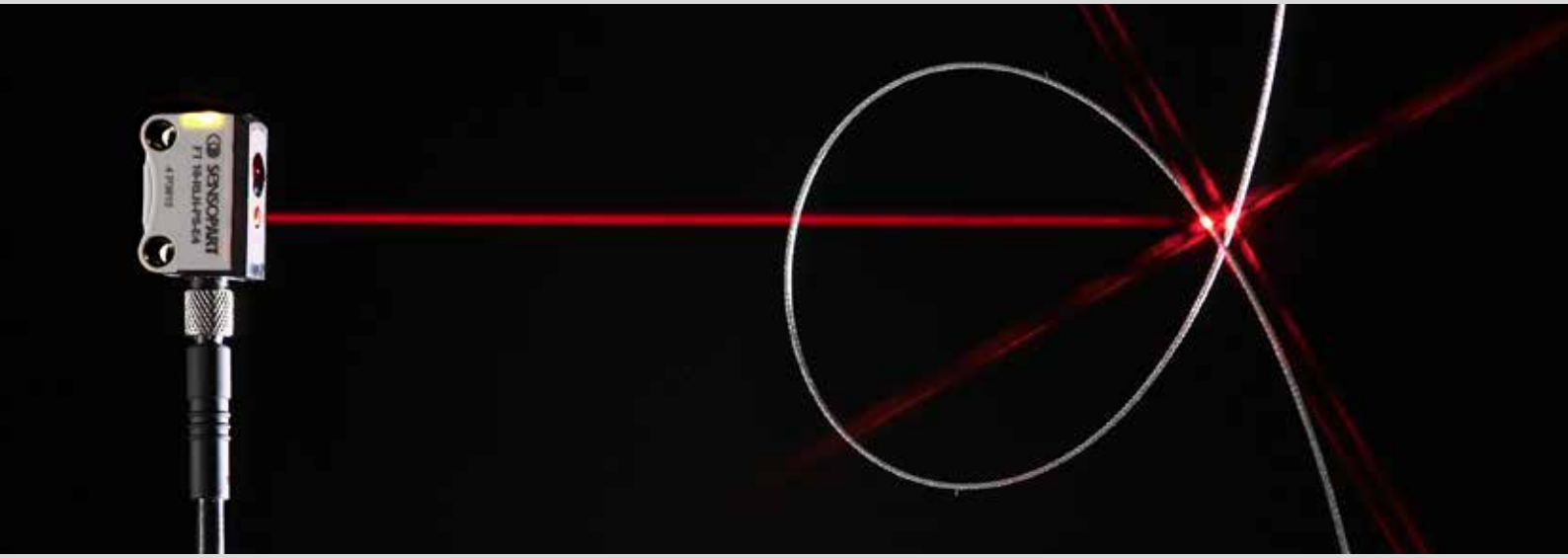
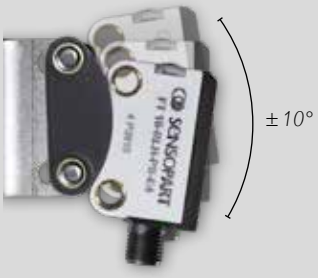
F 10 – family of sub-miniature sensors

Small housings, great performance

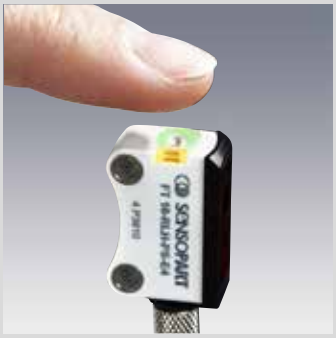


made in Germany



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 unmistakeable 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	321
FT 10-B-RLF	Laser	Fixed focus	15 mm / 30 mm	IO-Link	323
FT 10-RH	LED	Teach-in	70 mm	IO-Link	325
FT 10-BH	LED, blue	Teach-in	100 mm	BlueLight technology, IO-Link	327
FT 10-BHD	LED, blue	Teach-in	150 mm	BlueLight technology, 2 switching outputs, IO-Link	329
FT 10-RF	LED	Fixed focus	15 mm / 30 mm / 50 mm	IO-Link	331
FT 10-BF	LED, blue	Fixed focus	30 mm / 50 mm	BlueLight technology	333
Photoelectric retro-reflective sensors					
FR 10-RL	Laser	Teach-in	2 m	Long range, precise small-part detection	335
FR 10-R	LED	Teach-in	1.6 m	Long range	337
Photoelectric through-beam sensors					
FS/FE 10-RL	Laser	Teach-in	3 m	Sensor pair, very accurate object positioning	339
FS 10-RL/FE 10-RL	Laser	Teach-in	3 m	Transmitter/receiver, very accurate object positioning	341

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	
Scanning distance	6 … 70 mm[1]
Adjustment range	10 … 70 mm[1]
Type of light	Laser, red, 655 nm
Light spot size (total detection area)	1 x 3 mm
Laser Class (IEC 60825-1)	1

Functions	
Indicator LED, green	Operating voltage indicator
Indicator LED, yellow	Switching output indicator
Scanning distance adjustment	Via Teach-in button, control input[4] and IO-Link
Adjustment possibilities	N.O./N.C. and Auto-Detect / NPN / PNP via teach-in button, control input[4] and IO-Link Button lock via control input[4] and IO-Link Wide variety of adjustment possibilities via IO-Link
Default settings	Max. scanning distance and N.O.

Electrical data	
Operating voltage, $+U_B$	10 … 30 V DC[2]
No-load current, I_0	≤ 12 mA
Output current, Ie	≤ 50 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection (Q)
Protection Class	2
Switching output, Q	1x Auto-Detect (PNP/NPN)[3]
Output function	N.O./N.C.
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz
Response time	500 µs
Control input, IN[4]	$+U_B$ = teach-in $-U_B$ = button locked Open = normal operation

Mechanical data	
Dimensions	21.1 x 14.6 x 8 mm
Enclosure rating	IP 67[5]
Material, housing	PUR
Material, front screen	PMMA
Type of connection	See selection table
Ambient temperature: operation	-20 … +50 °C[6]
Ambient temperature: storage	-20 … +80 °C
Weight (plug device)	Approx. 3 g
Weight (cable device)	Approx. 22 g
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] Only 4-pin design [5] With connected IP 67 plug [6] UL: -20 ... +30 °C

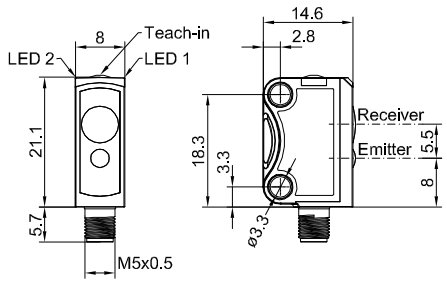
Version: 07/2023. Subject to changes; diagrams similar

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

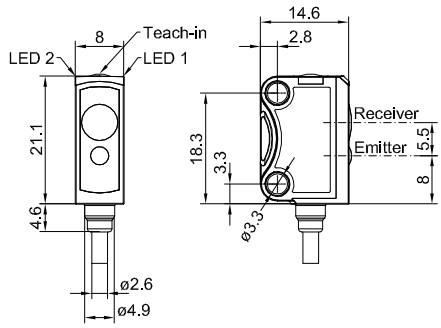
Plug connection

153-00894



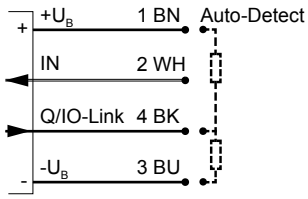
Cable connection

153-00895



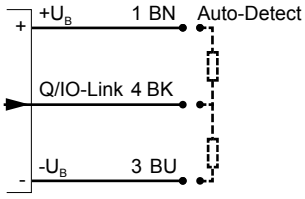
Connection, 4-pin, IO-Link

154-00566



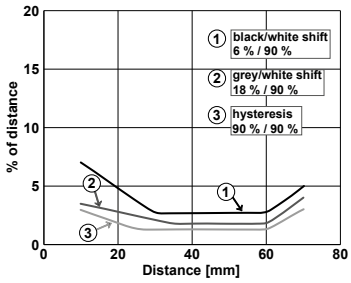
Connection, 3-pin, IO-Link

154-00572



Scanning properties

155-02719



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

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	
Scanning distance	6 … 15 mm[1] 6 … 30 mm[1]
Type of light	Laser, red, 655 nm
Light spot size (total detection area)	1 x 3 mm
Laser Class (IEC 60825-1)	1

Functions	
Indicator LED, green	Operating voltage indicator
Indicator LED, yellow	Switching output indicator
Adjustment possibilities	N.O. / N.C. via control input[3] and IO-Link

Electrical data	
Operating voltage, $+U_B$	10 … 30 V DC[2]
No-load current, I_0	≤ 12 mA
Output current, Ie	≤ 50 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection (Q)
Protection Class	2
Switching output, Q	PNP/NPN (see selection table)
Output function	N.O./N.C.
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz
Response time	500 µs
Control input, IN[3]	$+U_B$ = N.C. $-U_B$ / Open = N.O.

Mechanical data	
Dimensions	21.1 x 14.6 x 8 mm
Enclosure rating	IP 67[4]
Material, housing	PUR
Material, front screen	PMMA
Type of connection	See selection table
Ambient temperature: operation	-20 … +50 °C[5]
Ambient temperature: storage	-20 … +80 °C
Weight (plug device)	Approx. 3 g
Weight (cable device)	Approx. 22 g
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

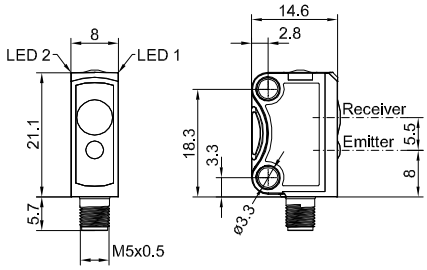
[1] Reference material white, 90 % reflectivity [2] Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz [3] Only 4-pin design [4] With connected IP 67 plug [5] UL: -20 ... +30 °C

Operating range	Switching output	Type of connection	Part number	Article number
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

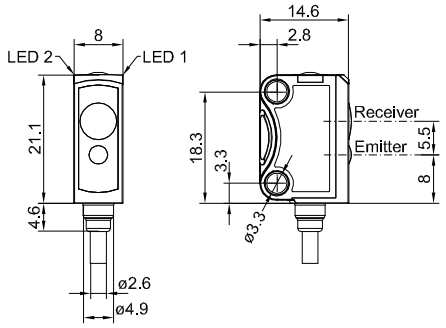
Plug connection

153-00909



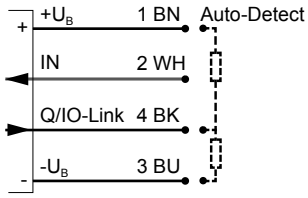
Cable connection

153-00910



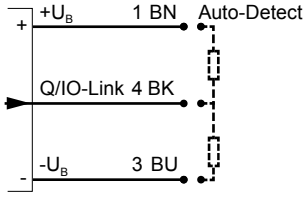
Connection, 4-pin

154-00566



Connection, 3-pin

154-00572



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

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

Scanning distance	2 … 70 mm[1]
Adjustment range	10 … 70 mm[1]
Used light	LED, red, 650 nm
Light spot size	See diagram
Hysteresis	≤ 2 mm[2]
Grey/white shift (18 % / 90 %)	≤ 3 mm[2]
Black/white shift (6 % / 90 %)	≤ 4 mm[2]

Functions

Indicator LED, green	Operating voltage indicator
Indicator LED, yellow	Switching output indicator
Scanning distance adjustment	Via Teach-in button, control input[5] and IO-Link
Teach-in modes	Mode 1: during running process Mode 2: during standing process
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
Default settings	Max. range and N.O.

Electrical data

Operating voltage, $+U_B$	10 … 30 V DC[3]
No-load current, I_0	≤ 20 mA
Output current, Ie	≤ 50 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection (Q)
Protection class	2
Power On Delay	< 300 ms
Switching output, Q	1x Auto-Detect (PNP/NPN)[4]
Output function	N.O./N.C.
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz
Response time	500 µs
Control input, IN[5]	$+U_B$ = teach-in $-U_B$ = button locked Open = normal operation

Mechanical data

Dimensions	21,1 x 14,6 x 8 mm
Enclosure rating	IP 67[6]
Material, housing	PUR
Material, front screen	PMMA
Type of connection	See selection table
Ambient temperature: operation	-20 … +60 °C[7]
Ambient temperature: storage	-20 … +80 °C
Weight (plug device)	Approx. 3 g
Weight (cable device)	Approx. 22 g
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] 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

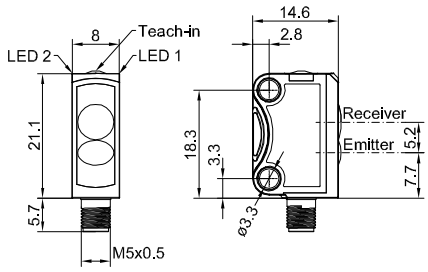
Version: 07/2023. Subject to changes; diagrams similar

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

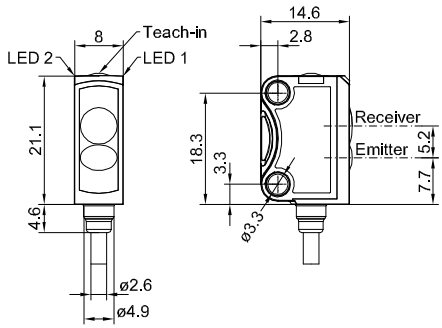
Plug connection

153-01109



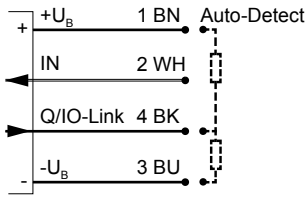
Cable connection

153-01110



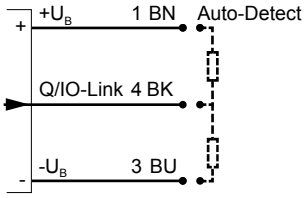
Connection, 4-pin, IO-Link

154-00566



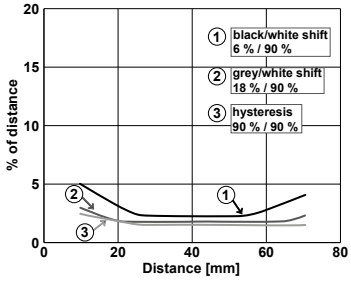
Connection, 3-pin, IO-Link

154-00572



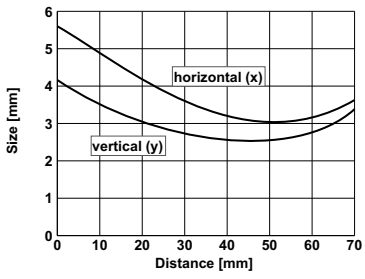
Scanning properties

155-02718



Light spot size

155-01770



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

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

Scanning distance	3 … 100 mm[1]
Adjustment range	10 … 100 mm[1]
Used light	LED, blue, 470 nm
Light spot size	See diagram
Hysteresis	≤ 1.2 mm[1, 2]
Grey/white shift (18 % / 90 %)	≤ 1.4 mm[2]
Black/white shift (6 % / 90 %)	≤ 2.4 mm[2]

Functions

Indicator LED, green	Operating voltage indicator
Indicator LED, yellow	Switching output indicator
Scanning distance adjustment	Via Teach-in button, control input and IO-Link
Teach-in modes	Mode 1: during running process Mode 2: during standing process
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
Default settings	Max. range and N.O.

Electrical data

Operating voltage, $+U_B$	13 … 30 V DC[3]
No-load current, I_0	≤ 20 mA
Output current, Ie	≤ 50 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection (Q)
Protection class	2
Power On Delay	< 300 ms
Switching output, Q	1x Auto-Detect (PNP/NPN)[4]
Output function	N.O./N.C.
Switching frequency, f (ti/tp 1:1)	≤ 700 Hz
Response time	700 µs
Control input, IN	$+U_B$ = teach-in / keylock / disabled[5] $-U_B$ / open = normal operation

Mechanical data

Dimensions	21,1 x 14,6 x 8 mm
Enclosure rating	IP 67[6]
Material, housing	PUR
Material, front screen	PMMA
Type of connection	See selection table
Ambient temperature: operation	-20 … +60 °C[7]
Ambient temperature: storage	-20 … +80 °C
Weight (cable device)	Approx. 22 g
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

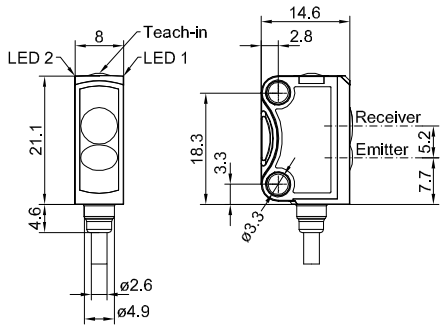
[1] Reference material white, 90 % reflectivity [2] At maximum scanning distance [3] Max. 10 % ripple within U_B, ~ 50 Hz / 100 Hz [4] Auto-Detect, automatic PNP/NPN selection by the sensor, PNP or NPN fixed [5] Adjustable via IO-Link, default:Teach-in [6] With connected IP 67 plug [7] UL: -20 ... +30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

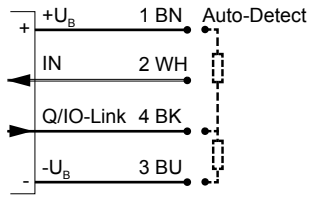
Cable connection

153-01110



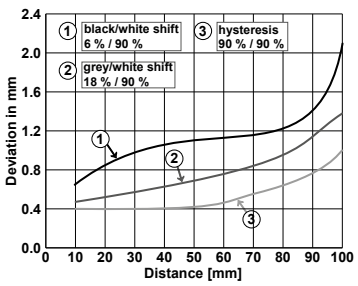
Connection, 4-pin, IO-Link

154-00566



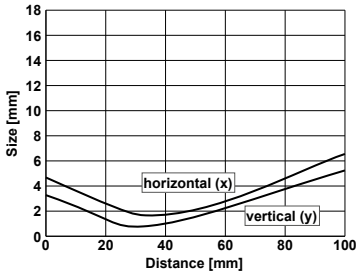
Scanning properties

155-03577



Light spot size

155-03578



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

FT 10-BHD

BlueLight-Photoelectric diffuse sensor with background suppression and two switching outputs

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
- Two physical switching outputs
- Sensor settings via teach-in, control input and IO-Link
- No blind zone in Detect All mode

Optical data

Scanning distance	3 … 150 mm[1]
Adjustment range	10 … 150 mm[1]
Used light	LED, blue, 470 nm
Light spot size	See diagram
Hysteresis	≦ 3.6 mm[1, 2]
Grey/white shift (20 % / 90 %)	See diagram
Black/white shift (5 % / 90 %)	See diagram

Functions

Indicator LED, green	Operating voltage indicator
Indicator LED, yellow	Switching output indicator
Scanning distance adjustment	Via Teach-in button and IO-Link
Teach-in modes	Mode 1: during running process Mode 2: during standing process
Adjustment possibilities	N.O./N.C. and Auto-Detect / NPN / PNP via teach-in button and IO-Link Button lock via IO-Link Wide variety of adjustment possibilities via IO-Link
Default settings	Max. range and N.O.

Electrical data

Operating voltage, $+U_B$	13 … 30 V DC[3]
No-load current, I_0	≦ 20 mA
Output current, Ie	≦ 50 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection (Q)
Protection class	2
Power On Delay	< 300 ms
Switching output, Q	1 x Auto-Detect (PNP/NPN)[4]
Output function	N.O./N.C.
Switching frequency, f (ti/tp 1:1)	≦ 700 Hz
Response time	700 µs
Number of switching outputs	2

Mechanical data

Dimensions	21,1 x 14,6 x 8 mm
Enclosure rating	IP 67[5]
Material, housing	PUR
Material, front screen	PMMA
Type of connection	See selection table
Ambient temperature: operation	-20 … +60 °C[6]
Ambient temperature: storage	-20 … +80 °C
Weight (cable device)	Approx. 22 g
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

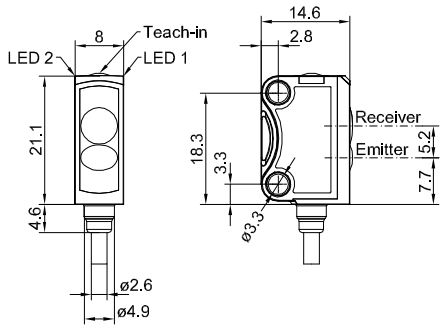
[1] Reference material white, 90 % reflectivity [2] At maximum scanning distance [3] Max. 10 % ripple within U_B, ~ 50 Hz / 100 Hz [4] Auto-Detect, automatic PNP/NPN selection by the sensor, PNP or NPN fixed [5] With connected IP 67 plug [6] UL: -20 ... +30 °C

Scanning distance	Switching output	Type of connection	Part number	Article number
3 … 150 mm[1]	2 x Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 10-BHD-2PNSL-K4	600-11065
3 … 150 mm[1]	2 x Auto-Detect	Pigtail, 200 mm with M8 plug, 4-pin, IO-Link	FT 10-BHD-2PNSL-KM4	600-11064

Including dovetail clamp mounting MBD F 10 for all types

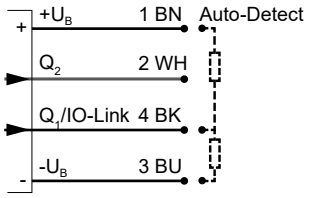
Cable connection

153-01110



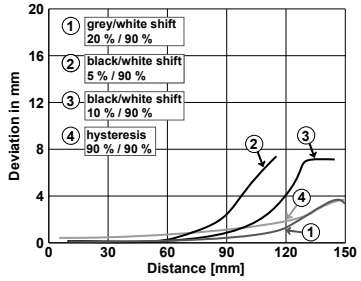
Connection, 4-pin, IO-Link

154-00593



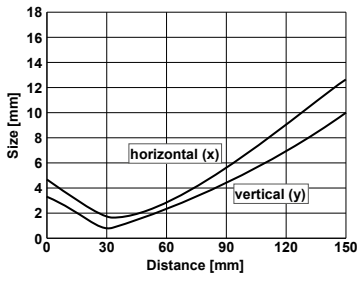
Scanning properties

155-03623



Light spot size

155-03622



Reference material	Detection range	Accessories	
Grey (20 %)	3 … 150 mm	Connection cables	www.sensopart.com/en/accessories
Black (10 %)	4 … 145 mm	Brackets	
Ultra black (5 %)	5 … 115 mm	SensoIO (901-01001)	

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	
Scanning distance	2 … 15 mm[1] 2 … 30 mm[1] 2 … 50 mm[1]
Used light	LED, red, 650 nm
Light spot size	See diagram

Functions	
Indicator LED, green	Operating voltage indicator
Indicator LED, yellow	Switching output indicator
Adjustment possibilities	N.O. / N.C. via control input[3] and IO-Link

Electrical data	
Operating voltage, $+U_B$	10 … 30 V DC[2]
No-load current, I_0	≤ 20 mA
Output current, Ie	≤ 50 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection (Q)
Protection class	2
Power On Delay	< 300 ms
Switching output, Q	PNP/NPN (see selection table)
Output function	N.O./N.C.
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz
Response time	500 µs
Control input, IN[3]	$+U_B$ = N.C. $-U_B$ / Open = N.O.

Mechanical data	
Dimensions	21,1 x 14,6 x 8 mm
Enclosure rating	IP 67[4]
Material, housing	PUR
Material, front screen	PMMA
Type of connection	See selection table
Ambient temperature: operation	-20 … +60 °C[5]
Ambient temperature: storage	-20 … +80 °C
Weight (cable device)	Approx. 22 g
Weight (pigtail)	Approx. 10 g

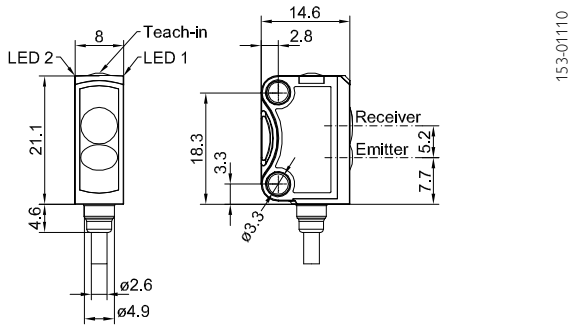
IO-Link	
Communication mode	COM 2
Min. cycletime	2.3 ms
SIO mode	Compatible
Data storage	Compatible
Length process data	16 Bit
Specification	1.1

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

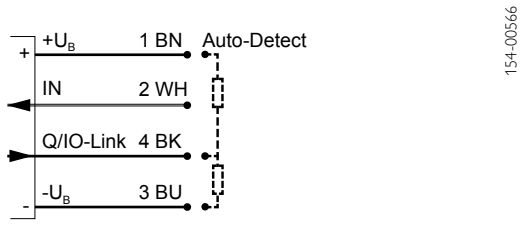
Scanning distance	Switching output	Type of connection	Part number	Article number
2 … 15 mm[1]	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 10-RF1-PNSL-K4	600-11052
2 … 15 mm[1]	Auto-Detect	Pigtail, 200 mm with M8 plug, 4-pin, IO-Link	FT 10-RF1-PNSL-KM4	600-11053
2 … 15 mm[1]	Auto-Detect	Pigtail, 200 mm 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

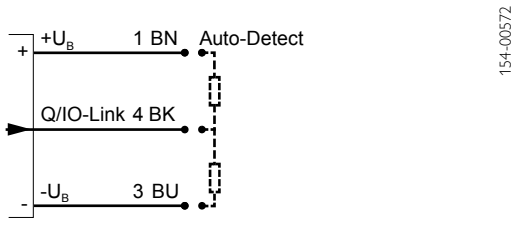
Cable connection



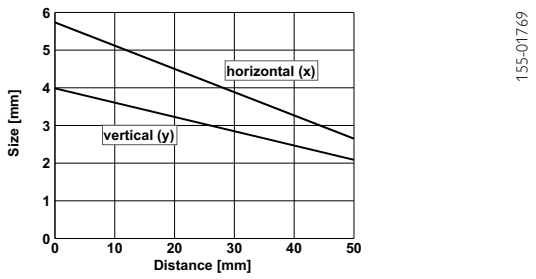
Connection, 4-pin



Connection, 3-pin



Light spot size



Reference material	Detection range		
	FT 10-RF1	FT 10-RF2	FT 10-RF3
white (90 %)	2 … 15 mm	2 … 30 mm	2 … 50 mm
grey (18 %)	4 … 15 mm	4 … 30 mm	4 … 50 mm
black (6 %)	5 … 15 mm	5 … 30 mm	5 … 50 mm

Accessories	
Connection cables	www.sensopart.com/en/accessories
Brackets	
SensoIO (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	
Scanning distance	2 … 30 mm[1] / 2 … 50 mm[1]
Optimum scanning distance	15 … 20 mm
Used light	LED, blue, 450 nm
LED risk group (DIN 62471)	2
Light spot size	See diagram
Ambient light	EN IEC 60947-5-2

Functions	
Indicator LED, green	Operating voltage indicator
Indicator LED, yellow	Switching output indicator
Adjustment possibilities	N.O. / N.C. via control input[3]

Electrical data	
Operating voltage $+U_B$	10 … 30 V DC[2]
No-load supply current I_0	≤ 20 mA
Output current Ie	≤ 50 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection (Q)
Protection class	2
Power On Delay	< 300 ms
Switching output, Q	PNP/NPN (see selection table)
Output function	N.O./N.C.
Switching frequency, f (ti/tp 1:1)	1000 Hz
Response time	500 µs
Control input, IN[3]	$+U_B$ = N.C. $-U_B$ / Open = N.O.

Mechanical data	
Dimensions	21,1 x 14,6 x 8 mm
Enclosure rating	IP 67[4]
Material, housing	PUR
Material, front screen	PMMA
Type of connection	See selection table
Ambient temperature: operation	-20 … +50 °C[5]
Ambient temperature: storage	-20 … +80 °C
Weight (cable device)	Approx. 22 g
Weight (pigtail)	Approx. 10 g

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

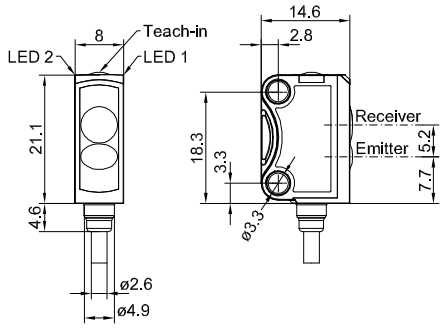
Scanning distance	Switching output	Type of connection	Part number	Article number
2 … 30 mm[1]	PNP	Cable, 2 m, 4-wire	FT 10-BF2-PS-K4	600-11026
2 … 30 mm[1]	NPN	Cable, 2 m, 4-wire	FT 10-BF2-NS-K4	600-11029
2 … 30 mm[1]	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-BF2-PS-KM4	600-11027
2 … 30 mm[1]	NPN	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

Version: 07/2023. Subject to changes; diagrams similar

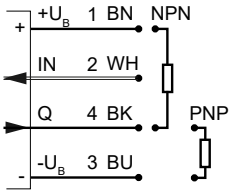
Cable connection

153-01110



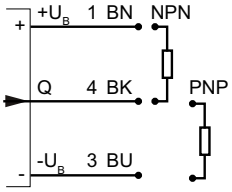
Connection, 4-pin

154-00508



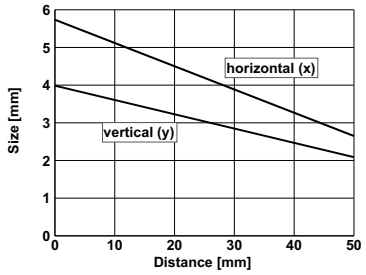
Connection, 3-pin

154-00509



Light spot size

155-01769



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	
Limit range	0.1 … 4 m[1]
Operating range	0.1 … 3 m[1]
Type of light	Laser, red, 655 nm
Light spot size	See diagram
Laser Class (IEC 60825-1)	1

Functions	
Indicator LED, green	Operating voltage indicator
Indicator LED, yellow	Switching output indicator
Sensitivity adjustment	Via Teach-in button and control input[3]
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	
Operating voltage, $+U_B$	10 … 30 V DC[2]
No-load current, I_0	≤ 12 mA
Output current, Ie	≤ 50 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection (Q)
Protection Class	2
Switching output, Q	PNP/NPN (see selection table)
Output function	N.O./N.C.
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz
Response time	500 µs
Control input, IN[3]	$+U_B$ = teach-in $-U_B$ = button locked Open = normal operation

Mechanical data	
Dimensions	21.1 x 14.6 x 8 mm
Enclosure rating	IP 67[4]
Material, housing	PUR
Material, front screen	PMMA
Type of connection	See selection table
Ambient temperature: operation	-20 … +50 °C[5]
Ambient temperature: storage	-20 … +80 °C
Weight (plug device)	Approx. 3 g
Weight (cable device)	Approx. 22 g
Weight (pigtail)	Approx. 10 g

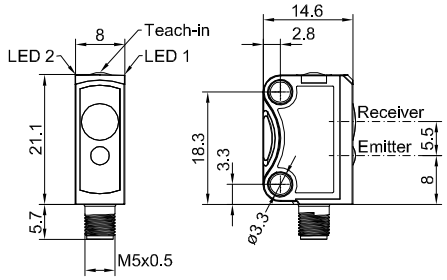
[1] Reference material: R5/L reflector [2] Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz [3] Only 4-pin design [4] With connected IP 67 plug [5] UL: -20 ... +30 °C

Operating range	Switching output	Type of connection	Part number	Article number
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

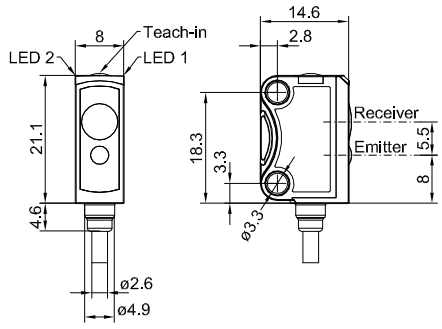
Plug connection

153-00894



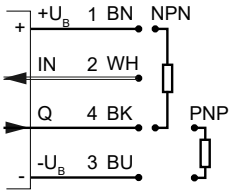
Cable connection

153-00895



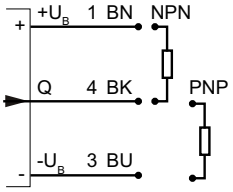
Connection, 4-pin

154-00508



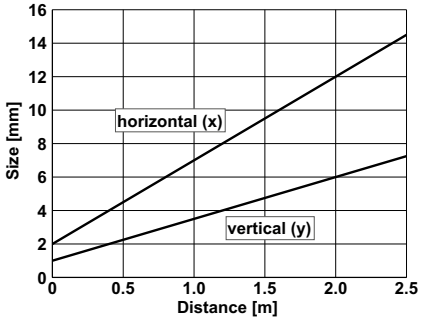
Connection, 3-pin

154-00509



Light spot size

155-01289



Reflector / Reflective foil*	Operating range
R5/L	0.1 … 3 m
RF-100 KL*	0.1 … 3 m

Accessories	
Reflectors	www.sensopart.com/en/accessories
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 µs
- Static and dynamic teach-in via electronic teach-in button or control line
- Simple mounting and adjustment through innovative dovetail clamp mounting

Optical data	
Operating range	0.1 … 1.6 m[1]
Used light	LED, red, 650 nm
Light spot size	See diagram
Polarising filter	Yes

Functions	
Indicator LED green	Operating voltage indicator
Indicator LED yellow	Switching output indicator
Sensitivity adjustment	Via Teach-in button and control input[3]
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	
Operating voltage, $+U_B$	10 … 30 V DC[2]
No-load current, I_0	≤ 20 mA
Output current, Ie	≤ 50 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection (Q)
Protection class	2
Power On Delay	< 300 ms
Switching output, Q	PNP/NPN (see selection table)
Output function	N.O./N.C.
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz
Response time	500 µs
Control input, IN[3]	$+U_B$ = teach-in $-U_B$ = button locked Open = normal operation

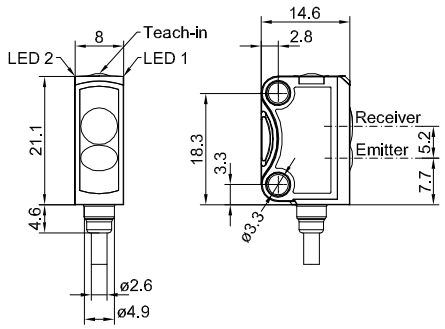
Mechanical data	
Dimensions	21,1 x 14,6 x 8 mm
Enclosure rating	IP 67[4]
Material, housing	PUR
Material, front screen	PMMA
Type of connection	See selection table
Ambient temperature: operation	-20 … +60 °C[5]
Ambient temperature: storage	-20 … +80 °C
Weight (cable device)	Approx. 22 g
Weight (pigtail)	Approx. 10 g

[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

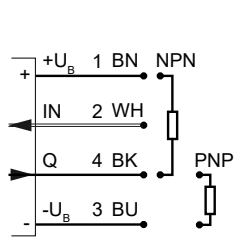
Operating range	Switching output	Type of connection	Part number	Article number-Nr.
0.1 … 1.6 m[1]	PNP	Cable, 2 m, 4-wire	FR 10-R-PS-K4	603-11001
0.1 … 1.6 m[1]	NPN	Cable, 2 m, 4-wire	FR 10-R-NS-K4	603-11004
0.1 … 1.6 m[1]	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FR 10-R-PS-KM4	603-11002
0.1 … 1.6 m[1]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

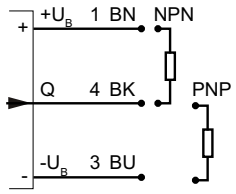
Cable connection



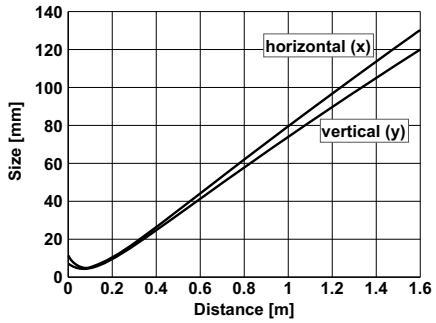
Connection, 4-pin



Connection, 3-pin



Light spot size



Reflector / Reflective foil*	Operating range (min./max. reflector distance)
R5	0.1 … 1.6 m
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

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

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	
Limit range	0 … 5 m
Operating range	0 … 4 m
Type of light	Laser, red, 655 nm
Light spot size	See diagram
Laser Class (IEC 60825-1)	1

Functions	
Indicator LED, green	Operating voltage indicator
Indicator LED, yellow	Switching output indicator
Sensitivity adjustment	Via Teach-in button and control input[2]
Teach-in modes	Mode 1: during running process Mode 2: during standing process
Adjustment possibilities (receiver)	N.O. / N.C. via Teach-in button and control input[2] Button lock via control input[2]
Default settings	Max. range and N.O.

Electrical data	
Operating voltage, $+U_B$	10 … 30 V DC[1]
No-load current, I_0	≤ 12 mA
Output current, Ie	≤ 50 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection (Q)
Protection Class	2
Switching output, Q	PNP/NPN (see selection table)
Output function	N.O./N.C.
Switching frequency, f (ti/tp 1:1)	≤ 4000Hz
Response time	125 µs
Control input, IN (receiver)[2]	$+U_B$ = teach-in $-U_B$ = button locked Open = normal operation
Control input, Test (transmitter)	$+U_B$ = Test (transmitter off) $-U_B$ / Open = normal operation

Mechanical data	
Dimensions	21.1 x 14.6 x 8 mm
Enclosure rating	IP 67[3]
Material, housing	PUR
Material, front screen	PMMA
Type of connection	See selection table
Ambient temperature: operation	-20 ... +50 °C[4]
Ambient temperature: storage	-20 ... +80 °C
Weight (plug device)	Approx. 6 g
Weight (cable device)	Approx. 44 g
Weight (pigtail)	Approx. 20 g

[1] Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz [2] Only 4-pin design [3] With connected IP 67 plug [4] UL: -20 ... +30 °C

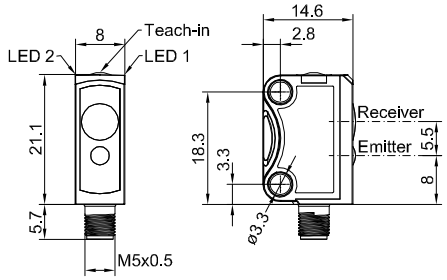
Operating range	Switching output	Type of connection	Part number	Design	Article number
0 … 4 m	PNP	Plug, M5x0.5, 4-pin	FS/FE 10-RL-PS-E4	Sensor pair (transmitter & receiver)	611-51000
0 … 4 m	NPN	Plug, M5x0.5, 4-pin	FS/FE 10-RL-NS-E4	Sensor pair (transmitter & receiver)	611-51001
0 … 4 m	PNP	Cable, 2 m, 4-wire	FS/FE 10-RL-PS-K4	Sensor pair (transmitter & receiver)	611-51002
0 … 4 m	NPN	Cable, 2 m, 4-wire	FS/FE 10-RL-NS-K4	Sensor pair (transmitter & receiver)	611-51003
0 … 4 m	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FS/FE 10-RL-PS-KM4	Sensor pair (transmitter & receiver)	611-51004
0 … 4 m	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FS/FE 10-RL-NS-KM4	Sensor pair (transmitter & receiver)	611-51005
0 … 4 m	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FS/FE 10-RL-PS-KM3	Sensor pair (transmitter & receiver)	611-51006
0 … 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

Version: 07/2023. Subject to changes; diagrams similar

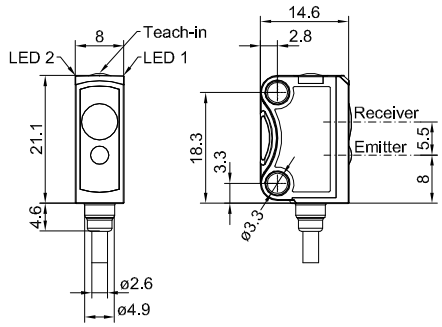
Plug connection

153-00894



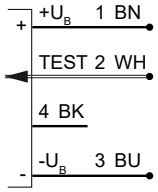
Cable connection

153-00895



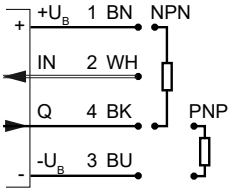
Connection, transmitter, 4-pin

154-00511



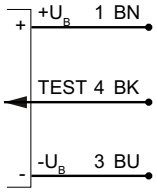
Connection, receiver, 4-pin

154-00508



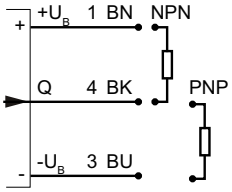
Connection, transmitter, 3-pin

154-00514



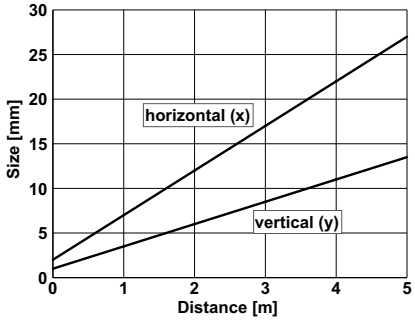
Connection, receiver, 3-pin

154-00509



Light spot size

155-01321



Accessories

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

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FS 10-RL / FE 10-RL

Through-beam laser sensor

PRODUCT HIGHLIGHTS

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Default settings	Max. range and N.O.

Electrical data	
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No-load current, I_0	≤ 12 mA
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Protective circuits	Reverse-polarity protection, U_B / short-circuit protection (Q)
Protection Class	2
Switching output, Q	PNP/NPN (see selection table)
Output function	N.O./N.C.
Switching frequency, f (ti/tp 1:1)	≤ 4000Hz
Response time	125 µs
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Control input, Test (transmitter)	$+U_B$ = Test (transmitter off) $-U_B$ / Open = normal operation

Mechanical data	
Dimensions	21.1 x 14.6 x 8 mm
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Weight (cable device)	Approx. 44 g
Weight (pigtail)	Approx. 20 g

[1] Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz [2] Only 4-pin design [3] With connected IP 67 plug [4] UL: -20 ... +30 °C

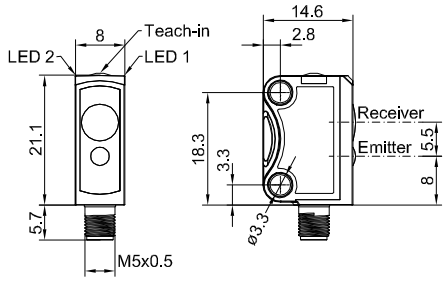
Operating range	Switching output	Type of connection	Part number	Design	Article number
0 … 4 m	PNP	Plug, M5x0.5, 4-pin	FE 10-RL-PS-E4	Receiver	602-71000
0 … 4 m	–	Plug, M5x0.5, 4-pin	FS 10-RL-E4	Transmitter	601-61000
0 … 4 m	NPN	Plug, M5x0.5, 4-pin	FE 10-RL-NS-E4	Receiver	602-71001
0 … 4 m	PNP	Cable, 2 m, 4-wire	FE 10-RL-PS-K4	Receiver	602-71002
0 … 4 m	–	Cable, 2 m, 4-wire	FS 10-RL-K4	Transmitter	601-61002
0 … 4 m	NPN	Cable, 2 m, 4-wire	FE 10-RL-NS-K4	Receiver	602-71003
0 … 4 m	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FE 10-RL-PS-KM4	Receiver	602-71004
0 … 4 m	–	Pigtail, 200 mm with M8 plug, 4-pin	FS 10-RL-KM4	Transmitter	601-61004
0 … 4 m	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FE 10-RL-NS-KM4	Receiver	602-71005
0 … 4 m	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FE 10-RL-PS-KM3	Receiver	602-71006
0 … 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.
0 … 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

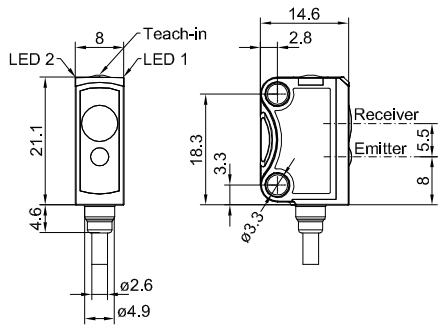
Plug connection

153-00894



Cable connection

153-00895



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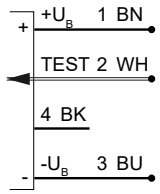
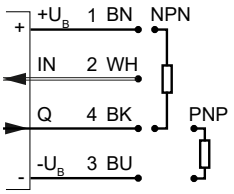
Connection, transmitter, 4-pin

154-00511



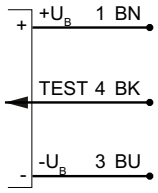
Connection, receiver, 4-pin

154-00508



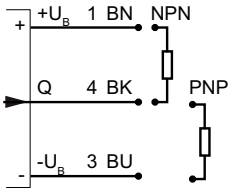
Connection, transmitter, 3-pin

154-00514



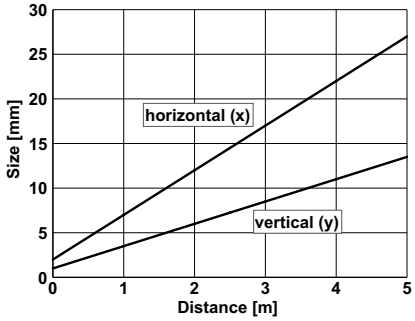
Connection, receiver, 3-pin

154-00509



Light spot size

155-01321



Accessories

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