their glass-fibre-reinforced plastic housings and tension-resistant cables.

With their small dimensions and powerful features, as well as the great variety of functional principles, the laser and LED sensors of the F 10 series not only open up completely new application potentials, but also represent an alternative to considerably more expensive fibre-optic systems. They are at home wherever high demands must be met in the most restricted of spaces.





# Unmasked!

Regardless of if black, white or brightly coloured – our sensors miss nothing.

**Who can see the tiger?** Distinguishing object from background can sometimes be a real art. Photoelectric proximity sensors from SensoPart master this art with ultimate perfection. Thanks to their excellent background suppression they see precisely what matters: the object itself – and nothing else!

#### Reliable object detection

- Independent of the target object's size, shape, colour; material and surface properties
- Detection according to the principle of distance measurement: precise and reliable

#### High process stability

- Reliable suppression of unwanted reflections and ambient light
- Suppression of moving parts in the background (e.g. the transport belt, machine parts, persons)
- Reliable detection of target objects even at low distances to the background



#### The economical solution

- Applicable for all task areas
- Rapid commissioning via simple teach-in
- Long machine running times thanks to quality sensors from SensoPart, made in Germany

# Mastering challenges

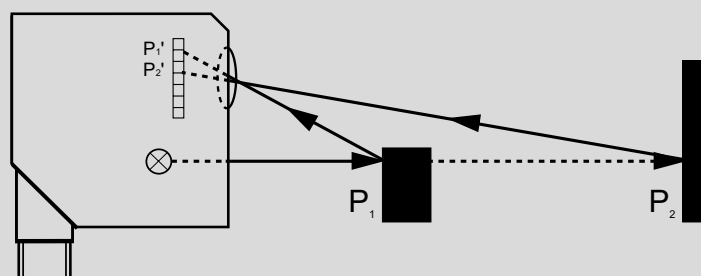
The F 10 family cannot be distracted from what matters – thanks to optimum adjustable background suppression

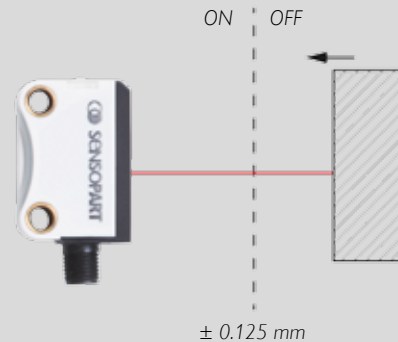


Polished panelling sheets on machines, blinking warning lamps on passing vehicles, moving machine parts, sunbeams through a window: all these are background effects that can make detecting the actual target object considerably more difficult and represent a challenge for any sensor. Even under these conditions, however, one can rely on the proximity sensors of the F 10 sub-miniature family with background suppression and the ASIC technology developed by SensoPart. Because the sensors only see what they are supposed to see: the object, regardless of its material, shape and colour – and nothing else!

## Object detection by means of distance measurement

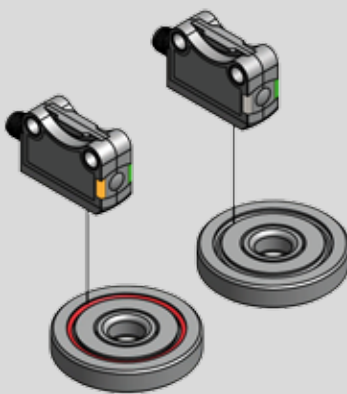
SensoPart proximity sensors with background suppression can always differentiate between the object and the background, even in strongly reflective environments. The sensor measures the distance to object  $P_1$  and to any background  $P_2$  using the triangulation process and not the object's reflectivity. The signal  $P_2'$  coming from the background is then suppressed.





### Maximum switching accuracy

The F 10 sensors with background suppression can resolve a change in distance (object shift) of 0.25 mm in the switching point – a standard for maximum positioning accuracy regardless of the object's colour or surface.



**Millimetre accuracy:**  
The FT 10-RLH even detects height differences of just 1 mm, found for example when monitoring the presence of a sealing washer, without difficulty.

### Precise detection

Our laser sensors – with their precise, clearly contoured light spots – even detect minute parts reliably. Thus the F 10 series' sub-miniature photoelectric proximity sensor with background suppression easily detects a wire with a diameter of 0.5 mm from a distance of 60 mm.



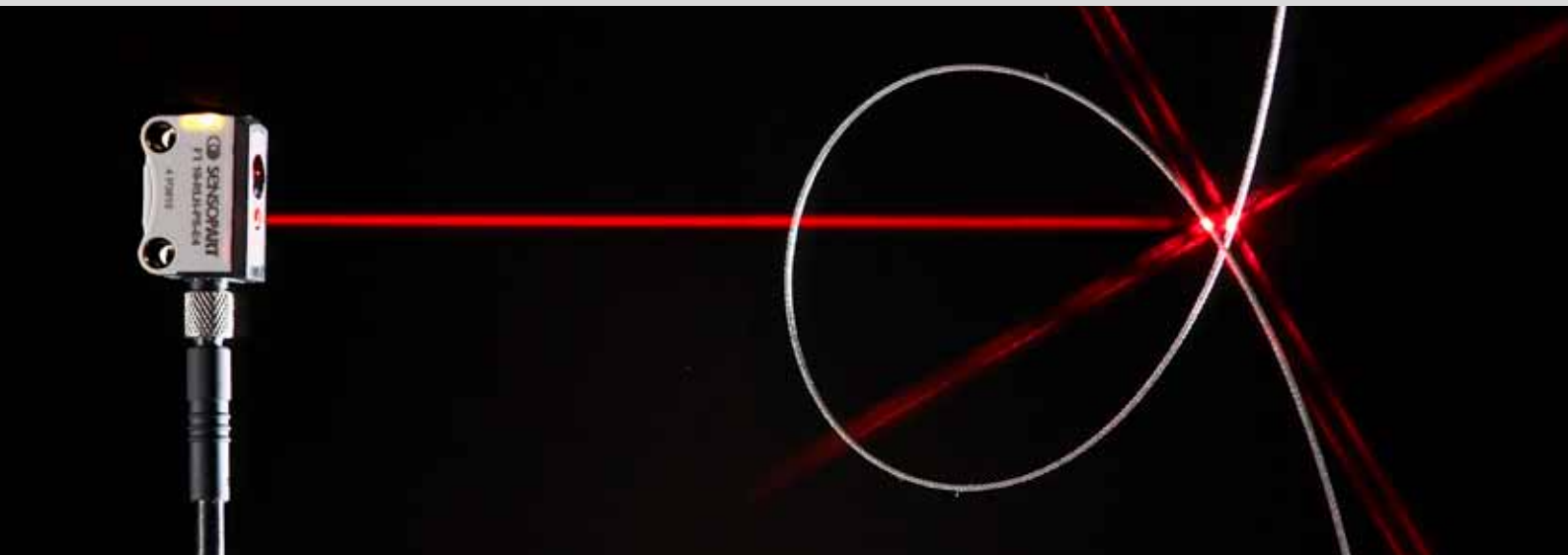
**Mini-sensor with maximum user-friendliness:**  
Simple commissioning with an electronic teach-in button and easily visible status LEDs is far from normal at this size.


### Teach-in – greater stability, greater reliability

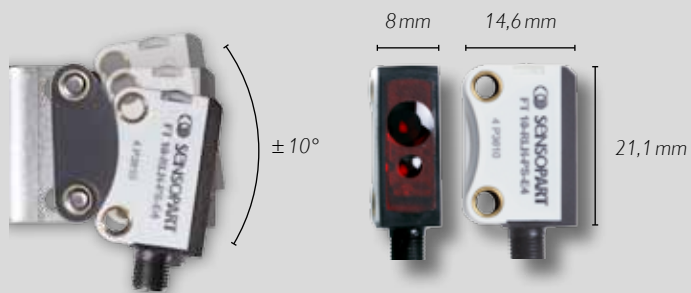
Despite the small, compact housing of the F 10 family it still offers the user-friendliness of its larger brothers: the entire F 10 series of sensors can be uniformly commissioned via teach-in. In addition, electronic data storage ensures that the switching point does not shift as a result of vibrations or impacts, as can occur when using devices adjusted by potentiometer. Moreover, the sensor can be adjusted and locked from a central control unit – and is therefore absolutely tamperproof.

# F 10 – family of sub-miniature sensors

Small housings, great performance



 made in Germany



#### Simple mounting:

Mounting using a dovetail that permits fine retro-adjustment of the sensor is particularly recommended when space is limited.

#### Special characteristics:

The glass-fibre-reinforced plastic housing with its integrated mounting sleeve, dovetail guide on the back, and laser-marked indelible type code are characteristic of the F 10.














#### TYPICAL F 10

- Sub-miniature sensor for installation in the smallest of spaces and in moving machine parts
- The world's smallest laser sensor with background suppression, adjustable via teach-in
- Sensors as LED or laser versions
- F 10 BlueLight: specially designed for scanning solar wafers and strongly light-absorbing objects
- User-friendly commissioning via electronic teach-in button or control wire
- Well thought-out mounting accessories for rapid and simple integration



The sensors of the F 10 series, available as LED and laser versions, form one of the most comprehensive series on the market in sub-miniature housings. Their precise background suppression, adjustable via teach-in, makes the sensors unique. The light spot of the F 10 laser sensors also remains so focused that small parts in the millimetre range can still be reliably detected even at long distances – for example, a wire with a diameter of 0.5 mm at a distance of 60 mm. One highlight of the new F 10 LED sensors is the F 10 Bluelight with its blue transmission LED, specially developed for detecting solar wafers and strongly light-absorbing objects using the scanning principle.

The F 10 sensors not only impress through their excellent performance data, but also through their unmistakable design with special features – unique in this size of housing. The dovetail mounting system considerably simplifies fine adjustment, particularly in difficult installation locations, and the various connection variants allow rapid commissioning and replacement. The mounting holes of the sub-miniature sensors are reinforced with metal eyelets. A small sensor that will give users great pleasure!

F 10 – Product Overview					
	Type of light	Adjustment	Scanning distance/range	Special features	Page
<b>Photoelectric proximity sensors with background suppression</b>					
FT 10-RLH	Laser 	Teach-in 	60 mm	The only scanner with scanning distance adjustment	10
FT 10-RLHR	Laser 	Teach-in 	60 mm	Broad-beam light spot	12
FT 10-B-RLF	Laser 	Fixed focus	15 mm/30 mm		14
FT 10-RH	LED	Teach-in 	70 mm		16
FT 10-RF	LED	Fixed focus	15 mm/30 mm/50 mm		18
FT 10-BF Bluelight	LED, blue	Fixed focus	30 mm	Blue transmission LED for strongly light-absorbing objects	20
<b>Retroreflective photoelectric sensors</b>					
FR 10-RL	Laser 	Teach-in 	2 m	Long range, precise small-part detection	22
FR 10-R	LED	Teach-in 	1,6 m	Long range	24
<b>Through-beam photoelectric sensors</b>					
FS/FE 10-RL	Laser 	Teach-in 	3 m	Sensor pair; very accurate object positioning	26
FS 10-RL/FE 10-RL	Laser 	Teach-in 	3 m	Transmitter/receiver; very accurate object positioning	28

# FT 10-RLH

## Laser photoelectric proximity sensor with background suppression



### PRODUCT HIGHLIGHTS

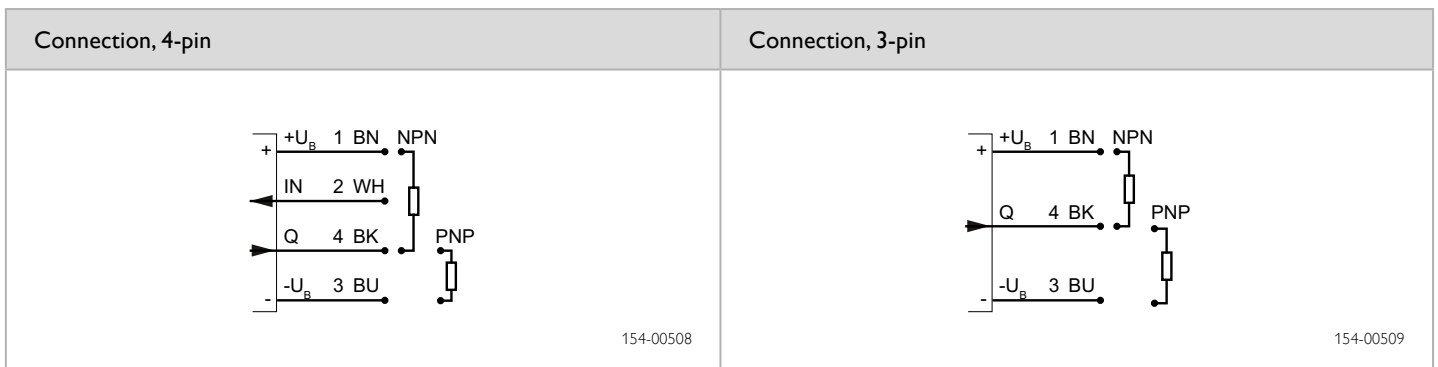
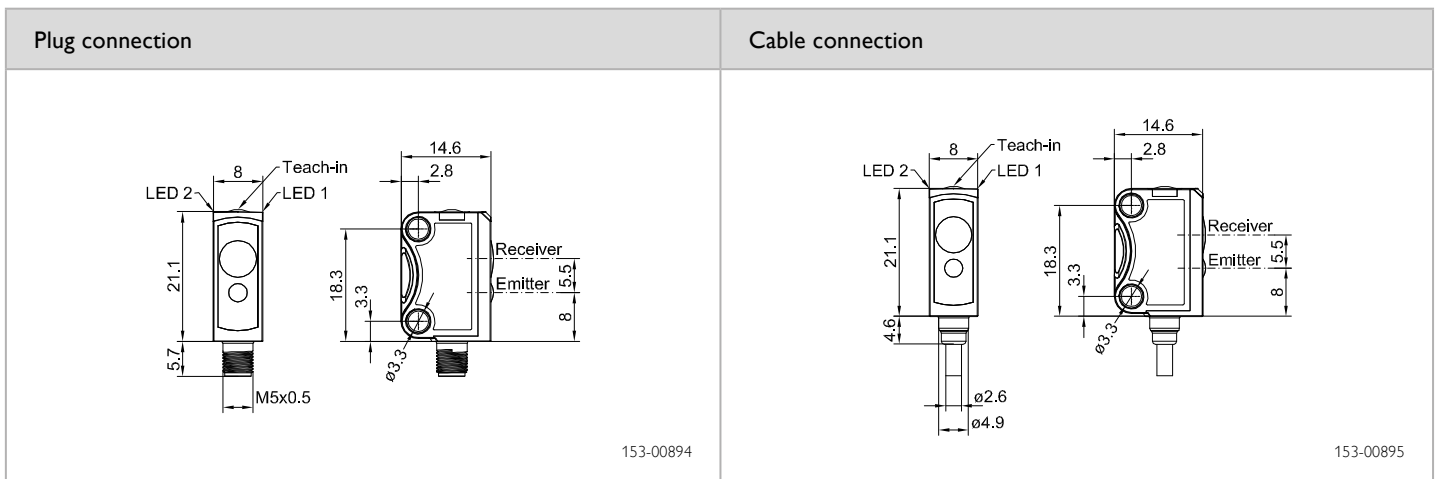
- Sub-miniature sensor with laser light and adjustable background suppression
- Precise and reliable switching behaviour, even with varying object surfaces and colours
- Reliable operation even with highly reflective machine parts in the background, thanks to SensoPart ASIC technology
- Particularly suitable for detecting the smallest of parts and for installation in extremely confined spaces

Optical data		Functions	
Scanning distance	6 ... 60 mm <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Adjustment range	10 ... 60 mm <sup>1</sup>	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 655 nm	Scanning distance adjustment	Via Teach-in button and control input
Light spot size (total detection area)	1 x 3 mm <sup>2</sup>	Adjustment possibilities	Button lock via control input
Laser Class (DIN EN 60825-1:2008-5)	1	Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	21.1 x 14.6 x 8 mm <sup>3</sup>
No-load current, I <sub>0</sub>	≤ 12 mA	Enclosure rating	IP 67 <sup>3</sup>
Output current, I <sub>e</sub>	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Switching output, Q	PNP / NPN (see Selection Table)	Ambient temperature: operation	-20 ... +50 °C
Output function	N.O.	Ambient temperature: storage	-20 ... +80 °C
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (plug device)	Ca. 3 g
Response time	500 μs	Weight (cable device)	Ca. 22 g
Control input, I <sub>N</sub> (only 4-pin design)	+U <sub>B</sub> = teach-in -U <sub>B</sub> = button locked Open = normal operation	Weight (pigtail)	Ca. 10 g

<sup>1</sup> Reference material white, 90 % reflectivity    <sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> With connected IP 67 plug

Scanning distance	Switching output	Type of connection	Part number	Article number
6 ... 60 mm	PNP	Plug, M5x0.5, 4-pin	FT 10-RLH-PS-E4	600-11130
6 ... 60 mm	NPN	Plug, M5x0.5, 4-pin	FT 10-RLH-NS-E4	600-11131
6 ... 60 mm	PNP	Cable, 2 m, 4-wire	FT 10-RLH-PS-K4	600-11132
6 ... 60 mm	NPN	Cable, 2 m, 4-wire	FT 10-RLH-NS-K4	600-11133
6 ... 60 mm	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-RLH-PS-KM4	600-11134
6 ... 60 mm	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-RLH-NS-KM4	600-11135
6 ... 60 mm	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-RLH-PS-KM3	600-11146
6 ... 60 mm	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-RLH-NS-KM3	600-11147
6 ... 60 mm	PNP	Pigtail, 500 mm with M8 plug, 3-pin	FT 10-RLH-PS-KM3-X07	600-11158

Including dovetail clamp mounting MBD F 10 for all types



Reference material	Detection range
White (90 %)	6 ... 60 mm
Grey (18 %)	7 ... 60 mm
Black (6 %)	7 ... 60 mm

Accessories	
Connection cables	From page 30
Brackets	

# FT 10-RLHR

Laser photoelectric proximity sensor with background suppression



## PRODUCT HIGHLIGHTS

- Sub-miniature sensor with wide laser light spot and adjustable background suppression
- Precise and reliable switching behaviour, even with varying object surfaces and colours
- Reliable operation even with highly reflective machine parts in the background, thanks to SensoPart ASIC technology
- Particularly suitable for installation in the smallest of spaces
- Simple operation via electronic Teach-in button or control line

Optical data		Functions	
Scanning distance	6 ... 60 mm <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Adjustment range	10 ... 60 mm <sup>1</sup>	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 655 nm	Scanning distance adjustment	Via Teach-in button and control input
Light spot size	See diagram	Adjustment possibilities	Button lock via control input
Laser Class (DIN EN 60825-1:2008-5)	1	Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	21.1 x 14.6 x 8 mm <sup>3</sup>
No-load current, I <sub>0</sub>	≤ 12 mA	Enclosure rating	IP 67 <sup>3</sup>
Output current, I <sub>e</sub>	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Switching output, Q	PNP / NPN (see Selection Table)	Ambient temperature: operation	-20 ... +50 °C
Output function	N.O.	Ambient temperature: storage	-20 ... +80 °C
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (plug device)	Ca. 3 g
Response time	500 μs	Weight (cable device)	Ca. 22 g
Control input, IN (only 4-pin design)	+U <sub>B</sub> = teach-in -U <sub>B</sub> = button locked Open = normal operation	Weight (pigtail)	Ca. 10 g

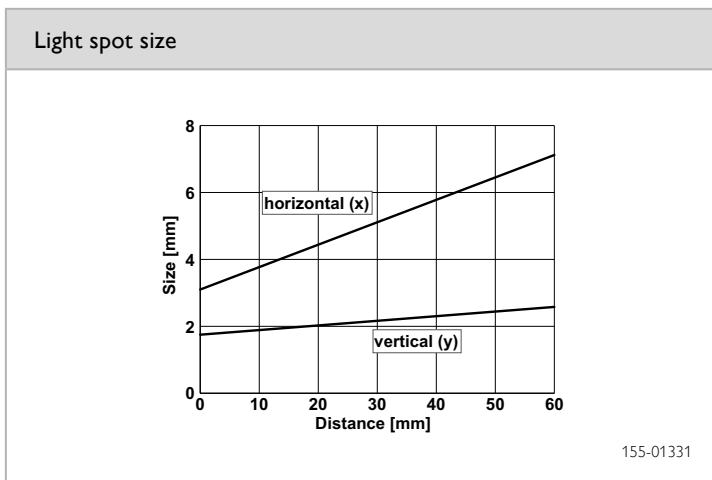
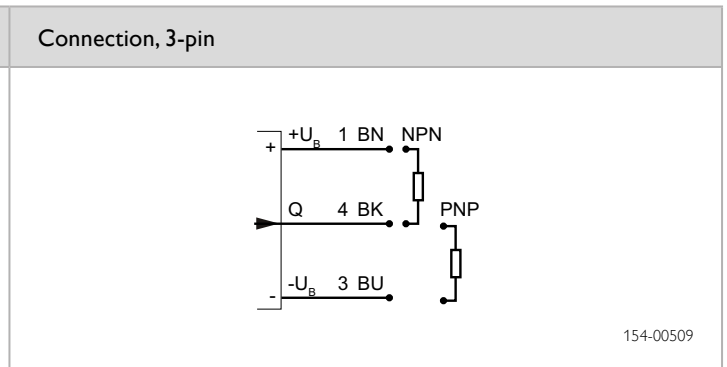
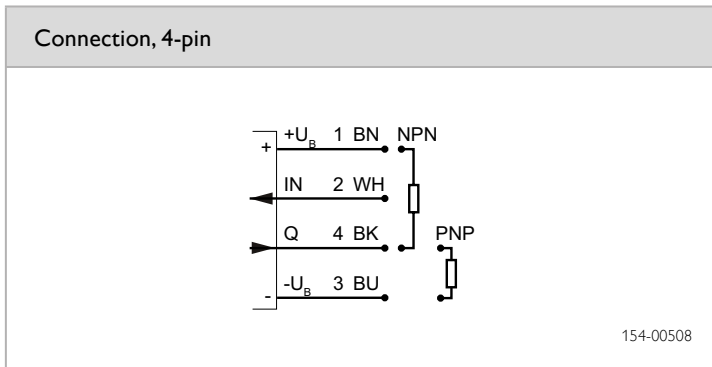
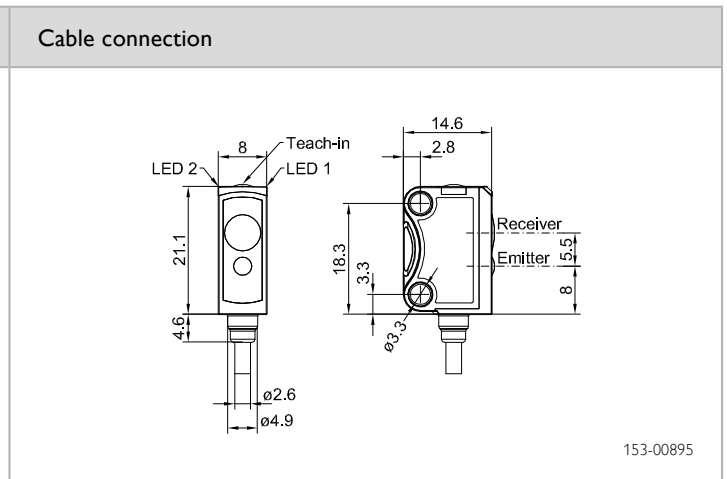
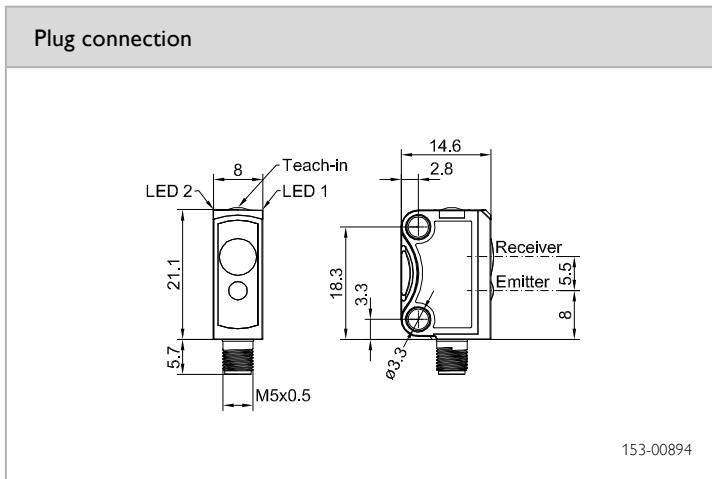
<sup>1</sup> Reference material white, 90 % reflectivity

<sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz

<sup>3</sup> With connected IP 67 plug

Scanning distance	Switching output	Type of connection	Part number	Article number
6 ... 60 mm	PNP	Plug, M5x0.5, 4-pin	FT 10-RLHR-PS-E4	600-11136
6 ... 60 mm	NPN	Plug, M5x0.5, 4-pin	FT 10-RLHR-NS-E4	600-11137
6 ... 60 mm	PNP	Cable, 2 m, 4-wire	FT 10-RLHR-PS-K4	600-11138
6 ... 60 mm	NPN	Cable, 2 m, 4-wire	FT 10-RLHR-NS-K4	600-11139
6 ... 60 mm	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-RLHR-PS-KM4	600-11140
6 ... 60 mm	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-RLHR-NS-KM4	600-11141
6 ... 60 mm	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-RLHR-PS-KM3	600-11148
6 ... 60 mm	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-RLHR-PS-KM3	600-11149

Including dovetail clamp mounting MBD F 10 for all types



Reference material	Detection range
White (90 %)	6 ... 60 mm
Grey (18 %)	7 ... 60 mm
Black (6 %)	7 ... 60 mm

**Accessories**

Connection cables	From page 30
Brackets	



# FT 10-B-RLF

Laser photoelectric proximity sensor with background suppression, fixed focus



## PRODUCT HIGHLIGHTS

- Sub-miniature sensor with laser light and precise fixed background suppression
- Reliable switching behaviour even with varying object surfaces and colours
- Particularly suitable for detecting the smallest of parts and for installation in extremely confined spaces
- Tamper-proof sensor design – no misalignment possible
- Robust, glass-fibre-reinforced plastic housings

Optical data		Functions	
Scanning distance	6 ... 15 mm <sup>1</sup> 6 ... 30 mm <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Type of light	Laser, red, 655 nm	Indicator LED, yellow	Switching output indicator
Light spot size (total detection area)	1 x 3 mm <sup>2</sup>	Adjustment possibilities	N.O. / N.C. via control input
Laser Class (DIN EN 60825-1:2008-5)	1		
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	21.1 x 14.6 x 8 mm <sup>3</sup>
No-load current, I <sub>0</sub>	≤ 12 mA	Enclosure rating	IP 67 <sup>3</sup>
Output current, I <sub>e</sub>	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Switching output, Q	PNP / NPN (see Selection Table)	Ambient temperature: operation	-20 ... +50 °C
Output function	N.O. / N.C.	Ambient temperature: storage	-20 ... +80 °C
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (plug device)	Ca. 3 g
Response time	500 μs	Weight (cable device)	Ca. 22 g
Control input, IN (only 4-pin design)	+U <sub>B</sub> = N.C. -U <sub>B</sub> / Open = N.O.	Weight (pigtail)	Ca. 10 g

<sup>1</sup> Reference material white, 90 % reflectivity    <sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> With connected IP 67 plug

Operating range	Switching output	Type of connection	Part number	Article number
6 ... 15 mm	PNP	Plug, M5x0.5, 4-pin	FT 10-B-RLF1-PS-E4	600-11100
6 ... 15 mm	NPN	Plug, M5x0.5, 4-pin	FT 10-B-RLF1-NS-E4	600-11101
6 ... 30 mm	PNP	Plug, M5x0.5, 4-pin	FT 10-B-RLF2-PS-E4	600-11106
6 ... 30 mm	NPN	Plug, M5x0.5, 4-pin	FT 10-B-RLF2-NS-E4	600-11107
6 ... 15 mm	PNP	Cable, 2 m, 4-wire	FT 10-B-RLF1-PS-K4	600-11102
6 ... 15 mm	NPN	Cable, 2 m, 4-wire	FT 10-B-RLF1-NS-K4	600-11103
6 ... 30 mm	PNP	Cable, 2 m, 4-wire	FT 10-B-RLF2-PS-K4	600-11108
6 ... 30 mm	NPN	Cable, 2 m, 4-wire	FT 10-B-RLF2-NS-K4	600-11109
6 ... 15 mm	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-B-RLF1-PS-KM4	600-11104
6 ... 15 mm	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-B-RLF1-NS-KM4	600-11105
6 ... 30 mm	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-B-RLF2-PS-KM4	600-11110
6 ... 30 mm	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-B-RLF2-NS-KM4	600-11111

Operating range	Switching output	Type of connection	Part number	Article number
6 ... 15 mm	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-B-RLF1-PS-KM3	600-11142
6 ... 15 mm	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-B-RLF1-NS-KM3	600-11143
6 ... 30 mm	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-B-RLF2-PS-KM3	600-11144
6 ... 30 mm	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-B-RLF2-NS-KM3	600-11145

All types include MBD F 10 dovetail clamp mounting.

Plug connection	Cable connection
<p>153-00909</p>	<p>153-00910</p>

Connection, 4-pin	Connection, 3-pin
<p>154-00508</p>	<p>154-00509</p>

Reference material	Detection range
White (90 %)	6 ... 15 mm / 30 mm
Grey (18 %)	7 ... 15 mm / 30 mm
Black (6 %)	7 ... 15 mm / 30 mm

Accessories	
Connection cables	From page 30
Brackets	

# FT 10-RH

## Photoelectric proximity sensor with background suppression



### PRODUCT HIGHLIGHTS

- Sub-miniature sensor with precise adjustable background suppression
- Precise and reliable switching behaviour even with varying object surfaces and colours
- Reliable operation even with highly reflective machine parts in the background, thanks to SensoPart ASIC technology
- Static and dynamic teach-in via electronic teach-in button or control line

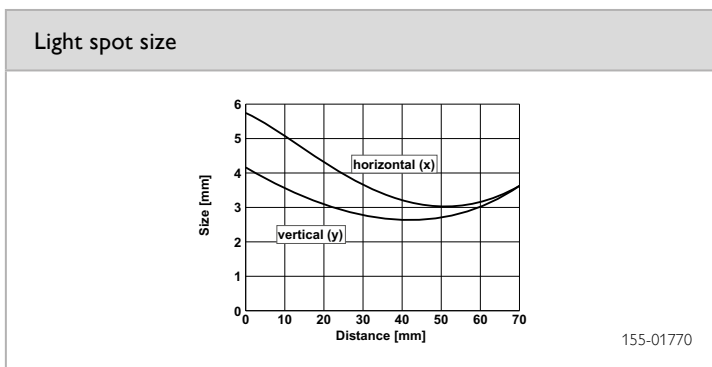
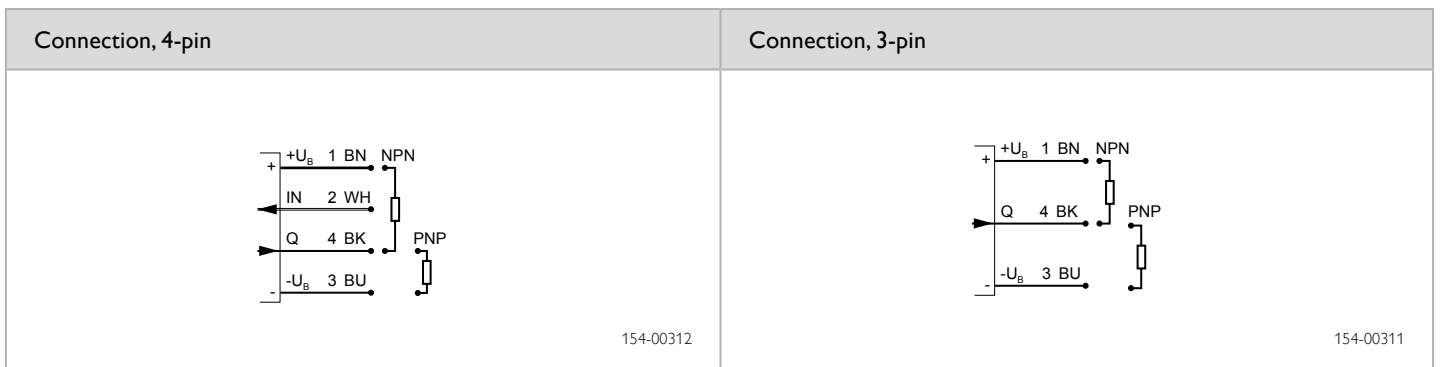
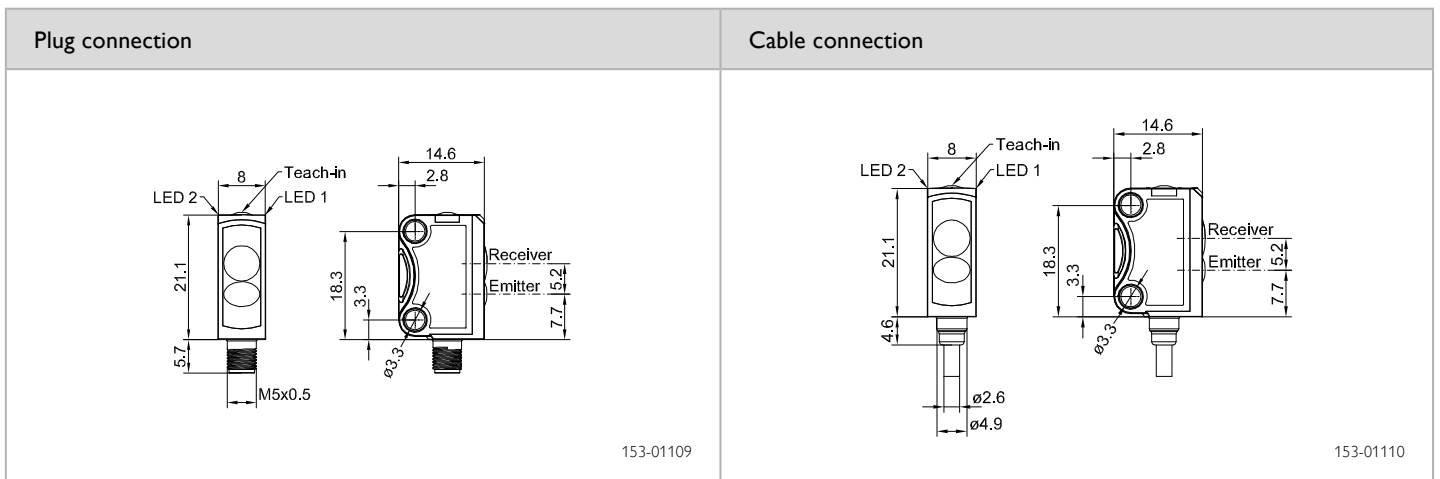
Optical data		Functions	
Scanning distance	5 ... 70 mm <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Adjustment range	10 ... 70 mm <sup>1</sup>	Indicator LED, yellow	Switching output indicator
Used light	LED, red, 650 nm	Scanning distance adjustment	Via Teach-in button and control input <sup>5</sup>
Light spot size	See diagram	Teach-in modes	Mode 1: during running process Mode 2: during standing process
Repeatability	0,45 mm <sup>2,3</sup>	Adjustment possibilities	N.O./N.C. via Teach-in button and control input <sup>5</sup> Button lock via control input <sup>5</sup>
Hysteresis	≤ 2 mm <sup>2</sup>	Default settings	Max. range and N.O.
Grey/white shift (18%/90%)	≤ 3 mm <sup>2</sup>		
Black/white shift (6%/90%)	≤ 4 mm <sup>2</sup>		
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>4</sup>	Dimensions	21,1 x 14,6 x 8 mm <sup>3</sup>
No-load current, I <sub>0</sub>	≤ 20 mA	Enclosure rating	IP 67 <sup>6</sup>
Output current, I <sub>e</sub>	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C
Switching output, Q	PNP / NPN	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O. / N.C.	Weight (plug device)	approx. 3 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (cable device)	approx. 22 g
Response time	500 µs	Weight (pigtail)	approx. 10 g
Control input, IN <sup>3</sup>	+U <sub>B</sub> = teach-in -U <sub>B</sub> = button locked Open = normal operation		

<sup>1</sup> Reference material white, 90 % reflectivity    <sup>2</sup> at maximum scanning distance    <sup>3</sup> in constant environmental conditions    <sup>4</sup> max. 10 % ripple within U<sub>B</sub>, ~ 50 Hz / 100 Hz

<sup>5</sup> only 4-pin design    <sup>6</sup> with connected IP 67 plug

Scanning distance	Switching output	Type of connection	Part number	Article number
5 ... 70 mm <sup>1</sup>	PNP	Plug, M5x0.5, 4-pin	FT 10-RH-PS-E4	600-11000
5 ... 70 mm <sup>1</sup>	NPN	Plug, M5x0.5, 4-pin	FT 10-RH-NS-E4	600-11004
5 ... 70 mm <sup>1</sup>	PNP	Cable, 2 m, 4-wire	FT 10-RH-PS-K4	600-11001
5 ... 70 mm <sup>1</sup>	NPN	Cable, 2 m, 4-wire	FT 10-RH-NS-K4	600-11005
5 ... 70 mm <sup>1</sup>	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-RH-PS-KM4	600-11002
5 ... 70 mm <sup>1</sup>	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-RH-NS-KM4	600-11006
5 ... 70 mm <sup>1</sup>	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-RH-PS-KM3	600-11003
5 ... 70 mm <sup>1</sup>	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-RH-NS-KM3	600-11007

Including dovetail clamp mounting MBD F 10 for all types



Reference material	Detection range
White (90 %)	5 ... 70 mm
Grey (18 %)	8 ... 70 mm
Black (6 %)	8 ... 70 mm

Accessories	
Connection cables	From page 30
Brackets	

# FT 10-RF

Photoelectric proximity sensor with background suppression, fixed focus



## PRODUCT HIGHLIGHTS

- Sub-miniature sensor with precise fixed background suppression
- Economical multi-purpose sensor
- Reliable switching behaviour even with varying object surfaces and colours
- Tamper-proof sensor design – no misalignment possible
- Simple mounting and adjustment through innovative dovetail clamp mounting

Optical data		Functions	
Scanning distance	2 ... 15 mm <sup>1</sup> 2 ... 30 mm <sup>1</sup> 2 ... 50 mm <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Used light	LED, red, 650 nm	Indicator LED, yellow	Switching output indicator
Light spot size	See diagram	Adjustment possibilities	N.O. / N.C. via control input <sup>3</sup>
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	21,1 x 14,6 x 8 mm <sup>3</sup>
No-load current, I <sub>0</sub>	≤ 20 mA	Enclosure rating	IP 67 <sup>4</sup>
Output current, I <sub>e</sub>	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C
Switching output, Q	PNP / NPN (see Selection Table)	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O. / N.C.	Weight (cable device)	approx. 22 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (pigtail)	approx. 10 g
Response time	500 µs		
Control input, I <sub>N</sub> <sup>3</sup>	+U <sub>B</sub> = N.C. -U <sub>B</sub> / Open = N.O.		

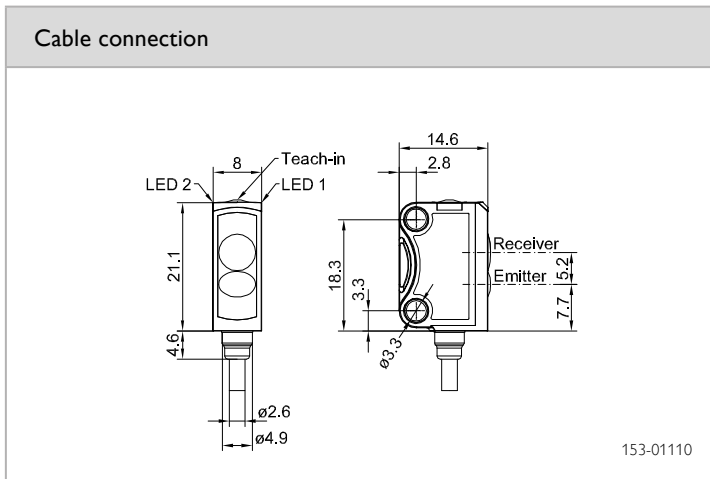
<sup>1</sup> Reference material white, 90 % reflectivity    <sup>2</sup> max. 10 % ripple within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> only 4-pin design    <sup>4</sup> with connected IP 67 plug

Scanning distance	Switching output	Type of connection	Part number	Article number
2 ... 15 mm <sup>1</sup>	PNP	Cable, 2 m, 4-wire	FT 10-RF1-PS-K4	600-11008
2 ... 15 mm <sup>1</sup>	NPN	Cable, 2 m, 4-wire	FT 10-RF1-NS-K4	600-11011
2 ... 30 mm <sup>1</sup>	PNP	Cable, 2 m, 4-wire	FT 10-RF2-PS-K4	600-11014
2 ... 30 mm <sup>1</sup>	NPN	Cable, 2 m, 4-wire	FT 10-RF2-NS-K4	600-11017
2 ... 50 mm <sup>1</sup>	PNP	Cable, 2 m, 4-wire	FT 10-RF3-PS-K4	600-11020
2 ... 50 mm <sup>1</sup>	NPN	Cable, 2 m, 4-wire	FT 10-RF3-NS-K4	600-11023
2 ... 15 mm <sup>1</sup>	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-RF1-PS-KM4	600-11009
2 ... 15 mm <sup>1</sup>	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-RF1-NS-KM4	600-11012
2 ... 30 mm <sup>1</sup>	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-RF2-PS-KM4	600-11015
2 ... 30 mm <sup>1</sup>	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-RF2-NS-KM4	600-11018
2 ... 50 mm <sup>1</sup>	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-RF3-PS-KM4	600-11021
2 ... 50 mm <sup>1</sup>	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-RF3-NS-KM4	600-11024
2 ... 15 mm <sup>1</sup>	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-RF1-PS-KM3	600-11010
2 ... 15 mm <sup>1</sup>	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-RF1-NS-KM3	600-11013

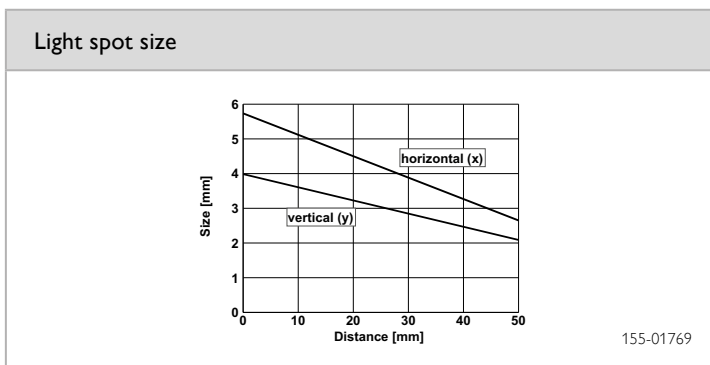


Scanning distance	Switching output	Type of connection	Part number	Article number
2 ... 30 mm <sup>1</sup>	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-RF2-PS-KM3	600-11016
2 ... 30 mm <sup>1</sup>	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-RF2-NS-KM3	600-11019
2 ... 50 mm <sup>1</sup>	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-RF3-PS-KM3	600-11022
2 ... 50 mm <sup>1</sup>	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-RF3-NS-KM3	600-11025

Including dovetail clamp mounting MBD F 10 for all types



Connection, 4-pin	Connection, 3-pin
<p>4-pin connection diagram showing terminals: +U<sub>B</sub> 1 BN, IN 2 WH, Q 4 BK, -U<sub>B</sub> 3 BU. Output types: NPN, PNP.</p>	<p>3-pin connection diagram showing terminals: +U<sub>B</sub> 1 BN, Q 4 BK, -U<sub>B</sub> 3 BU. Output types: NPN, PNP.</p>
154-00312	154-00311



Reference material	Detection range			Accessories	From page 30
white (90 %)	FT 10-RF1 2 ... 15 mm	FT 10-RF2 2 ... 30 mm	FT 10-RF3 2 ... 50 mm	Connection cables	
grey (18 %)	3 ... 15 mm	4 ... 30 mm	5 ... 50 mm	Brackets	
black (6 %)	4 ... 15 mm	5 ... 30 mm	7 ... 50 mm		

# FT 10-BF Bluelight

Bluelight photoelectric proximity sensor with background suppression, fixed focus



## PRODUCT HIGHLIGHTS

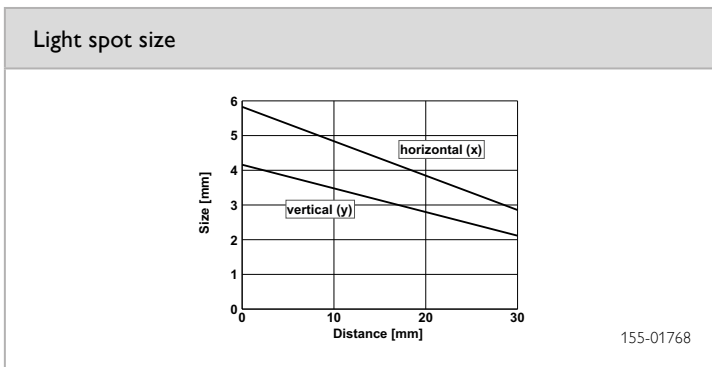
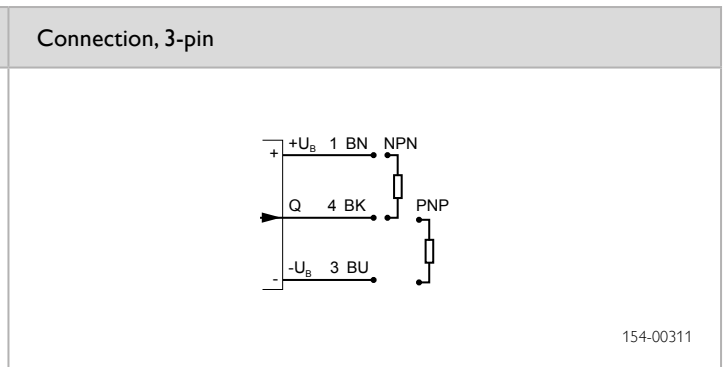
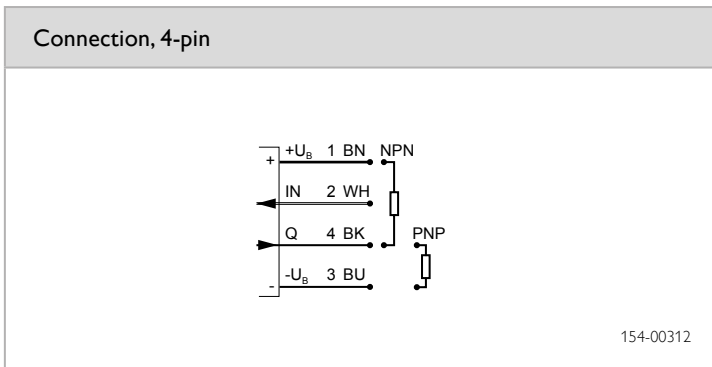
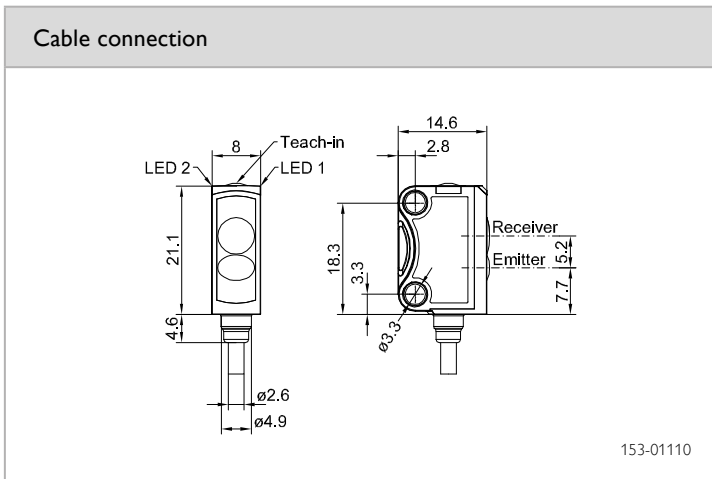
- Sub-miniature sensor with blue transmission LED and precise fixed background suppression
- Reliable switching behaviour with strongly light-absorbing objects, e.g. solar wafers
- Reliable operation without reflector - even with critical surfaces
- Tamper-proof sensor design - no misalignment possible
- Simple mounting and adjustment through innovative dovetail clamp mounting

Optical data		Functions	
Scanning distance	2 ... 30 mm <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Optimum scanning distance	15 ... 20 mm	Indicator LED, yellow	Switching output indicator
Used light	LED, blue, 450 nm	Adjustment possibilities	N.O. / N.C. via control input <sup>3</sup>
LED risk group (DIN 62471)	2		
Light spot size	See diagram		
Electrical data		Mechanical data	
Operating voltage +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	21,1 x 14,6 x 8 mm <sup>3</sup>
No-load supply current I <sub>0</sub>	≤ 20 mA	Enclosure rating	IP 67 <sup>4</sup>
Output current I <sub>e</sub>	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +50 °C
Switching output, Q	PNP / NPN (see Selection Table)	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O. / N.C.	Weight (cable device)	approx. 22 g
Switching frequency, f (ti/tp 1:1)	800 Hz	Weight (pigtail)	approx. 10 g
Response time	625 μs		
Control input, I <sub>N</sub> <sup>3</sup>	+U <sub>B</sub> = N.C. -U <sub>B</sub> / Open = N.O.		

<sup>1</sup> Reference material white, 90 % reflectivity    <sup>2</sup> max. residual ripple 10 %, within U<sub>B</sub>, approx. 50 Hz/100 Hz    <sup>3</sup> only 4-pin design    <sup>4</sup> with connected IP 67 plug

Scanning distance	Switching output	Type of connection	Part number	Article number
2 ... 30 mm <sup>1</sup>	PNP	Cable, 2 m, 4-wire	FT 10-BF2-PS-K4	600-11026
2 ... 30 mm <sup>1</sup>	NPN	Cable, 2 m, 4-wire	FT 10-BF2-NS-K4	600-11029
2 ... 30 mm <sup>1</sup>	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-BF2-PS-KM4	600-11027
2 ... 30 mm <sup>1</sup>	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-BF2-NS-KM4	600-11030
2 ... 30 mm <sup>1</sup>	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-BF2-PS-KM3	600-11028
2 ... 30 mm <sup>1</sup>	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-BF2-NS-KM3	600-11031

Including dovetail clamp mounting MBD F 10 for all types



### Accessories

Connection cables	From page 30
Brackets	

# FR 10-RL

## Laser retroreflective photoelectric sensor



### PRODUCT HIGHLIGHTS

- Sub-miniature sensor for installation in the smallest of spaces
- Bright, precise laser light spot for optimum small-part detection and simple alignment
- Suitable for numerous different reflectors
- User-friendly operation via electronic Teach-in button or control line
- Robust, glass-fibre-reinforced plastic housings

Optical data		Functions	
Limit range	0.1 ... 2.5 m <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Operating range	0.1 ... 2 m <sup>1</sup>	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 655 nm	Sensitivity adjustment	Via Teach-in button and control input
Light spot size	See diagram	Teach-in modes	Mode 1: during running process Mode 2: during standing process
Laser Class (DIN EN 60825-1:2008-5)	1	Adjustment possibilities	N.O. / N.C. via Teach-in button and control input Button lock via control input
		Default settings	Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	21.1 × 14.6 × 8 mm <sup>3</sup>
No-load current, I <sub>0</sub>	≤ 12 mA	Enclosure rating	IP 67 <sup>3</sup>
Output current, I <sub>e</sub>	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Switching output, Q	PNP / NPN (see Selection Table)	Ambient temperature: operation	-20 ... +50 °C
Output function	N.O. / N.C.	Ambient temperature: storage	-20 ... +80 °C
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (plug device)	Ca. 3 g
Response time	500 μs	Weight (cable device)	Ca. 22 g
Control input, IN (only 4-pin design)	+U <sub>B</sub> = teach-in -U <sub>B</sub> = button locked Open = normal operation	Weight (pigtail)	Ca. 10 g

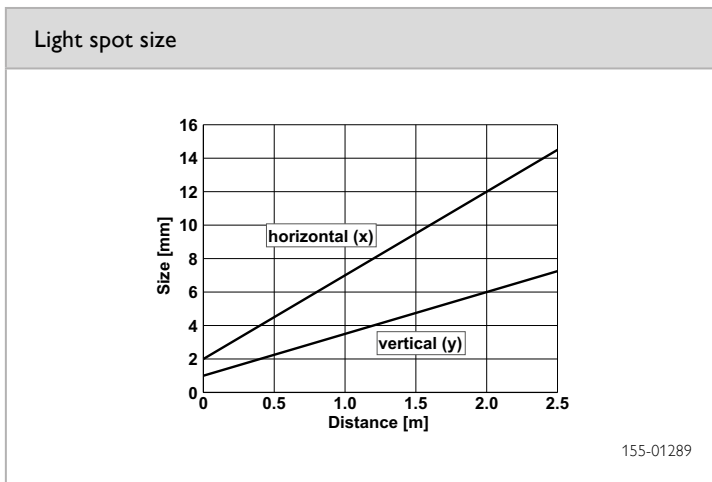
<sup>1</sup> Reference material: R5/L reflector    <sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> With connected IP 67 plug

Operating range	Switching output	Type of connection	Part number	Article number
0.1 ... 2 m	PNP	Plug, M5x0.5, 4-pin	FR 10-RL-PS-E4	603-31000
0.1 ... 2 m	NPN	Plug, M5x0.5, 4-pin	FR 10-RL-NS-E4	603-31001
0.1 ... 2 m	PNP	Cable, 2 m, 4-wire	FR 10-RL-PS-K4	603-31002
0.1 ... 2 m	NPN	Cable, 2 m, 4-wire	FR 10-RL-NS-K4	603-31003
0.1 ... 2 m	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FR 10-RL-PS-KM4	603-31004
0.1 ... 2 m	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FR 10-RL-NS-KM4	603-31005
0.1 ... 2 m	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FR 10-RL-PS-KM3	603-31006
0.1 ... 2 m	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FR 10-RL-NS-KM3	603-31007

Including dovetail clamp mounting MBD F 10 for all types

Plug connection	Cable connection
153-00894	153-00895

Connection, 4-pin	Connection, 3-pin
154-00508	154-00509



Reflector / reflective foil *	Operating range	Accessories
R5/L	0.1 ... 2 m	Reflectors
R2-2LB	0.1 ... 2 m	Connection cables
R3-2LK	0.1 ... 2 m	Brackets
RF-50 KL*	0.06 ... 0.75 m	
RF-100-KL*	0.1 ... 2 m	
		From page 30



# FR 10-R

## Retroreflective photoelectric sensor



### PRODUCT HIGHLIGHTS

- Sub-miniature sensor for installation in the smallest of spaces
- Despite very small sensor housing very long operating range of 1.6 m
- Fast response time: only 500  $\mu$ s
- Static and dynamic teach-in via electronic teach-in button or control line
- Simple mounting and adjustment through innovative dovetail clamp mounting

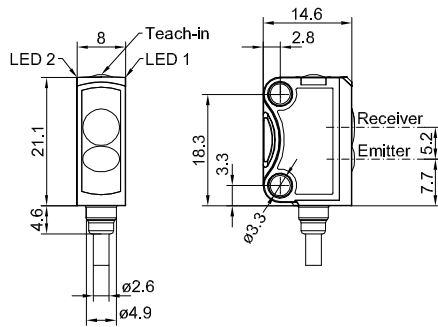
Optical data		Functions	
Operating range	0.1 ... 1.6 m <sup>1</sup>	Indicator LED green	Operating voltage indicator
Used light	LED, red, 650 nm	Indicator LED yellow	Switching output indicator
Light spot size	See diagram	Sensitivity adjustment	Via Teach-in button and control input <sup>3</sup>
Polarising filter	Yes	Teach-in modes	Mode 1: during running process
		Adjustment possibilities	Mode 2: during standing process
		Default settings	N.O./N.C. via Teach-in button and control input <sup>3</sup>
			Button lock via control input <sup>3</sup>
			Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	21,1 x 14,6 x 8 mm <sup>3</sup>
No-load current, I <sub>0</sub>	≤ 20 mA	Enclosure rating	IP 67 <sup>4</sup>
Output current, I <sub>e</sub>	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C
Switching output, Q	PNP / NPN (see Selection Table)	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O. / N.C.	Weight (cable device)	approx. 22 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (pigtail)	approx. 10 g
Response time	500 $\mu$ s		
Control input, I <sub>N</sub> <sup>3</sup>	+U <sub>B</sub> = teach-in -U <sub>B</sub> = button locked Open = normal operation		

<sup>1</sup> Reference material reflector R5    <sup>2</sup> max. 10 % ripple within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> only 4-pin design    <sup>4</sup> with connected IP 67 plug

Operating range	Switching output	Type of connection	Part number	Article number-Nr.
0.1 ... 1.6 m <sup>1</sup>	PNP	Cable, 2 m, 4-wire	FR 10-R-PS-K4	603-11001
0.1 ... 1.6 m <sup>1</sup>	NPN	Cable, 2 m, 4-wire	FR 10-R-NS-K4	603-11004
0.1 ... 1.6 m <sup>1</sup>	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FR 10-R-PS-KM4	603-11002
0.1 ... 1.6 m <sup>1</sup>	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FR 10-R-NS-KM4	603-11005
0.1 ... 1.6 m <sup>1</sup>	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FR 10-R-PS-KM3	603-11003
0.1 ... 1.6 m <sup>1</sup>	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FR 10-R-NS-KM3	603-11006

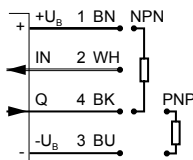
Including dovetail clamp mounting MBD F 10 for all types

### Cable connection



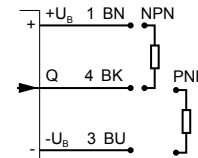
153-01110

### Connection, 4-pin



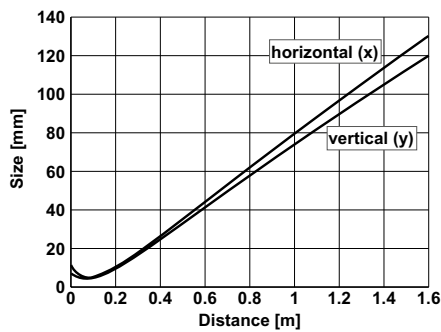
154-00312

### Connection, 3-pin



154-00311

### Light spot size



155-01767

Reflector / reflective foil *	Operating range (min./max. reflector distance)	Accessories	
R5	0.1 ... 1.6 m	Reflectors	From page 30
R1	0.1 ... 1 m	Connection cables	
R2-2LB1	0,15 ... 0,5 m	Brackets	
R3-2LK1	0,15 ... 0,5 m		
RF-100 KL*	0,15 ... 1 m		

# FS/FE 10-RL

## Laser through-beam photoelectric sensor



### PRODUCT HIGHLIGHTS

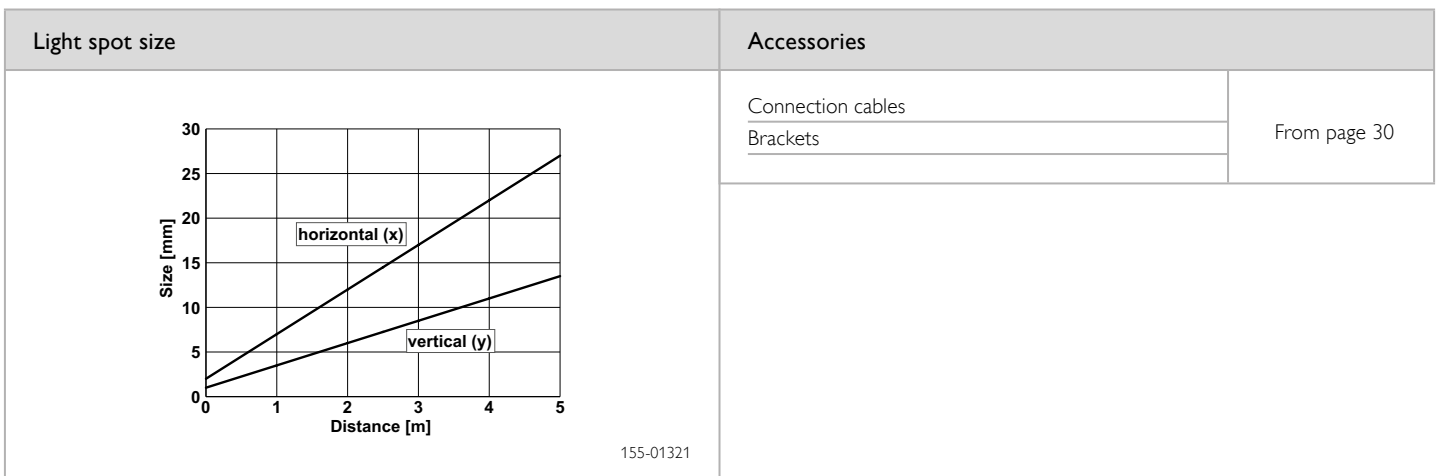
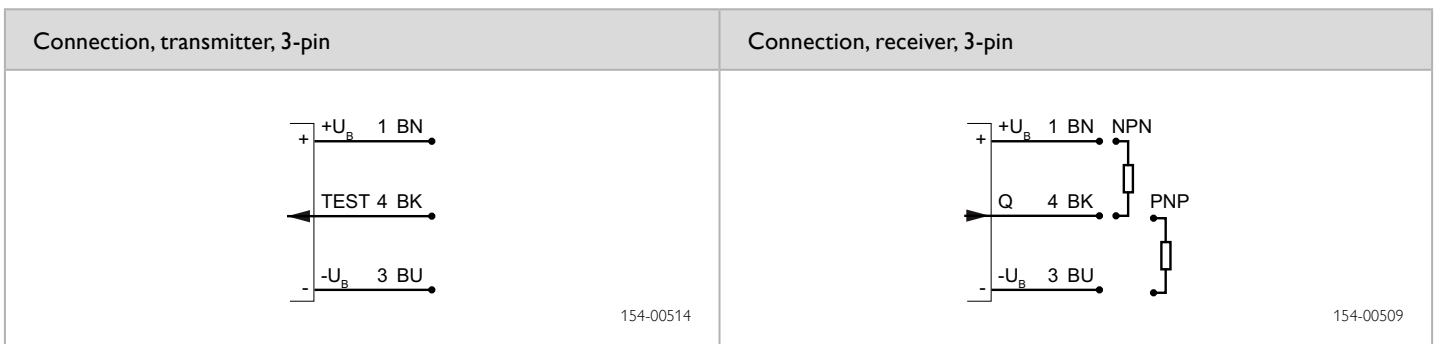
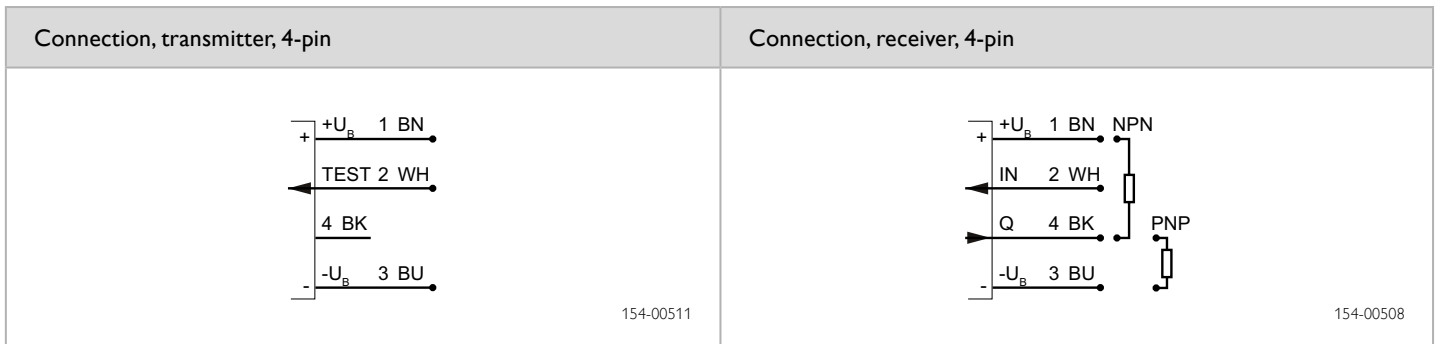
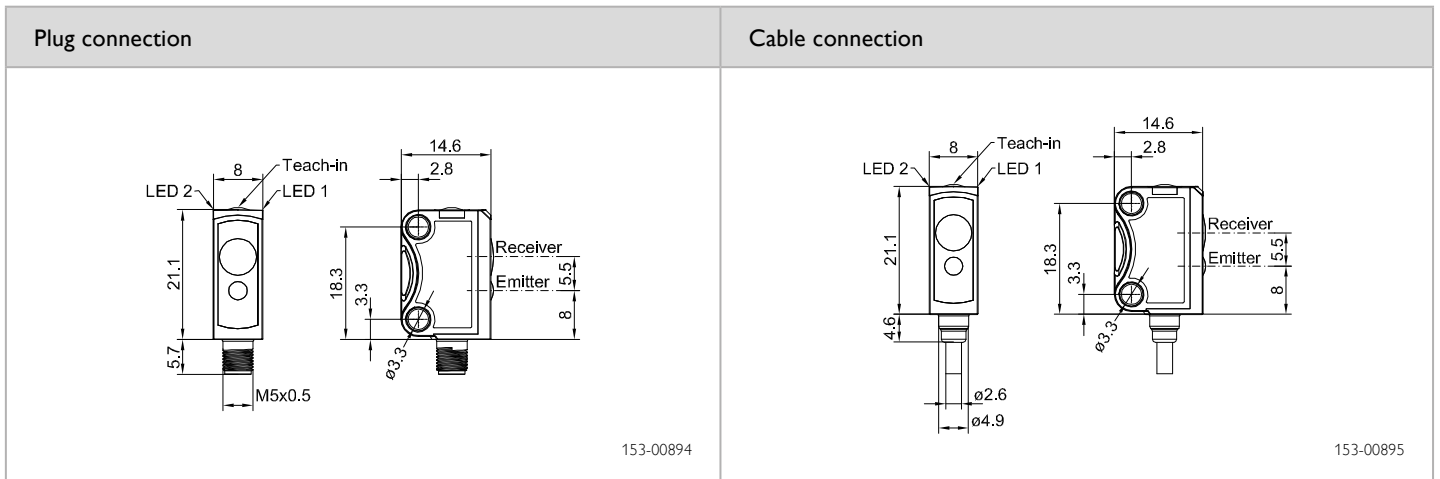
- Sub-miniature sensor for installation in the smallest of spaces
- Bright, precise laser light spot for optimum small-part detection and simple alignment
- High switching frequency for detection in even the fastest processes
- User-friendly operation via electronic Teach-in button or control line
- Robust, glass-fibre-reinforced plastic housings

Optical data		Functions	
Limit range	0 ... 5 m	Indicator LED, green	Operating voltage indicator
Operating range	0 ... 3 m	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 655 nm	Sensitivity adjustment	Via Teach-in button and control input
Light spot size	See diagram	Teach-in modes	Mode 1: during running process Mode 2: during standing process
Laser Class (DIN EN 60825-1:2008-5)	1	Adjustment possibilities (receiver)	N.O. / N.C. via Teach-in button and control input Button lock via control input
		Default settings	Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>b</sub>	10 ... 30V DC <sup>1</sup>	Dimensions	21.1 × 14.6 × 8 mm <sup>3</sup>
No-load current, I <sub>o</sub>	≤ 12 mA	Enclosure rating	IP 67 <sup>2</sup>
Output current, I <sub>e</sub>	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U <sub>b</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Switching output, Q	PNP / NPN (see Selection Table)	Ambient temperature: operation	-20 : +50 °C
Output function	N.O. / N.C.	Ambient temperature: storage	-20 : +80 °C
Switching frequency, f (ti/tp 1:1)	≤ 4000Hz	Weight (plug device)	Ca. 6 g
Response time	125 µs	Weight (cable device)	Ca. 44 g
Control input, IN (receiver) (only 4-pin design)	+U <sub>b</sub> = teach-in -U <sub>b</sub> = button locked Open = normal operation	Weight (pigtail)	Ca. 20 g
Control input, Test (transmitter)	+U <sub>b</sub> = Test (transmitter off) -U <sub>b</sub> / Open = normal operation		

<sup>1</sup> Max. 10 % ripple, within U<sub>b</sub>, ~ 50 Hz / 100 Hz    <sup>2</sup> With connected IP 67 plug

Operating range	Switching output	Type of connection	Part number	Design	Article number
1 ... 3 m	PNP	Plug, M5x0.5, 4-pin	FS/FE 10-RL-PS-E4	Sensor pair (transmitter & receiver)	611-51000
1 ... 3 m	NPN	Plug, M5x0.5, 4-pin	FS/FE 10-RL-NS-E4	Sensor pair (transmitter & receiver)	611-51001
1 ... 3 m	PNP	Cable, 2 m, 4-wire	FS/FE 10-RL-PS-K4	Sensor pair (transmitter & receiver)	611-51002
1 ... 3 m	NPN	Cable, 2 m, 4-wire	FS/FE 10-RL-NS-K4	Sensor pair (transmitter & receiver)	611-51003
1 ... 3 m	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FS/FE 10-RL-PS-KM4	Sensor pair (transmitter & receiver)	611-51004
1 ... 3 m	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FS/FE 10-RL-NS-KM4	Sensor pair (transmitter & receiver)	611-51005
1 ... 3 m	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FS/FE 10-RL-PS-KM3	Sensor pair (transmitter & receiver)	611-51006
1 ... 3 m	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FS/FE 10-RL-NS-KM3	Sensor pair (transmitter & receiver)	611-51007

Including dovetail clamp mounting MBD F 10 for all types



# FS 10-RL / FE 10-RL

Laser through-beam photoelectric sensor



## PRODUCT HIGHLIGHTS

- Sub-miniature sensor for installation in the smallest of spaces
- Bright, precise laser light spot for optimum small-part detection and simple alignment
- High switching frequency for detection in even the fastest processes
- User-friendly operation via electronic Teach-in button or control line
- Robust, glass-fibre-reinforced plastic housings

Optical data		Functions	
Limit range	0 ... 5 m	Indicator LED, green	Operating voltage indicator
Operating range	0 ... 3 m	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 655 nm	Sensitivity adjustment	Via Teach-in button and control input
Light spot size	See diagram	Teach-in modes	Mode 1: during running process Mode 2: during standing process
Laser Class (DIN EN 60825-1:2008-5)	1	Adjustment possibilities (receiver)	N.O. / N.C. via Teach-in button and control input; Button lock via control input
		Default settings	Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>1</sup>	Dimensions	21.1 × 14.6 × 8 mm <sup>3</sup>
No-load current, I <sub>0</sub>	≤ 12 mA	Enclosure rating	IP 67 <sup>2</sup>
Output current, I <sub>e</sub>	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Switching output, Q	PNP / NPN (see Selection Table)	Ambient temperature: operation	-20 ... +50 °C
Output function	N.O. / N.C.	Ambient temperature: storage	-20 ... +80 °C
Switching frequency, f (ti/tp 1:1)	≤ 4000Hz	Weight (plug device)	Ca. 6 g
Response time	125 µs	Weight (cable device)	Ca. 44 g
Control input, IN (receiver) (only 4-pin design)	+U <sub>B</sub> = Teach-in; -U <sub>B</sub> = button locked; Open = normal operation	Weight (pigtail)	Ca. 20 g
Control input, Test (transmitter)	+U <sub>B</sub> = Test (transmitter off) -U <sub>B</sub> / Open = normal operation		

<sup>1</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>2</sup> With connected IP 67 plug

Operating range	Switching output	Type of connection	Part number	Design	Article number
1 ... 3 m	PNP	Plug, M5x0.5, 4-pin	FE 10-RL-PS-E4	Receiver	602-71000
1 ... 3 m	-	Plug, M5x0.5, 4-pin	FS 10-RL-E4	Transmitter	601-61000
1 ... 3 m	NPN	Plug, M5x0.5, 4-pin	FE 10-RL-NS-E4	Receiver	602-71001
1 ... 3 m	PNP	Cable, 2 m, 4-wire	FE 10-RL-PS-K4	Receiver	602-71002
1 ... 3 m	-	Cable, 2 m, 4-wire	FS 10-RL-K4	Transmitter	601-61002
1 ... 3 m	NPN	Cable, 2 m, 4-wire	FE 10-RL-NS-K4	Receiver	602-71003
1 ... 3 m	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FE 10-RL-PS-KM4	Receiver	602-71004
1 ... 3 m	-	Pigtail, 200 mm with M8 plug, 4-pin	FS 10-RL-KM4	Transmitter	601-61004
1 ... 3 m	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FE 10-RL-NS-KM4	Receiver	602-71005
1 ... 3 m	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FE 10-RL-PS-KM3	Receiver	602-71006
1 ... 3 m	-	Pigtail, 200 mm with M8 plug, 3-pin	FS 10-RL-KM3	Transmitter	601-61005

Including dovetail clamp mounting MBD F 10 for all types



Operating range	Switching output	Type of connection	Part number	Design	Article number.
1 ... 3 m	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FE 10-RL-NS-KM3	Receiver	602-71008

Including dovetail clamp mounting MBD F 10 for all types

Plug connection	Cable connection
<p>153-00894</p>	<p>153-00895</p>


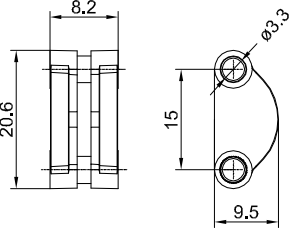

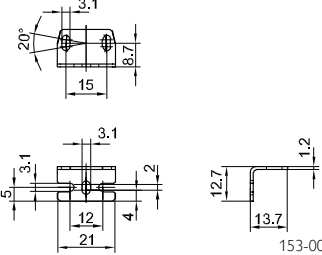
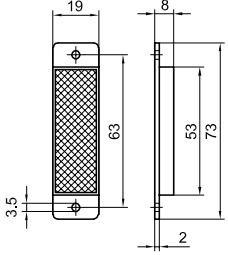
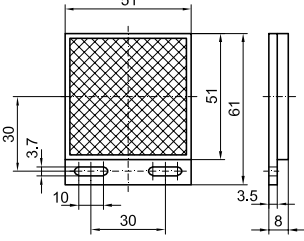
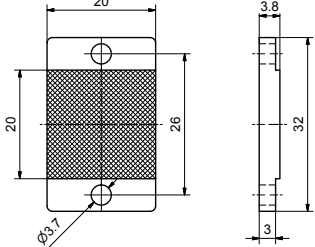
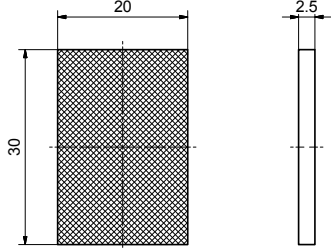
Connection, transmitter, 4-pin	Connection, receiver, 4-pin
<p>154-00511</p>	<p>154-00508</p>

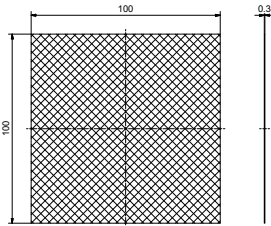
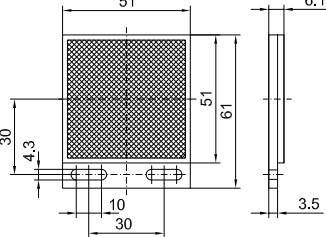
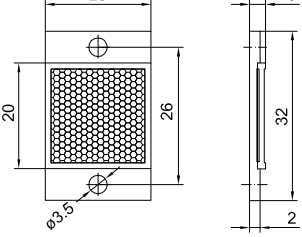
Connection, transmitter, 3-pin	Connection, receiver, 3-pin
<p>154-00514</p>	<p>154-00509</p>

Light spot size	Accessories			
<p>155-01321</p>	<table border="1"> <tr> <td>Connection cables</td> <td rowspan="2">From page 30</td> </tr> <tr> <td>Brackets</td> </tr> </table>	Connection cables	From page 30	Brackets
Connection cables	From page 30			
Brackets				

# Accessories

## Brackets

Brackets			
	 <p>153-00899</p>	<p>Part number / Article number</p> <p>Description</p> <p>Suitable for</p>	<p>MBD F10 / 660-01001</p> <p>Dovetail clamp mounting, adjustable <math>\pm 10^\circ</math>, with screws</p> <p>Material: PBT</p> <p>F 10</p>
	 <p>153-00907</p>	<p>Part number / Article number</p> <p>Description</p> <p>Suitable for</p>	<p>MS F 10 / 660-01000</p> <p>Mounting bracket with screws</p> <p>1x mounting plate M3</p> <p>1x mounting plate <math>\varnothing 3.1</math> mm</p> <p>Material: stainless steel V2A</p> <p>F 10</p>
Reflectors for retroreflective photoelectric sensor			
 <p>153-00068</p>	<p>Part number / Article number</p> <p>Description</p> <p>Dimensions</p> <p>Mounting</p> <p>Temperature range</p> <p>Suitable for</p>	<p>R1 / 904-51532</p> <p>Reflector in housing</p> <p>19 x 73 x 8 mm<sup>3</sup></p> <p>2 mounting holes M3</p> <p>-20 ... +60 °C</p> <p>Retroreflective photoelectric sensor (LED)</p>	
 <p>153-00069</p>	<p>Part number / Article number</p> <p>Description</p> <p>Dimensions</p> <p>Mounting</p> <p>Temperature range</p> <p>Suitable for</p>	<p>R5 / 904-51533</p> <p>Reflector in housing</p> <p>51 x 61 x 8 mm<sup>3</sup></p> <p>2 mounting holes</p> <p>-20 ... +60 °C</p> <p>Retroreflective photoelectric sensor (LED)</p>	
 <p>153-001046</p>	<p>Part number / Article number</p> <p>Description</p> <p>Dimensions</p> <p>Mounting</p> <p>Temperature range</p> <p>Suitable for</p>	<p>R2-2LB1 / 904-51595</p> <p>Reflector in housing, with very fine structure</p> <p>20 x 32 x 3.8 mm<sup>3</sup></p> <p>2 mounting holes</p> <p>-20 ... +60 °C</p> <p>Retroreflective photoelectric sensor (LED)</p>	
 <p>153-01047</p>	<p>Part number / Article number</p> <p>Description</p> <p>Dimensions</p> <p>Mounting</p> <p>Temperature range</p> <p>Suitable for</p>	<p>R3-2LK1 / 904-51596</p> <p>Reflector in housing with very fine structure</p> <p>20 x 30 x 2.5 mm<sup>3</sup></p> <p>Self-adhesive</p> <p>-20 ... +60 °C</p> <p>Retroreflective photoelectric sensor (LED)</p>	

Reflectors for retroreflective photoelectric sensor		
 <p style="text-align: right;">153-01125</p>	Part number / Article number Description Dimensions Mounting Temperature range Suitable for	RF-100 KL / 904-51644 Reflective tape 100 x 100 mm, to cut to size 100 x 100 mm <sup>2</sup> Self-adhesive -40 ... +70 °C Retroreflective photoelectric sensor (LED & laser)
 <p style="text-align: right;">153-00242</p>	Part number / Article number Description Dimensions Mounting Temperature range Suitable for	R5/L / 904-51543 Reflector in housing 51 x 61 x 6.1 mm <sup>3</sup> 2 mounting holes (slots) -20 ... +60 °C Retroreflective photoelectric sensor (laser)
 <p style="text-align: right;">153-00773</p>	Part number / Article number Description Dimensions Mounting Temperature range Suitable for	R2-2LB / 904-51586 Reflector in housing 20 x 32 x 3 mm <sup>3</sup> 2 mounting holes -20 ... +60 °C Retroreflective photoelectric sensor (laser)
Connection cables		
Part number	Article number	Description
<b>M5, 4-pin</b> CN4 FG-2m-PUR CN4 FG-5m-PUR CN4 FW-2m-PUR CN4 FW-5m-PUR	902-51793 902-51791 902-51794 902-51792	2 m, straight, PUR 5 m, straight, PUR 2 m, 90°, PUR 5 m, 90°, PUR
<b>M8, 3-pin</b> K3-2m-G-PUR K3-5m-G-PUR K3-10m-G-PUR K3-2m-W-PUR K3-5m-W-PUR K3-2m-W-PL-PUR K3-5m-W-PL-PUR K3-10m-W-PL-PUR	902-50679 902-51614 902-50694 902-50681 902-51615 902-50683 902-51616 902-50693	2 m, straight, PUR 5 m, straight, PUR, suitable for drag chains 10 m, straight, PUR, suitable for drag chains 2 m, 90°, PUR, suitable for drag chains 5 m, 90°, PUR, suitable for drag chains 2 m, 90°, PUR, with indicator LED 5 m, 90°, PUR, with indicator LED, suitable for drag chains 10 m, 90°, PUR, with indicator LED, suitable for drag chains
<b>M8, 4-pin</b> K4-2m-G-PUR K4-5m-G-PUR K4-10m-G-PUR K4-2m-W-PUR K4-5m-W-PUR K4-10m-W-PUR K4-2m-W-PL-PUR K4-5m-W-PL-PUR	902-50801 902-51617 902-51610 902-50803 902-51618 902-51629 902-51642 902-51643	2 m, straight, PUR, suitable for drag chains 5 m, straight, PUR, suitable for drag chains 10 m, straight, PUR, suitable for drag chains 2 m, 90°, PUR, suitable for drag chains 5 m, 90°, PUR, suitable for drag chains 10 m, 90°, PUR, suitable for drag chains 2 m, 90°, PUR, with indicator LED 5 m, 90°, PUR, with indicator LED

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