


# F 25 – the miniature sensor family of the new generation

The best of its type



 made in Germany



### The specialist for glass detection:

The FR 25-RGO photoelectric retro-reflective sensor has been specially designed for detecting transparent objects. It offers absolutely precise and reproducible switching behaviour thanks to its autocollimation principle and automatic adaptation of the switching threshold (the DELTA function).

(Left) **Simple mounting, precise adjustment:** The robust aluminium dovetail mounting is particularly suitable when installation space is limited. It allows easy and accurate fine adjustment of the sensor after installation.

**Precise background suppression:** Thanks to extremely precise background suppression, the sensors of the F 25 series are completely immune to reflective and glossy machine parts and background effects. Together with switching that is independent of color and object properties, F 25 sensors are the best on the market.



### TYPICAL F 25

- The best black/white-shift on the market in this sensor class
- Precise background suppression thanks to the ASIC microchip
- Auto-Detect: automatic adjustment of the switching output (PNP/NPN), unique on the market
- Precise detection of transparent objects of any shape (FR-25-RGO with DELTA function)
- Long ranges with compact miniature housing
- All sensors available in laser and LED designs
- Robust glass-fibre-reinforced plastic housings (IP 69 & IP 67, Ecolab)
- Robust sensor design with metal plug and mounting holes reinforced with metal inserts
- Simplest mounting thanks to dovetail, patented rod mounting and clamping jaws
- Safe operation thanks to Laser Class 1

The right sensor for every application: the new F 25 sensor family from SensoPart offers a very large range of variants – from the LED photoelectric through-beam sensor to the laser photoelectric diffuse sensor with adjustable background suppression. Everything that the user could want is in the programme, including special applications: the FR 25-RGO autocollimation sensor detects transparent objects of any shape whilst automatically adapting its switching threshold to the operating conditions (the DELTA function).

Whether small-part detection or checking presence on a conveyor belt, the excellent performance of the F 25 series is always

impressive. Thus the FT 25-RHD scanner not only offers very precise background suppression, but also the best black/white-shift in its class.

The robust design with tightly sealed housings (IP 69K & IP 67), the tough metal plugs and mounting holes with metal inserts, the simple dovetail mounting, the easy setup via teach-in or control input, and the many other clever details ensure uncomplicated and efficient operating processes. Not to mention the Auto-detect function that is exclusive to SensoPart: sensors equipped with it autonomously detect whether there is PNP or NPN wiring.

F 25 – Product Overview							
	Type of light		Adjustment		Scanning distance / range	Special features	Page
<b>Photoelectric diffuse sensor with background suppression</b>							
FT 25-RLH	Laser		Teach-in		150 mm	Most accurate small-part detection, IO-Link	311
FT 25-RH	LED		Teach-in		200 mm	IO-Link	313
FT 25-BH	LED, blue		Teach-in		200 mm	BlueLight technology, IO-Link	315
FT 25-RHD	LED		Teach-in		400 mm	Long scanning distance, IO-Link	317
FT 25-RF1/2	LED		Fixed focus		60 mm / 80 mm	IO-Link	319
FT 25-BF2	LED, blue		Fixed focus		80 mm	BlueLight technology	321
<b>Photoelectric diffuse sensor</b>							
FT 25-RL	Laser		Teach-in		250 mm	Detection of minimal grey value differences, IO-Link	323
FT 25-R	LED		Teach-in		800 mm	IO-Link	325
<b>Photoelectric retro-reflective sensors</b>							
FR 25-RGO	LED		Teach-in		2 m	Autocollimation, detection of transparent objects, IO-Link	327
FR 25-RGO2	LED		Teach-in		2 m	Autocollimation, IO-Link	329
FR 25-RLO	Laser		Teach-in		4 m	Autocollimation, most accurate small-part detection, IO-Link	331
FR 25-RL	Laser		Teach-in		15 m	Most accurate small-part detection, IO-Link	335
FR 25-R	LED		Teach-in		7 m	IO-Link	337
FR 25-RF	LED		Fixed focus		5 m		339
<b>Photoelectric through-beam sensors</b>							
FS/FE 25-RL	Laser		Teach-in		20 m	Most accurate small-part detection, IO-Link	341
FS/FE 25-R	LED		Teach-in		15 m	IO-Link	343
FS/FE 25-RF	LED		Fixed focus		6 m		345

# FT 25-RLH

Diffuse laser sensor with background suppression



## PRODUCT HIGHLIGHTS

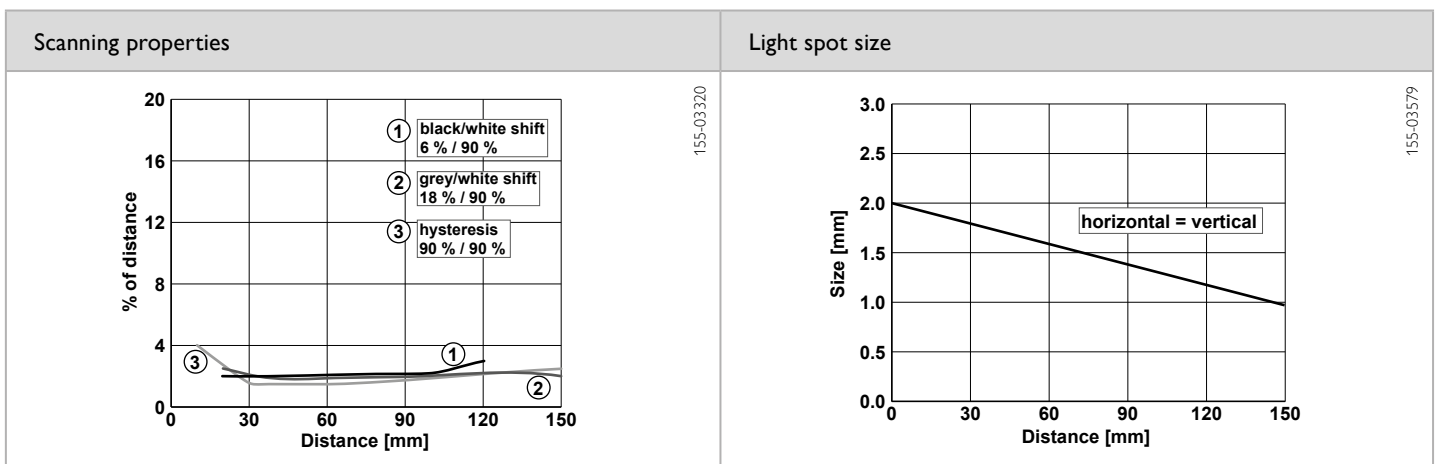
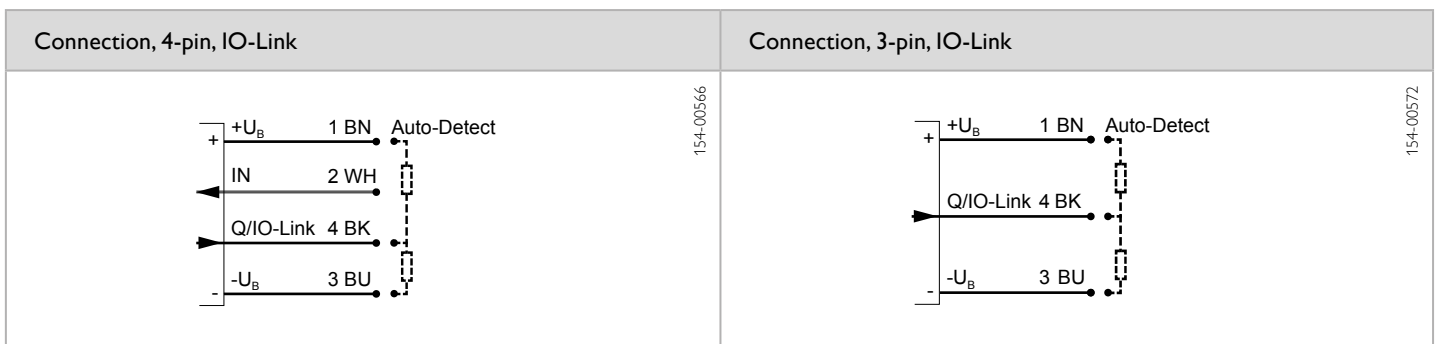
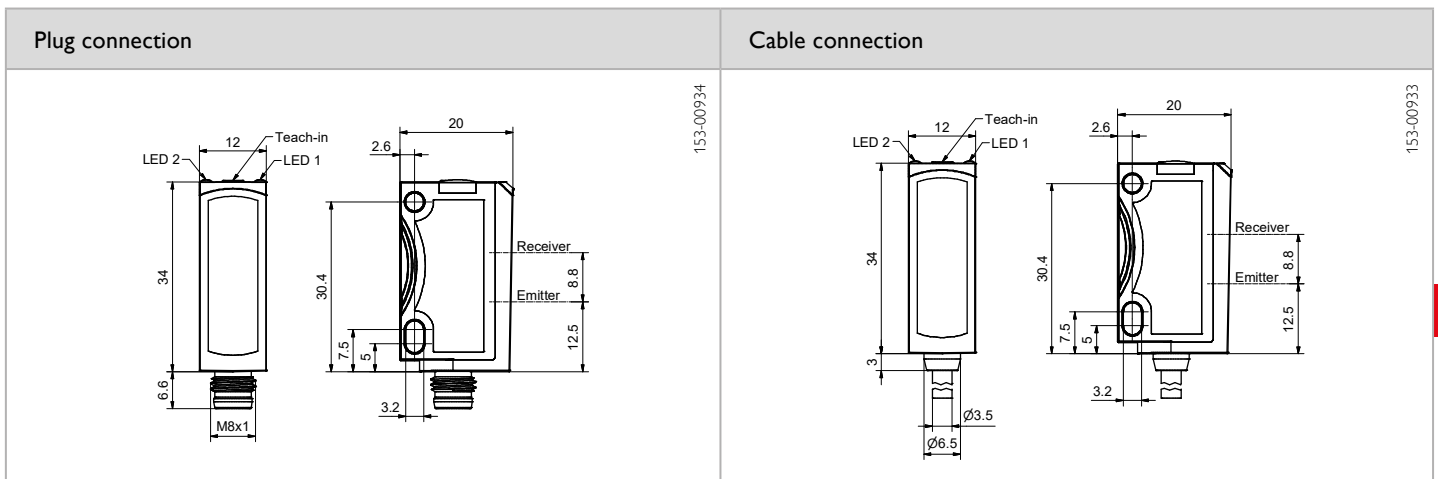
- Precisely adjustable background suppression
- Reliable switching despite varying object colors and surfaces
- Reliable operation even with highly reflective backgrounds, thanks to SensoPart ASIC technology
- Particularly suitable for the detection of the smallest of objects
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings
- Setting of smart functions via IO-Link

Optical data		Functions	
Scanning distance	4 ... 150 mm <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Adjustment range	12 ... 150 mm <sup>1</sup>	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 650 nm	Scanning distance adjustment	Via Teach-in button, control input <sup>4</sup> and IO-Link
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. and Auto-Detect / NPN / PNP via teach-in button, control input <sup>4</sup> and IO-Link Button lock via control input <sup>4</sup> and IO-Link Wide variety of adjustment possibilities via IO-Link
		Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	34 x 20 x 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69 & IP 67 <sup>5</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>6</sup>
Switching output, Q	1x Auto-Detect (PNP/NPN) <sup>3</sup>	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (metal plug device <sup>7</sup> )	10 g
Response time	500 μs	Weight (cable device)	40 g
Control input, IN <sup>4</sup>	+U <sub>B</sub> = teach-in -U <sub>B</sub> = button locked Open = normal operation	Weight (pigtail)	20 g
		Vibration and impact resistance	EN 60947-5-2
IO-Link			
Communication mode	COM 2		
Min. cycletime	2.3 ms		
SIO mode	Compatible		
Length process data	16 Bit		
Specification	1.1		

<sup>1</sup> Reference material: white, 90 % reflectivity    <sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> Auto-Detect, automatic PNP/NPN selection by the sensor, PNP or NPN fixed

<sup>4</sup> Only 4-pin design    <sup>5</sup> With connected IP 67 / IP 69 plug    <sup>6</sup> UL: -20 ... +50 °C    <sup>7</sup> No Ecolab

Scanning distance	Switching output	Type of connection	Part number	Article number
4 ... 150 mm	Auto-Detect	Plug, M8x1, 3-pin, IO-Link	FT 25-RLH-PNSL-M3	609-11018
4 ... 150 mm	Auto-Detect	Metal plug, M8x1, 3-pin, IO-Link	FT 25-RLH-PNSL-M3M	609-11019
4 ... 150 mm	Auto-Detect	Plug, M8x1, 4-pin, IO-Link	FT 25-RLH-PNSL-M4	609-11015
4 ... 150 mm	Auto-Detect	Metal plug, M8x1, 4-pin, IO-Link	FT 25-RLH-PNSL-M4M	609-11017
4 ... 150 mm	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 25-RLH-PNSL-K4	609-11016
4 ... 150 mm	Auto-Detect	Pigtail, 150 mm with plug, M8 4-pin, IO-Link	FT 25-RLH-PNSL-KM4	609-11021
4 ... 150 mm	Auto-Detect	Pigtail, 150 mm with plug, M12 4-pin, IO-Link	FT 25-RLH-PNSL-KL4	609-11020



Reference material	Detection range	Accessories
White (90 %)	4 ... 150 mm	Connection cables
Grey (18 %)	5 ... 150 mm	Brackets
Black (6 %)	8 ... 120 mm	SensolO (901-01001)
		From Page A-38
		From Page A-4
		From Page A-56

# FT 25-RH

Photoelectric diffuse sensor with background suppression



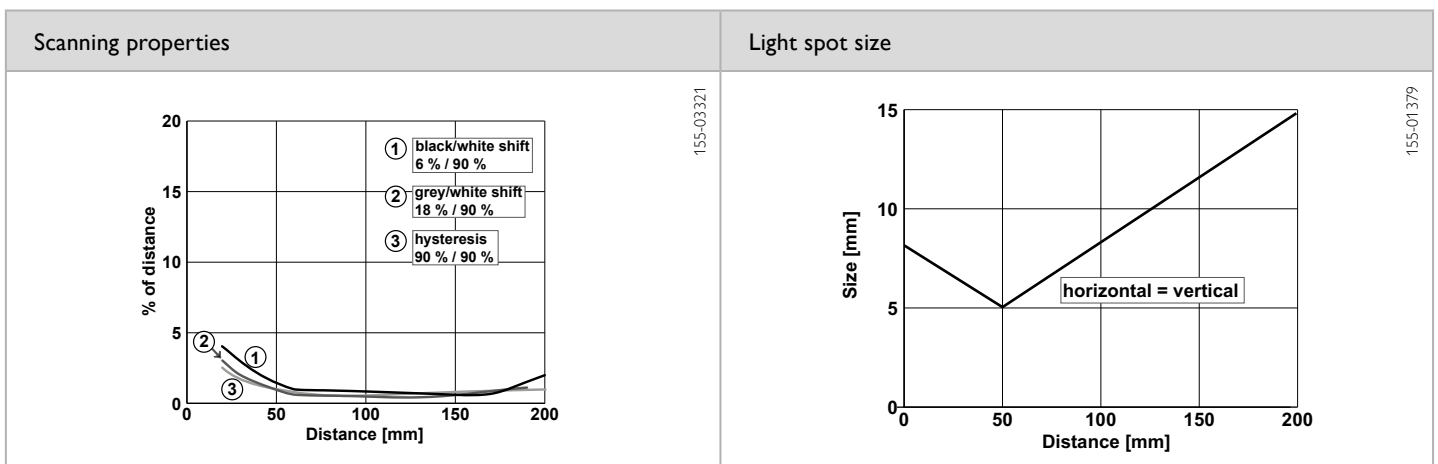
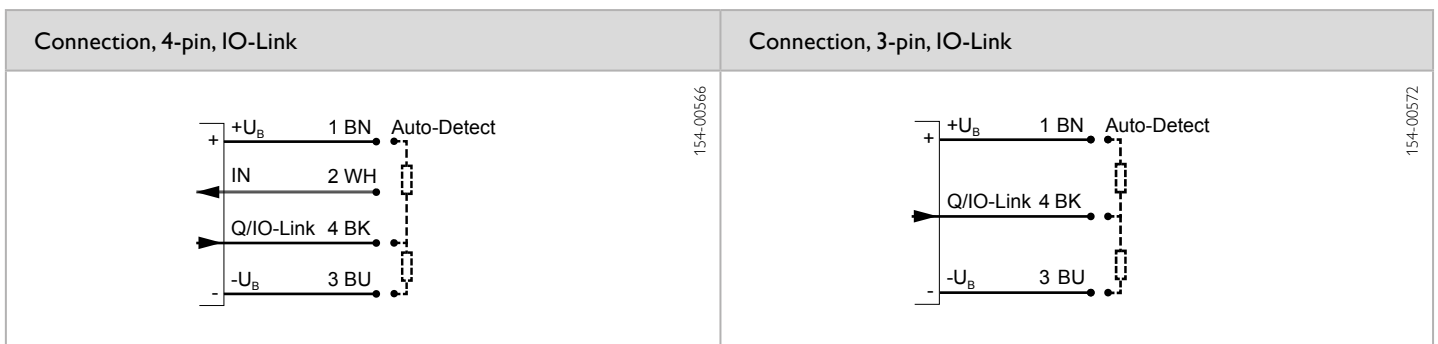
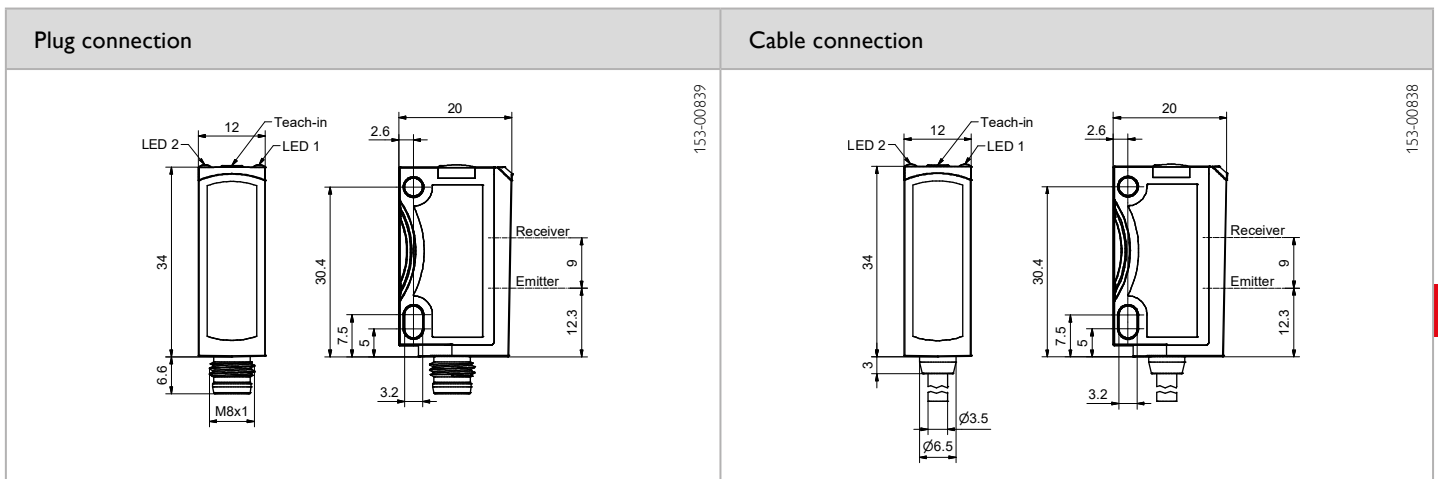
## PRODUCT HIGHLIGHTS

- Precisely adjustable background suppression
- Reliable switching despite varying object colors and surfaces
- Reliable operation even with highly reflective backgrounds, thanks to SensoPart ASIC technology
- Simple alignment thanks to easily visible light spot
- Sensor setting via teach-in and control input
- Robust glass-fibre-reinforced plastic housings

Optical data		Functions	
Scanning distance	1 ... 200 mm <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Adjustment range	10 ... 200 mm <sup>1</sup>	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 632 nm	Scanning distance adjustment	Via Teach-in button, control input <sup>3</sup> and IO-Link
Light spot size	See diagram	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 <sup>3</sup> and IO-Link Button lock via control input <sup>3</sup> and IO-Link Wide variety of adjustment possibilities via IO-Link
		Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	34 x 20 x 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69 & IP 67 <sup>5</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>6</sup>
Switching output, Q	1x Auto-Detect (PNP/NPN) <sup>4</sup>	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (metal plug device <sup>7</sup> )	10 g
Response time	500 μs	Weight (cable device)	40 g
Control input, IN <sup>3</sup>	+U <sub>B</sub> = teach-in -U <sub>B</sub> = button locked Open = normal operation	Weight (pigtail)	20 g
		Vibration and impact resistance	EN 60947-5-2
IO-Link			
Communication mode	COM 2		
Min. cycletime	2.3 ms		
SIO mode	Compatible		
Length process data	16 Bit		
Specification	1.1		

<sup>1</sup> Reference material: white, 90 % reflectivity    <sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> Only 4-pin design    <sup>4</sup> Auto-Detect, automatic PNP/NPN selection by the sensor; PNP or NPN fixed    <sup>5</sup> With connected IP 67 / IP 69 plug    <sup>6</sup> UL: -20 ... +50 °C    <sup>7</sup> No Ecolab

Scanning distance	Switching output	Type of connection	Part number	Article number
1 ... 200 mm	Auto-Detect	Plug, M8x1, 3-pin, IO-Link	FT 25-RH-PNSL-M3	608-11054
1 ... 200 mm	Auto-Detect	Metal plug, M8x1, 3-pin, IO-Link	FT 25-RH-PNSL-M3M	608-11055
1 ... 200 mm	Auto-Detect	Plug, M8x1, 4-pin, IO-Link	FT 25-RH-PNSL-M4	608-11051
1 ... 200 mm	Auto-Detect	Metal plug, M8x1, 4-pin, IO-Link	FT 25-RH-PNSL-M4M	608-11053
1 ... 200 mm	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 25-RH-PNSL-K4	608-11052
1 ... 200 mm	Auto-Detect	Pigtail, 150 mm with plug, M8, 4-pin, IO-Link	FT 25-RH-PNSL-KM4	608-11057
1 ... 200 mm	Auto-Detect	Pigtail, 150 mm with plug, M12 4-pin, IO-Link	FT 25-RH-PNSL-KL4	608-11056



Reference material	Detection range	Accessories
White (90 %)	1 ... 200 mm	Connection cables
Grey (18 %)	2 ... 200 mm	Brackets
Black (6 %)	4 ... 190 mm	SensolO (901-01001)
		From Page A-38
		From Page A-4
		From Page A-56

# FT 25-BH

BlueLight-Photoelectric diffuse sensor with background suppression



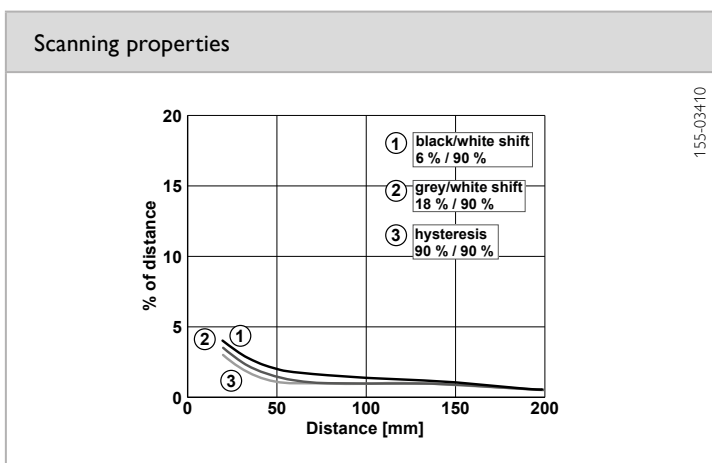
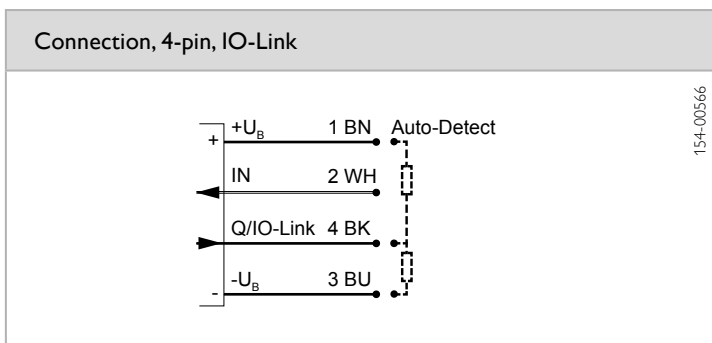
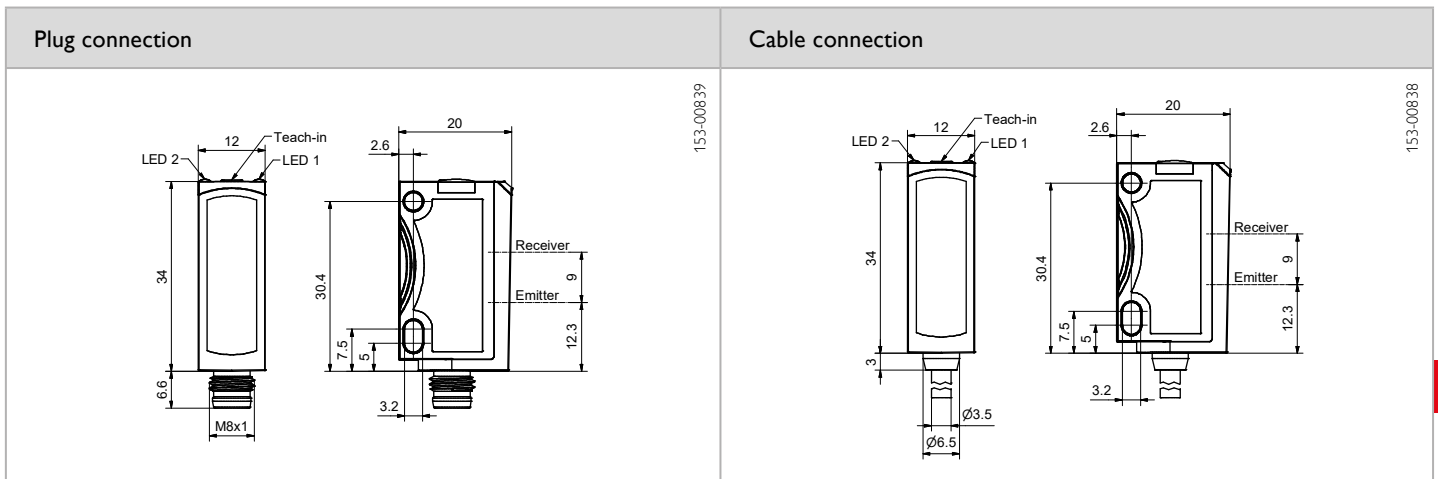
## PRODUCT HIGHLIGHTS

- Miniature sensor with BlueLight technology and precisely adjustable background suppression
- Reliable switching with strongly light absorbing and shiny objects
- Reliable operation even with highly reflective backgrounds thanks to SensoPart ASIC technology
- Simple alignment thanks to easily visible light spot
- Sensor setting via teach-in, control input and IO-Link
- Robust glass-fibre-reinforced plastic housings

Optical data		Functions	
Scanning distance	0 ... 200 mm <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Adjustment range	10 ... 200 mm <sup>1</sup>	Indicator LED, yellow	Switching output indicator
Type of light	LED, blue, 450 nm	Scanning distance adjustment	Via Teach-in button, control input <sup>3</sup> and IO-Link
Light spot size	7 mm x 7 mm	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 <sup>3</sup> and IO-Link Button lock via control input <sup>3</sup> and IO-Link Wide variety of adjustment possibilities via IO-Link
		Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	34 x 20 x 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69 & IP 67 <sup>5</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>6</sup>
Switching output, Q	1x Auto-Detect (PNP/NPN) <sup>4</sup>	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	≤ 700 Hz	Weight (metal plug device <sup>7</sup> )	10 g
Response time	500 μs	Weight (cable device)	40 g
Control input, IN <sup>3</sup>	+U <sub>B</sub> = teach-in -U <sub>B</sub> = button locked Open = normal operation	Weight (pigtail)	20 g
		Vibration and impact resistance	EN 60947-5-2
IO-Link			
Communication mode	COM 2		
Min. cycletime	2.3 ms		
SIO mode	Compatible		
Length process data	16 Bit		
Specification	1.1		

<sup>1</sup> Reference material: white, 90 % reflectivity    <sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> Only 4-pin design    <sup>4</sup> Auto-Detect, automatic PNP/NPN selection by the sensor; PNP or NPN fixed    <sup>5</sup> With connected IP 67 / IP 69 plug    <sup>6</sup> UL: -20 ... +50 °C    <sup>7</sup> No Ecolab

Scanning distance	Switching output	Type of connection	Part number	Article number
0 ... 200 mm	Auto-Detect	Metal plug, M8x1, 4-pin, IO-Link	FT 25-BH-PNSL-M4M	608-11063
0 ... 200 mm	Auto-Detect	Plug, M8x1, 4-pin, IO-Link	FT 25-BH-PNSL-M4	608-11064
0 ... 200 mm	Auto-Detect	Pigtail, 150 mm with plug, M8, 4-pin, IO-Link	FT 25-BH-PNSL-KM4	608-11065
0 ... 200 mm	Auto-Detect	Pigtail, 150 mm with plug, M12 4-pin, IO-Link	FT 25-BH-PNSL-KL4	608-11070



Reference material	Detection range	Accessories	
White (90 %)	0 ... 200 mm	Connection cables	From Page A-38
Grey (18 %)	0 ... 200 mm	Brackets	From Page A-4
Black (6 %)	2 ... 200 mm	SensIO (901-01001)	From Page A-56



# FT 25-RHD

Photoelectric diffuse sensor with background suppression



## PRODUCT HIGHLIGHTS

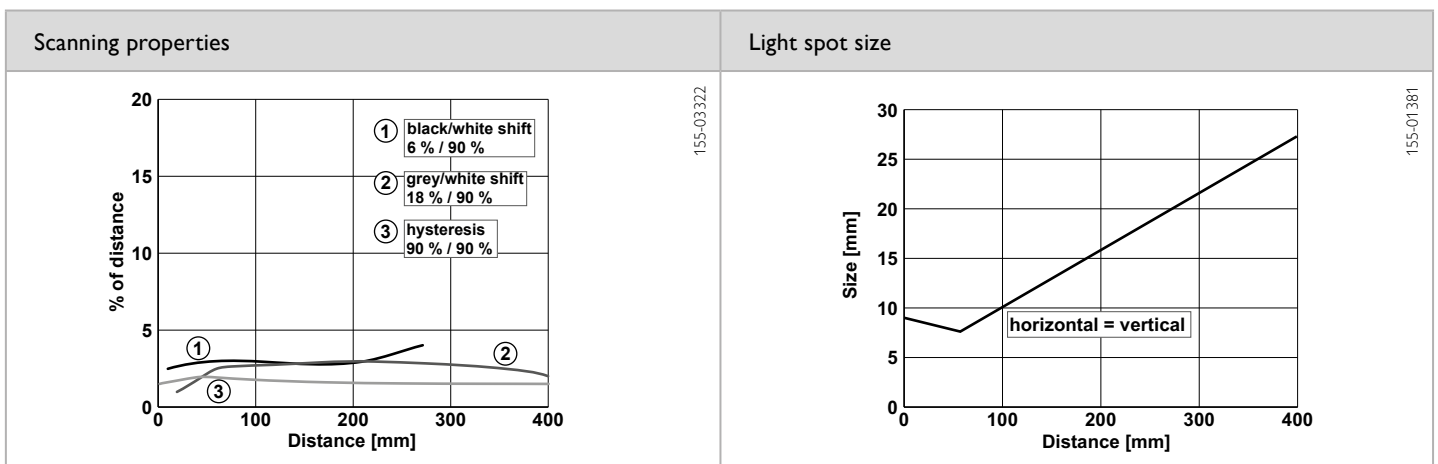
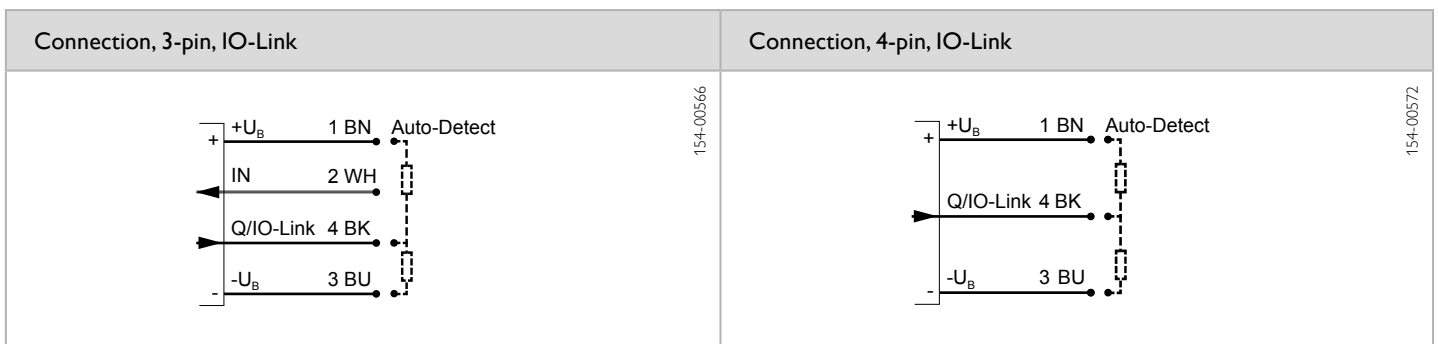
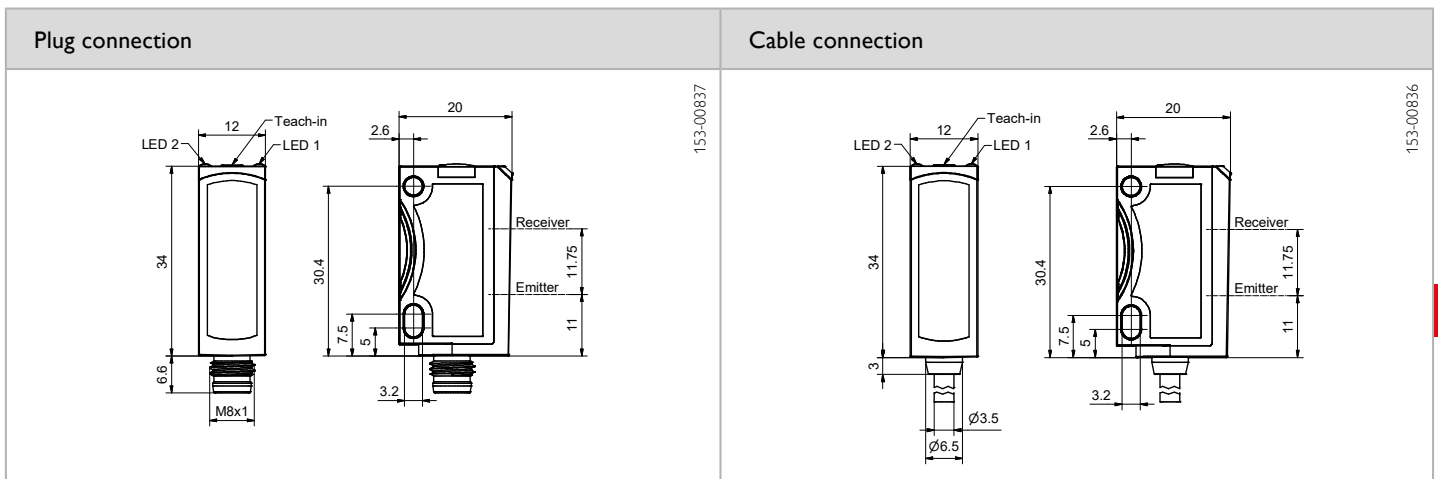
- Auto-Detect photoelectric diffuse sensor with real PNP and real NPN functions
- Precisely adjustable background suppression
- Long scanning distance of 400 mm with small and compact housings
- Reliable operation even with highly reflective backgrounds, thanks to SensoPart ASIC technology
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings

Optical data		Functions	
Scanning distance	3 ... 400 mm <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Adjustment range	30 ... 400 mm <sup>1</sup>	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 632 nm	Scanning distance adjustment	Via Teach-in button, control input <sup>4</sup> and IO-Link
Light spot size	See diagram	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 <sup>4</sup> and IO-Link Button lock via control input <sup>4</sup> and IO-Link Wide variety of adjustment possibilities via IO-Link
		Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	34 x 20 x 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69 & IP 67 <sup>5</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>6</sup>
Switching output, Q	1x Auto-Detect (PNP/NPN) <sup>3</sup>	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (metal plug device <sup>7</sup> )	10 g
Response time	500 μs	Weight (cable device)	40 g
Control input, IN <sup>4</sup>	+U <sub>B</sub> = teach-in, -U <sub>B</sub> = button locked Open = normal operation	Weight (pigtail)	20 g
		Vibration and impact resistance	EN 60947-5-2
IO-Link			
Communication mode	COM 2		
Min. cycletime	2.3 ms		
SIO mode	Compatible		
Length process data	16 Bit		
Specification	1.1		

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

<sup>4</sup> Only 4-pin design    <sup>5</sup> With connected IP 67 / IP 69 plug    <sup>6</sup> UL: -20 ... +50 °C    <sup>7</sup> No Ecolab

Scanning distance	Switching output	Type of connection	Part number	Article number
3 ... 400 mm	Auto-Detect	Plug, M8x1, 3-pin, IO-Link	FT 25-RHD-PNSL-M3	608-11045
3 ... 400 mm	Auto-Detect	Metal plug, M8x1, 3-pin, IO-Link	FT 25-RHD-PNSL-M3M	608-11046
3 ... 400 mm	Auto-Detect	Plug, M8x1, 4-pin, IO-Link	FT 25-RHD-PNSL-M4	608-11042
3 ... 400 mm	Auto-Detect	Metal plug, M8x1, 4-pin, IO-Link	FT 25-RHD-PNSL-M4M	608-11044
3 ... 400 mm	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 25-RHD-PNSL-K4	608-11043
3 ... 400 mm	Auto-Detect	Pigtail, 150 mm with plug, M8, 4-pin, IO-Link	FT 25-RHD-PNSL-KM4	608-11048
3 ... 400 mm	Auto-Detect	Pigtail, 150 mm with plug, M12 4-pin, IO-Link	FT 25-RHD-PNSL-KL4	608-11047



Reference material	Detection range	Accessories
White (90 %)	3 ... 400 mm	Connection cables
Grey (18 %)	6 ... 400 mm	Brackets
Black (6 %)	12 ... 270 mm	SensolO (901-01001)
		From Page A-38
		From Page A-4
		From Page A-56

# FT 25-RF

Photoelectric diffuse sensor with background suppression, fixed focus



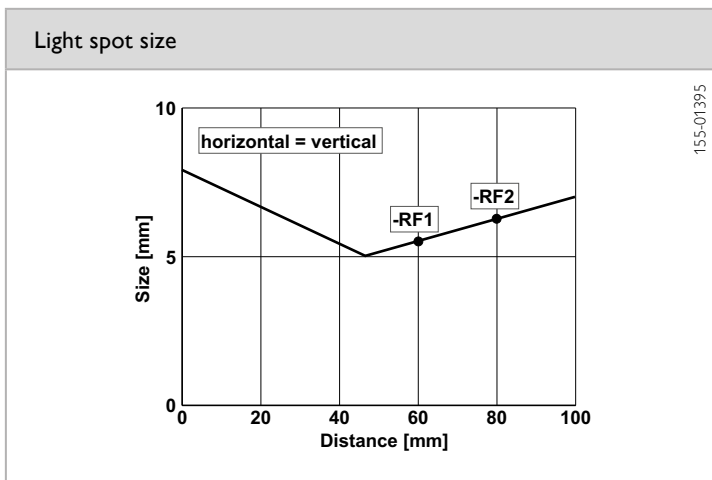
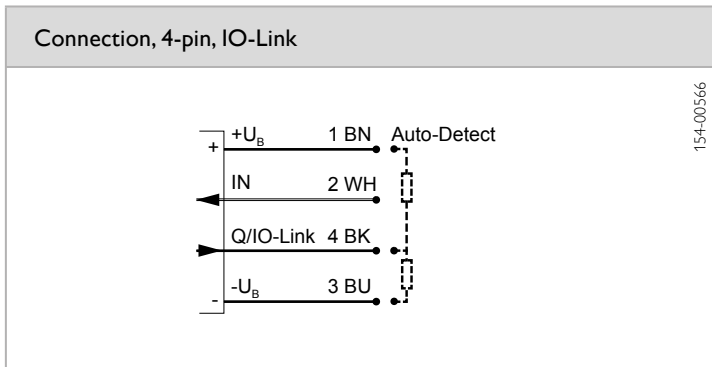
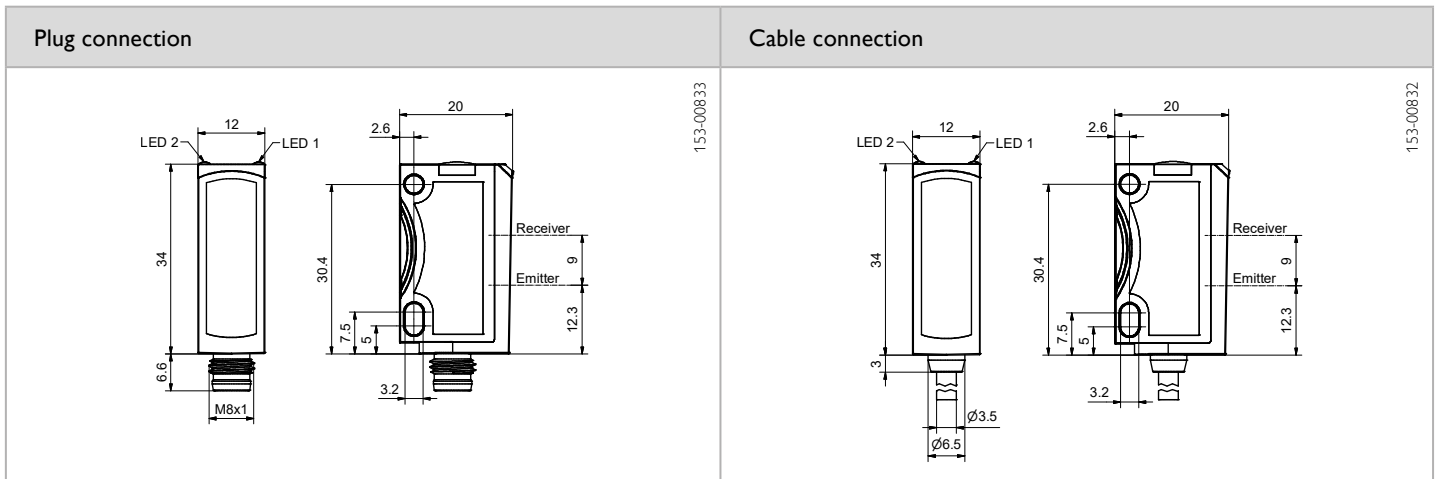
## PRODUCT HIGHLIGHTS

- Precise fixed background suppression
- Economical solution for numerous applications
- Tamper-proof sensor design – no misalignment possible
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings

Optical data		Functions	
Scanning distance	1 ... 60 mm <sup>1</sup> / 1 ... 80 mm <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Type of light	LED, red, 632 nm	Indicator LED, yellow	Switching output indicator
Light spot size	See diagram	Adjustment possibilities	N.O./N.C. via control input and IO-Link
Hysteresis	~ 5 % <sup>2</sup>		
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>3</sup>	Dimensions	34 x 20 x 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69 & IP 67 <sup>5</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>6</sup>
Switching output, Q	1x Auto-Detect (PNP/NPN) <sup>4</sup>	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (metal plug device <sup>7</sup> )	10 g
Response time	500 μs	Weight (cable device)	40 g
Control input, IN	+U <sub>B</sub> = N.C. -U <sub>B</sub> / Open = N.O.	Vibration and impact resistance	EN 60947-5-2
IO-Link			
Communication mode	COM 2		
Min. cycletime	2.3 ms		
SIO mode	Compatible		
Length process data	16 Bit		
Specification	1.1		

<sup>1</sup> Reference material: white, 90 % reflectivity    <sup>2</sup> Based on scanning distance    <sup>3</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>4</sup> Auto-Detect, automatic PNP/NPN selection by the sensor, PNP or NPN fixed via IO-Link    <sup>5</sup> With connected IP 67 / IP 69 plug    <sup>6</sup> UL: -20 ... +50 °C    <sup>7</sup> No Ecolab

Scanning distance	Switching output	Type of connection	Part number	Article number
1 ... 60 mm	Auto-Detect	Plug, M8x1, 4-pin, IO-Link	FT 25-RF1-PNSL-M4	608-11058
1 ... 60 mm	Auto-Detect	Metal plug, M8x1, 4-pin, IO-Link	FT 25-RF1-PNSL-M4M	608-11062
1 ... 60 mm	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 25-RF1-PNSL-K4	608-11059
1 ... 80 mm	Auto-Detect	Plug, M8x1, 4-pin, IO-Link	FT 25-RF2-PNSL-M4	608-11060
1 ... 80 mm	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 25-RF2-PNSL-K4	608-11061



Reference material	Detection range
White (90 %)	1 ... 60 mm / 80 mm
Grey (18 %)	2 ... 60 mm / 80 mm
Black (6 %)	4 ... 60 mm / 80 mm

**Accessories**

Connection cables	From Page A-38
Brackets	From Page A-4
SensolO (901-01001)	From Page A-56

# FT 25-BF2

BlueLight-Photoelectric diffuse sensor with background suppression, fixed focus



## PRODUCT HIGHLIGHTS

- Miniature sensor with BlueLight technology and precise fixed background suppression
- Reliable switching behaviour with strongly light-absorbing and highly transparent objects
- 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	0 ... 80 mm <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Background suppression from	100 mm	Indicator LED, yellow	Switching output indicator
Type of light	LED, blue, 450 nm	Adjustment possibilities	N.O./N.C. via control input
Light spot size	See diagram		
Hysteresis	~ 1% <sup>2</sup>		
Ambient light	EN 60947-5-2		
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>3</sup>	Dimensions	34 x 20 x 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69K & IP 67 <sup>4</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300ms	Ambient temperature: operation	-20 ... +60 °C <sup>5</sup>
Switching output, Q	PNP/NPN (see selection table)	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (cable device)	40 g
Response time	500 μs	Vibration and impact resistance	EN 60947-5-2
Control input, IN	+U <sub>B</sub> = N.C. -U <sub>B</sub> / Open = N.O.		

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

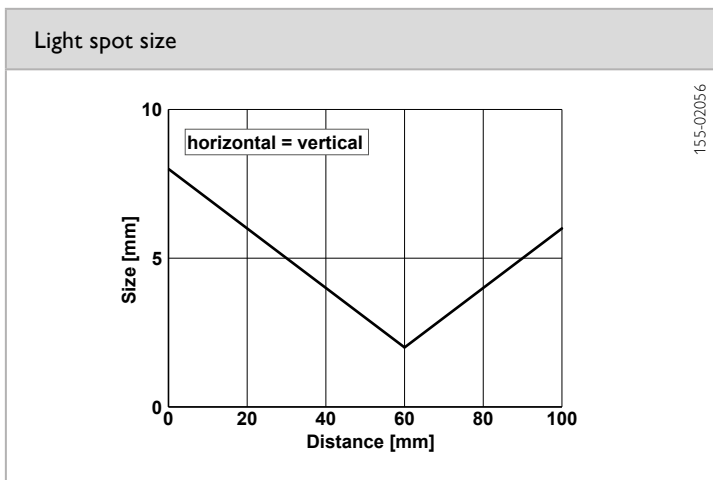
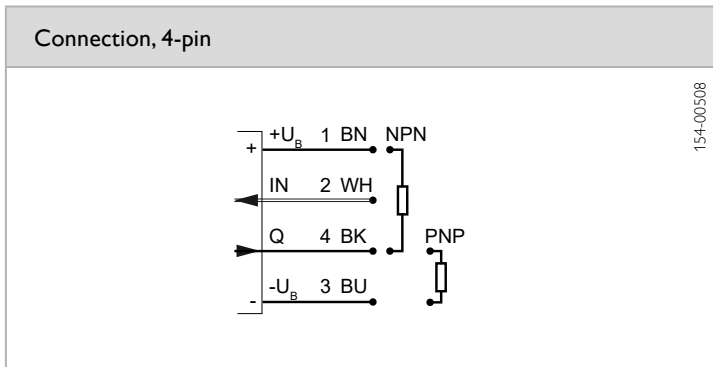
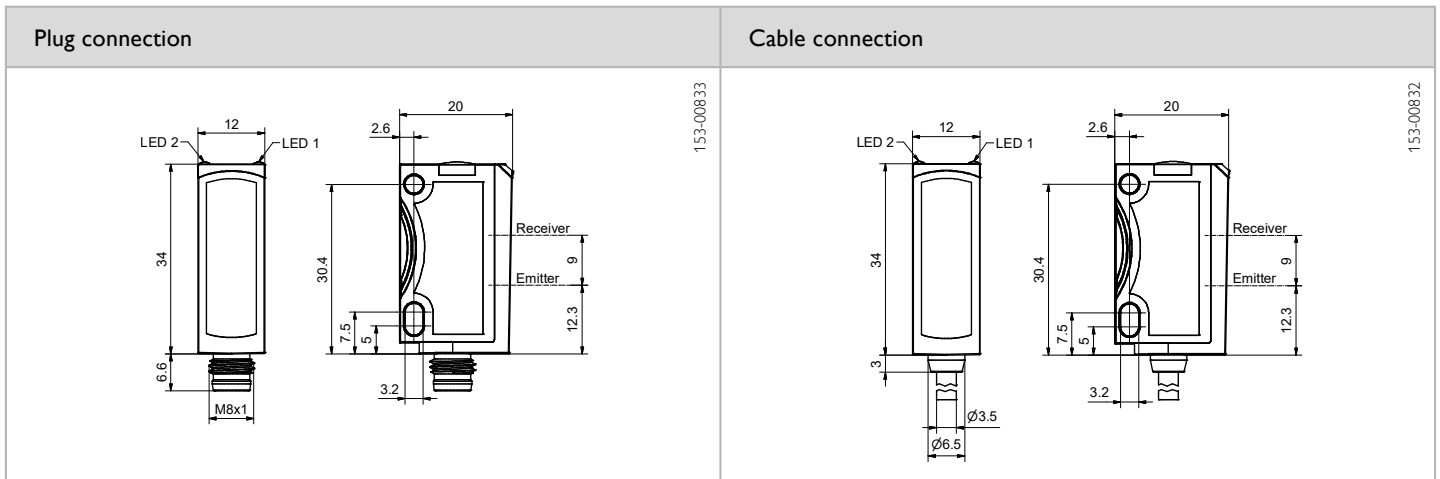
<sup>2</sup> Based on scanning distance

<sup>3</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz

<sup>4</sup> With connected IP 67 / IP 69K plug

<sup>5</sup> UL: -20 ... +50 °C

Scanning distance	Switching output	Type of connection	Part number	Article number
0 ... 80 mm	PNP	Plug, M8x1, 4-pin	FT 25-BF2-PS-M4	608-11038
0 ... 80 mm	NPN	Plug, M8x1, 4-pin	FT 25-BF2-NS-M4	608-11039
0 ... 80 mm	PNP	Cable, 2 m, 4-wire	FT 25-BF2-PS-K4	608-11040
0 ... 80 mm	NPN	Cable, 2 m, 4-wire	FT 25-BF2-NS-K4	608-11041



Reference material	Detection range
White (90 %)	0 ... 80 mm
Grey (18 %)	0 ... 80 mm
Black (6 %)	1 ... 80 mm

Accessories	
Connection cables	From Page A-38
Brackets	From Page A-4

# FT 25-RL

Diffuse laser sensor



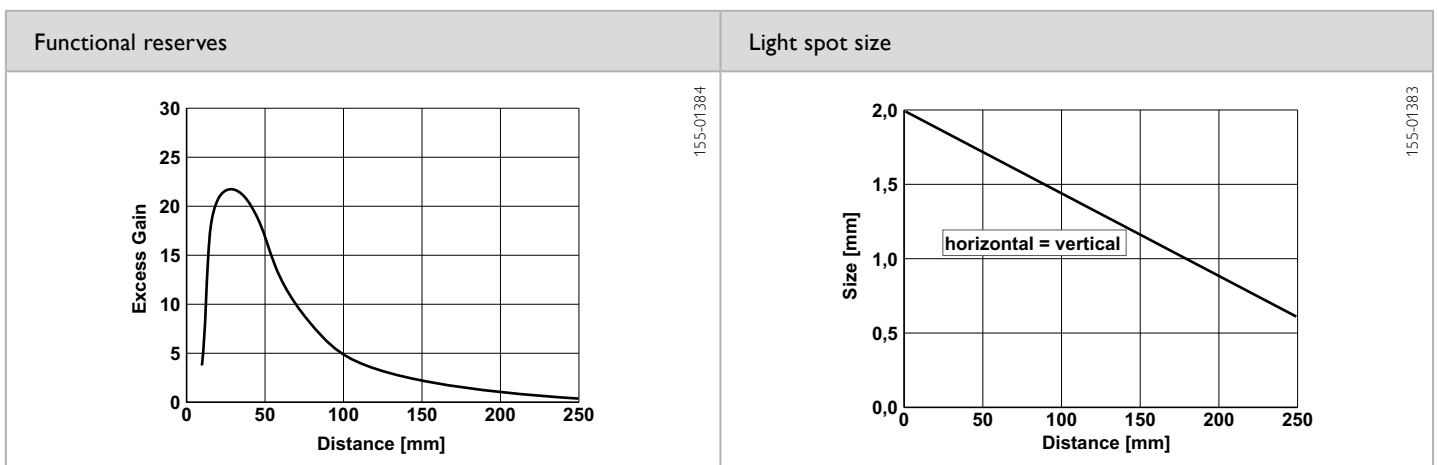
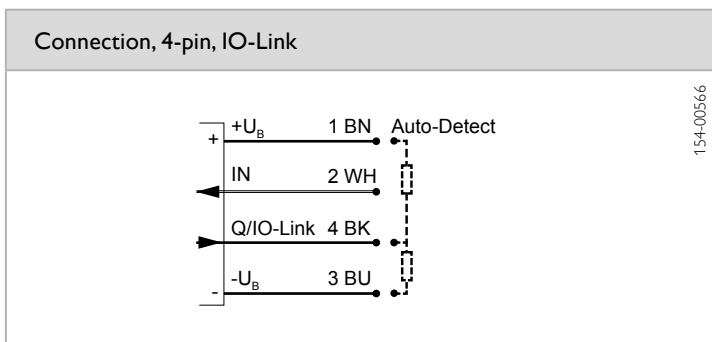
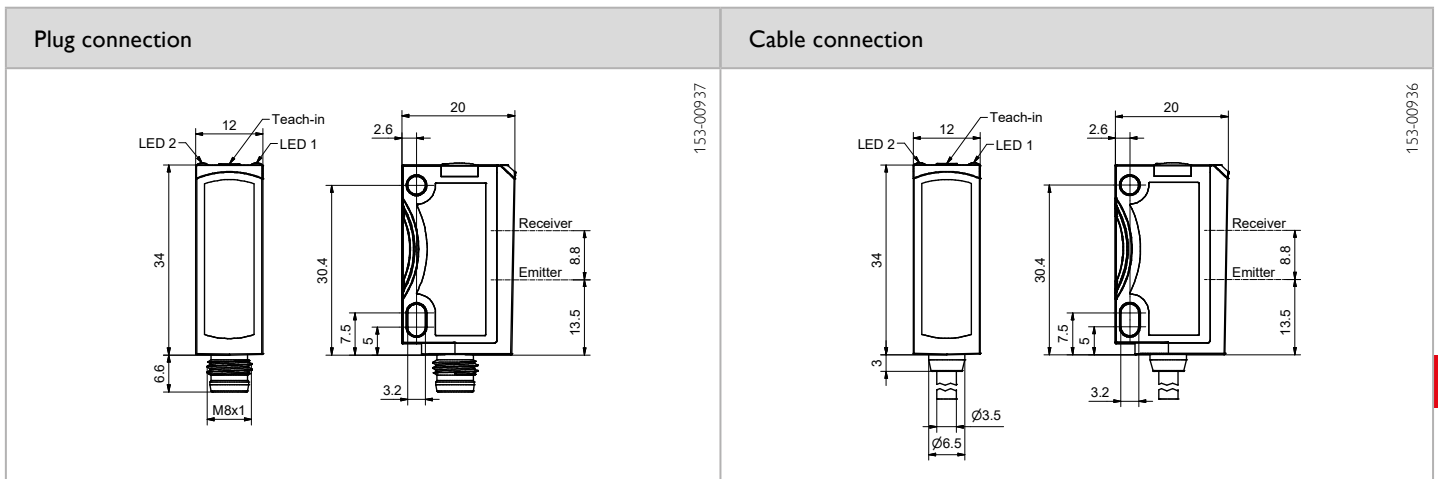
## PRODUCT HIGHLIGHTS

- Differentiates between even the slightest of grey value differences
- Sensor settings via teach-in and control input
- Durable laser printing
- Very small, easily visible laser light spot
- Wide range of variants

Optical data		Functions	
Scanning distance	1 ... 250 mm <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Adjustment range	25 ... 250 mm <sup>1</sup>	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 650 nm	Sensitivity 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
Laser Class (IEC 60825-1)	1	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
Hysteresis	≤ 10 % <sup>2</sup>	Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>3</sup>	Dimensions	34 x 20 x 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69 & IP 67 <sup>5</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>6</sup>
Switching output, Q	1x Auto-Detect (PNP/NPN) <sup>4</sup>	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (metal plug device <sup>7</sup> )	10 g
Switching frequency, f (ti/tp 1:1)	≤ 4000 Hz	Weight (cable device)	40 g
Response time	125 μs	Weight (pigtail)	20 g
Control input, IN	+U <sub>B</sub> = teach-in -U <sub>B</sub> = button locked Open = normal operation	Vibration and impact resistance	EN 60947-5-2
IO-Link			
Communication mode	COM 2		
Min. cycletime	2.3 ms		
SIO mode	Compatible		
Length process data	16 Bit		
Specification	1.1		

<sup>1</sup> Reference material: white, 90 % reflectivity    <sup>2</sup> Up to scanning distance of 150 mm    <sup>3</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>4</sup> Auto-Detect, automatic PNP/NPN selection by the sensor, PNP or NPN fixed    <sup>5</sup> With connected IP 67 / IP 69 plug    <sup>6</sup> UL: -20 ... +50 °C    <sup>7</sup> No Ecolab

Scanning distance	Switching output	Type of connection	Part number	Article number
1 ... 250 mm	Auto-Detect	Metal plug, M8x1, 4-pin, IO-Link	FT 25-RL-PNSL-M4M	609-21021
1 ... 250 mm	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 25-RL-PNSL-K4	609-21019
1 ... 250 mm	Auto-Detect	Pigtail, 152 mm with plug, M8, 4-pin, IO-Link	FT 25-RL-PNSL-KM4	609-21018
1 ... 250 mm	Auto-Detect	Pigtail, 150 mm with plug, M12, 4-pin, IO-Link	FT 25-RL-PNSL-KL4	609-21020



Reference material	Detection range	Accessories
White (90 %)	1 ... 250 mm	Connection cables
Grey (18 %)	6 ... 100 mm	Brackets
Black (6 %)	20 ... 60 mm	SensolO (901-01001)
		From Page A-38
		From Page A-4
		From Page A-56



# FT 25-R

Photoelectric diffuse sensor



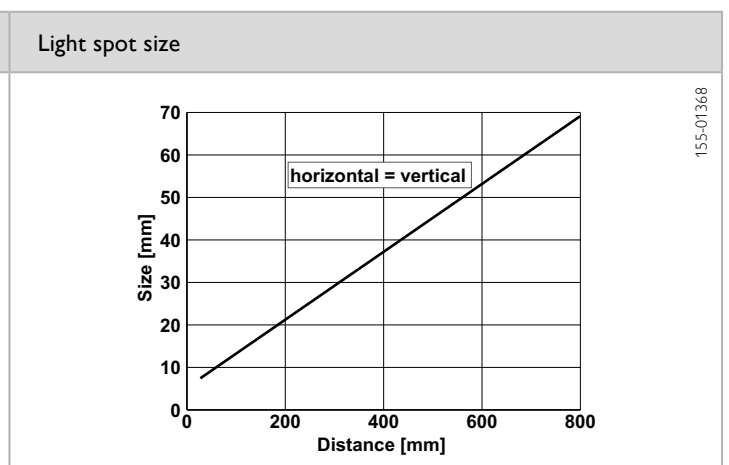
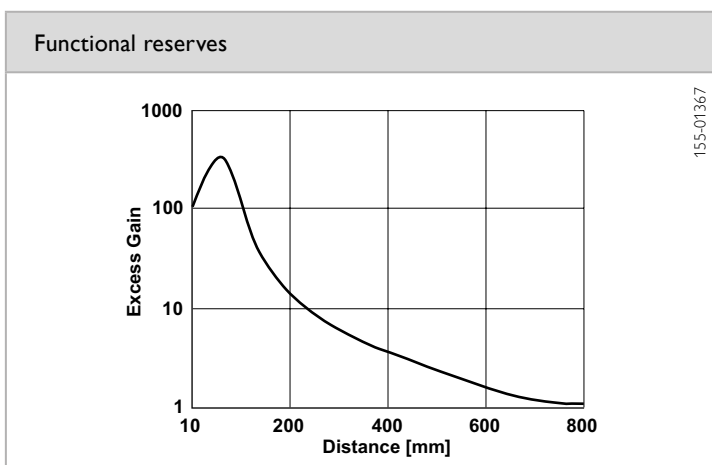
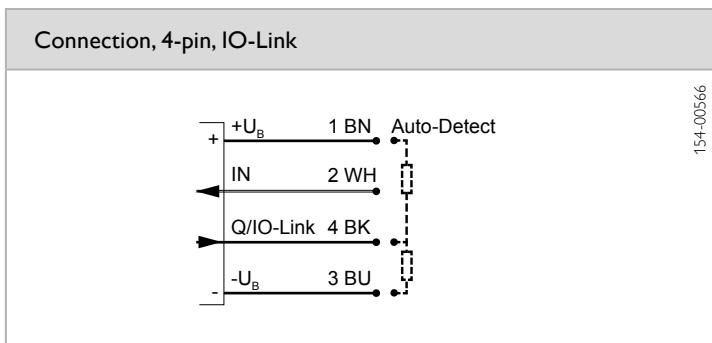
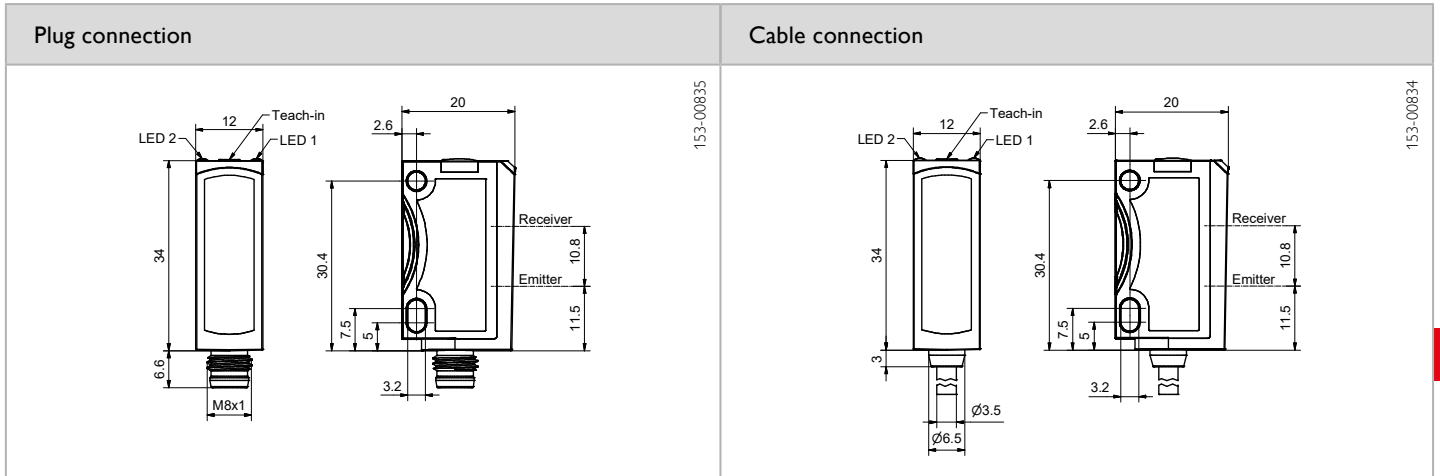
## PRODUCT HIGHLIGHTS

- Differentiates between even the slightest of grey value differences
- Sensor settings via teach-in and control input
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings
- Durable laser printing
- Setting of smart functions via IO-Link

Optical data		Functions	
Scanning distance	0 ... 800 mm <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Adjustment range	20 ... 800 mm <sup>1</sup>	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 632 nm	Sensitivity 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
		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. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	34 x 20 x 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69 & IP 67 <sup>4</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>5</sup>
Switching output, Q	1x Auto-Detect (PNP/NPN) <sup>3</sup>	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (metal plug device <sup>6</sup> )	10 g
Response time	500 μs	Weight (cable device)	40 g
Control input, IN	+ U <sub>B</sub> = teach-in - U <sub>B</sub> = button locked Open = normal operation	Weight (pigtail)	20 g
		Vibration and impact resistance	EN 60947-5-2
IO-Link			
Communication mode	COM 2		
Min. cycletime	2.3 ms		
SIO mode	Compatible		
Length process data	16 Bit		
Specification	1.1		

<sup>1</sup> Reference material: white, 90 % reflectivity    <sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> Auto-Detect, automatic PNP/NPN selection by the sensor; PNP or NPN fixed  
<sup>4</sup> With connected IP 67 / IP 69 plug    <sup>5</sup> UL: -20 ... +50 °C    <sup>6</sup> No Ecolab

Scanning distance	Switching output	Type of connection	Part number	Article number
0 ... 800 mm	Auto-Detect	Plug, M8x1, 4-pin, IO-Link	FT 25-R-PNSL-M4	607-21027
0 ... 800 mm	Auto-Detect	Metal plug, M8x1, 4-pin, IO-Link	FT 25-R-PNSL-M4M	607-21030
0 ... 800 mm	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FT 25-R-PNSL-K4	607-21028
0 ... 800 mm	Auto-Detect	Pigtail, 152 mm with plug, M8, 4-pin, IO-Link	FT 25-R-PNSL-KM4	607-21031
0 ... 800 mm	Auto-Detect	Pigtail, 150 mm with plug, M12, 4-pin, IO-Link	FT 25-R-PNSL-KL4	607-21029



Reference material	Detection range	Accessories
White (90 %)	0 ... 800 mm	Connection cables
Grey (18 %)	1 ... 450 mm	Brackets
Black (6 %)	3 ... 250 mm	SensIO (901-01001)
		From Page A-38
		From Page A-4
		From Page A-56

# FR 25-RGO

Photoelectric retro-reflective sensor for detection of transparent objects



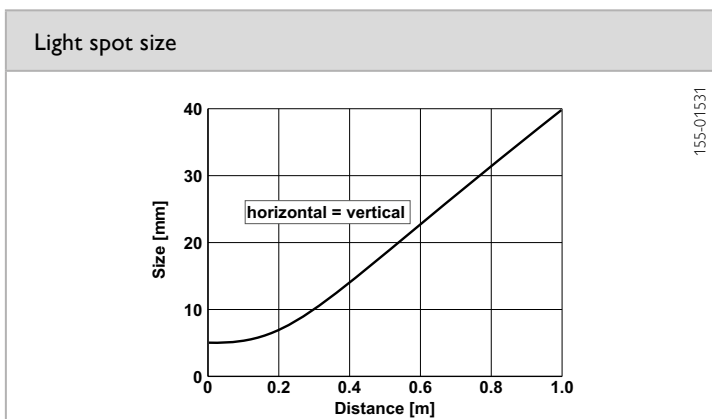
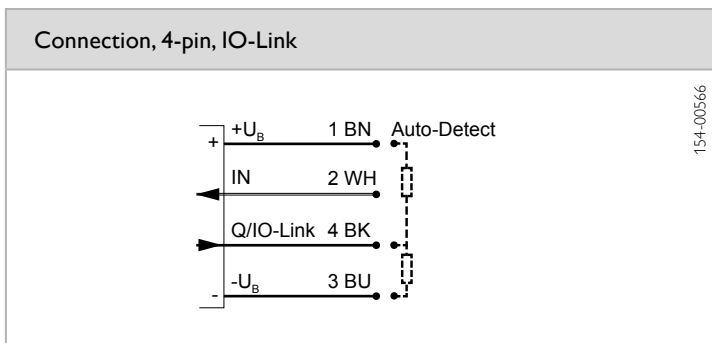
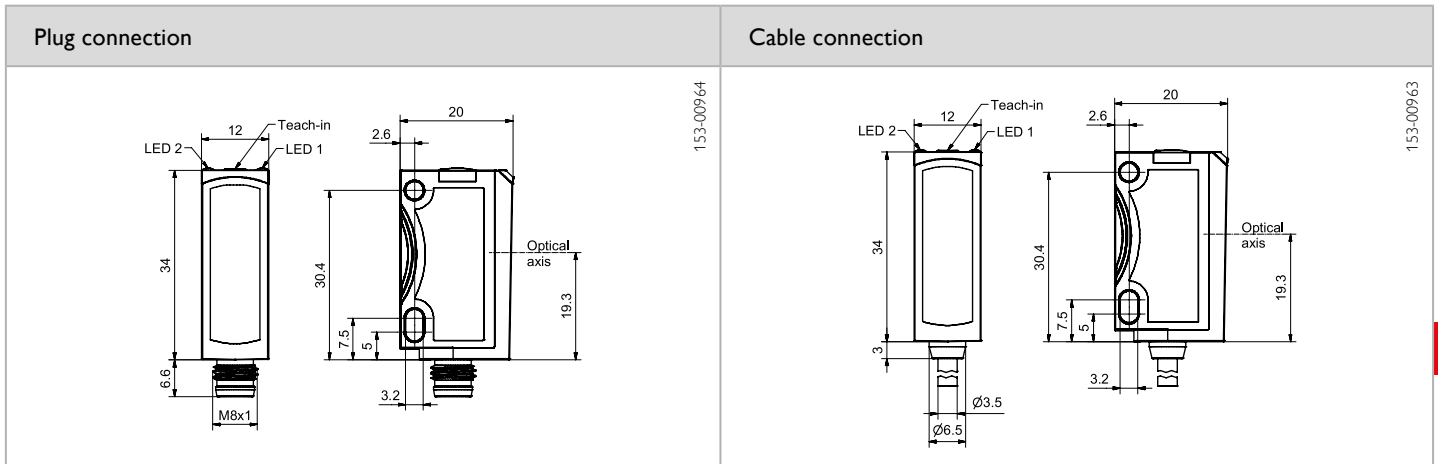
## PRODUCT HIGHLIGHTS

- Reliable detection of transparent objects regardless of shape
- Autocollimation principle: reliable and precise detection from a range of 0 mm
- DELTA function (Dynamic Evaluation of Light for Threshold Adaption): dynamic sensor adaptation to changing environmental conditions – dust and dirt have no effect
- Precise and easily visible light spot with sharp contour for easy alignment of the sensor
- Setting of smart functions via IO-Link

Optical data		Functions	
Operating range	0 ... 2 m <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Type of light	LED, red, 632 nm	Indicator LED, yellow	Switching output indicator
Polarising filter	Yes	Sensitivity adjustment	Via Teach-in button and control input
		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		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	34 × 20 × 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69 & IP 67 <sup>4</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>5</sup>
Switching output, Q	1x Auto-Detect (PNP/NPN) <sup>3</sup>	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (metal plug device <sup>6</sup> )	10 g
Response time	500 µs	Weight (cable device)	40 g
Control input, IN	+ U <sub>B</sub> = teach-in - U <sub>B</sub> = button locked Open = normal operation	Weight (pigtail)	20 g
		Vibration and impact resistance	EN 60947-5-2
IO-Link			
Communication mode	COM 2		
Min. cycletime	2.3 ms		
SIO mode	Compatible		
Length process data	16 Bit		
Specification	1.1		

<sup>1</sup> Reference material: R5/L reflector    <sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> Auto-Detect, automatic PNP/NPN selection by the sensor; PNP or NPN fixed  
<sup>4</sup> With connected IP 67 / IP 69 plug    <sup>5</sup> UL: -20 ... +50 °C    <sup>6</sup> No Ecolab

Operating range	Switching output	Type of connection	Part number	Article number
0 ... 2 m	Auto-Detect	Plug, M8x1, 4-pin, IO-Link	FR 25-RGO-PNSL-M4	606-11054
0 ... 2 m	Auto-Detect	Metal plug, M8x1, 4-pin, IO-Link	FR 25-RGO-PNSL-M4M	606-11052
0 ... 2 m	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FR 25-RGO-PNSL-K4	606-11053
0 ... 2 m	Auto-Detect	Pigtail, 150 mm with plug, M8, 4-pin, IO-Link	FR 25-RGO-PNSL-KM4	606-11055
0 ... 2 m	Auto-Detect	Pigtail, 150 mm with plug, M12, 4-pin, IO-Link	FR 25-RGO-PNSL-KL4	606-11056



Reflector / Reflective foil*	Operating range (min./max. reflector distance)	Accessories
R5/L	0.5 ... 2 m	Reflectors
RF-100 KL*	0 ... 2 m	Connection cables
R2-2LB1	0 ... 500 mm	Brackets
R3-2LK1	0 ... 500 mm	SensIO (901-01001)
		From Page A-18
		From Page A-38
		From Page A-4
		From Page A-56

# FR 25-RGO2

## Autocollimation photoelectric retro-reflective sensor



### PRODUCT HIGHLIGHTS

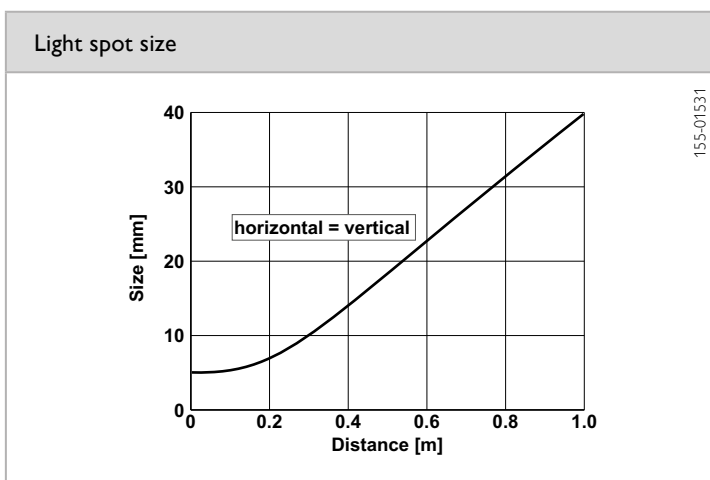
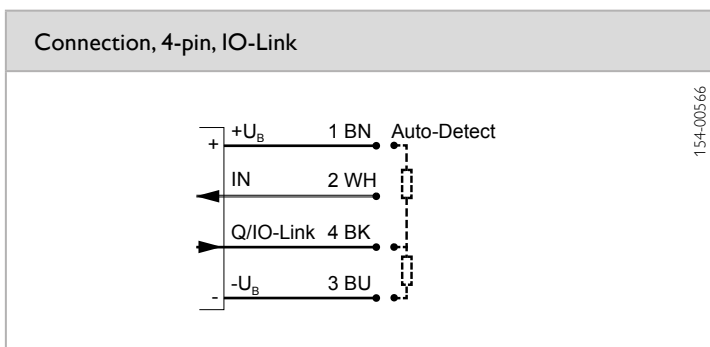
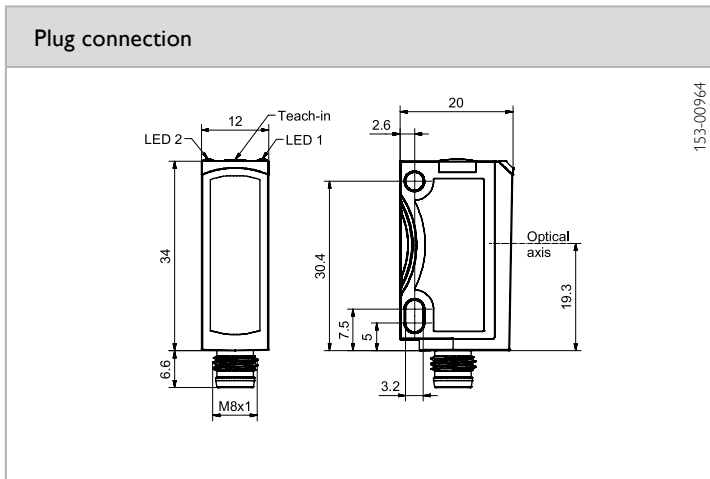
- Autocollimation principle: reliable and precise detection from a range of 0 mm
- Precise detection, even through narrow openings and drilled holes
- Compact miniature housings for installation in the smallest of spaces
- Simple operation via electronic Teach-in button or control input
- Robust glass-fibre-reinforced plastic housings
- Setting of smart functions via IO-Link

Optical data		Functions	
Operating range	0 ... 2 m <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Type of light	LED, red, 632 nm	Indicator LED, yellow	Switching output indicator
Polarising filter	Yes	Sensitivity adjustment	Via Teach-in button and control input
		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		Mechanical data	
Operating voltage, +U <sub>b</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	34 x 20 x 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69 & IP 67 <sup>4</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>b</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>5</sup>
Switching output, Q	1x Auto-Detect (PNP/NPN) <sup>3</sup>	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (cable device)	40 g
Response time	500 µs	Vibration and impact resistance	EN 60947-5-2
Control input, IN	+U <sub>b</sub> = teach-in -U <sub>b</sub> = 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		

<sup>1</sup> Reference material: R5/L reflector    <sup>2</sup> Max. 10 % ripple, within U<sub>b</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> Auto-Detect, automatic PNP/NPN selection by the sensor; PNP or NPN fixed

<sup>4</sup> With connected IP 67 / IP 69 plug    <sup>5</sup> UL: -20 ... +50 °C

Operating range	Switching output	Type of connection	Part number	Article number
0 ... 2 m	Auto-Detect	Plug, M8x1, 4-pin, IO-Link	FR 25-RGO2-PNSL-M4	606-11057
0 ... 2 m	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FR 25-RGO2-PNSL-K4	606-11058



Reflector / Reflective foil*	Operating range (min./max. reflector distance)	Accessories	
R5/L	0.5 ... 2 m	Reflectors	From Page A-18
RF-100 KL*	0 ... 2 m	Connection cables	From Page A-38
R2-2LB1	0 ... 500 mm	Brackets	From Page A-4
R3-2LK1	0 ... 500 mm	SensolO (901-01001)	From Page A-56

# FR 25-RLO

Autocollimation laser photoelectric retro-reflective sensor



## PRODUCT HIGHLIGHTS

- Reliable small-part detection over the entire operating range from a size of 0.2 mm
- Precise front-edge detection even in fastest automation processes thanks to a high switching frequency of 10 kHz
- Constant detection position with lateral object approach over the entire operating range for maximum switching point and positioning accuracy
- Setting of smart functions via IO-Link

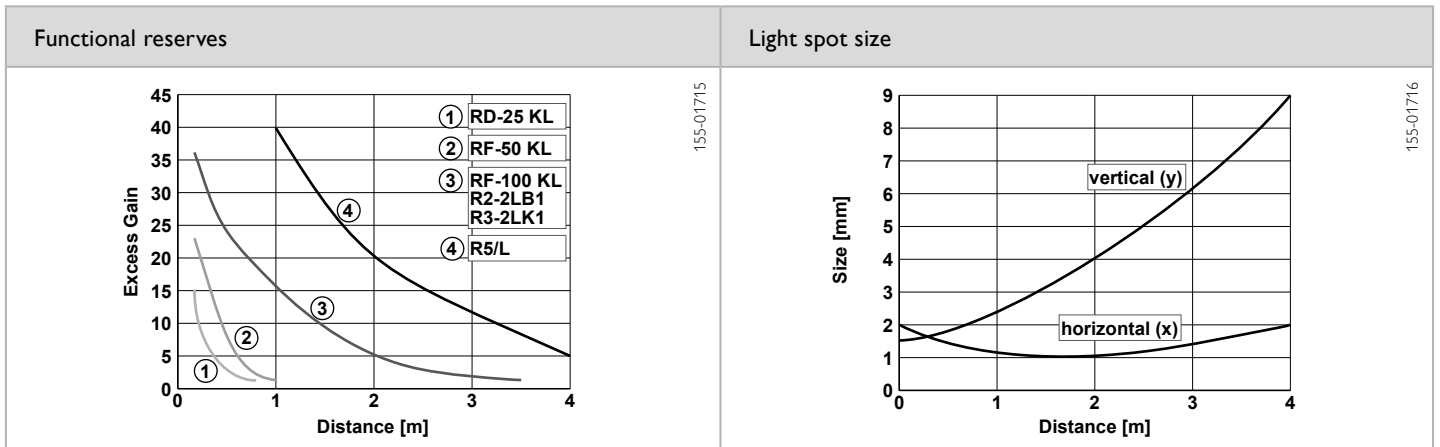
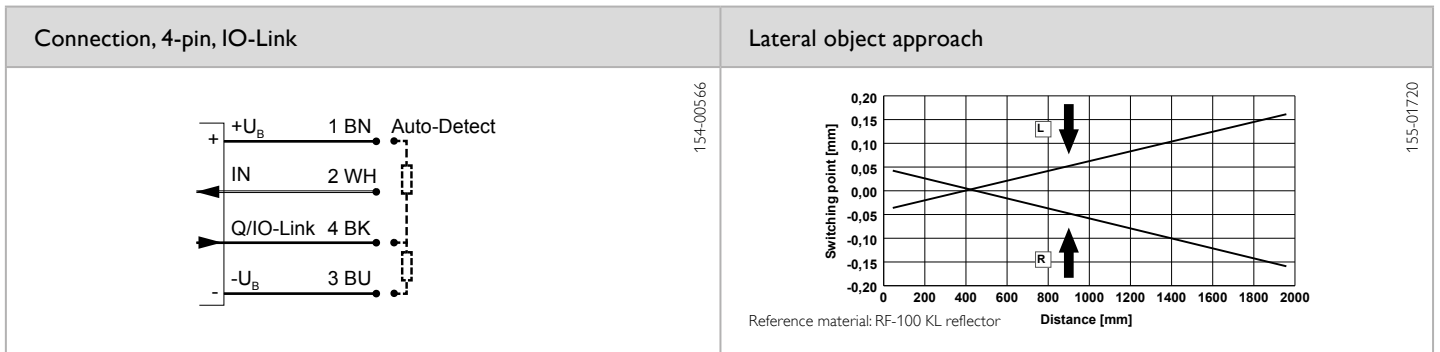
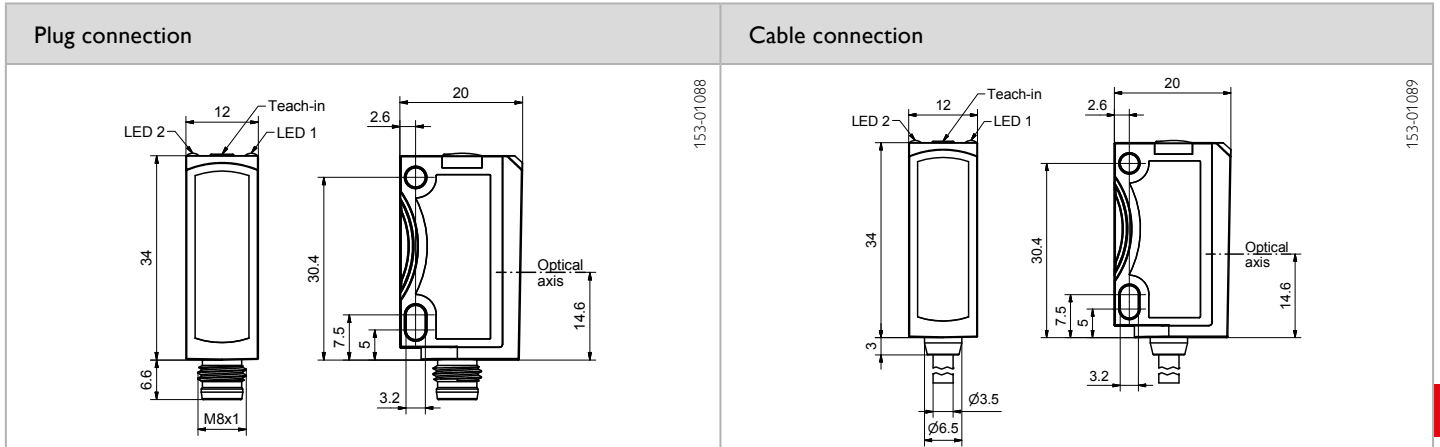
Optical data		Functions	
Limit range	0 ... 5 m <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Operating range	0 ... 4 m <sup>1</sup>	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 650 nm	Sensitivity adjustment	Via Teach-in button, control input and IO-Link
Light spot size	See diagram	Teach-in modes	Mode 1: during running process Mode 2: during standing process
Laser Class (IEC 60825-1)	1	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
Polarising filter	Yes	Default settings	Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	34 × 20 × 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69 & IP 67 <sup>4</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>5</sup>
Switching output, Q	1x Auto-Detect (PNP/NPN) <sup>3</sup>	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	See selection table	Weight (metal plug device <sup>6</sup> )	10 g
Response time	See selection table	Weight (cable device)	40 g
Control input, IN <sup>3</sup>	+ U <sub>B</sub> = teach-in - U <sub>B</sub> = button locked Open = normal operation	Weight (pigtail)	20 g
		Vibration and impact resistance	EN 60947-5-2
IO-Link			
Communication mode	COM 2	Length process data	16 Bit
Min. cycletime	2.3 ms	Specification	1.1
SIO mode	Compatible		

<sup>1</sup> Reference material: R5/L reflector    <sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> Auto-Detect, automatic PNP/NPN selection by the sensor; PNP or NPN fixed

<sup>4</sup> With connected IP 67 / IP 69 plug    <sup>5</sup> UL: -20 ... +50 °C    <sup>6</sup> No Ecolab

Switching frequency, f (ti/tp 1:1) <sup>2</sup>	Response time	Switching output	Type of connection	Part number	Article number
≤ 10 kHz	50 μs	Auto-Detect	Metal plug, M8x1, 4-pin, IO-Link	FR 25-RLO1-PNSL-M4M	609-31019
≤ 10 kHz	50 μs	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FR 25-RLO1-PNSL-K4	609-31020

Switching frequency, $f$ (ti/tp 1:1) <sup>2</sup>	Response time	Switching output	Type of connection	Part number	Article number
≤ 4 kHz	125 μs	Auto-Detect	Plug, M8x1, 4-pin, IO-Link	FR 25-RLO2-PNSL-M4	609-31021
≤ 4 kHz	125 μs	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FR 25-RLO2-PNSL-K4	609-31022
≤ 4 kHz	125 μs	Auto-Detect	Pigtail, 150 mm with plug, M8, 4-pin, IO-Link	FR 25-RLO2-PNSL-KM4	609-31023



Small part detection				Reflector / Reflective foil*	Operating range (min./max. reflector distance)	Accessories		
Reflector / Reflective foil*	Reflector distance	Scanning distance	Smallest detectable part			Connection cables	From Page A-38	
R5L	1000 ... 4000 mm	0 ... 4000 mm	≥ 1 mm	R5L	0 ... 4000 mm			Brackets SensolO (901-01001)
RD 25LK	50 ... 500 mm	50 ... 500 mm	≥ 0,2 mm	RD 25LK	50 ... 600 mm			
RF-100 KL*	500 ... 2500 mm	0 ... 500 mm	≥ 0,2 mm	RF-100 KL*	0 ... 2500 mm	From Page A-56		
R2-2LB1	500 ... 2500 mm	0 ... 500 mm	≥ 0,2 mm	R2-2LB1	0 ... 2500 mm			
R3-2LK1	500 ... 2500 mm	0 ... 500 mm	≥ 0,2 mm	R3-2LK1	0 ... 2500 mm			
RF-50 KL*	100 ... 500 mm	100 ... 500 mm	≥ 0,2 mm	RF-50 KL*	0 ... 800 mm			



# FR 25-RLO

Autocollimation laser photoelectric retro-reflective sensor with 2 switching outputs Q<sup>2</sup>



## PRODUCT HIGHLIGHTS

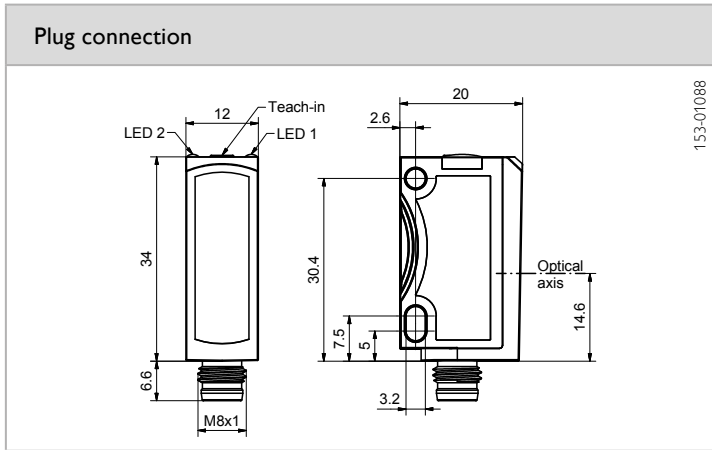
- Fast switching output for precise switching behavior and parallel IO-Link communication for quick format changes and diagnostic data
- Reliable small-part detection over the entire operating range from a size of 0.2 mm
- Precise front-edge detection even in fastest automation processes thanks to a high switching frequency of 10 kHz
- Constant detection position with lateral object approach over the entire operating range for maximum switching point and positioning accuracy

Optical data		Functions	
Limit range	0 ... 5 m <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Operating range	0 ... 4 m <sup>1</sup>	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 650 nm	Sensitivity 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
Laser Class (IEC 60825-1)	1	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
Polarising filter	Yes	Default settings	Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>b</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	34 x 20 x 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69 & IP 67 <sup>4</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>b</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>5</sup>
Switching output, Q	1x Auto-Detect (PNP/NPN) <sup>3</sup>	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	See selection table	Weight (metal plug device <sup>6</sup> )	10 g
Response time	See selection table	Weight (cable device)	40 g
Control input, I <sub>N</sub> <sup>3</sup>	+ U <sub>b</sub> = teach-in - U <sub>b</sub> = button locked Open = normal operation	Weight (pigtail)	20 g
		Vibration and impact resistance	EN 60947-5-2
IO-Link			
Communication mode	COM 2	Length process data	16 Bit
Min. cycletime	2.3 ms	Specification	1.1
SIO mode	Compatible		

<sup>1</sup> Reference material: R5/L reflector    <sup>2</sup> Max. 10 % ripple, within U<sub>b</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> Auto-Detect, automatic PNP/NPN selection by the sensor, PNP or NPN fixed

<sup>4</sup> With connected IP 67 / IP 69 plug    <sup>5</sup> UL: -20 ... +50 °C    <sup>6</sup> No Ecolab

Switching frequency, $f$ (ti/tp 1:1) <sup>2</sup>	Response time	Switching output	Type of connection	Part number	Article number
≤ 10 kHz	50 μs	Auto-Detect	Metal plug, M8x1, 4-pin, IO-Link	FR 25-RLO1-2GSL-M4M	609-31025



Connection, 4-pin, IO-Link	Lateral object approach
<p>154-0584</p>	<p>Reference material: RF-100 KL reflector</p> <p>155-01720</p>

Functional reserves	Light spot size
<p>155-07715</p>	<p>155-07716</p>

Small part detection				Reflector / Reflective foil*	Operating range (min./max. reflector distance)	Accessories		
Reflector / Reflective foil*	Reflector distance	Scanning distance	Smallest detectable part			Connection cables	From Page A-38	
R5L	1000 ... 4000 mm	0 ... 4000 mm	≥ 1 mm	R5L	0 ... 4000 mm			Brackets SensolO (901-01001)
RD 25LK	50 ... 500 mm	50 ... 500 mm	≥ 0,2 mm	RD 25LK	50 ... 600 mm			
RF-100 KL*	500 ... 2500 mm	0 ... 500 mm	≥ 0,2 mm	RF-100 KL*	0 ... 2500 mm	From Page A-56		
R2-2LB1	500 ... 2500 mm	0 ... 500 mm	≥ 0,2 mm	R2-2LB1	0 ... 2500 mm			
R3-2LK1	500 ... 2500 mm	0 ... 500 mm	≥ 0,2 mm	R3-2LK1	0 ... 2500 mm			
RF-50 KL*	100 ... 500 mm	100 ... 500 mm	≥ 0,2 mm	RF-50 KL*	0 ... 800 mm			

# FR 25-RL

## Retro-reflective laser sensor



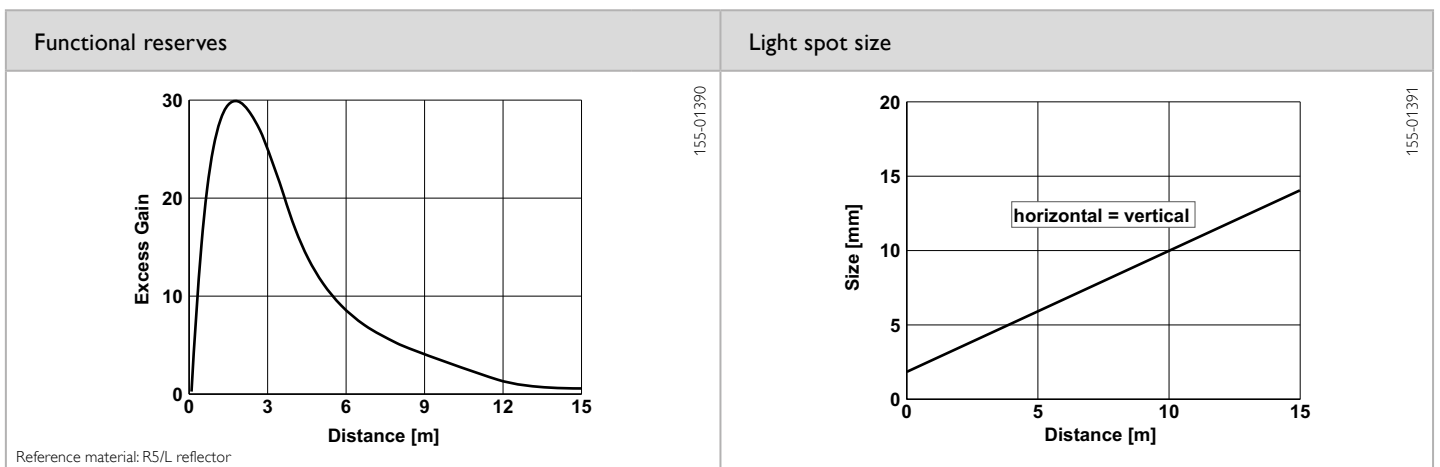
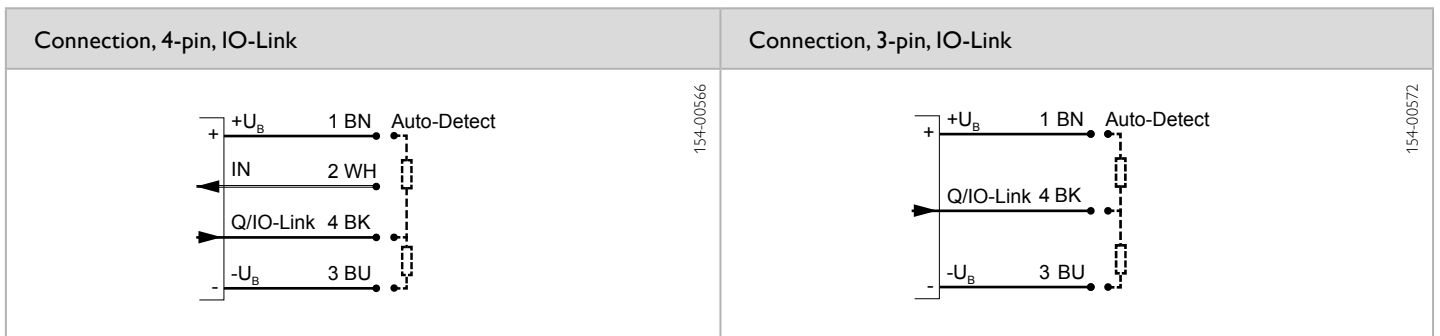
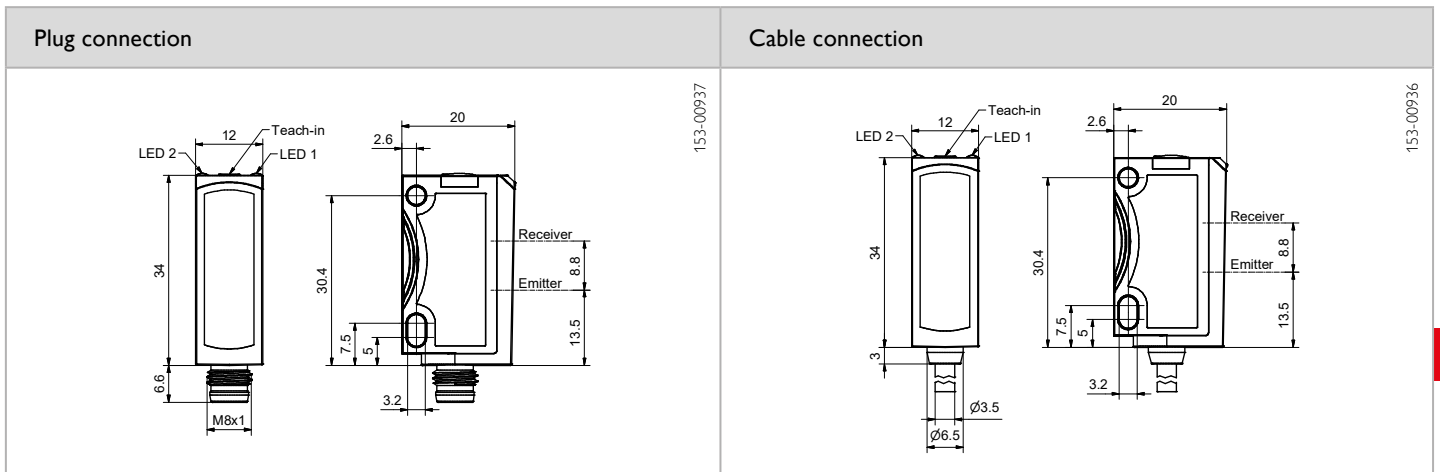
### PRODUCT HIGHLIGHTS

- Particularly suitable for short-range applications
- Suitable for a wide variety of different reflectors
- Very small, easily visible laser light spot
- Sensor settings via teach-in and control input
- Robust glass-fibre-reinforced plastic housings
- Setting of smart functions via IO-Link

Optical data		Functions	
Limit range	0.1 ... 15 m <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Operating range	0.1 ... 13 m <sup>1</sup>	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 650 nm	Sensitivity adjustment	Via Teach-in button, control input <sup>4</sup> and IO-Link
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. and Auto-Detect / NPN / PNP via teach-in button, control input <sup>4</sup> and IO-Link Button lock via control input <sup>4</sup> and IO-Link Wide variety of adjustment possibilities via IO-Link
Polarising filter	Yes	Default settings	Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	34 x 20 x 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69 & IP 67 <sup>5</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>6</sup>
Switching output, Q	1x Auto-Detect (PNP/NPN) <sup>3</sup>	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (metal plug device <sup>7</sup> )	10 g
Switching frequency, f (ti/tp 1:1)	≤ 4000 Hz	Weight (cable device)	40 g
Response time	125 μs	Weight (pigtail)	20 g
Control input, IN <sup>4</sup>	+ U <sub>B</sub> = teach-in - U <sub>B</sub> = button locked Open = normal operation	Vibration and impact resistance	EN 60947-5-2
IO-Link			
Communication mode	COM 2		
Min. cycletime	2.3 ms		
SIO mode	Compatible		
Length process data	16 Bit		
Specification	1.1		

<sup>1</sup> Reference material: R5/L reflector    <sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> Auto-Detect, automatic PNP/NPN selection by the sensor; PNP or NPN fixed    <sup>4</sup> Only 4-pin design  
<sup>5</sup> With connected IP 67 / IP 69 plug    <sup>6</sup> UL: -20 ... +50 °C    <sup>7</sup> No Ecolab

Operating range	Switching output	Type of connection	Part number	Article number
0.1 ... 13 m	Auto-Detect	Metal plug, M8x1, 3-pin, IO-Link	FR 25-RL-PNSL-M3M	609-31017
0.1 ... 13 m	Auto-Detect	Metal plug, M8x1, 4-pin, IO-Link	FR 25-RL-PNSL-M4M	609-31018
0.1 ... 13 m	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FR 25-RL-PNSL-K4	609-31014
0.1 ... 13 m	Auto-Detect	Pigtail, 150 mm with plug, M8, 4-pin, IO-Link	FR 25-RL-PNSL-KM4	609-31016
0.1 ... 13 m	Auto-Detect	Pigtail, 150 mm with plug, M12, 4-pin, IO-Link	FR 25-RL-PNSL-KL4	609-31015



Reflector (especially for short range)	Operating range	Accessories
RD 25LK	0.15 ... 1 m	<ul style="list-style-type: none"> <li>Reflectors</li> <li>Connection cables</li> <li>Brackets</li> <li>Sensolo (901-01001)</li> </ul>
		<ul style="list-style-type: none"> <li>From Page A-18</li> <li>From Page A-38</li> <li>From Page A-4</li> <li>From Page A-56</li> </ul>

# FR 25-R

## Photoelectric retro-reflective sensor



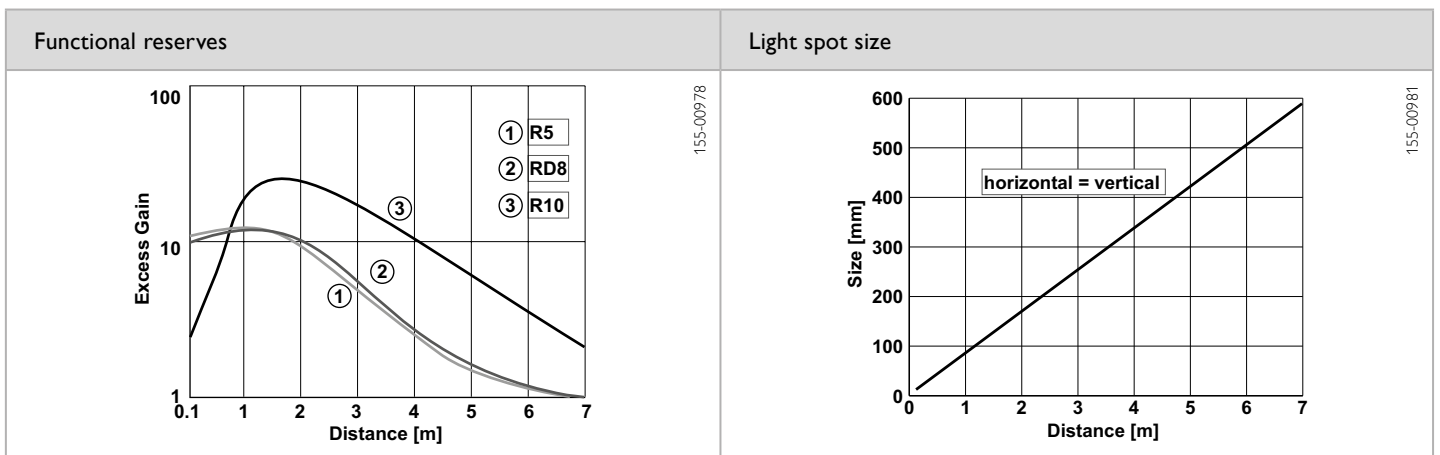
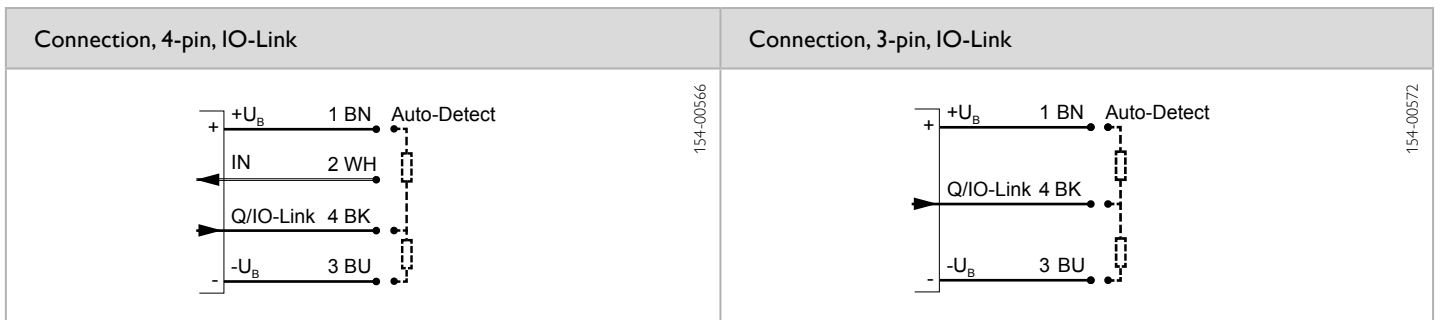
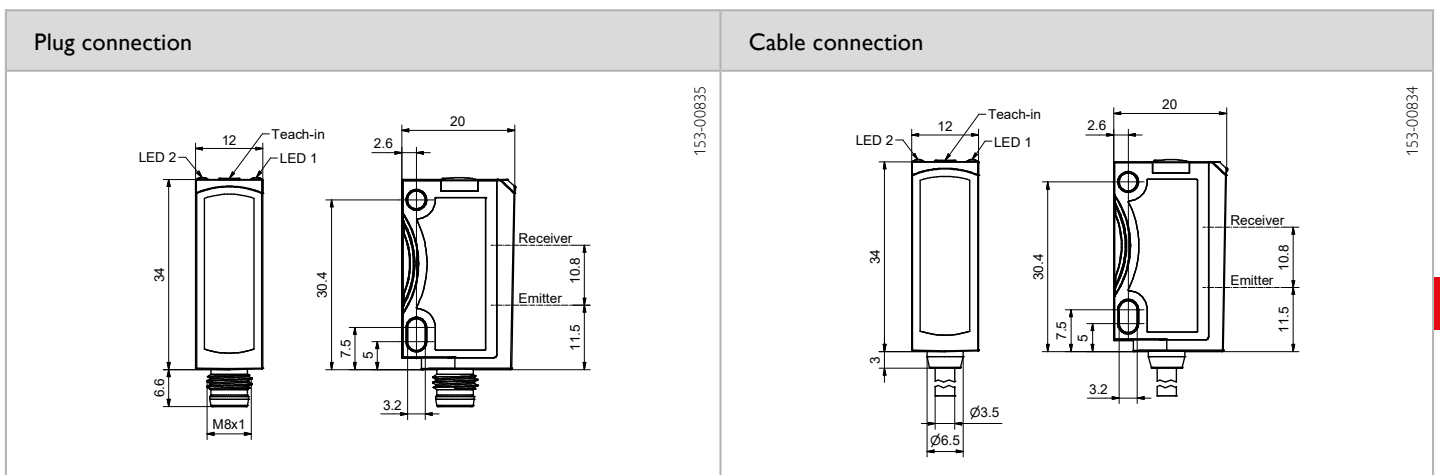
### PRODUCT HIGHLIGHTS

- Auto-Detect photoelectric retro-reflective sensor with real PNP and real NPN functions
- Particularly suitable for short-range applications
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings
- Durable laser printing
- Wide range of variants
- Setting of smart functions via IO-Link

Optical data		Functions	
Limit range	0.1 ... 7 m <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Operating range	0.1 ... 6 m <sup>1</sup>	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 632 nm	Sensitivity adjustment	Via Teach-in button, control input <sup>4</sup> and IO-Link
Light spot size	See diagram	Teach-in modes	Mode 1: during running process Mode 2: during standing process
Polarising filter	Yes	Adjustment possibilities	N.O./N.C. and Auto-Detect / NPN / PNP via teach-in button, control input <sup>4</sup> and IO-Link Button lock via control input <sup>4</sup> and IO-Link Wide variety of adjustment possibilities via IO-Link
		Default settings	Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	34 × 20 × 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69 & IP 67 <sup>5</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>6</sup>
Switching output, Q	1x Auto-Detect (PNP/NPN) <sup>3</sup>	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (metal plug device <sup>7</sup> )	10 g
Response time	500 μs	Weight (cable device)	40 g
Control input, IN <sup>4</sup>	+U <sub>B</sub> = teach-in -U <sub>B</sub> = button locked Open = normal operation	Weight (pigtail)	20 g
		Vibration and impact resistance	EN 60947-5-2
IO-Link			
Communication mode	COM 2		
Min. cycletime	2.3 ms		
SIO mode	Compatible		
Length process data	16 Bit		
Specification	1.1		

<sup>1</sup> Reference material: R10 reflector    <sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> Auto-Detect, automatic PNP/NPN selection by the sensor; PNP or NPN fixed    <sup>4</sup> Only 4-pin design  
<sup>5</sup> With connected IP 67 / IP 69 plug    <sup>6</sup> UL: -20 ... +50 °C    <sup>7</sup> No Ecolab

Operating range	Switching output	Type of connection	Part number	Article number
0.1 ... 6 m	Auto-Detect	Plug, M8x1, 3-pin, IO-Link	FR 25-R-PNSL-M3	606-11048
0.1 ... 6 m	Auto-Detect	Metal plug, M8x1, 3-pin, IO-Link	FR 25-R-PNSL-M3M	606-11045
0.1 ... 6 m	Auto-Detect	Plug, M8x1, 4-pin, IO-Link	FR 25-R-PNSL-M4	606-11042
0.1 ... 6 m	Auto-Detect	Metal plug, M8x1, 4-pin, IO-Link	FR 25-R-PNSL-M4M	606-11046
0.1 ... 6 m	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FR 25-R-PNSL-K4	606-11043
0.1 ... 6 m	Auto-Detect	Pigtail, 150 mm with plug, M8, 4-pin, IO-Link	FR 25-R-PNSL-KM4	606-11047
0.1 ... 6 m	Auto-Detect	Pigtail, 150 mm with plug, M12, 4-pin, IO-Link	FR 25-R-PNSL-KL4	606-11044



Reflector	Operating range	Accessories
R10	0.1 ... 6 m	Reflectors
RD8	0,05 ... 4 m	Connection cables
R5	0.1 ... 4 m	Brackets
		Sensolo (901-01001)
		From Page A-18
		From Page A-38
		From Page A-4
		From Page A-56

# FR 25-RF

Photoelectric retro-reflective sensor, fixed focus



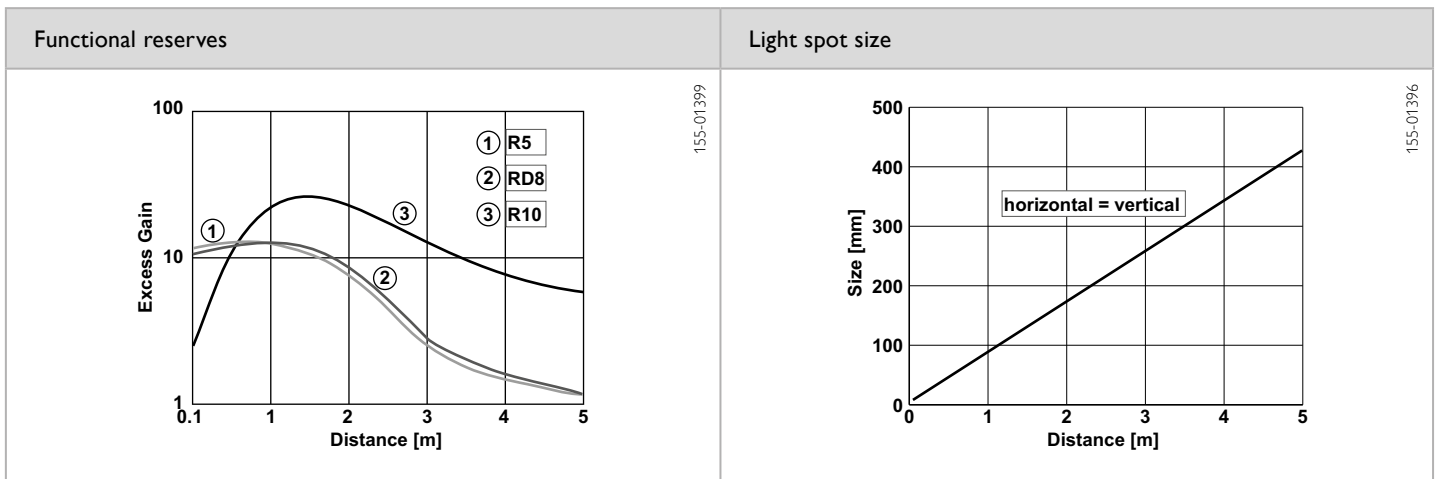
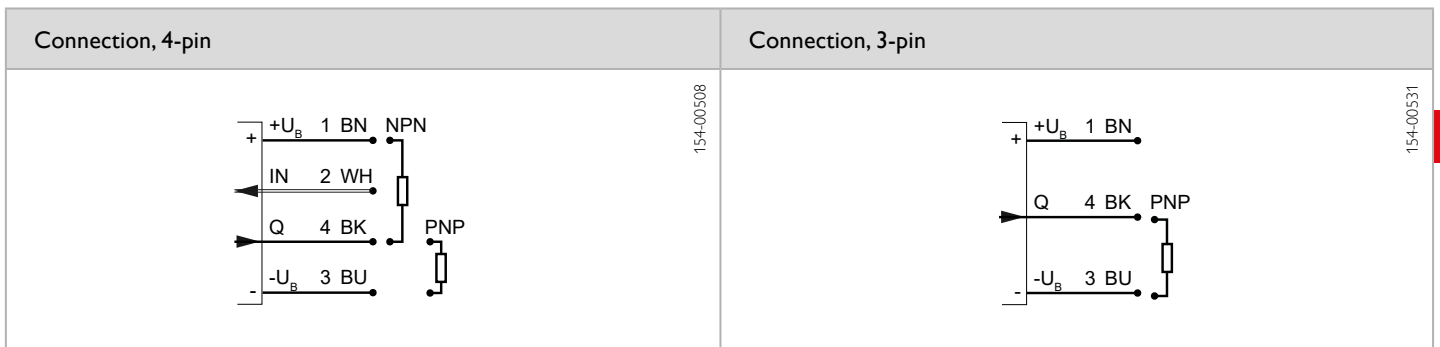
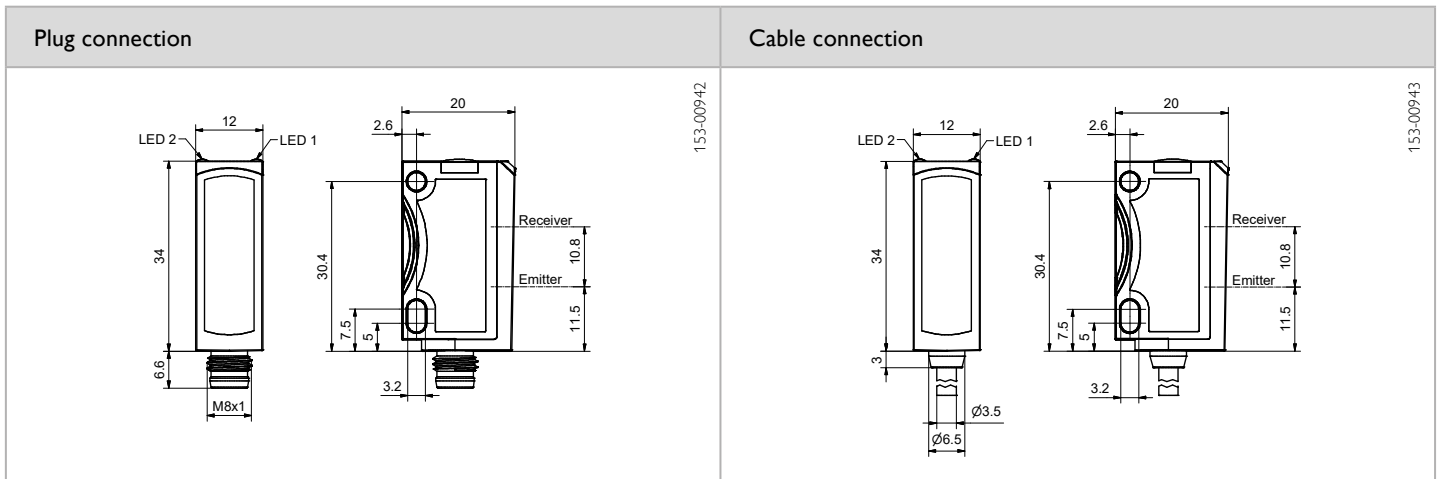
## PRODUCT HIGHLIGHTS

- Economical solution for numerous applications
- Tamper-proof sensor design – no misalignment possible
- Suitable for a wide variety of different reflectors
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings

Optical data		Functions	
Limit range	0.1 ... 5 m <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Operating range	0.1 ... 3 m <sup>1</sup>	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 632 nm	Adjustment possibilities	N.O./N.C. via control input
Light spot size	See diagram		
Polarising filter	Yes		
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	34 x 20 x 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69K & IP 67 <sup>3</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>4</sup>
Switching output, Q	PNP/NPN (see selection table)	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (cable device)	40 g
Response time	500 μs	Weight (pigtail)	20 g
Control input, I <sub>N</sub>	+U <sub>B</sub> = N.C. -U <sub>B</sub> / Open = N.O.	Vibration and impact resistance	EN 60947-5-2

<sup>1</sup> Reference material: R10 reflector    <sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> With connected IP 67 / IP 69K plug    <sup>4</sup> UL: -20 ... +50 °C

Operating range	Switching output	Type of connection	Part number	Article number
0.1 ... 3 m	PNP	Plug, M8x1, 3-pin	FR 25-RF-PS-M3	606-11038
0.1 ... 3 m	PNP	Plug, M8x1, 4-pin	FR 25-RF-PS-M4	606-11012
0.1 ... 3 m	NPN	Plug, M8x1, 4-pin	FR 25-RF-NS-M4	606-11013
0.1 ... 3 m	PNP	Cable, 2 m, 4-wire	FR 25-RF-PS-K4	606-11014
0.1 ... 3 m	NPN	Cable, 2 m, 4-wire	FR 25-RF-NS-K4	606-11015
0.1 ... 3 m	NPN	Pigtail, 150 mm with plug, M8, 4-pin	FR 25-RF-NS-KM4	606-11059



Reflector	Operating range
R10	0.1 ... 3 m
RD8	0.1 ... 3 m
R5	0.1 ... 3 m

Accessories	
Reflectors	From Page A-18
Connection cables	From Page A-38
Brackets	From Page A-4



# FS/FE 25-RL

## Through-beam laser sensor



### PRODUCT HIGHLIGHTS

- Long range with small and compact housings
- Test input for checking sensor pair function
- Very small, easily visible laser light spot
- Sensor settings via teach-in and control input
- Robust glass-fibre-reinforced plastic housings
- Setting of smart functions via IO-Link

Optical data		Functions	
Limit range	0 ... 20 m	Indicator LED, green	Operating voltage indicator
Operating range	0 ... 18 m	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 650 nm	Sensitivity adjustment (receiver)	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
Laser Class (IEC 60825-1)	1	Adjustment possibilities (receiver)	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		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>1</sup>	Dimensions	34 × 20 × 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69 & IP 67 <sup>3</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>4</sup>
Switching output, Q	1x Auto-Detect (PNP/NPN) <sup>2</sup>	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (metal plug device <sup>5</sup> )	10 g
Switching frequency, f (ti/tp 1:1)	≤ 2000 Hz	Weight (cable device)	40 g
Response time	250 μs	Vibration and impact resistance	EN 60947-5-2
Control input, IN (receiver)	+U <sub>B</sub> = teach-in -U <sub>B</sub> = button locked Open = normal operation	IO-Link	
Control input, Test (transmitter)	+U <sub>B</sub> = Test (transmitter off) -U <sub>B</sub> / Open = normal operation	Communication mode	COM 2
		Min. cycle time	2.3 ms
		SIO mode	compatible
		Process bit length	16 Bit
		Specification	1.1

<sup>1</sup> Max. 10 % ripple, within U<sub>B</sub> ~ 50 Hz / 100 Hz    <sup>2</sup> Auto-Detect, automatic PNP/NPN selection by the sensor; PNP or NPN fixed    <sup>3</sup> With connected IP 67 / IP 69 plug

<sup>4</sup> UL: -20 ... +50 °C    <sup>5</sup> No Ecolab

Operating range	Switching output	Type of connection	Part number	Article number
0 ... 18 m	Auto-Detect	Metal plug, M8x1, 4-pin, IO-Link	FE 25-RL-PNSL-M4M	605-21022
0 ... 18 m	–	Metal plug, M8x1, 4-pin, IO-Link	FS 25-RL-L-M4M	605-11013
0 ... 18 m	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FE 25-RL-PNSL-K4	605-21021
0 ... 18 m	–	Cable, 2 m, 4-wire, IO-Link	FS 25-RL-L-K4	605-11012

<p><b>Plug connection (transmitter)</b></p> <p>153-00940</p>	<p><b>Cable connection (transmitter)</b></p> <p>153-00939</p>
<p><b>Plug connection (receiver)</b></p> <p>153-00854</p>	<p><b>Cable connection (receiver)</b></p> <p>153-00853</p>

7

<p><b>Connection, transmitter, 4-pin, IO-Link</b></p> <p>154-00581</p>	<p><b>Connection, receiver, 4-pin, IO-Link</b></p> <p>154-00566</p>
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<p><b>Functional reserves</b></p> <p>155-01388</p>	<p><b>Light spot size</b></p> <p>155-01389</p>
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Accessories			
Connection cables	From Page A-38	Sensolo (901-01001)	From Page A-56
Brackets	From Page A-4		

# FS/FE 25-R

Photoelectric through-beam sensor



## PRODUCT HIGHLIGHTS

- Test input for checking sensor pair function
- Sensor settings via teach-in and control input
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings
- Durable laser printing
- Setting of smart functions via IO-Link

Optical data		Functions	
Limit range	0 ... 15 m	Indicator LED, green	Operating voltage indicator
Operating range	0 ... 13 m	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 632 nm	Sensitivity adjustment (receiver)	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
		Adjustment possibilities (receiver)	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		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>1</sup>	Dimensions	34 × 20 × 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69 & IP 67 <sup>3</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>4</sup>
Switching output, Q	1x Auto-Detect (PNP/NPN) <sup>2</sup>	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (metal plug device <sup>5</sup> )	10 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (cable device)	40 g
Response time	500 μs	Vibration and impact resistance	EN 60947-5-2
Control input, IN (receiver)	+U <sub>B</sub> = teach-in -U <sub>B</sub> = button locked Open = normal operation	IO-Link	
Control input, Test (transmitter)	+U <sub>B</sub> = Test (transmitter off) -U <sub>B</sub> / Open = normal operation	Communication mode	COM 2
		Min. cycle time	2.3 ms
		SIO mode	compatible
		Process bit length	16 Bit
		Specification	1.1

<sup>1</sup> Max 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>2</sup> Auto-Detect, automatic PNP/NPN selection by the sensor; PNP or NPN fixed    <sup>3</sup> With connected IP 67 / IP 69 plug

<sup>4</sup> UL: -20 ... +50 °C    <sup>5</sup> No Ecolab

Operating range	Switching output	Type of connection	Part number	Article number
0 ... 13 m	Auto-Detect	Metal plug, M8x1, 4-pin, IO-Link	FE 25-R-PNSL-M4M	605-21019
0 ... 13 m	–	Metal plug, M8x1, 4-pin, IO-Link	FS 25-R-L-M4M	605-11010
0 ... 13 m	Auto-Detect	Cable, 2 m, 4-wire, IO-Link	FE 25-R-PNSL-K4	605-21018
0 ... 13 m	–	Cable, 2 m, 4-wire, IO-Link	FS 25-R-L-K4	605-11009

<p><b>Plug connection (transmitter)</b></p>	<p><b>Cable connection (transmitter)</b></p>
<p><b>Plug connection (receiver)</b></p>	<p><b>Cable connection (receiver)</b></p>

<p><b>Connection, transmitter, 4-pin, IO-Link</b></p>	<p><b>Connection, receiver, 4-pin, IO-Link</b></p>

<p><b>Functional reserves</b></p>	<p><b>Light spot size</b></p>

<p><b>Accessories</b></p>			
<p>Connection cables</p>	<p>From Page A-38</p>	<p>Sensolo (901-01001)</p>	<p>From Page A-56</p>
<p>Brackets</p>	<p>From Page A-4</p>		

# FS/FE 25-RF

Photoelectric through-beam sensor, fixed focus



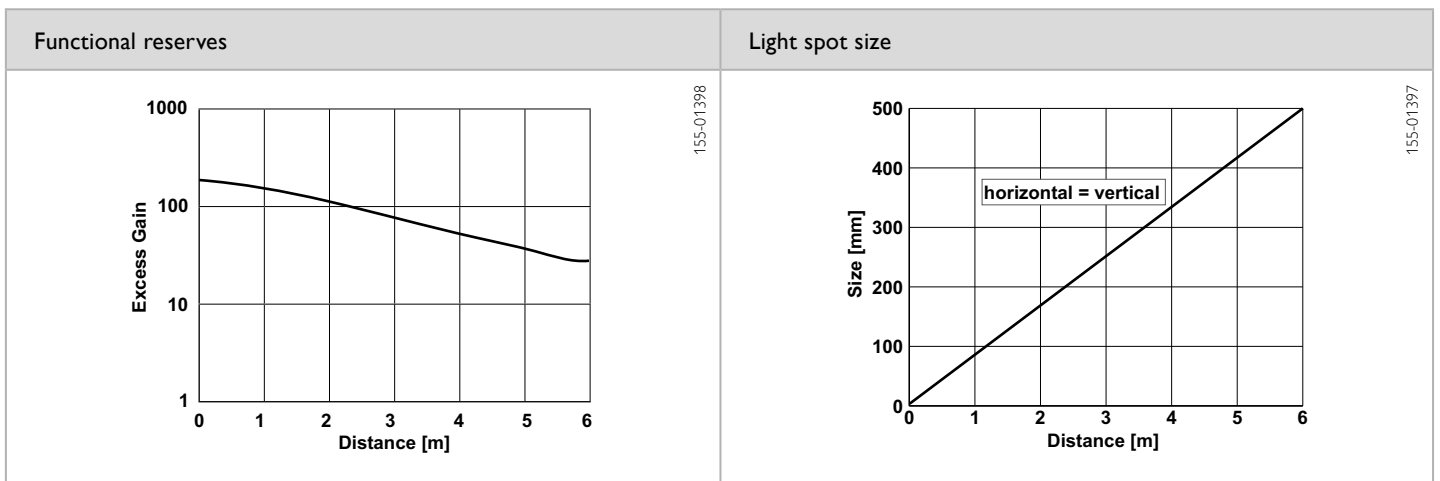
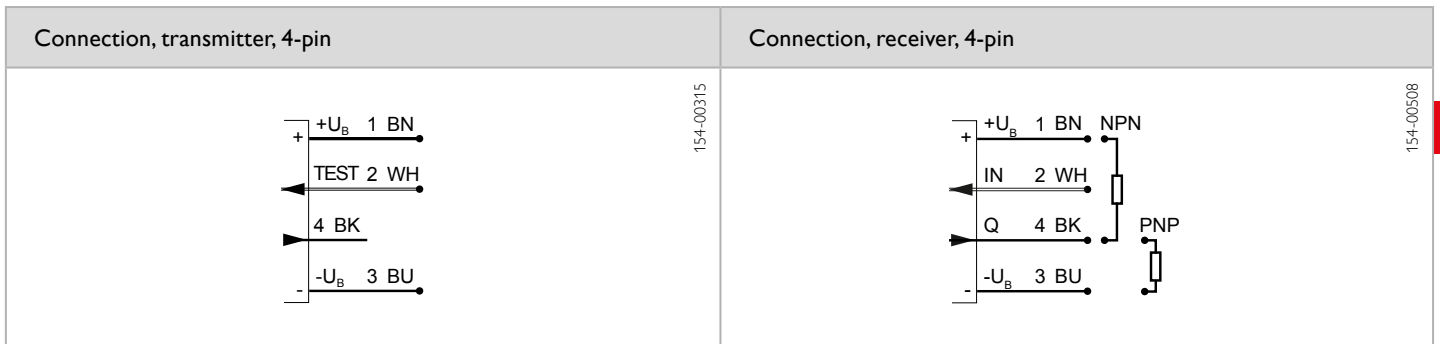
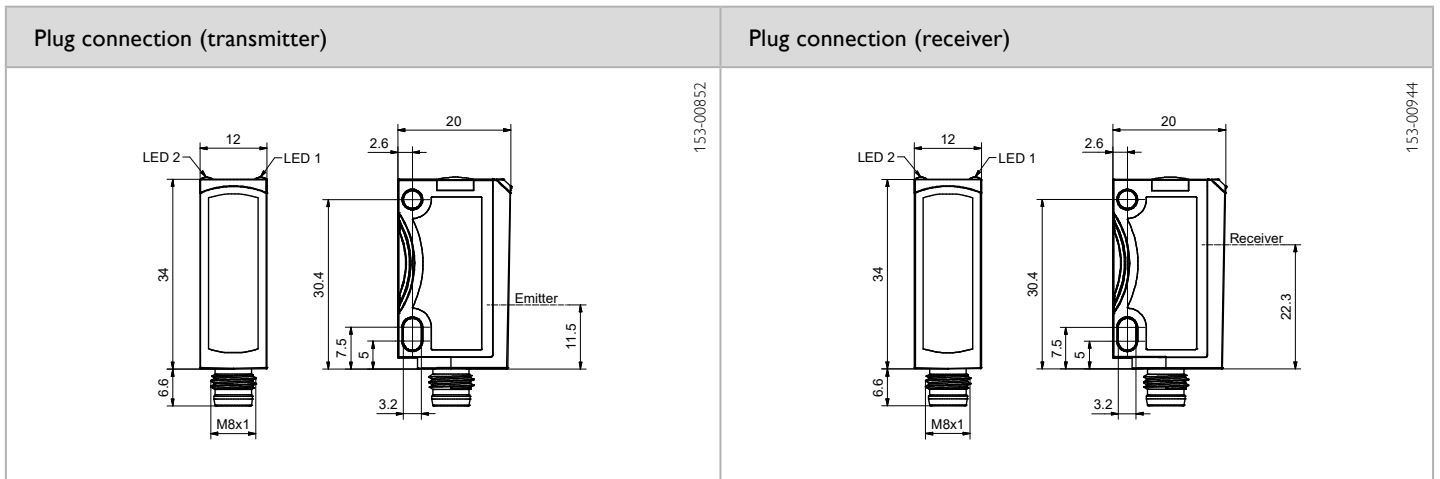
## PRODUCT HIGHLIGHTS

- Economical solution for numerous applications
- Tamper-proof sensor design – no misalignment possible
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings
- Durable laser printing

Optical data		Functions	
Limit range	0 ... 6 m	Indicator LED, green	Operating voltage indicator
Operating range	0 ... 4 m	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 632 nm	Adjustment possibilities (receiver)	N.O./N.C. via control input
Light spot size	See diagram		
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>1</sup>	Dimensions	34 × 20 × 12 mm
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69K & IP 67 <sup>2</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See selection table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>3</sup>
Switching output, Q	PNP/NPN (see selection table)	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Vibration and impact resistance	EN 60947-5-2
Response time	500 μs		
Control input, IN (receiver)	+U <sub>B</sub> = N.C. -U <sub>B</sub> / Open = N.O.		
Control input, Test (transmitter)	+U <sub>B</sub> = Test (transmitter off) -U <sub>B</sub> / Open = normal operation		

<sup>1</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>2</sup> With connected IP 67 / IP 69K plug    <sup>3</sup> UL: -20 ... +50 °C

Operating range	Switching output	Type of connection	Part number	Article number
0 ... 4 m	PNP	Plug, M8x1, 4-pin	FE 25-RF-PS-M4	605-21016
0 ... 4 m	NPN	Plug, M8x1, 4-pin	FE 25-RF-NS-M4	605-21017
0 ... 4 m	–	Plug, M8x1, 4-pin	FS 25-RF-M4	605-11008



Accessories	
Connection cables	From Page A-38
Brackets	From Page A-4