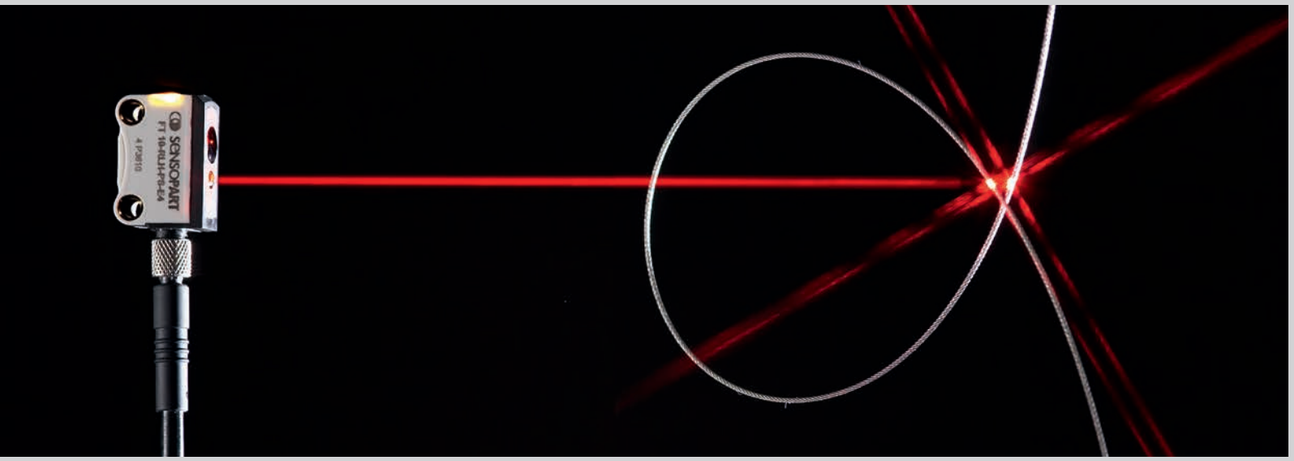
F 10 sub-miniature laser sensors

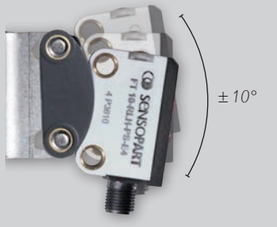
Small housings, great performance



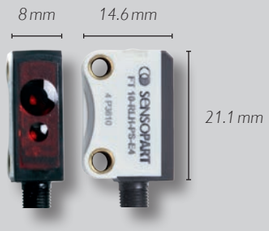
The F 10 is the only sub-miniature sensor on the market with laser light and adjustable background suppression. Its precise light spot is still so focused, even at longer distances, that small parts in the millimetre range can be reliable detected, e.g. a wire with a diameter of 0.5 mm at a distance of 60 mm. With such capabilities, the sensors of the F 10 series have nothing to fear from the considerably larger examples of their sort.

Whether in handling and positioning applications, during the production of solar cells, or for the placement of semiconductor components, the sensors – just 21.1 x 14.6 x 8 mm³ in size and weighing only 3 grammes – even fit into a robot gripper without being a burden. With their great performance, the F 10 series is also an alternative to (considerably more expensive) fibre-optic systems.

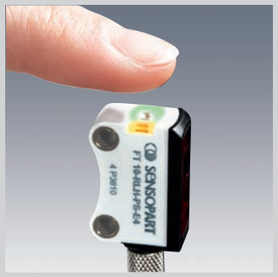
The F 10 series not only impresses through its excellent performance data, but also through its unmistakeable design with special features – that are unique in this size of housing. The dovetail mounting system considerably simplifies fine adjustment, particularly in difficult installation locations, and the M5 plug allows rapid connection and exchange. A small sensor that gives users great pleasure!



Simple mounting:
Mounting using a dovetail that permits fine retro-adjustment of the sensor is particularly recommended when installation 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.



Bright but harmless laser light:
The red-light laser of the F 10 generates a bright light spot that is also easily visible in daylight. Being in Laser Class 1, however, it poses no danger.

made in Germany

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 adjustable background suppression
- Reliable suppression of sunlight and highly reflective machine parts
- Reliable detection of very dark, glossy and structured objects
- Bright, focused laser light spot for first-class small-part detection and simple alignment
- User-friendly commissioning via electronic Teach-in button or control line
- Well thought-out mounting accessories for rapid and easy integration
- Wide range of types to meet individual requirements
- Robust, detergent-proof plastic housing (IP 67, Ecolab) for use in harsh industrial environments
- Brass-reinforced mounting holes

F 10 – Product Overview

	Type of light	Adjustment	Scanning distance / range	Special features	Page
Photoelectric proximity sensors with background suppression					
FT 10-RLH	Laser	Teach-in	60 mm	The only scanner with scanning distance adjustment	202
FT 10-RLHR	Laser	Teach-in	60 mm	Broad-beam light spot	204
FT 10-B-RLF	Laser	Fixed focus	15 mm / 30 mm		206
Retroreflective photoelectric sensors					
FR 10-RL	Laser	Teach-in	2 m		208
Through-beam photoelectric sensors					
FS/FE 10-RL	Laser	Teach-in	3 m	Sensor pair, very accurate object positioning	210
FS 10-RL/FE 10-RL	Laser	Teach-in	3 m	Transmitter/receiver, very accurate object positioning	212

FT 10-RLH

Laser photoelectric proximity sensor with background suppression

PRODUCT HIGHLIGHTS

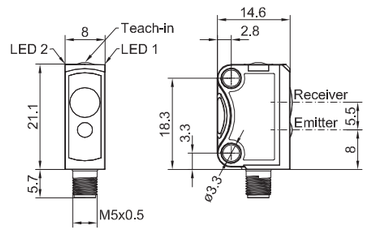
- Sub-miniature sensor with laser light and adjustable background suppression
- Precise and reliable switching behaviour, even with varying object surfaces and colours
- Reliable operation even with highly reflective machine parts in the background, thanks to SensoPart ASIC technology
- Particularly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

Optical data		Functions	
Scanning distance	1 … 60 mm[1]	Indicator LED, green	Operating voltage indicator
Adjustment range	10 … 60 mm[1]	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 655 nm	Scanning distance adjustment	Via Teach-in button and control input
Light spot size (total detection area)	1 x 3 mm[2]	Adjustment possibilities	Button lock via control input
Laser Class (DIN EN 60825-1:2008-5)	1	Default settings	Max. scanning distance and N.O.
Electrical data		**Mechanical data**	
Operating voltage, $+U_B$	10 … 30 V DC[2]	Dimensions	21.1 x 14.6 x 8 mm[3]
No-load current, I_0	≤ 12 mA	Enclosure rating	IP 67[3]
Output current, Ie	≤ 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
Output function	N.O.	Ambient temperature: storage	-20 … +80 °C
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (plug device)	Ca. 3 g
Response time	500 µs	Weight (cable device)	Ca. 22 g
Control input, IN (only 4-pin design)	$+U_B$ = teach-in $-U_B$ = button locked Open = normal operation	Weight (pigtail)	Ca. 10 g

[1] Reference material white, 90 % reflectivity [2] Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz [3] With connected IP 67 plug

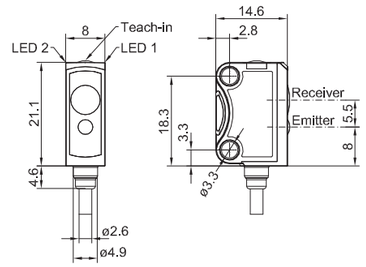
Scanning distance	Switching output	Type of connection	Part number	Article number
1 … 60 mm	PNP	Plug, M5x0.5, 4-pin	FT 10-RLH-PS-E4	600-11130
1 … 60 mm	NPN	Plug, M5x0.5, 4-pin	FT 10-RLH-NS-E4	600-11131
1 … 60 mm	PNP	Cable, 2 m, 4-wire	FT 10-RLH-PS-K4	600-11132
1 … 60 mm	NPN	Cable, 2 m, 4-wire	FT 10-RLH-NS-K4	600-11133
1 … 60 mm	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-RLH-PS-KM4	600-11134
1 … 60 mm	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-RLH-NS-KM4	600-11135
1 … 60 mm	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-RLH-PS-KM3	600-11146
1 … 60 mm	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-RLH-PS-KM3	600-11147

Plug connection



153-00894

Cable connection



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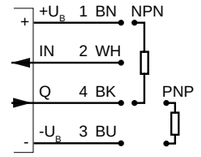
Connection, 4-pin



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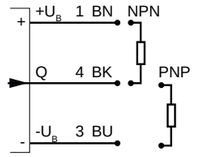
Connection, 3-pin



154-00509

Reference material	Detection range
White (90 %)	1 … 60 mm
Grey (18 %)	5 … 60 mm
Black (6 %)	5 … 60 mm

Accessories	
Connection cables	From Page 670
Brackets	From Page 642

FT 10-RLHR

Laser photoelectric proximity sensor with background suppression

PRODUCT HIGHLIGHTS

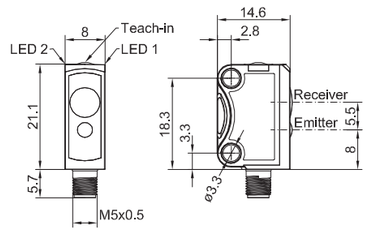
- Sub-miniature sensor with wide laser light spot and adjustable background suppression
- Precise and reliable switching behaviour, even with varying object surfaces and colours
- Reliable operation even with highly reflective machine parts in the background, thanks to SensoPart ASIC technology
- Particularly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

Optical data		Functions	
Scanning distance	4 … 60 mm[1]	Indicator LED, green	Operating voltage indicator
Adjustment range	10 … 60 mm[1]	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 655 nm	Scanning distance adjustment	Via Teach-in button and control input
Light spot size	See diagram	Adjustment possibilities	Button lock via control input
Laser Class (DIN EN 60825-1:2008-5)	1	Default settings	Max. scanning distance and N.O.
Electrical data		**Mechanical data**	
Operating voltage, $+U_B$	10 … 30 V DC[2]	Dimensions	21.1 x 14.6 x 8 mm[3]
No-load current, I_0	≤ 12 mA	Enclosure rating	IP 67[3]
Output current, Ie	≤ 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
Output function	N.O.	Ambient temperature: storage	-20 … +80 °C
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (plug device)	Ca. 3 g
Response time	500 µs	Weight (cable device)	Ca. 22 g
Control input, IN (only 4-pin design)	$+U_B$ = teach-in $-U_B$ = button locked Open = normal operation	Weight (pigtail)	Ca. 10 g

[1] Reference material white, 90 % reflectivity [2] Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz [3] With connected IP 67 plug

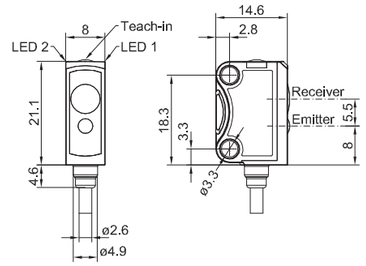
Scanning distance	Switching output	Type of connection	Part number	Article number
4 … 60 mm	PNP	Plug, M5x0.5, 4-pin	FT 10-RLHR-PS-E4	600-11136
4 … 60 mm	NPN	Plug, M5x0.5, 4-pin	FT 10-RLHR-NS-E4	600-11137
4 … 60 mm	PNP	Cable, 2 m, 4-wire	FT 10-RLHR-PS-K4	600-11138
4 … 60 mm	NPN	Cable, 2 m, 4-wire	FT 10-RLHR-NS-K4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

Plug connection



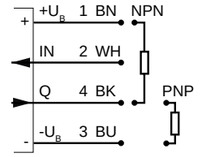
153-00894

Cable connection



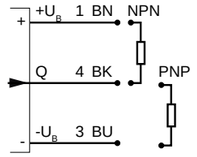
153-00895

Connection, 4-pin



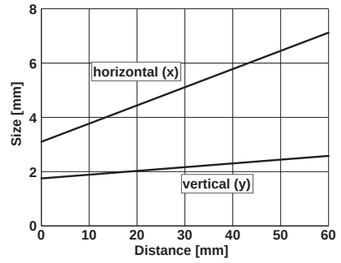
154-00508

Connection, 3-pin



154-00509

Light spot size



155-01331

Reference material	Detection range
White (90 %)	4 … 60 mm
Grey (18 %)	5 … 60 mm
Black (6 %)	5 … 60 mm

Accessories	
Connection cables	From Page 670
Brackets	From Page 642

FT 10-B-RLF

Laser photoelectric proximity sensor with background suppression, fixed focus

PRODUCT HIGHLIGHTS

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

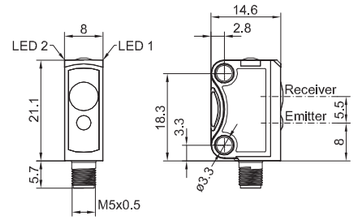
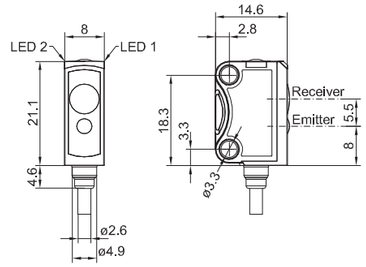
Optical data		Functions	
Scanning distance	1 … 15 mm[1]	Indicator LED, green	Operating voltage indicator
	1 … 30 mm[1]	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 655 nm	Adjustment possibilities	N.O. / N.C. via control input
Light spot size (total detection area)	1 x 3 mm²		
Laser Class (DIN EN 60825-1:2008-5)	1		

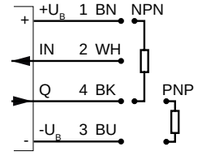
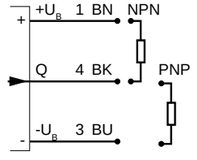
Electrical data		Mechanical data	
Operating voltage, $+U_B$	10 … 30 V DC[2]	Dimensions	21.1 x 14.6 x 8 mm[3]
No-load current, I_0	≤ 12 mA	Enclosure rating	IP 67[3]
Output current, Ie	≤ 50 mA	Material, housing	PUR
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection (Q)	Material, front screen	PMMA
		Type of connection	(See Selection Table)
Protection Class	2	Ambient temperature: operation	-20 … +50 °C
Switching output, Q	PNP / NPN (see Selection Table)	Ambient temperature: storage	-20 … +80 °C
Output function	N.O. / N.C.	Weight (plug device)	Ca. 3 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (cable device)	Ca. 22 g
Response time	500 µs	Weight (pigtail)	Ca. 10 g
Control input, IN (only 4-pin design)	$+U_B$ = N.C. $-U_B$ / Open = N.O.		

[1] Reference material white, 90 % reflectivity [2] Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz [3] With connected IP 67 plug

Operating range	Switching output	Type of connection	Part number	Article number
1 … 15 mm	PNP	Plug, M5x0.5, 4-pin	FT 10-B-RLF1-PS-E4	600-11100
1 … 15 mm	NPN	Plug, M5x0.5, 4-pin	FT 10-B-RLF1-NS-E4	600-11101
1 … 30 mm	PNP	Plug, M5x0.5, 4-pin	FT 10-B-RLF2-PS-E4	600-11106
1 … 30 mm	NPN	Plug, M5x0.5, 4-pin	FT 10-B-RLF2-NS-E4	600-11107
1 … 15 mm	PNP	Cable, 2 m, 4-wire	FT 10-B-RLF1-PS-K4	600-11102
1 … 15 mm	NPN	Cable, 2 m, 4-wire	FT 10-B-RLF1-NS-K4	600-11103
1 … 30 mm	PNP	Cable, 2 m, 4-wire	FT 10-B-RLF2-PS-K4	600-11108
1 … 30 mm	NPN	Cable, 2 m, 4-wire	FT 10-B-RLF2-NS-K4	600-11109
1 … 15 mm	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-B-RLF1-PS-KM4	600-11104
1 … 15 mm	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-B-RLF1-NS-KM4	600-11105
1 … 30 mm	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-B-RLF2-PS-KM4	600-11110
1 … 30 mm	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FT 10-B-RLF2-NS-KM4	600-11111

Operating range	Switching output	Type of connection	Part number	Article number
1 … 15 mm	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-B-RLF1-PS-KM3	600-11142
1 … 15 mm	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-B-RLF1-NS-KM3	600-11143
1 … 30 mm	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-B-RLF2-PS-KM3	600-11144
1 … 30 mm	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FT 10-B-RLF2-NS-KM3	600-11145

Plug connection	Cable connection
 153-00909	 153-00910

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

Reference material	Detection range
White (90 %)	1 … 15 mm / 30 mm
Grey (18 %)	5 … 15 mm / 30 mm
Black (6 %)	5 … 15 mm / 30 mm

Accessories	
Connection cables	From Page 670
Brackets	From Page 642

FR 10-RL

Laser retroreflective photoelectric sensor

PRODUCT HIGHLIGHTS

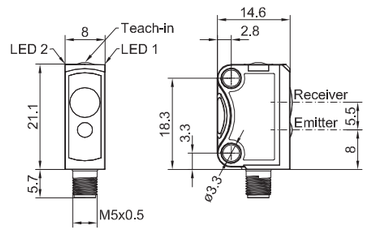
- Sub-miniature sensor for installation in the smallest of spaces
- Bright, precise laser light spot for optimum small-part detection and simple alignment
- Suitable for numerous different reflectors
- User-friendly operation via electronic Teach-in button or control line
- Robust, glass-fibre-reinforced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

Optical data		Functions	
Limit range	0.1 … 2.5 m[1]	Indicator LED, green	Operating voltage indicator
Operating range	0.1 … 2 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 (DIN EN 60825-1:2008-5)	1	Adjustment possibilities	N.O. / N.C. via Teach-in button and control input Button lock via control input
		Default settings	Max. range and N.O.
Electrical data		**Mechanical data**	
Operating voltage, $+U_B$	10 … 30 V DC[2]	Dimensions	21.1 x 14.6 x 8 mm[3]
No-load current, I_0	≤ 12 mA	Enclosure rating	IP 67[3]
Output current, Ie	≤ 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
Output function	N.O. / N.C.	Ambient temperature: storage	-20 … +80 °C
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (plug device)	Ca. 3 g
Response time	500 µs	Weight (cable device)	Ca. 22 g
Control input, IN (only 4-pin design)	$+U_B$ = teach-in $-U_B$ = button locked Open = normal operation	Weight (pigtail)	Ca. 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

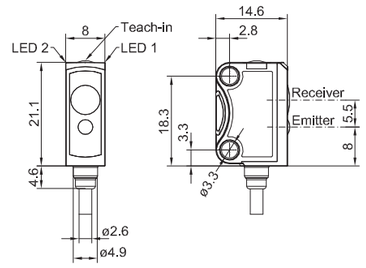
Operating range	Switching output	Type of connection	Part number	Article number
0.1 … 2 m	PNP	Plug, M5x0.5, 4-pin	FR 10-RL-PS-E4	603-31000
0.1 … 2 m	NPN	Plug, M5x0.5, 4-pin	FR 10-RL-NS-E4	603-31001
0.1 … 2 m	PNP	Cable, 2 m, 4-wire	FR 10-RL-PS-K4	603-31002
0.1 … 2 m	NPN	Cable, 2 m, 4-wire	FR 10-RL-NS-K4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

Plug connection



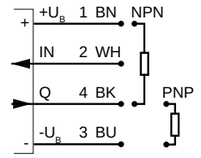
153-00894

Cable connection



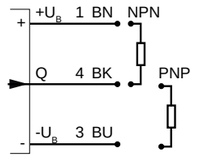
153-00895

Connection, 4-pin



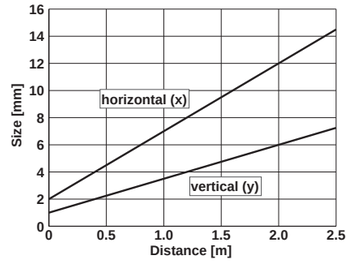
154-00508

Connection, 3-pin



154-00509

Light spot size



155-01289

Reflector / reflective foil *	Operating range	Accessories	
R5/L	0.1 … 2 m	Reflectors	From Page 654
R2-2LB	0.1 … 2 m	Connection cables	From Page 670
RF-50 KL*	0.06 … 0.75 m	Brackets	From Page 642
RF-230 KL*	0.1 … 2 m		

FS/FE 10-RL

Laser through-beam photoelectric sensor

PRODUCT HIGHLIGHTS

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

Optical data	
Limit range	0 … 5 m
Operating range	0 … 3 m
Type of light	Laser, red, 655 nm
Light spot size	See diagram
Laser Class (DIN EN 60825-1:2008-5)	1

Functions	
Indicator LED, green	Operating voltage indicator
Indicator LED, yellow	Switching output indicator
Sensitivity adjustment	Via Teach-in button and control input
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 Button lock via control input
Default settings	Max. range and N.O.

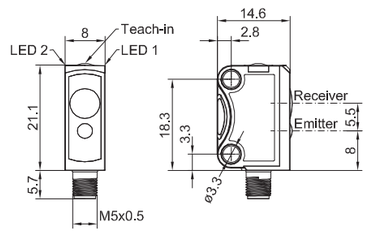
Electrical data	
Operating voltage, $+U_B$	10 … 30 V DC[1]
No-load current, I_0	≤ 12 mA
Output current, Ie	≤ 50 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection (Q)
Protection Class	2
Switching output, Q	PNP / NPN (see Selection Table)
Output function	N.O. / N.C.
Switching frequency, f (ti/tp 1:1)	≤ 4000Hz
Response time	125 µs
Control input, IN (receiver) (only 4-pin design)	$+U_B$ = 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[3]
Enclosure rating	IP 67[2]
Material, housing	PUR
Material, front screen	PMMA
Type of connection	(See Selection Table)
Ambient temperature: operation	-20 : +50 °C
Ambient temperature: storage	-20 : +80 °C
Weight (plug device)	Ca. 6 g
Weight (cable device)	Ca. 44 g
Weight (pigtail)	Ca. 20 g

[1] Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz [2] With connected IP 67 plug

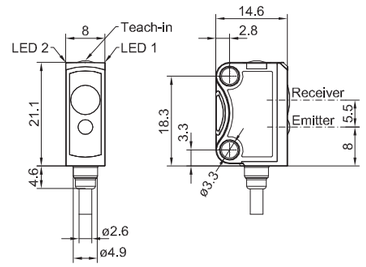
Operating range	Switching output	Type of connection	Part number	Design	Article number
1 … 3 m	PNP	Plug, M5x0.5, 4-pin	FS/FE 10-RL-PS-E4	Sensor pair (transmitter & receiver)	611-51000
1 … 3 m	NPN	Plug, M5x0.5, 4-pin	FS/FE 10-RL-NS-E4	Sensor pair (transmitter & receiver)	611-51001
1 … 3 m	PNP	Cable, 2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

Plug connection



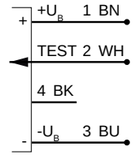
153-00894

Cable connection



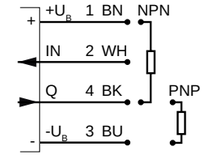
153-00895

Connection, transmitter, 4-pin



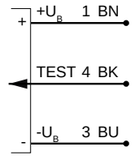
154-00511

Connection, receiver, 4-pin



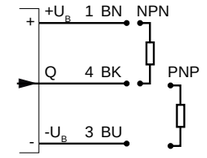
154-00508

Connection, transmitter, 3-pin



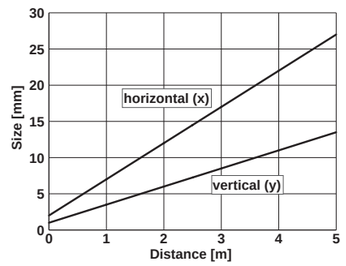
154-00514

Connection, receiver, 3-pin



154-00509

Light spot size



155-01321

Accessories

Connection cables	From Page 670
Brackets	From Page 642

FS 10-RL / FE 10-RL

Laser through-beam photoelectric sensor

PRODUCT HIGHLIGHTS

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Operating range	0 … 3 m
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Light spot size	See diagram
Laser Class (DIN EN 60825-1:2008-5)	1

Functions	
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Indicator LED, yellow	Switching output indicator
Sensitivity adjustment	Via Teach-in button and control input
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; Button lock via control input
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
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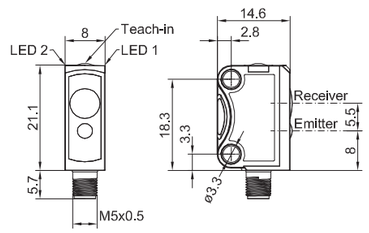
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection (Q)
Protection Class	2
Switching output, Q	PNP / NPN (see Selection Table)
Output function	N.O. / N.C.
Switching frequency, f (ti/tp 1:1)	≤ 4000Hz
Response time	125 µs
Control input, IN (receiver) (only 4-pin design)	$+U_B$ = 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[3]
Enclosure rating	IP 67[2]
Material, housing	PUR
Material, front screen	PMMA
Type of connection	(See Selection Table)
Ambient temperature: operation	-20 … +50 °C
Ambient temperature: storage	-20 … +80 °C
Weight (plug device)	Ca. 6 g
Weight (cable device)	Ca. 44 g
Weight (pigtail)	Ca. 20 g

[1] Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz [2] With connected IP 67 plug

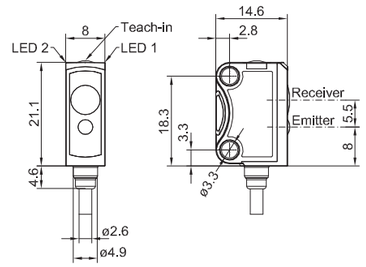
Operating range	Switching output	Type of connection	Part number	Design	Article number
1 ... 3 m	PNP	Plug, M5x0.5, 4-pin	FE 10-RL-PS-E4	Receiver	602-71000
1 ... 3 m	–	Plug, M5x0.5, 4-pin	FS 10-RL-E4	Transmitter	601-61000
1 ... 3 m	NPN	Plug, M5x0.5, 4-pin	FE 10-RL-NS-E4	Receiver	602-71001
1 ... 3 m	PNP	Cable, 2 m, 4-wire	FE 10-RL-PS-K4	Receiver	602-71002
1 ... 3 m	–	Cable, 2 m, 4-wire	FS 10-RL-K4	Transmitter	601-61002
1 ... 3 m	NPN	Cable, 2 m, 4-wire	FE 10-RL-NS-K4	Receiver	602-71003
1 ... 3 m	PNP	Pigtail, 200 mm with M8 plug, 4-pin	FE 10-RL-PS-KM4	Receiver	602-71004
1 ... 3 m	–	Pigtail, 200 mm with M8 plug, 4-pin	FS 10-RL-KM4	Transmitter	601-61004
1 ... 3 m	NPN	Pigtail, 200 mm with M8 plug, 4-pin	FE 10-RL-NS-KM4	Receiver	602-71005
1 ... 3 m	PNP	Pigtail, 200 mm with M8 plug, 3-pin	FE 10-RL-PS-KM3	Receiver	602-71006
1 ... 3 m	–	Pigtail, 200 mm with M8 plug, 3-pin	FS 10-RL-KM3	Transmitter	601-61005
1 ... 3 m	NPN	Pigtail, 200 mm with M8 plug, 3-pin	FE 10-RL-NS-KM3	Receiver	602-71008

Plug connection



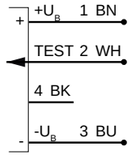
153-00894

Cable connection



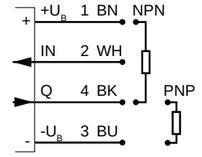
153-00895

Connection, transmitter, 4-pin



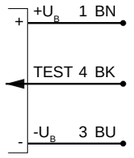
154-00511

Connection, receiver, 4-pin



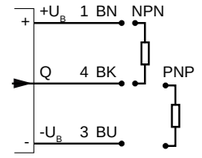
154-00508

Connection, transmitter, 3-pin



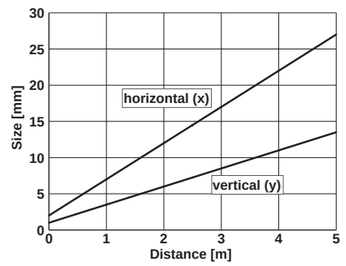
154-00514

Connection, receiver, 3-pin



154-00509

Light spot size



155-01321

Accessories

Connection cables	From Page 670
Brackets	From Page 642