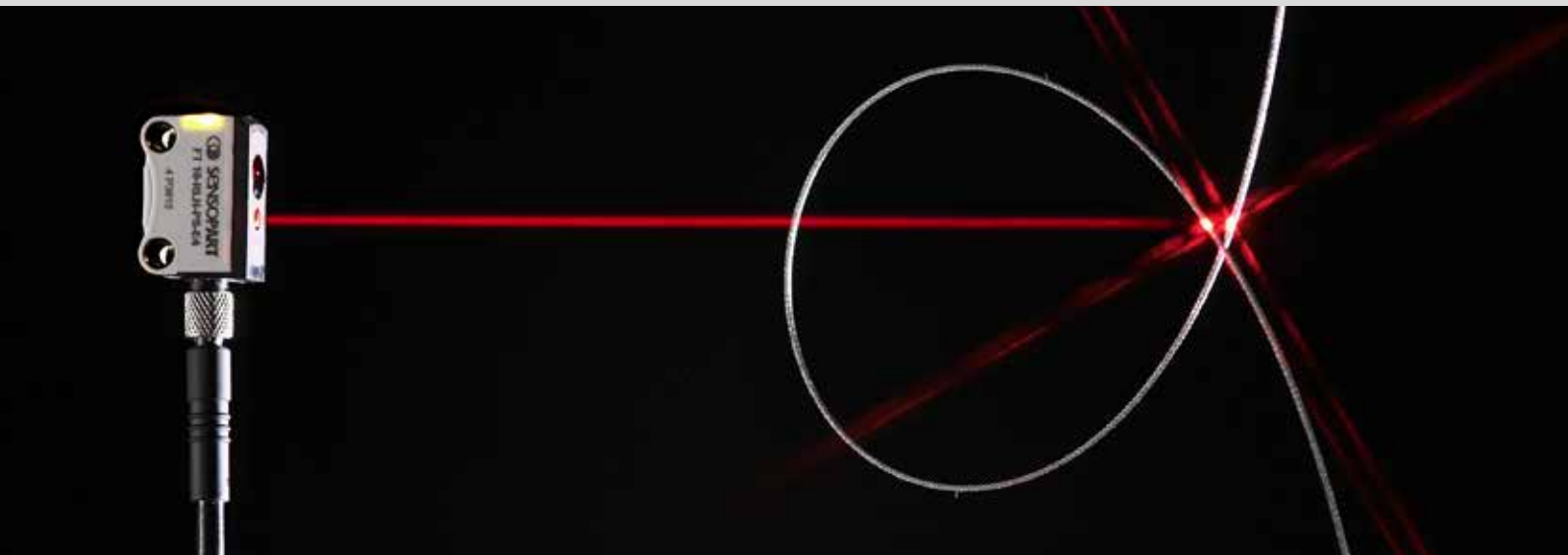

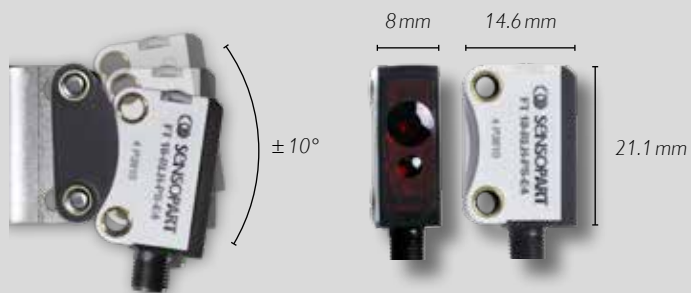


F 10 – family of sub-miniature sensors

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.



Mini-sensor with maximum ease-of-use:




















Simple commissioning with an electronic teach-in button and easily visible status LEDs is by no means typical for housings of this size.

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

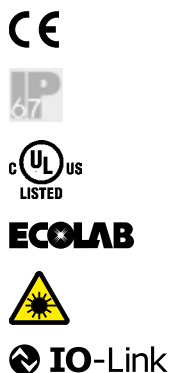
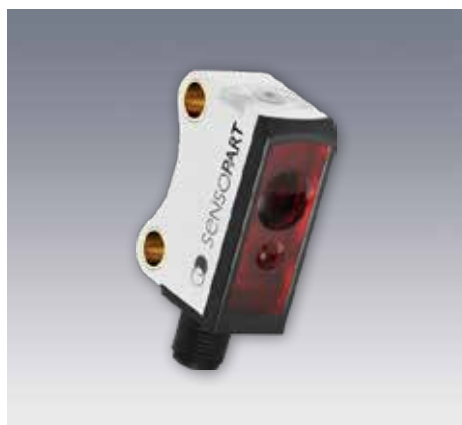
The sensors of the F 10 series, available as LED and laser versions, form one of the most comprehensive series on the market in sub-miniature housings. Their precise background suppression, adjustable via teach-in, makes the sensors unique. The light spot of the F 10 laser sensors also remains so focused 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	
Photoelectric diffuse sensors with background suppression						
FT 10-RLH	Laser 	Teach-in 	70 mm	IO-Link 	279	
FT 10-B-RLF	Laser 	Fixed focus	15 mm / 30 mm	IO-Link 	281	
FT 10-RH	LED	Teach-in 	70 mm	IO-Link 	283	
FT 10-BH	LED, blue 	Teach-in 	100 mm	BlueLight technology, IO-Link 	285	
FT 10-RF	LED	Fixed focus	15 mm / 30 mm / 50 mm	IO-Link 	287	
FT 10-BF	LED, blue 	Fixed focus	30 mm / 50 mm	BlueLight technology	289	
Photoelectric retro-reflective sensors						
FR 10-RL	Laser 	Teach-in 	2 m	Long range, precise small-part detection	291	
FR 10-R	LED	Teach-in 	1.6 m	Long range	293	
Photoelectric through-beam sensors						
FS/FE 10-RL	Laser 	Teach-in 	3 m	Sensor pair, very accurate object positioning	295	
FS 10-RL/FE 10-RL	Laser 	Teach-in 	3 m	Transmitter/receiver, very accurate object positioning	297	

FT 10-RLH

Diffuse laser 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 colors
- 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
- Setting of smart functions via IO-Link

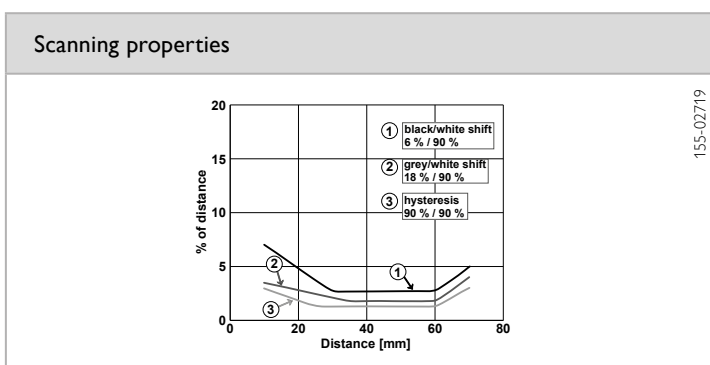
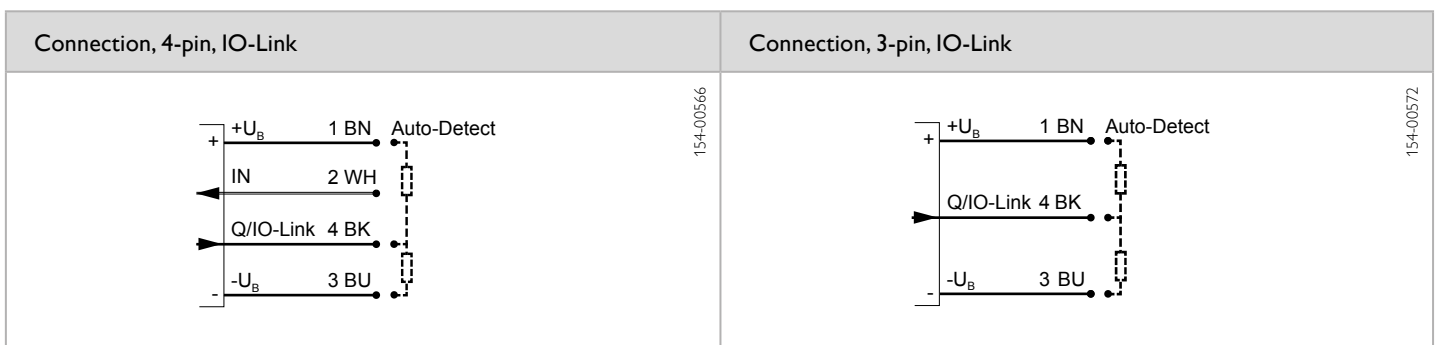
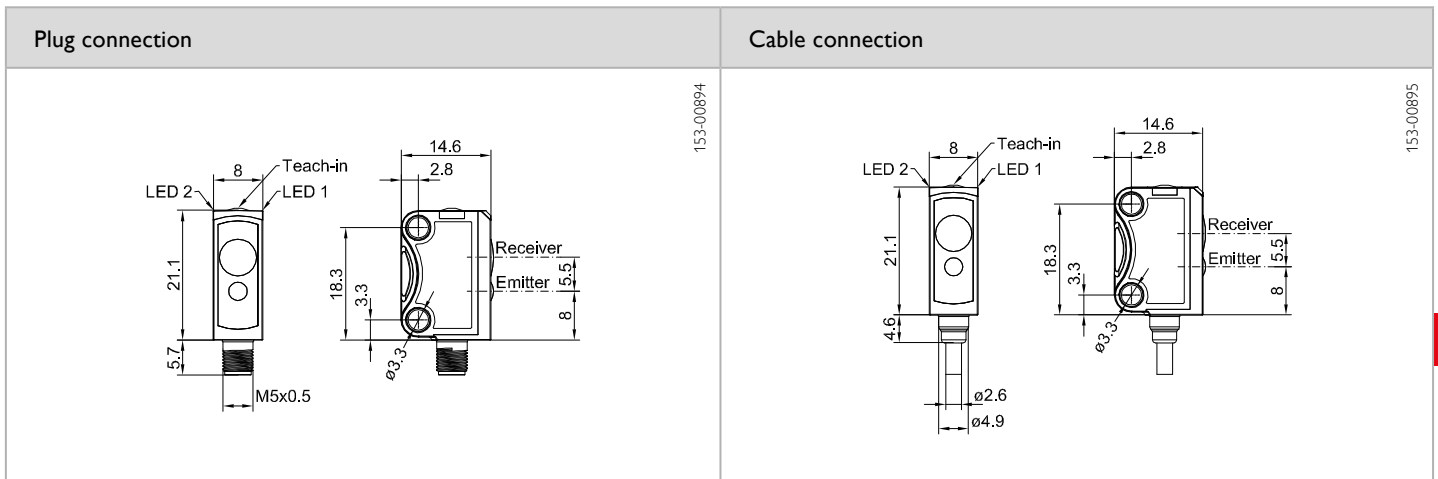
Optical data		Functions	
Scanning distance	6 ... 70 mm ¹	Indicator LED, green	Operating voltage indicator
Adjustment range	10 ... 70 mm ¹	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 655 nm	Scanning distance adjustment	Via Teach-in button, control input ⁶ and IO-Link
Light spot size (total detection area)	1 x 3 mm	Adjustment possibilities	N.O./N.C. and Auto-Detect / NPN / PNP via teach-in button, control input ⁶ and IO-Link Button lock via control input ⁶ and IO-Link Wide variety of adjustment possibilities via IO-Link
Laser Class (IEC 60825-1)	1	Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _b	10 ... 30V DC ²	Dimensions	21.1 x 14.6 x 8 mm
No-load current, I ₀	≤ 12 mA	Enclosure rating	IP 67 ⁴
Output current, I _e	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U _b / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Switching output, Q	1x Auto-Detect (PNP/NPN) ³	Ambient temperature: operation	-20 ... +50 °C ⁵
Output function	N.O./N.C.	Ambient temperature: storage	-20 ... +80 °C
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (plug device)	Approx. 3 g
Response time	500 μs	Weight (cable device)	Approx. 22 g
Control input, IN (only 4-pin design)	+U _b = teach-in -U _b = button locked Open = normal operation	Weight (pigtail)	Approx. 10 g
IO-Link			
Communication mode	COM 2		
Min. cycletime	2.3 ms		
SIO mode	Compatible		
Length process data	16 Bit		
Specification	1.1		

¹ Reference material white, 90 % reflectivity ² Max. 10 % ripple, within U_b, ~ 50 Hz / 100 Hz ³ Auto-Detect, automatic PNP/NPN selection by the sensor; PNP or NPN fixed

⁴ With connected IP 67 plug ⁵ UL: -20 ... +30 °C

Scanning distance	Switching output	Type of connection	Part number	Article number
6 ... 70 mm	Auto-Detect	Plug, M5x0.5, 4-pin, IO-Link	FT 10-RLH-PNSL-E4	600-11163
6 ... 70 mm	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 10-RLH-PNSL-K4	600-11164
6 ... 70 mm	Auto-Detect	Pigtail, 200 mm with M8 plug, 4-pin, IO-Link	FT 10-RLH-PNSL-KM4	600-11165
6 ... 70 mm	Auto-Detect	Pigtail, 200 mm with M8 plug, 3-pin, IO-Link	FT 10-RLH-PNSL-KM3	600-11166

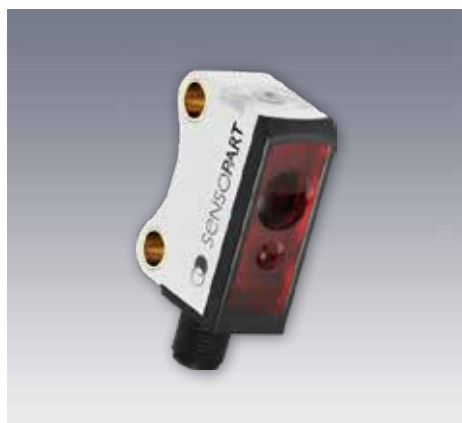
Including dovetail clamp mounting MBD F 10 for all types



Reference material	Detection range	Accessories
White (90 %)	6 ... 70 mm	Connection cables
Grey (18 %)	7 ... 70 mm	Brackets
Black (6 %)	7 ... 70 mm	SensolO (901-01001)
		www.sensopart.com/en/accessories

FT 10-B-RLF

Diffuse laser 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 colors
- 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 ¹ 6 ... 30 mm ¹	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	Adjustment possibilities	N.O. / N.C. via control input and IO-Link
Laser Class (IEC 60825-1)	1		
Electrical data		Mechanical data	
Operating voltage, +U _b	10 ... 30V DC ²	Dimensions	21.1 x 14.6 x 8 mm
No-load current, I ₀	≤ 12 mA	Enclosure rating	IP 67 ³
Output current, I _e	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U _b / 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 ⁴
Output function	N.O./N.C.	Ambient temperature: storage	-20 ... +80 °C
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (plug device)	Approx. 3 g
Response time	500 µs	Weight (cable device)	Approx. 22 g
Control input, I _N (only 4-pin design)	+U _b = N.C. -U _b / Open = N.O.	Weight (pigtail)	Approx. 10 g
IO-Link			
Communication mode	COM 2		
Min. cycletime	2.3 ms		
SIO mode	Compatible		
Data storage	Compatible		
Length process data	16 Bit		
Specification	1.1		

¹ Reference material white, 90 % reflectivity

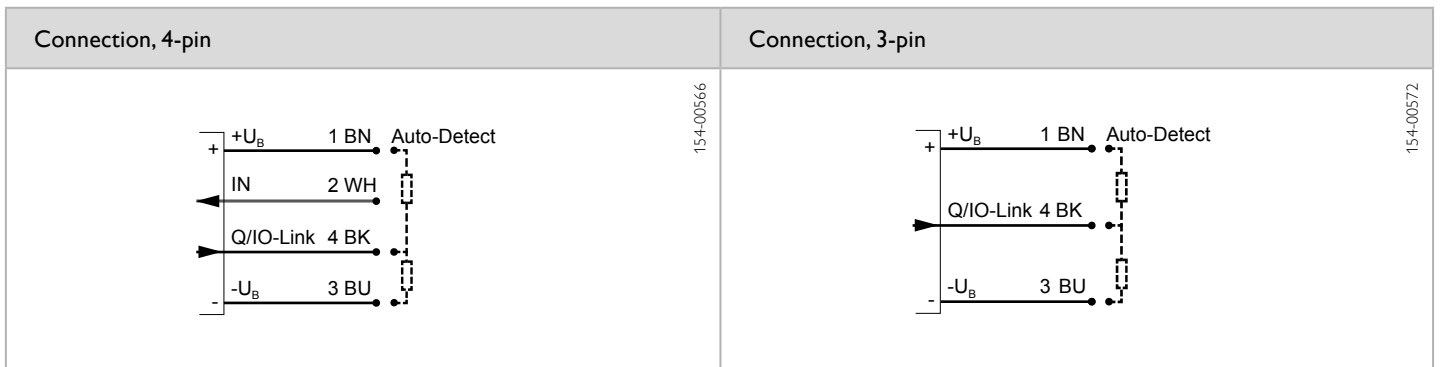
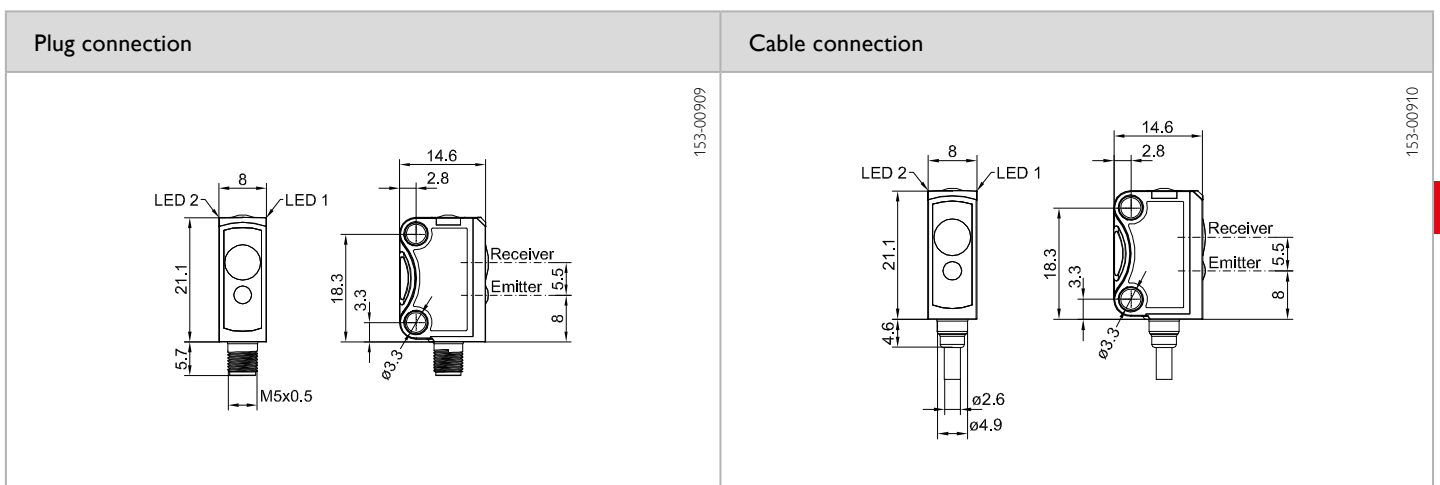
² Max. 10 % ripple, within U_b, ~ 50 Hz / 100 Hz

³ With connected IP 67 plug

⁴ UL: -20 ... +30 °C

Operating range	Switching output	Type of connection	Part number	Article number
6 ... 15 mm	Auto-Detect	Plug, M5x0.5, 4-pin, IO-Link	FT 10-B-RLF1-PNSL-E4	600-11167
6 ... 15 mm	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 10-B-RLF1-PNSL-K4	600-11168
6 ... 15 mm	Auto-Detect	Pigtail, 200 mm with M8 plug, 4-pin, IO-Link	FT 10-B-RLF1-PNSL-KM4	600-11169
6 ... 15 mm	Auto-Detect	Pigtail, 200 mm with M8 plug, 3-ping, IO-Link	FT 10-B-RLF1-PNSL-KM3	600-11170
6 ... 30 mm	Auto-Detect	Plug, M5x0.5, 4-pin, IO-Link	FT 10-B-RLF2-PNSL-E4	600-11171
6 ... 30 mm	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 10-B-RLF2-PNSL-K4	600-11172
6 ... 30 mm	Auto-Detect	Pigtail, 200 mm with M8 plug, 4-pin, IO-Link	FT 10-B-RLF2-PNSL-KM4	600-11173
6 ... 30 mm	Auto-Detect	Pigtail, 200 mm with M8 plug, 3-ping, IO-Link	FT 10-B-RLF2-PNSL-KM3	600-11174

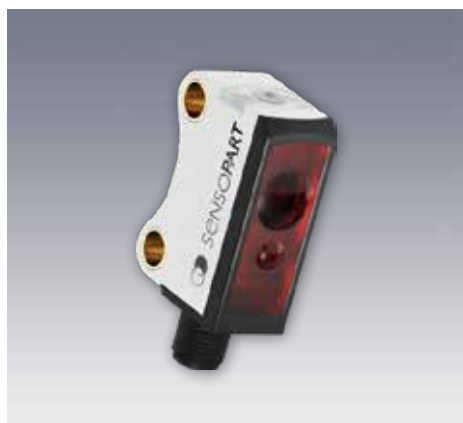
Including dovetail clamp mounting MBD F 10 for all types



Reference material	Detection range	Accessories
White (90 %)	6 ... 15 mm / 30 mm	Connection cables
Grey (18 %)	7 ... 15 mm / 30 mm	Brackets
Black (6 %)	7 ... 15 mm / 30 mm	SensolO (901-01001)
		www.sensopart.com/en/accessories

FT 10-RH

Photoelectric diffuse 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 colors
- 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
- Setting of smart functions via IO-Link

Optical data		Functions	
Scanning distance	2 ... 70 mm ¹	Indicator LED, green	Operating voltage indicator
Adjustment range	10 ... 70 mm ¹	Indicator LED, yellow	Switching output indicator
Used light	LED, red, 650 nm	Scanning distance adjustment	Via Teach-in button, control input ⁵ and IO-Link
Light spot size	See diagram	Teach-in modes	Mode 1: during running process Mode 2: during standing process
Hysteresis	≤ 2 mm ²	Adjustment possibilities	N.O./N.C. and Auto-Detect / NPN / PNP via teach-in button, control input ⁵ and IO-Link Button lock via control input ⁵ and IO-Link Wide variety of adjustment possibilities via IO-Link
Grey/white shift (18 % / 90 %)	≤ 3 mm ²	Default settings	Max. range and N.O.
Black/white shift (6 % / 90 %)	≤ 4 mm ²		
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ³	Dimensions	21,1 × 14,6 × 8 mm
No-load current, I ₀	≤ 20 mA	Enclosure rating	IP 67 ⁶
Output current, I _e	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U _B / 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 ⁷
Switching output, Q	1x Auto-Detect (PNP/NPN) ⁴	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 ³	+U _B = teach-in -U _B = button locked Open = normal operation		
IO-Link			
Communication mode	COM 2		
Min. cycletime	2.3 ms		
SIO mode	Compatible		
Length process data	16 Bit		
Specification	1.1		

¹ Reference material white, 90 % reflectivity ² At maximum scanning distance ³ Max. 10 % ripple within U_B, ~ 50 Hz / 100 Hz ⁴ Auto-Detect, automatic PNP/NPN selection by the sensor, PNP or NPN fixed ⁵ Only 4-pin design ⁶ With connected IP 67 plug ⁷ UL: -20 ... +30 °C

Scanning distance	Switching output	Type of connection	Part number	Article number
2 ... 70 mm ¹	Auto-Detect	Plug, M5x0.5, 4-pin, IO-Link	FT 10-RH-PNSL-E4	600-11048
2 ... 70 mm ¹	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 10-RH-PNSL-K4	600-11049
2 ... 70 mm ¹	Auto-Detect	Pigtail, 200 mm with M8 plug, 4-pin, IO-Link	FT 10-RH-PNSL-KM4	600-11050
2 ... 70 mm ¹	Auto-Detect	Pigtail, 200 mm with M8 plug, 3-pin, IO-Link	FT 10-RH-PNSL-KM3	600-11051

Including dovetail clamp mounting MBD F 10 for all types

Plug connection	Cable connection

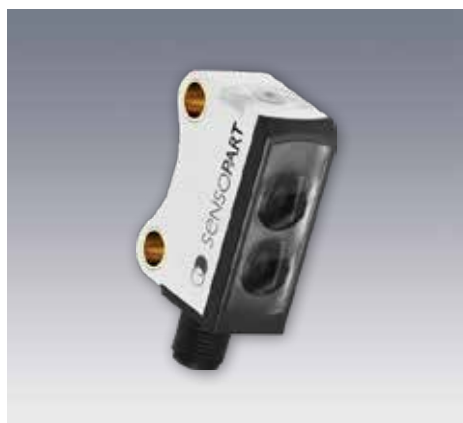
Connection, 4-pin, IO-Link	Connection, 3-pin, IO-Link

Scanning properties	Light spot size

Reference material	Detection range	Accessories
White (90 %)	2 ... 70 mm	Connection cables
Grey (18 %)	4 ... 70 mm	Brackets
Black (6 %)	5 ... 70 mm	SensolO (901-01001)
		www.sensopart.com/en/accessories

FT 10-BH

BlueLight-Photoelectric diffuse sensor with background suppression



PRODUCT HIGHLIGHTS

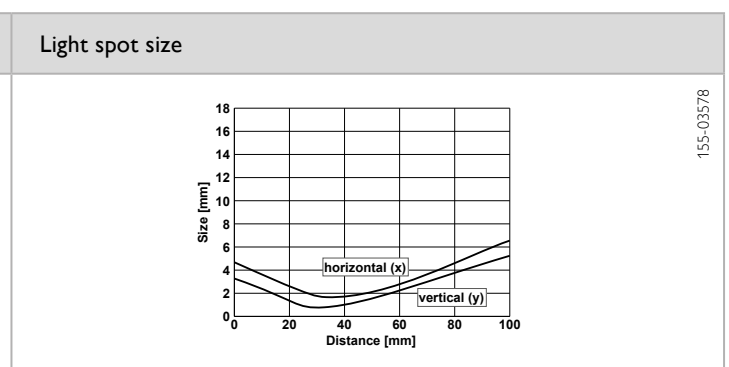
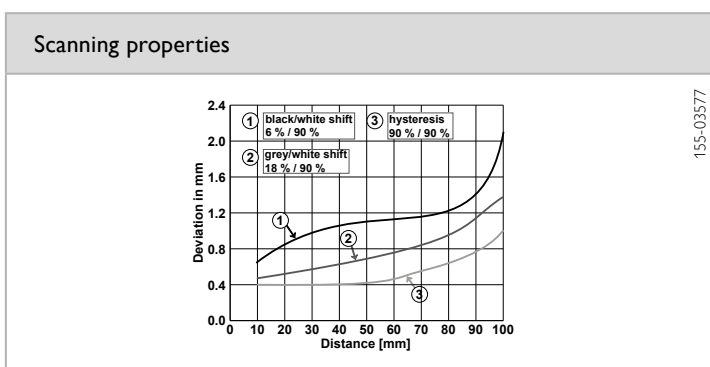
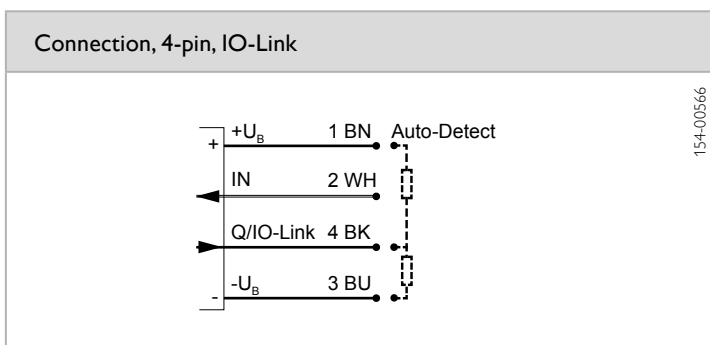
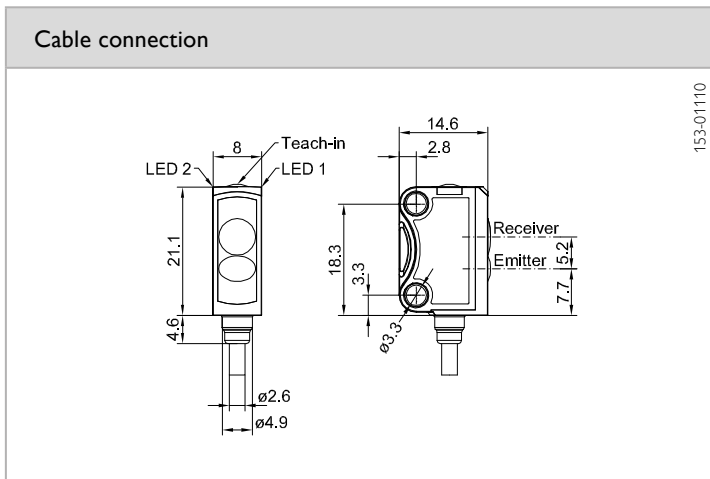
- Sub-miniature sensor with BlueLight technology and precise, adjustable background suppression
- Precise and reliable switching behaviour with strongly light-absorbing objects
- Reliable operation without reflector - even with critical surfaces
- Simple alignment through easily visible light spot
- Sensor settings via teach-in, control input and IO-Link

Optical data		Functions	
Scanning distance	3 ... 100 mm ¹	Indicator LED, green	Operating voltage indicator
Adjustment range	10 ... 100 mm ¹	Indicator LED, yellow	Switching output indicator
Used light	LED, blue, 470 nm	Scanning distance adjustment	Via Teach-in button, control input and IO-Link
Light spot size	See diagram	Teach-in modes	Mode 1: during running process Mode 2: during standing process
Hysteresis	≤ 1.2 mm ^{1,2}	Adjustment possibilities	N.O./N.C. and Auto-Detect / NPN / PNP via teach-in button, control input and IO-Link Button lock via control input and IO-Link Wide variety of adjustment possibilities via IO-Link
Grey/white shift (18 % / 90 %)	≤ 1.4 mm ²	Default settings	Max. range and N.O.
Black/white shift (6 % / 90 %)	≤ 2.4 mm ²		
Electrical data		Mechanical data	
Operating voltage, +U _B	13 ... 30V DC ³	Dimensions	21,1 × 14,6 × 8 mm
No-load current, I ₀	≤ 20 mA	Enclosure rating	IP 67 ⁶
Output current, I _e	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U _B / 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 ⁷
Switching output, Q	1x Auto-Detect (PNP/NPN) ⁴	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)	≤ 700 Hz	Weight (pigtail)	Approx. 10 g
Response time	700 μs		
Control input, IN	+U _B = teach-in / keylock / disabled ⁵ -U _B / open = normal operation		
IO-Link			
Communication mode	COM 2		
Min. cycletime	2.3 ms		
SIO mode	Compatible		
Length process data	16 Bit		
Specification	1.1		

¹ Reference material white, 90 % reflectivity ² At maximum scanning distance ³ Max. 10 % ripple within U_B, ~ 50 Hz / 100 Hz ⁴ Auto-Detect, automatic PNP/NPN selection by the sensor, PNP or NPN fixed ⁵ Adjustable via IO-Link, default: Teach-in ⁶ With connected IP 67 plug ⁷ UL: -20 ... +30 °C

Scanning distance	Switching output	Type of connection	Part number	Article number
3 ... 100 mm ¹	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 10-BH-PNSL-K4	600-11063
3 ... 100 mm ¹	Auto-Detect	Pigtail, 200 mm with M8 plug, 4-pin, IO-Link	FT 10-BH-PNSL-KM4	600-11062

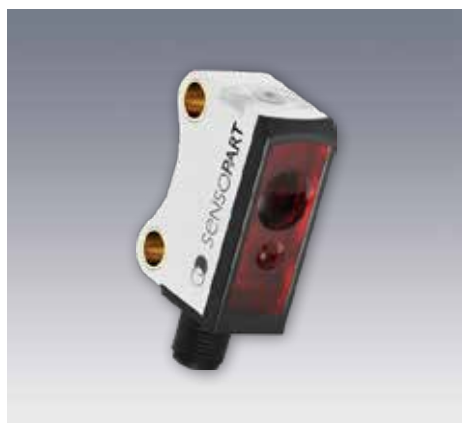
Including dovetail clamp mounting MBD F 10 for all types



Reference material	Detection range	Accessories
White (90 %)	3 ... 100 mm	Connection cables
Grey (18 %)	4 ... 100 mm	Brackets
Black (6 %)	5 ... 100 mm	SensolO (901-01001)
		www.sensopart.com/en/accessories

FT 10-RF

Photoelectric diffuse 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 colors
- Tamper-proof sensor design – no misalignment possible
- Simple mounting and adjustment through innovative dovetail clamp mounting

Optical data		Functions	
Scanning distance	2 ... 15 mm ¹ 2 ... 30 mm ¹ 2 ... 50 mm ¹	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 ³ and IO-Link
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	21,1 × 14,6 × 8 mm
No-load current, I ₀	≤ 20 mA	Enclosure rating	IP 67 ⁴
Output current, I _e	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U _B / 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 ⁵
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 _N ³	+U _B = N.C. -U _B / Open = N.O.		
IO-Link			
Communication mode	COM 2		
Min. cycletime	2.3 ms		
SIO mode	Compatible		
Data storage	Compatible		
Length process data	16 Bit		
Specification	1.1		

¹ Reference material white, 90 % reflectivity

² Max. 10 % ripple within U_B, ~ 50 Hz / 100 Hz

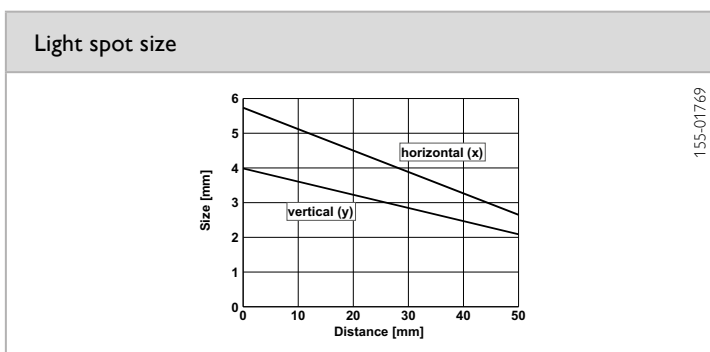
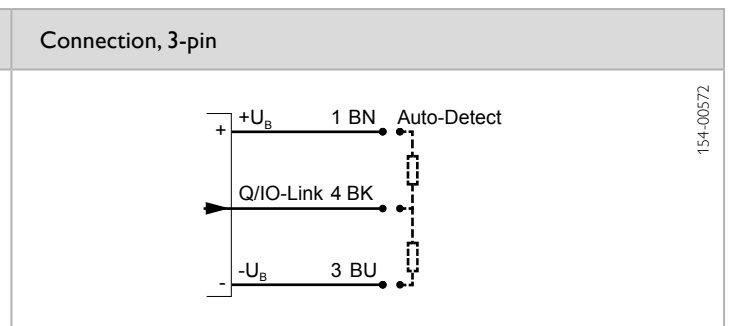
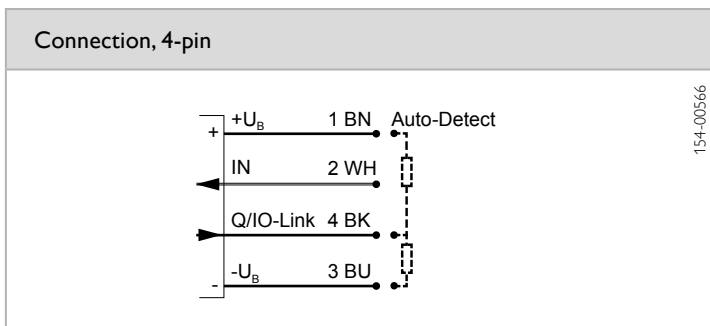
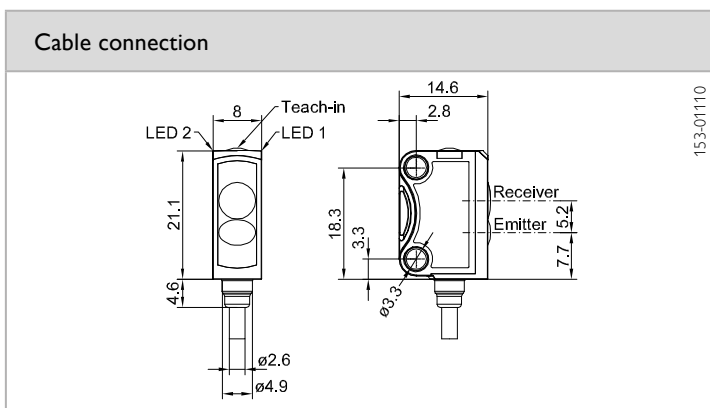
³ Only 4-pin design

⁴ With connected IP 67 plug

⁵ UL: -20 ... +30 °C

Scanning distance	Switching output	Type of connection	Part number	Article number
2 ... 15 mm ¹	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 10-RF1-PNSL-K4	600-11052
2 ... 15 mm ¹	Auto-Detect	Pigtail, 200 mm with M8 plug, 4-pin, IO-Link	FT 10-RF1-PNSL-KM4	600-11053
2 ... 15 mm ¹	Auto-Detect	Pigtail, 200 mm with M8 plug, 3-pin, IO-Link	FT 10-RF1-PNSL-KM3	600-11054
2 ... 30 mm ¹	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 10-RF2-PNSL-K4	600-11055
2 ... 30 mm ¹	Auto-Detect	Pigtail, 200 mm with M8 plug, 4-pin, IO-Link	FT 10-RF2-PNSL-KM4	600-11056
2 ... 30 mm ¹	Auto-Detect	Pigtail, 200 mm with M8 plug, 3-pin, IO-Link	FT 10-RF2-PNSL-KM3	600-11057
2 ... 50 mm ¹	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 10-RF3-PNSL-K4	600-11058
2 ... 50 mm ¹	Auto-Detect	Pigtail, 200 mm with M8 plug, 4-pin, IO-Link	FT 10-RF3-PNSL-KM4	600-11059
2 ... 50 mm ¹	Auto-Detect	Pigtail, 200 mm with M8 plug, 3-pin, IO-Link	FT 10-RF3-PNSL-KM3	600-11060

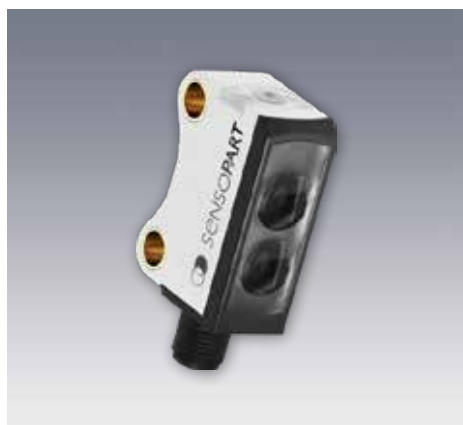
Including dovetail clamp mounting MBD F 10 for all types



Reference material	Detection range			Accessories	www.sensopart.com/en/accessories
white (90 %)	FT 10-RF1 2 ... 15 mm	FT 10-RF2 2 ... 30 mm	FT 10-RF3 2 ... 50 mm	Connection cables	
grey (18 %)	4 ... 15 mm	4 ... 30 mm	4 ... 50 mm	Brackets	
black (6 %)	5 ... 15 mm	5 ... 30 mm	5 ... 50 mm	SensolO (901-01001)	

FT 10-BF

BlueLight-Photoelectric diffuse sensor with background suppression, fixed focus



PRODUCT HIGHLIGHTS

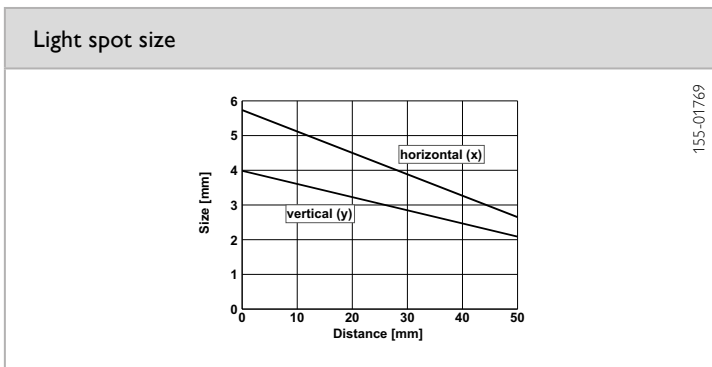
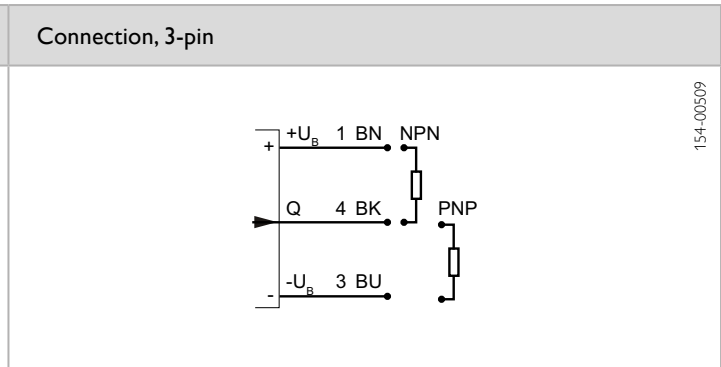
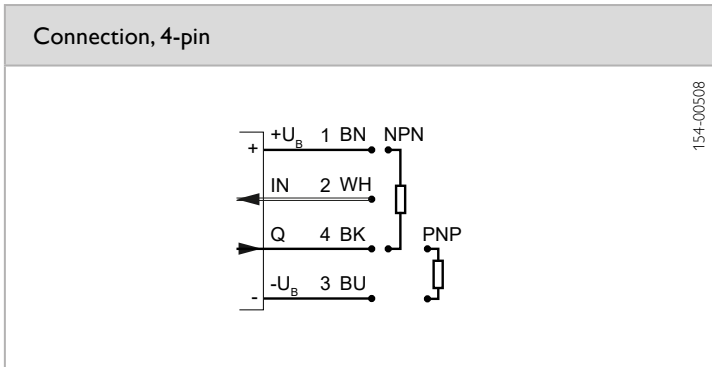
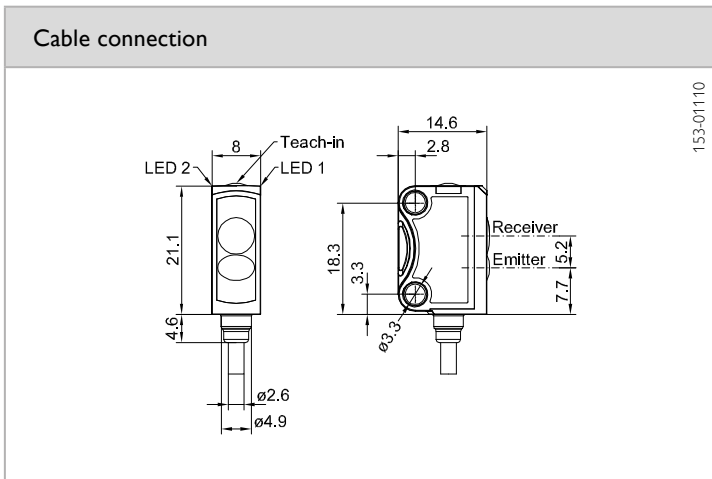
- Sub-miniature sensor with BlueLight technology and precise fixed background suppression
- Reliable switching behaviour with strongly light-absorbing and transparent objects, e.g. solar wafers in every process phase
- Reliable operation without reflector - even with critical surfaces
- Tamper-proof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

Optical data		Functions	
Scanning distance	2 ... 30 mm ¹ / 2 ... 50 mm ¹	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 ³
LED risk group (DIN 62471)	2		
Light spot size	See diagram		
Ambient light	EN 60947-5-2		
Electrical data		Mechanical data	
Operating voltage +U _B	10 ... 30V DC ²	Dimensions	21,1 x 14,6 x 8 mm
No-load supply current I ₀	≤ 20 mA	Enclosure rating	IP 67 ⁴
Output current I _e	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U _B / 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 ⁵
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, IN ³	+U _B = N.C. -U _B / Open = N.O.		

¹ Reference material white, 90 % reflectivity ² Max. residual ripple 10 %, within U_B, approx. 50 Hz/100 Hz ³ Only 4-pin design ⁴With connected IP 67 plug ⁵ UL: -20 ... +30 °C

Scanning distance	Switching output	Type of connection	Part number	Article number
2 ... 30 mm ¹	PNP	Cable, 2 m, 4-wire	FT 10-BF2-PS-K4	600-11026
2 ... 30 mm ¹	NPN	Cable, 2 m, 4-wire	FT 10-BF2-NS-K4	600-11029
2 ... 30 mm ¹	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-BF2-PS-KM4	600-11027
2 ... 30 mm ¹	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-BF2-NS-KM4	600-11030
2 ... 30 mm ¹	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-BF2-PS-KM3	600-11028
2 ... 30 mm ¹	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-BF2-NS-KM3	600-11031
2 ... 50 mm ¹	PNP	Cable, 2 m, 4-wire	FT 10-BF3-PS-K4	600-11036
2 ... 50 mm ¹	NPN	Cable, 2 m, 4-wire	FT 10-BF3-NS-K4	600-11039
2 ... 50 mm ¹	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-BF3-PS-KM4	600-11037
2 ... 50 mm ¹	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-BF3-NS-KM4	600-11040
2 ... 50 mm ¹	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-BF3-PS-KM3	600-11038
2 ... 50 mm ¹	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-BF3-NS-KM3	600-11041

Including dovetail clamp mounting MBD F 10 for all types

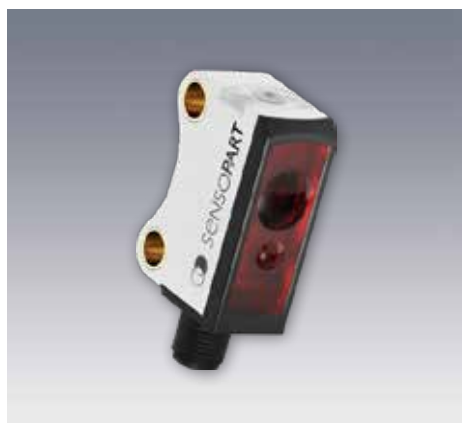


Accessories

Connection cables	www.sensopart.com/en/accessories
Brackets	

FR 10-RL

Retro-reflective laser 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 ... 4 m ¹	Indicator LED, green	Operating voltage indicator
Operating range	0.1 ... 3 m ¹	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 (IEC 60825-1)	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 _B	10 ... 30V DC ²	Dimensions	21.1 × 14.6 × 8 mm
No-load current, I ₀	≤ 12 mA	Enclosure rating	IP 67 ³
Output current, I _e	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U _B / 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 ⁴
Output function	N.O./N.C.	Ambient temperature: storage	-20 ... +80 °C
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (plug device)	Approx. 3 g
Response time	500 μs	Weight (cable device)	Approx. 22 g
Control input, I _N (only 4-pin design)	+U _B = teach-in -U _B = button locked Open = normal operation	Weight (pigtail)	Approx. 10 g

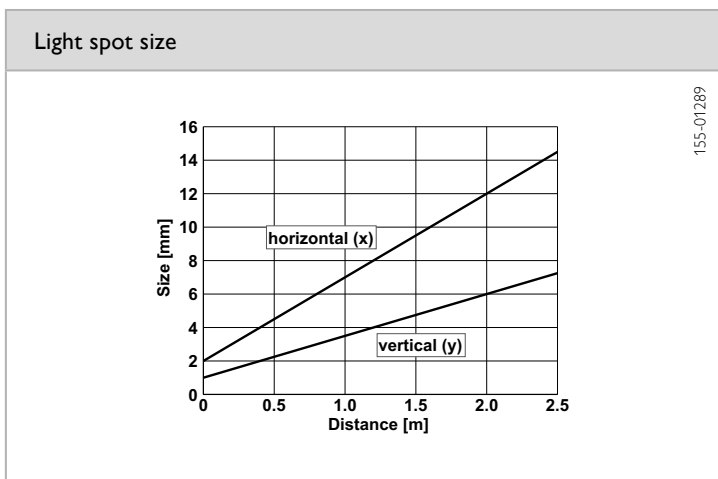
¹ Reference material: R5/L reflector ² Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ³ With connected IP 67 plug ⁴ UL: -20 ... +30 °C

Operating range	Switching output	Type of connection	Part number	Article number
0.1 ... 3 m	PNP	Plug, M5x0.5, 4-pin	FR 10-RL-PS-E4	603-31000
0.1 ... 3 m	NPN	Plug, M5x0.5, 4-pin	FR 10-RL-NS-E4	603-31001
0.1 ... 3 m	PNP	Cable, 2 m, 4-wire	FR 10-RL-PS-K4	603-31002
0.1 ... 3 m	NPN	Cable, 2 m, 4-wire	FR 10-RL-NS-K4	603-31003
0.1 ... 3 m	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FR 10-RL-PS-KM4	603-31004
0.1 ... 3 m	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FR 10-RL-NS-KM4	603-31005
0.1 ... 3 m	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FR 10-RL-PS-KM3	603-31006
0.1 ... 3 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
<p style="text-align: right;">153-00894</p>	<p style="text-align: right;">153-00895</p>

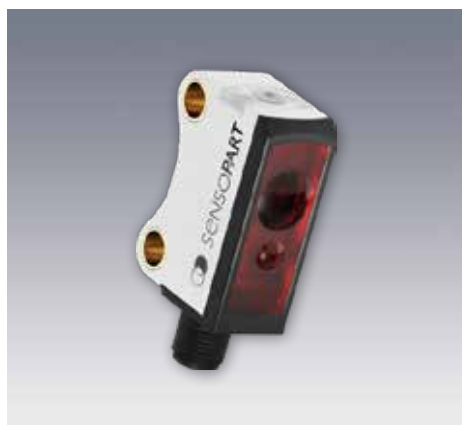
Connection, 4-pin	Connection, 3-pin
<p style="text-align: right;">154-00508</p>	<p style="text-align: right;">154-00509</p>



Reflector / Reflective foil*	Operating range	Accessories	
R5/L	0.1 ... 3 m	Reflectors	www.sensopart.com/en/accessories
RF-100 KL*	0.1 ... 3 m	Connection cables	
		Brackets	

FR 10-R

Photoelectric retro-reflective 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 μ 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 ¹	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 ³
Polarising filter	Yes	Teach-in modes	Mode 1: during running process Mode 2: during standing process
		Adjustment possibilities	N.O./N.C. via Teach-in button and control input ³ Button lock via control input ³
		Default settings	Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	21,1 × 14,6 × 8 mm
No-load current, I ₀	≤ 20 mA	Enclosure rating	IP 67 ⁴
Output current, I _e	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U _B / 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 ⁵
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 μ s		
Control input, I _N ³	+U _B = teach-in -U _B = button locked Open = normal operation		

¹ Reference material reflector R5

² Max. 10 % ripple within U_B, ~ 50 Hz / 100 Hz

³ Only 4-pin design

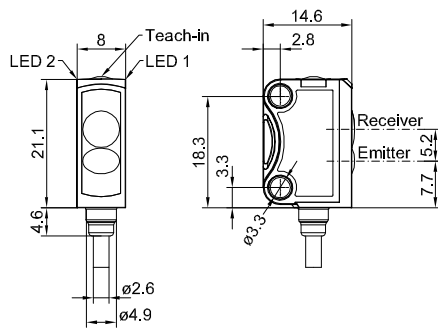
⁴ With connected IP 67 plug

⁵ UL: -20 ... +30 °C

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

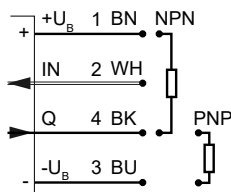
Including dovetail clamp mounting MBD F 10 for all types

Cable connection



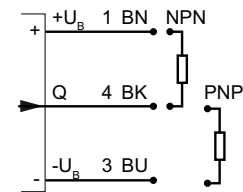
153-01110

Connection, 4-pin



154-00508

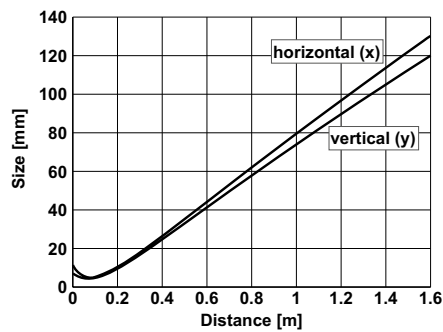
Connection, 3-pin



154-00509

7

Light spot size



155-01767

Reflector / Reflective foil*	Operating range (min./max. reflector distance)	Accessories	
R5	0.1 ... 1.6 m	Reflectors Connection cables Brackets	www.sensopart.com/en/accessories
R1	0.1 ... 1 m		
R2-2LB1	0,15 ... 0,5 m		
R3-2LK1	0,15 ... 0,5 m		
RF-100 KL*	0,15 ... 1 m		

FS/FE 10-RL

Through-beam laser 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 ... 4 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 (IEC 60825-1)	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 _B	10 ... 30V DC ¹	Dimensions	21.1 × 14.6 × 8 mm
No-load current, I ₀	≤ 12 mA	Enclosure rating	IP 67 ²
Output current, I _e	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U _B / 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 ³
Output function	N.O./N.C.	Ambient temperature: storage	-20 ... +80 °C
Switching frequency, f (ti/tp 1:1)	≤ 4000Hz	Weight (plug device)	Approx. 6 g
Response time	125 μs	Weight (cable device)	Approx. 44 g
Control input, IN (receiver) (only 4-pin design)	+U _B = teach-in -U _B = button locked Open = normal operation	Weight (pigtail)	Approx. 20 g
Control input, Test (transmitter)	+U _B = Test (transmitter off) -U _B / Open = normal operation		

¹ Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ² With connected IP 67 plug ³ UL: -20 ... +30 °C

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

Plug connection	Cable connection
<p style="text-align: right;">153-00894</p>	<p style="text-align: right;">153-00895</p>

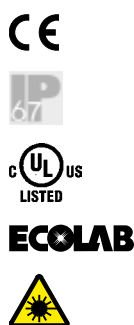
Connection, transmitter, 4-pin	Connection, receiver, 4-pin
<p style="text-align: right;">154-00511</p>	<p style="text-align: right;">154-00508</p>

Connection, transmitter, 3-pin	Connection, receiver, 3-pin
<p style="text-align: right;">154-00514</p>	<p style="text-align: right;">154-00509</p>

Light spot size	Accessories				
<p style="text-align: right;">155-01321</p>	<table border="1"> <tr> <td>Connection cables</td> <td rowspan="2" style="text-align: center; vertical-align: middle;">www.sensopart.com/en/accessories</td> </tr> <tr> <td>Brackets</td> </tr> </table>	Connection cables	www.sensopart.com/en/accessories	Brackets	
Connection cables	www.sensopart.com/en/accessories				
Brackets					

FS 10-RL / FE 10-RL

Through-beam laser 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 ... 4 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 (IEC 60825-1)	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 _B	10 ... 30V DC ¹	Dimensions	21.1 × 14.6 × 8 mm
No-load current, I ₀	≤ 12 mA	Enclosure rating	IP 67 ²
Output current, I _e	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U _B / 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 ³
Output function	N.O./N.C.	Ambient temperature: storage	-20 ... +80 °C
Switching frequency, f (ti/tp 1:1)	≤ 4000Hz	Weight (plug device)	Approx. 6 g
Response time	125 µs	Weight (cable device)	Approx. 44 g
Control input, IN (receiver) (only 4-pin design)	+U _B = Teach-in; -U _B = button locked; Open = normal operation	Weight (pigtail)	Approx. 20 g
Control input, Test (transmitter)	+U _B = Test (transmitter off) -U _B / Open = normal operation		

¹ Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ² With connected IP 67 plug ³ UL: -20 ... +30 °C

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

Operating range	Switching output	Type of connection	Part number	Design	Article number.
1 ... 4 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 style="text-align: right;">153-00894</p>	<p style="text-align: right;">153-00895</p>

Connection, transmitter, 4-pin	Connection, receiver, 4-pin
<p style="text-align: right;">154-00511</p>	<p style="text-align: right;">154-00508</p>

Connection, transmitter, 3-pin	Connection, receiver, 3-pin
<p style="text-align: right;">154-00514</p>	<p style="text-align: right;">154-00509</p>

Light spot size	Accessories			
<p style="text-align: right;">155-01321</p>	<table border="1"> <tr> <td>Connection cables</td> <td rowspan="2">www.sensopart.com/en/accessories</td> </tr> <tr> <td>Brackets</td> </tr> </table>	Connection cables	www.sensopart.com/en/accessories	Brackets
Connection cables	www.sensopart.com/en/accessories			
Brackets				