


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 retroreflective photoelectric 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 colour 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 69K & 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 through-beam photoelectric sensor to the laser photoelectric proximity 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

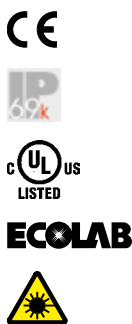
impressive. Thus the FT 25-RHD scanner not only offers very precise background suppression, but also the best black/white-shift in its class.

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	
Photoelectric proximity sensors with background suppression						
FT 25-RLH	Laser 	Teach-in 	120 mm	Most accurate small-part detection	298	
FT 25-RH	LED	Teach-in 	200 mm		300	
FT 25-RHD	LED	Teach-in 	400 mm	Long scanning distance	302	
FT 25-RF1/2	LED	Fixed focus	60 mm / 80 mm		304	
FT 25-BF2	LED, blue 	Fixed focus	80 mm	BlueLight technology	306	
Photoelectric proximity sensors with foreground suppression						
FT 25-RV	LED	Teach-in 	200 mm	Window function (switching window)	308	
Photoelectric proximity sensors						
FT 25-RL	Laser 	Teach-in 	250 mm	Detection of minimal grey value differences	310	
FT 25-R	LED	Teach-in 	800 mm		312	
Retroreflective photoelectric sensors						
FR 25-RGO	LED	Teach-in 	2 m	Autocollimation, detection of transparent objects	314	
FR 25-RGO2	LED	Teach-in 	2 m	Autocollimation	316	
FR 25-RLO	Laser 	Teach-in 	4 m	Autocollimation, most accurate small-part detection	318	
FR 25-RL	Laser 	Teach-in 	15 m	Most accurate small-part detection	320	
FR 25-R	LED	Teach-in 	7 m		322	
FR 25-RF	LED	Fixed setting	5 m		324	
Through-beam photoelectric sensors						
FS/FE 25-RL	Laser 	Teach-in 	20 m	Most accurate small-part detection	326	
FS/FE 25-R	LED	Teach-in 	15 m		328	
FS/FE 25-RF	LED	Fixed setting	6 m		330	

FT 25-RLH

Laser photoelectric proximity sensor with background suppression



PRODUCT HIGHLIGHTS

- Precisely adjustable background suppression
- Reliable switching despite varying object colours 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

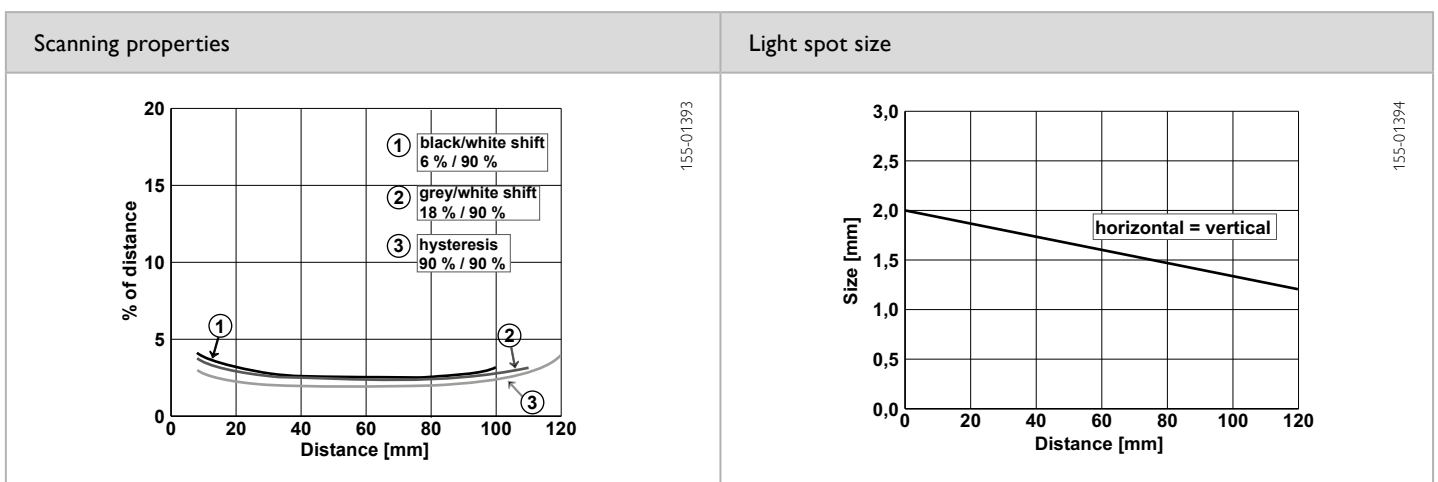
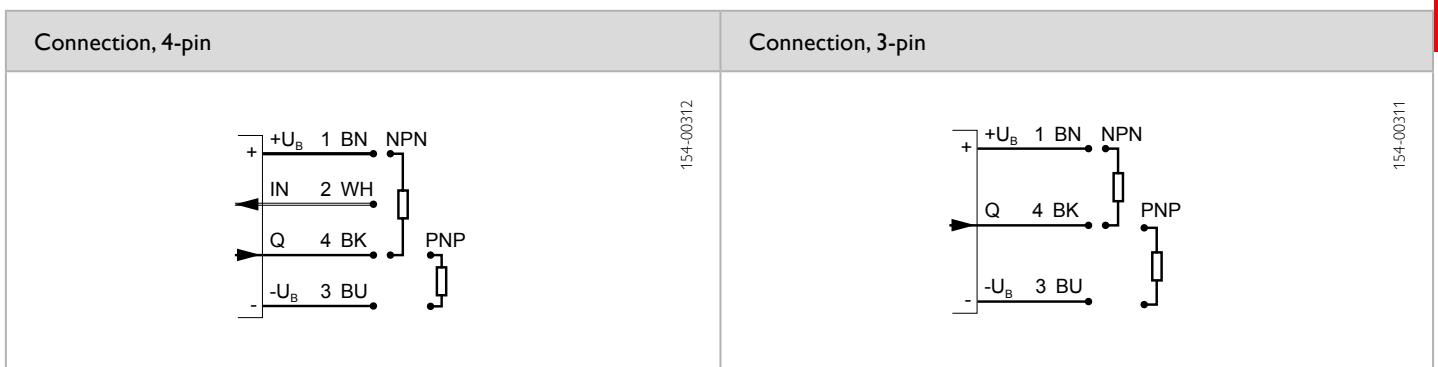
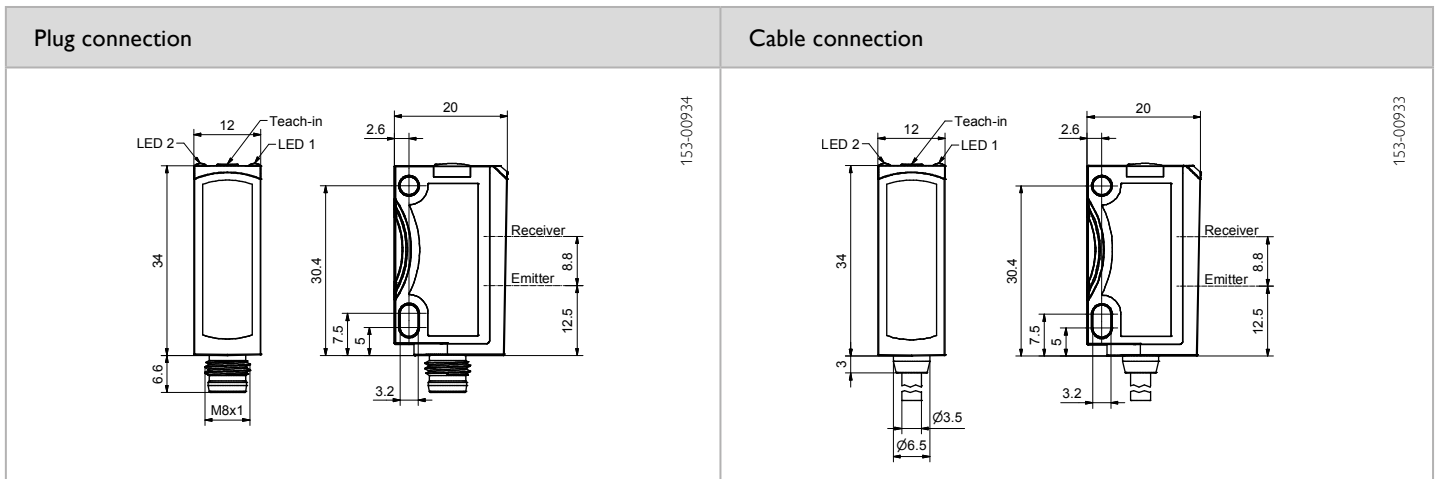
Optical data		Functions	
Scanning distance	4 ... 120 mm ¹	Indicator LED, green	Operating voltage indicator
Adjustment range	10 ... 120 mm ¹	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 650 nm	Scanning distance adjustment	Via Teach-in button and control input
Light spot size	See diagram	Teach-in modes	Mode 1: during running process Mode 2: during standing process
Laser Class (IEC 60825-1)	1	Adjustment possibilities	N.O./N.C. via Teach-in button and control input Button lock via control input
		Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _b	10 ... 30V DC ²	Dimensions	34 x 20 x 12 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ⁴
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _b / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C ⁵
Switching output, Q	PNP/NPN (see Selection Table)	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (metal plug device ⁶)	10 g
Response time	500 μs	Weight (cable device)	40 g
Control input, IN ³	+U _b = teach-in -U _b = button locked Open = normal operation	Weight (pigtail)	20 g
		Vibration and impact resistance	EN 60947-5-2

¹ Reference material: white, 90 % reflectivity ² Max. 10 % ripple, within U_b, ~ 50 Hz / 100 Hz ³ Only 4-pin design ⁴ With connected IP 67 / IP 69K plug ⁵ UL: -20 ... +50 °C

⁶ No Ecolab

Scanning distance	Switching output	Type of connection	Part number	Article number
4 ... 120 mm	PNP	Plug, M8x1, 3-pin	FT 25-RLH-PS-M3	609-11011
4 ... 120 mm	PNP	Plug, M8x1, 4-pin	FT 25-RLH-PS-M4	609-11005
4 ... 120 mm	NPN	Plug, M8x1, 4-pin	FT 25-RLH-NS-M4	609-11002
4 ... 120 mm	PNP	Metal plug, M8x1, 3-pin	FT 25-RLH-PS-M3M	609-11007
4 ... 120 mm	NPN	Metal plug, M8x1, 3-pin	FT 25-RLH-NS-M3M	609-11008
4 ... 120 mm	PNP	Metal plug, M8x1, 4-pin	FT 25-RLH-PS-M4M	609-11009
4 ... 120 mm	NPN	Metal plug, M8x1, 4-pin	FT 25-RLH-NS-M4M	609-11010
4 ... 120 mm	PNP	Cable, 2 m, 4-wire	FT 25-RLH-PS-K4	609-11004
4 ... 120 mm	NPN	Cable, 2 m, 4-wire	FT 25-RLH-NS-K4	609-11001
4 ... 120 mm	PNP	Pigtail, 150 mm with plug, M8 4-pin	FT 25-RLH-PS-KM4	609-11012
4 ... 120 mm	NPN	Pigtail, 150 mm with plug, M8, 4-pin	FT 25-RLH-NS-KM4	609-11013

Scanning distance	Switching output	Type of connection	Part number	Article number
4 ... 120 mm	PNP	Pigtail, 150 mm with plug, M12, 4-pin	FT 25-RLH-PS-KL4	609-11006
4 ... 120 mm	NPN	Pigtail, 150 mm with plug, M12, 4-pin	FT 25-RLH-NS-KL4	609-11003



Reference material	Detection range	Accessories
White (90 %)	4 ... 120 mm	Connection cables Brackets
Grey (18 %)	5 ... 110 mm	
Black (6 %)	8 ... 100 mm	
		From Page A-38
		From Page A-4

FT 25-RH

Photoelectric proximity sensor with background suppression



PRODUCT HIGHLIGHTS

- Precisely adjustable background suppression
- Reliable switching despite varying object colours 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 ¹	Indicator LED, green	Operating voltage indicator
Adjustment range	10 ... 200 mm ¹	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 632 nm	Scanning distance 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
		Adjustment possibilities	N.O./N.C. via Teach-in button and control input Button lock via control input
		Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _b	10 ... 30V DC ²	Dimensions	34 x 20 x 12 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ⁴
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _b / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C ⁵
Switching output, Q	PNP/NPN (see Selection Table)	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (metal plug device ⁶)	10 g
Response time	500 μs	Weight (cable device)	40 g
Control input, IN ³	+U _b = teach-in -U _b = button locked Open = normal operation	Weight (pigtail)	20 g
		Vibration and impact resistance	EN 60947-5-2

¹ Reference material: white, 90 % reflectivity

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

³ Only 4-pin design

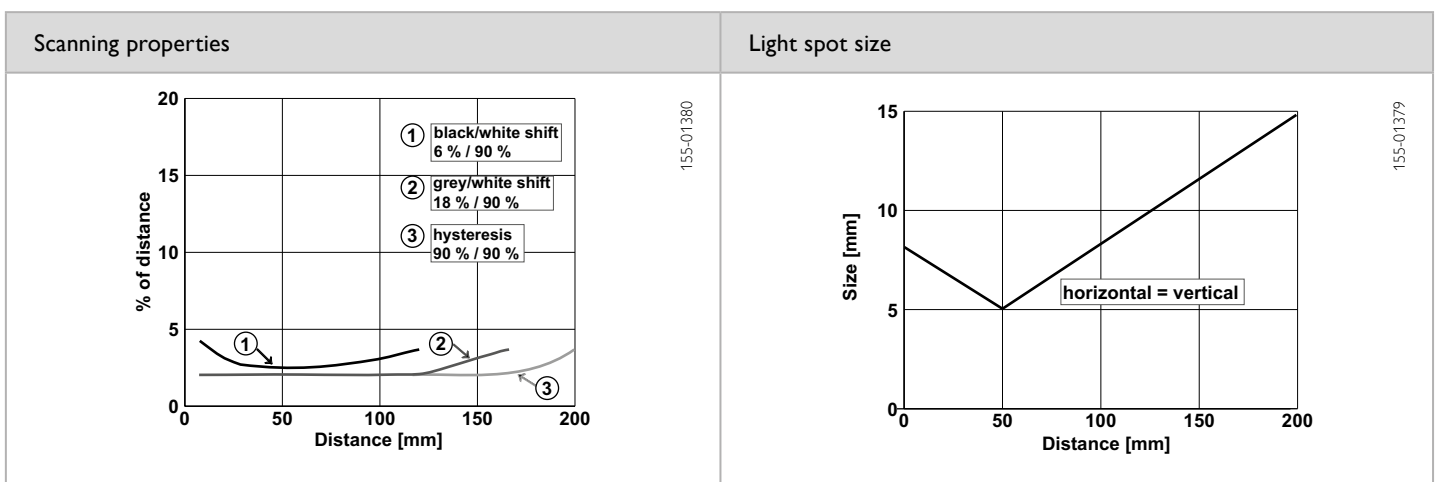
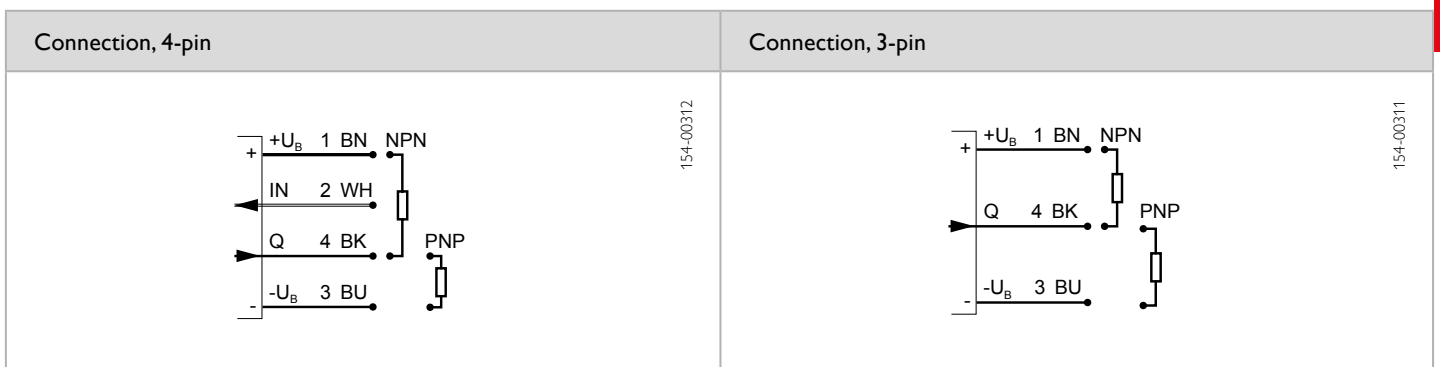
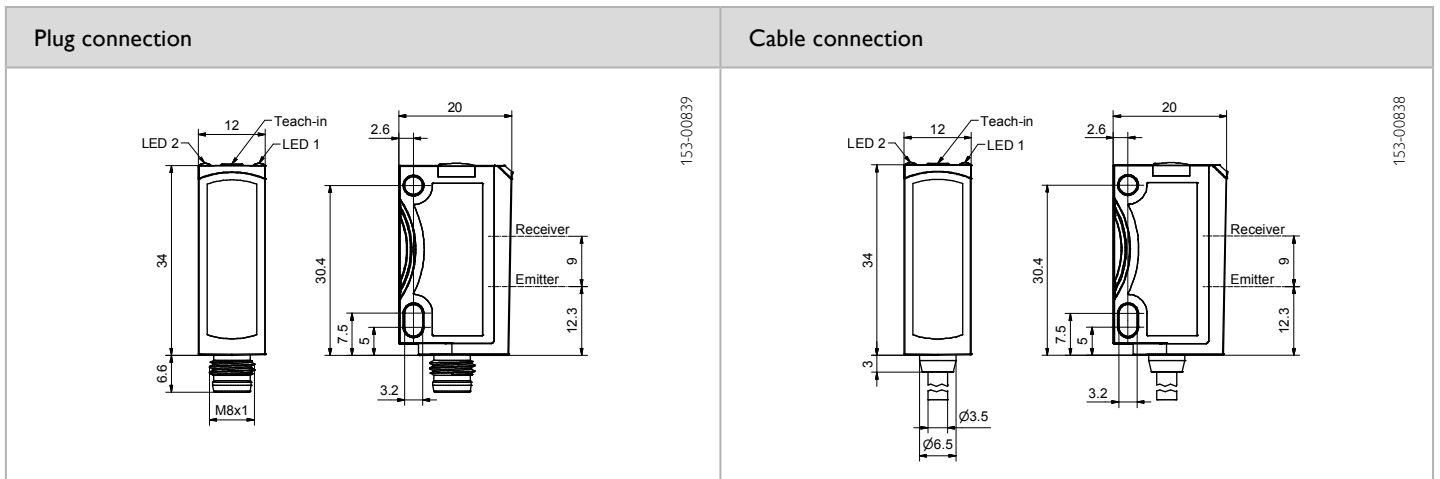
⁴ With connected IP 67 / IP 69K plug

⁵ UL: -20 ... +50 °C

⁶ No Ecolab

Scanning distance	Switching output	Type of connection	Part number	Article number
1 ... 200 mm	PNP	Plug, M8x1, 4-pin	FT 25-RH-PS-M4	608-11004
1 ... 200 mm	NPN	Plug, M8x1, 4-pin	FT 25-RH-NS-M4	608-11006
1 ... 200 mm	PNP	Metal plug, M8x1, 3-pin	FT 25-RH-PS-M3M	608-11012
1 ... 200 mm	NPN	Metal plug, M8x1, 3-pin	FT 25-RH-NS-M3M	608-11013
1 ... 200 mm	PNP	Metal plug, M8x1, 4-pin	FT 25-RH-PS-M4M	608-11014
1 ... 200 mm	NPN	Metal plug, M8x1, 4-pin	FT 25-RH-NS-M4M	608-11015
1 ... 200 mm	PNP	Cable, 2 m, 4-wire	FT 25-RH-PS-K4	608-11005
1 ... 200 mm	NPN	Cable, 2 m, 4-wire	FT 25-RH-NS-K4	608-11007
1 ... 200 mm	PNP	Pigtail, 150 mm with plug, M8, 4-pin	FT 25-RH-PS-KM4	608-11031
1 ... 200 mm	NPN	Pigtail, 150 mm with plug, M8, 4-pin	FT 25-RH-NS-KM4	608-11032

Scanning distance	Switching output	Type of connection	Part number	Article number
1 ... 200 mm	PNP	Pigtail, 150 mm with plug, M12, 4-pin	FT 25-RH-PS-KL4	608-11008
1 ... 200 mm	NPN	Pigtail, 150 mm with plug, M12, 4-pin	FT 25-RH-NS-KL4	608-11009



Reference material	Detection range	Accessories
White (90 %)	1 ... 200 mm	Connection cables Brackets
Grey (18 %)	2 ... 160 mm	
Black (6 %)	4 ... 120 mm	
		From Page A-38
		From Page A-4

FT 25-RHD

Photoelectric proximity sensor with background suppression



PRODUCT HIGHLIGHTS

- Auto-detect photoelectric proximity 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 ¹	Indicator LED, green	Operating voltage indicator
Adjustment range	30 ... 400 mm ¹	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 632 nm	Scanning distance 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
		Adjustment possibilities	N.O./N.C. via Teach-in button and control input Button lock via control input Auto-detect / NPN/ PNP via Teach-in button and control input (only Auto-detect variants)
		Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	34 x 20 x 12 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C ⁴
Switching output, Q	PNP/NPN / Auto-Detect (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 (metal plug device ⁵)	10 g
Response time	500 μs	Weight (cable device)	40 g
Control input, IN	+U _B = teach-in, -U _B = button locked Open = normal operation	Weight (pigtail)	20 g
		Vibration and impact resistance	EN 60947-5-2

¹ Reference material: white, 90 % reflectivity

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

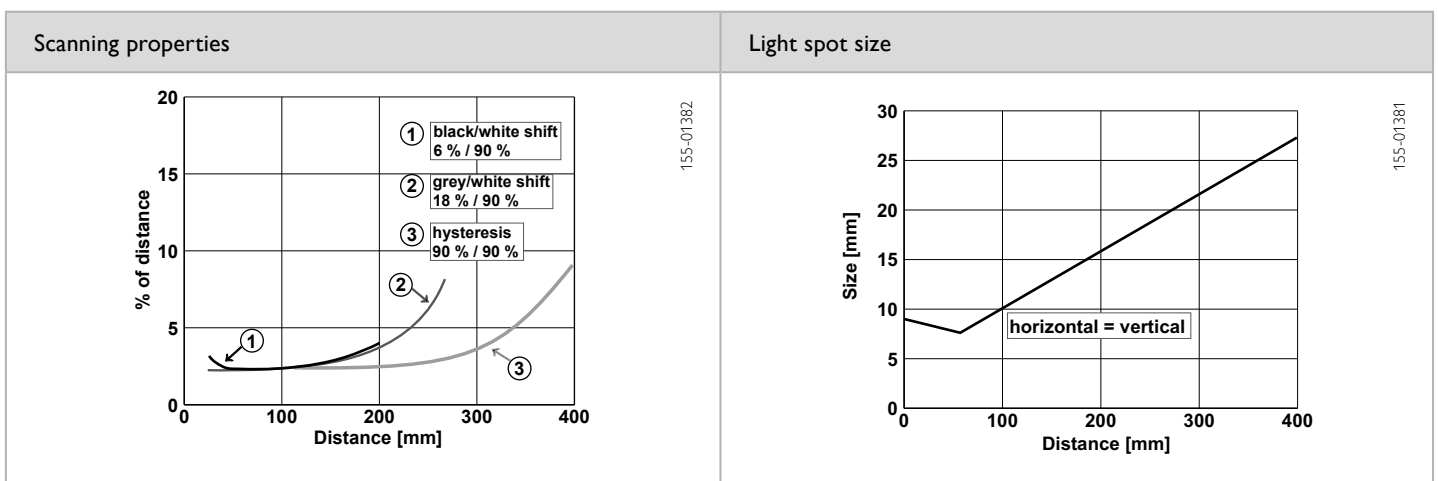
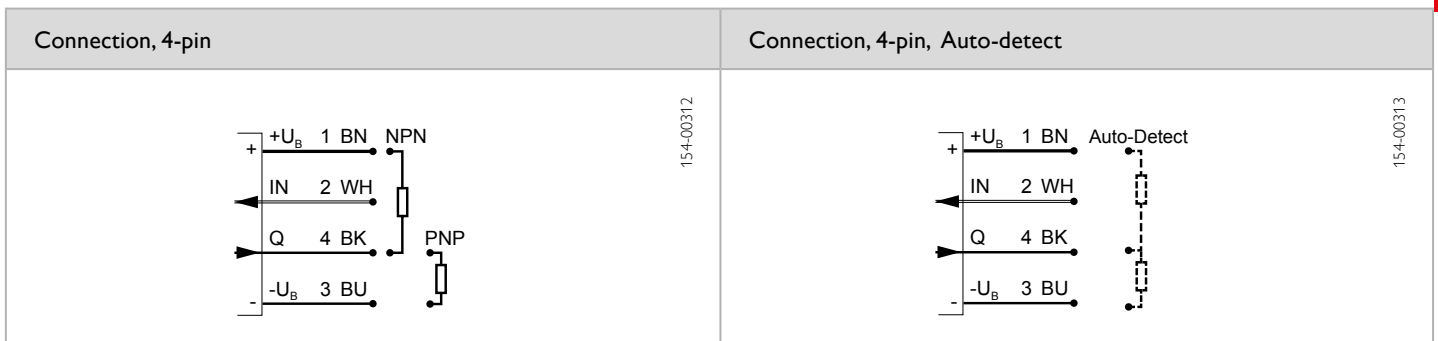
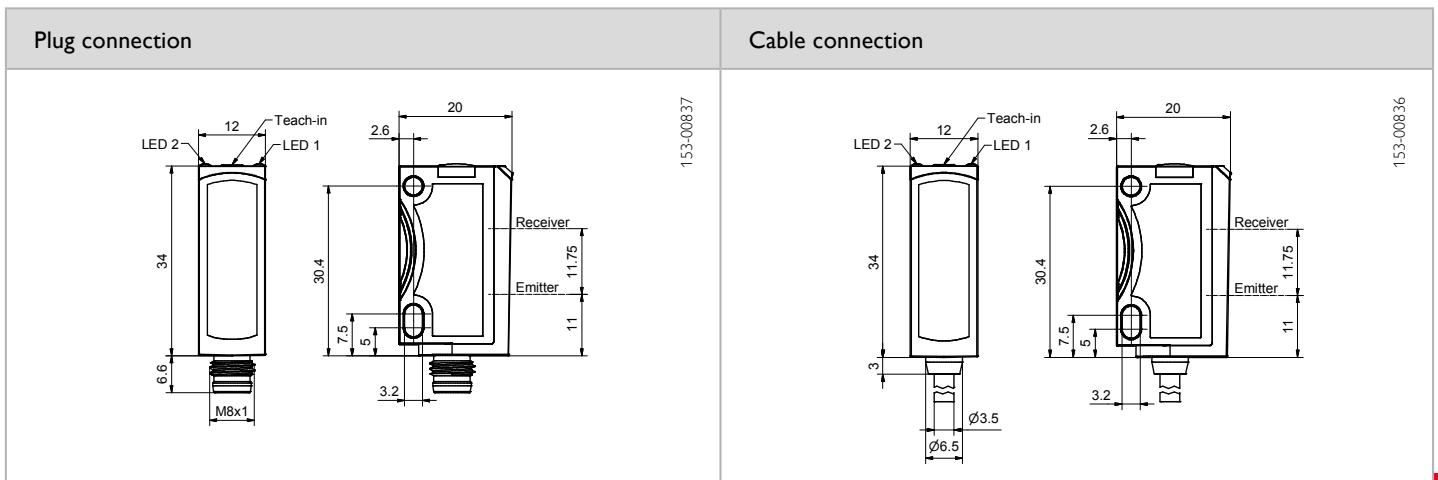
³ With connected IP 67 / IP 69K plug

⁴ UL: -20 ... +50 °C

⁵ No Ecolab

Scanning distance	Switching output	Type of connection	Part number	Article number
3 ... 400 mm	PNP	Plug, M8x1, 4-pin	FT 25-RHD-PS-M4	608-11000
3 ... 400 mm	NPN	Plug, M8x1, 4-pin	FT 25-RHD-NS-M4	608-11002
3 ... 400 mm	PNP	Plug, M8x1, 3-pin	FT 25-RHD-PS-M3M	608-11029
3 ... 400 mm	PNP	Metal plug, M8x1, 4-pin	FT 25-RHD-PS-M4M	608-11016
3 ... 400 mm	NPN	Metal plug, M8x1, 4-pin	FT 25-RHD-NS-M4M	608-11017
3 ... 400 mm	PNP	Cable, 2 m, 4-wire	FT 25-RHD-PS-K4	608-11001
3 ... 400 mm	NPN	Cable, 2 m, 4-wire	FT 25-RHD-NS-K4	608-11003
3 ... 400 mm	PNP	Pigtail, 150 mm with plug, M8, 4-pin	FT 25-RHD-PS-KM4	608-11030

Scanning distance	Switching output	Type of connection	Part number	Article number
3 ... 400 mm	NPN	Pigtail, 150 mm with plug, M8, 4-pin	FT 25-RHD-NS-KM4	608-11033
3 ... 400 mm	PNP	Pigtail, 150 mm with plug, M12, 4-pin	FT 25-RHD-PS-KL4	608-11010
3 ... 400 mm	NPN	Pigtail, 150 mm with plug, M12, 4-pin	FT 25-RHD-NS-KL4	608-11011
3 ... 400 mm	Auto-detect	Metal plug, M8x1, 4-pin	FT 25-RHD-PNS-M4M	608-11019



Reference material	Detection range	Accessories
White (90 %)	3 ... 400 mm	Connection cables
Grey (18 %)	6 ... 260 mm	Brackets
Black (6 %)	12 ... 200 mm	
		From Page A-38
		From Page A-4

FT 25-RF

Photoelectric proximity sensor with background suppression, fixed focus



PRODUCT HIGHLIGHTS

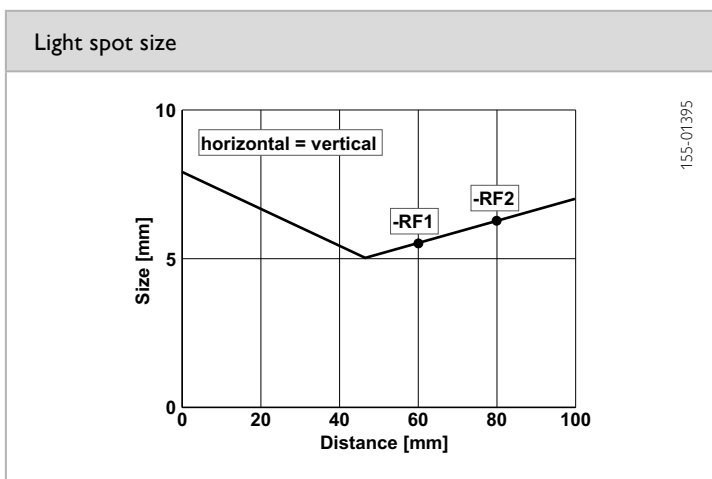
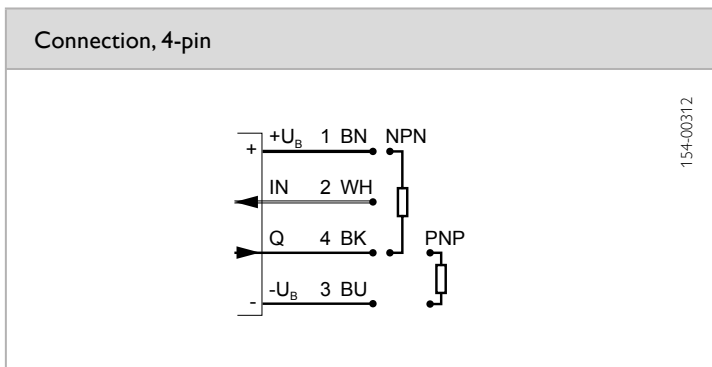
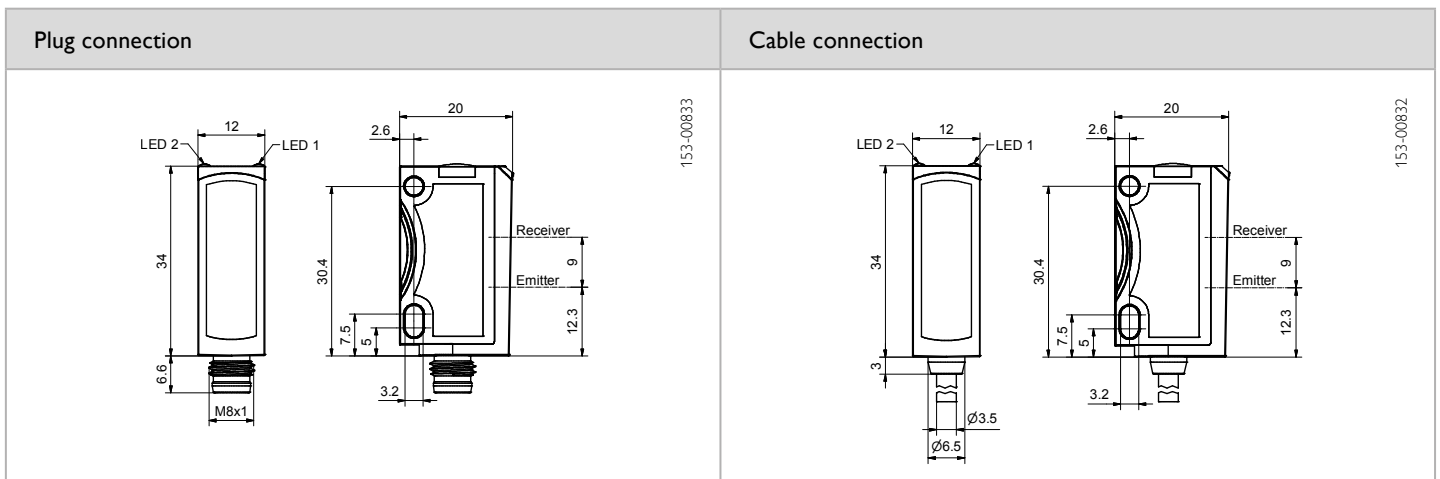
- Precise fixed background suppression
- Economical solution for numerous applications
- Tamper-proof sensor design – no misalignment possible
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings

Optical data		Functions	
Scanning distance	1 ... 60 mm ¹ / 1 ... 80 mm ¹	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
Hysteresis	~ 5% ²		
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ³	Dimensions	34 x 20 x 12 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ⁴
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300ms	Ambient temperature: operation	-20 ... +60 °C ⁵
Switching output, Q	PNP/NPN (see Selection Table)	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (metal plug device ⁶)	10 g
Response time	500 μs	Weight (cable device)	40 g
Control input, IN	+U _B = N.C. -U _B / Open = N.O.	Vibration and impact resistance	EN 60947-5-2

¹ Reference material: white, 90 % reflectivity ² Based on scanning distance ³ Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ⁴ With connected IP 67 / IP 69K plug

⁵ UL: -20 ... +50 °C ⁶ No Ecolab

Scanning distance	Switching output	Type of connection	Part number	Article number
1 ... 60 mm	PNP	Plug, M8x1, 4-pin	FT 25-RF1-PS-M4	608-11020
1 ... 60 mm	PNP	Metal plug, M8x1, 4-pin	FT 25-RF1-PS-M4M	608-11037
1 ... 60 mm	PNP	Cable, 2 m, 4-wire	FT 25-RF1-PS-K4	608-11021
1 ... 80 mm	PNP	Plug, M8x1, 4-pin	FT 25-RF2-PS-M4	608-11022
1 ... 80 mm	PNP	Cable, 2 m, 4-wire	FT 25-RF2-PS-K4	608-11023
1 ... 80 mm	NPN	Cable, 2 m, 4-wire	FT 25-RF2-NS-K4	608-11024



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

FT 25-BF2

BlueLight-Photoelectric proximity sensor with background suppression, fixed focus



PRODUCT HIGHLIGHTS

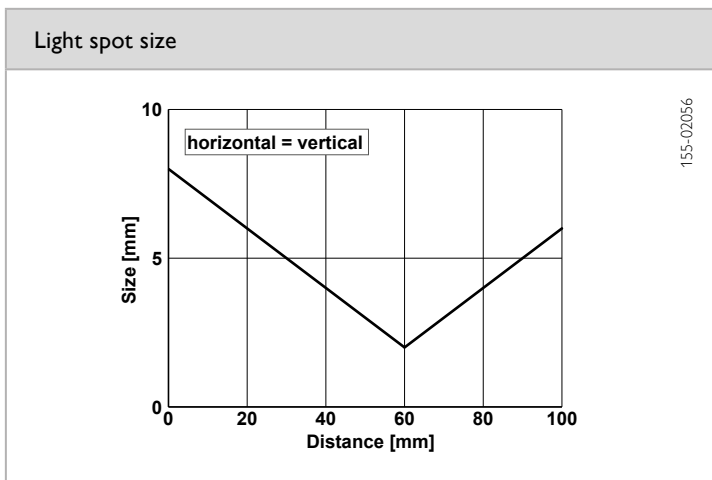
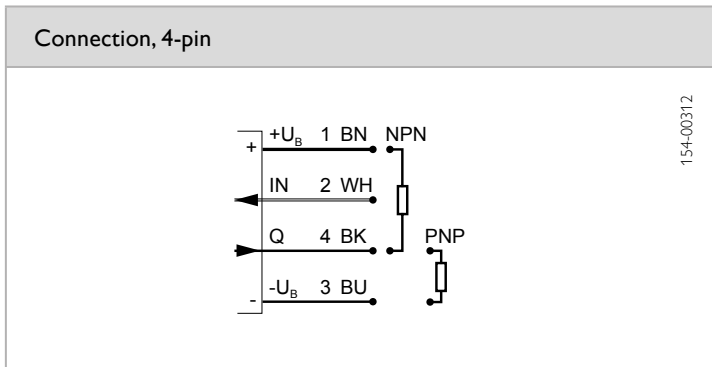
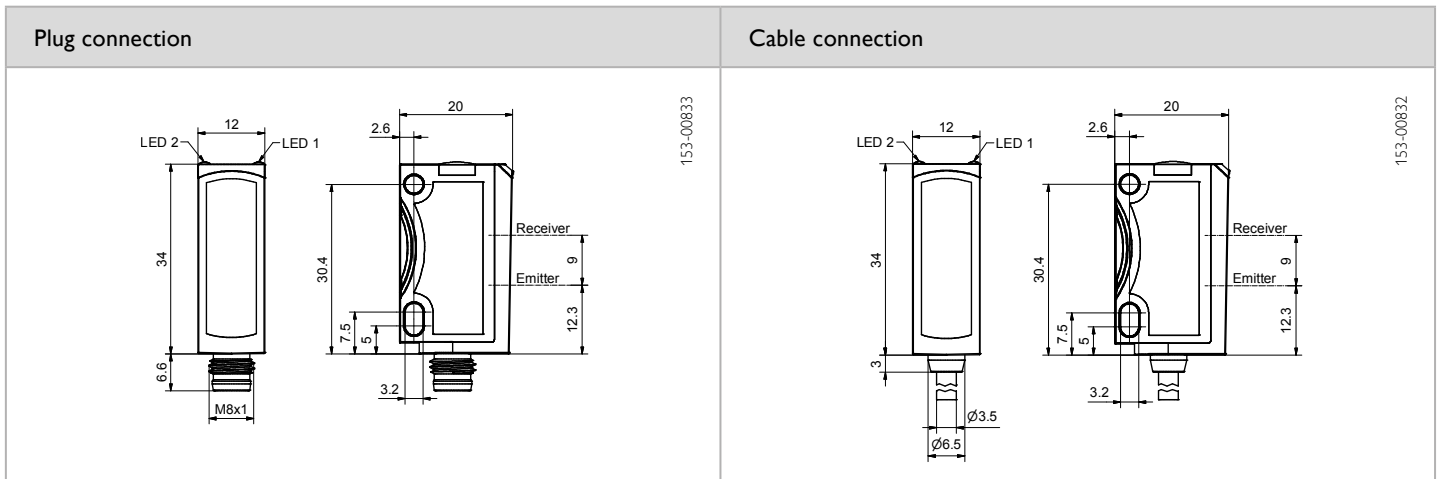
- Sub-miniature sensor with BlueLight technology and precise fixed background suppression
- Reliable switching behaviour with strongly light-absorbing and highly transparent objects
- Reliable operation without reflector - even with critical surfaces
- Tamper-proof sensor design - no misalignment possible
- Simple mounting and adjustment through innovative dovetail clamp mounting

Optical data		Functions	
Scanning distance	0 ... 80 mm ¹	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% ²		
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ³	Dimensions	34 x 20 x 12 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ⁴
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300ms	Ambient temperature: operation	-20 ... +60 °C ⁵
Switching output, Q	PNP/NPN (see Selection Table)	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (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 _B = N.C. -U _B / Open = N.O.		

¹ Reference material: white, 90 % reflectivity ² Based on scanning distance ³ Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ⁴ With connected IP 67 / IP 69K plug

⁵ UL: -20 ... +50 °C

Scanning distance	Switching output	Type of connection	Part number	Article number
0 ... 80 mm	PNP	Plug, M18x1, 4-pin	FT 25-BF2-PS-M4	608-11038
0 ... 80 mm	NPN	Plug, M18x1, 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-RV

Photoelectric proximity sensor with foreground suppression



PRODUCT HIGHLIGHTS

- Auto-detect photoelectric proximity sensor with real PNP and real NPN functions
- Precisely adjustable foreground suppression
- Long scanning distance of 200 mm with small and compact housings
- Additional adjustable window function (switching window)
- 2-point teach-in or dynamic teach-in also possible via external control line

Optical data		Functions	
Scanning distance	30 ... 200 mm ¹	Indicator LED, green	Operating voltage indicator
Type of light	LED, red, 632 nm	Indicator LED, yellow	Switching output indicator
Light spot size	See diagram	Scanning distance adjustment	Via Teach-in button and control input
		Teach-in modes	Mode 1: during running process Mode 2: during standing process Mode 3: switching window
		Adjustment possibilities	N.O./N.C. via Teach-in button and control input Button lock via control input Auto-detect / NPN/ PNP via Teach-in button and control input (only Auto-detect-variants)
		Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	34 x 20 x 12 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C ⁴
Switching output, Q	PNP/NPN / Auto-Detect (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 (metal plug device ⁵)	10 g
Response time	500 μs	Vibration and impact resistance	EN 60947-5-2
Control input, IN	+U _B = teach-in, -U _B = button locked Open = normal operation		

¹ Reference material: white, 90 % reflectivity

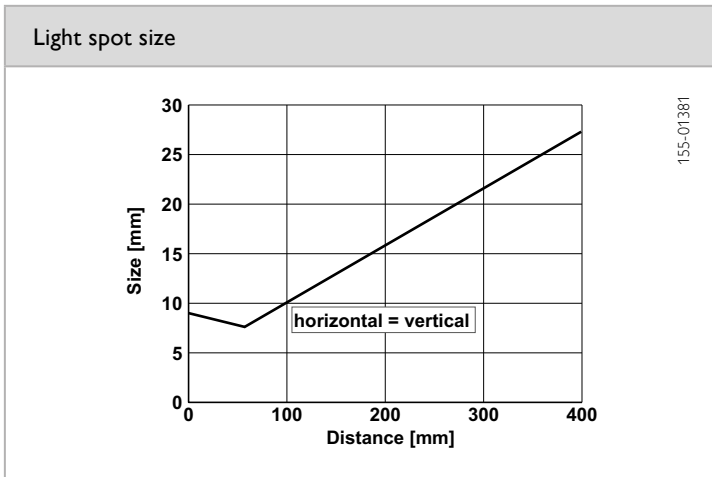
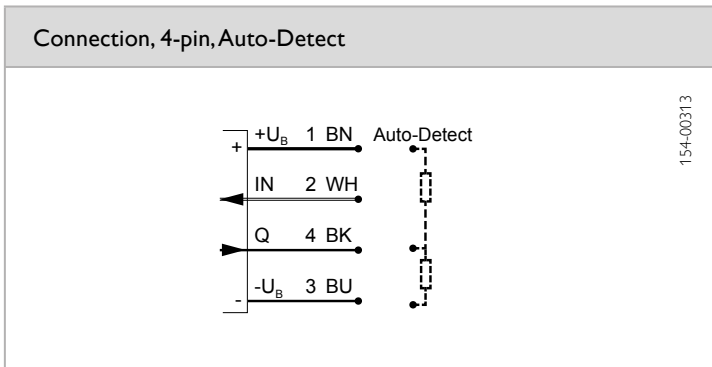
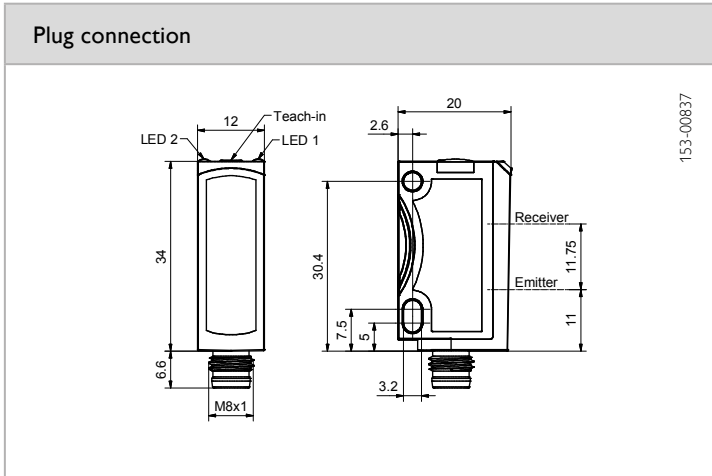
² Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz

³ With connected IP 67 / IP 69K plug

⁴ UL: -20 ... +50 °C

⁵ No Ecolab

Scanning distance	Switching output	Type of connection	Part number	Article number
30 ... 200 mm	PNP	Plug, M8x1, 4-pin	FT 25-RV-PS-M4	604-41006
30 ... 200 mm	NPN	Plug, M8x1, 4-pin	FT 25-RV-NS-M4	604-41007
30 ... 200 mm	Auto-Detect	Plug, M8x1, 4-pin	FT 25-RV-PNS-M4	604-41005
30 ... 200 mm	Auto-Detect	Metal plug, M8x1, 4-pin	FT 25-RV-PNS-M4M	604-41004



Reference material	Detection range
White (90 %)	30 ... 200 mm
Grey (18 %)	30 ... 200 mm
Black (6 %)	30 ... 200 mm

Accessories

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

FT 25-RL

Diffuse laser photoelectric proximity switch



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 ¹	Indicator LED, green	Operating voltage indicator
Adjustment range	25 ... 250 mm ¹	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 650 nm	Sensitivity adjustment	Via Teach-in button and control input
Light spot size	See diagram	Teach-in modes	Mode 1: during running process
Laser Class (IEC 60825-1)	1	Adjustment possibilities	Mode 2: during standing process
Hysteresis	≤ 10% ²	Default settings	N.O./N.C. via Teach-in button and control input
			Button lock via control input
			Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ³	Dimensions	34 × 20 × 12 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ⁴
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C ⁵
Switching output, Q	PNP/NPN (see Selection Table)	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (metal plug device ⁶)	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 _B = teach-in -U _B = button locked Open = normal operation	Vibration and impact resistance	EN 60947-5-2

¹ Reference material: white, 90 % reflectivity

² Up to scanning distance of 150 mm

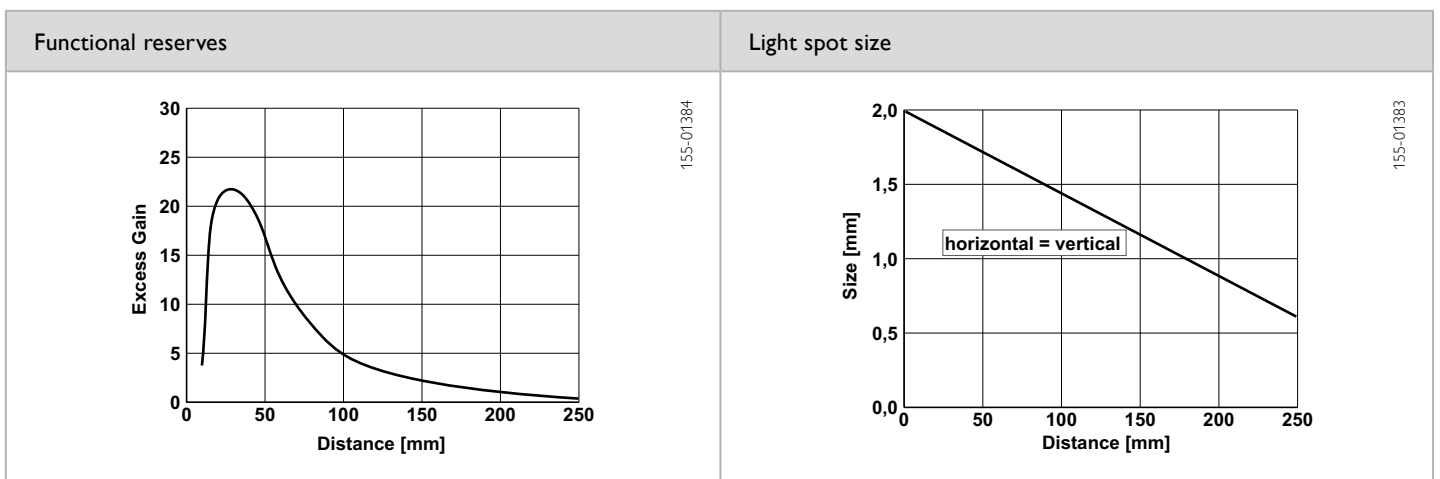
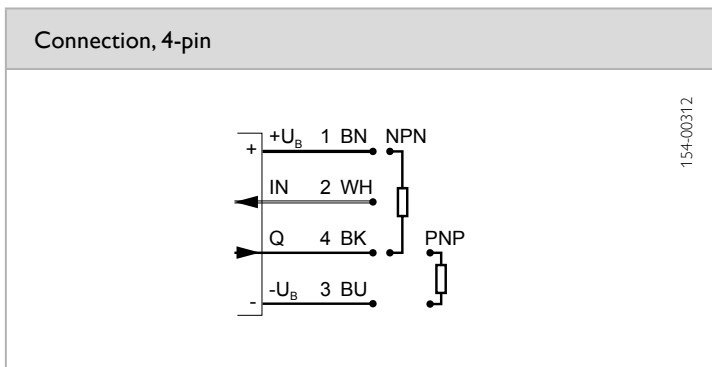
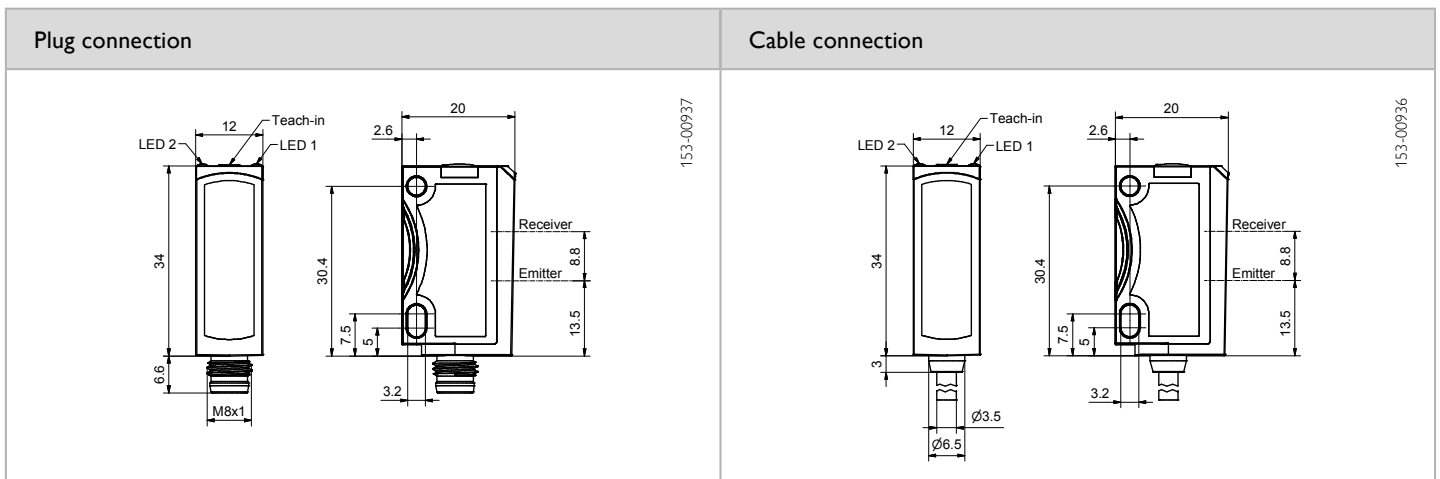
³ Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz

⁴ With connected IP 67 / IP 69K plug

⁵ UL: -20 ... +50 °C

⁶ No Ecolab

Scanning distance	Switching output	Type of connection	Part number	Article number
1 ... 250 mm	PNP	Metal plug, M8x1, 4-pin	FT 25-RL-PS-M4M	609-21013
1 ... 250 mm	NPN	Metal plug, M8x1, 4-pin	FT 25-RL-NS-M4M	609-21014
1 ... 250 mm	PNP	Cable, 2 m, 4-wire	FT 25-RL-PS-K4	609-21010
1 ... 250 mm	NPN	Cable, 2 m, 4-wire	FT 25-RL-NS-K4	609-21008
1 ... 250 mm	PNP	Pigtail, 152 mm with plug, M8, 4-pin	FT 25-RL-PS-KM4	609-21002
1 ... 250 mm	NPN	Pigtail, 152 mm with plug, M8, 4-pin	FT 25-RL-NS-KM4	609-21007
1 ... 250 mm	PNP	Pigtail, 150 mm with plug, M12, 4-pin	FT 25-RL-PS-KL4	609-21012
1 ... 250 mm	NPN	Pigtail, 150 mm with plug, M12, 4-pin	FT 25-RL-NS-KL4	609-21009



Reference material	Detection range
White (90 %)	1 ... 250 mm
Grey (18 %)	6 ... 100 mm
Black (6 %)	20 ... 60 mm

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

FT 25-R

Diffuse photoelectric proximity 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

Optical data		Functions	
Scanning distance	0 ... 800 mm ¹	Indicator LED, green	Operating voltage indicator
Adjustment range	20 ... 800 mm ¹	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 632 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
		Adjustment possibilities	N.O./N.C. via Teach-in button and control input Button lock via control input
		Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	34 × 20 × 12 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C ⁴
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 (metal plug device ⁵)	10 g
Response time	500 μs	Weight (cable device)	40 g
Control input, IN	+ U _B = teach-in - U _B = button locked Open = normal operation	Weight (pigtail)	20 g
		Vibration and impact resistance	EN 60947-5-2

¹ Reference material: white, 90 % reflectivity

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

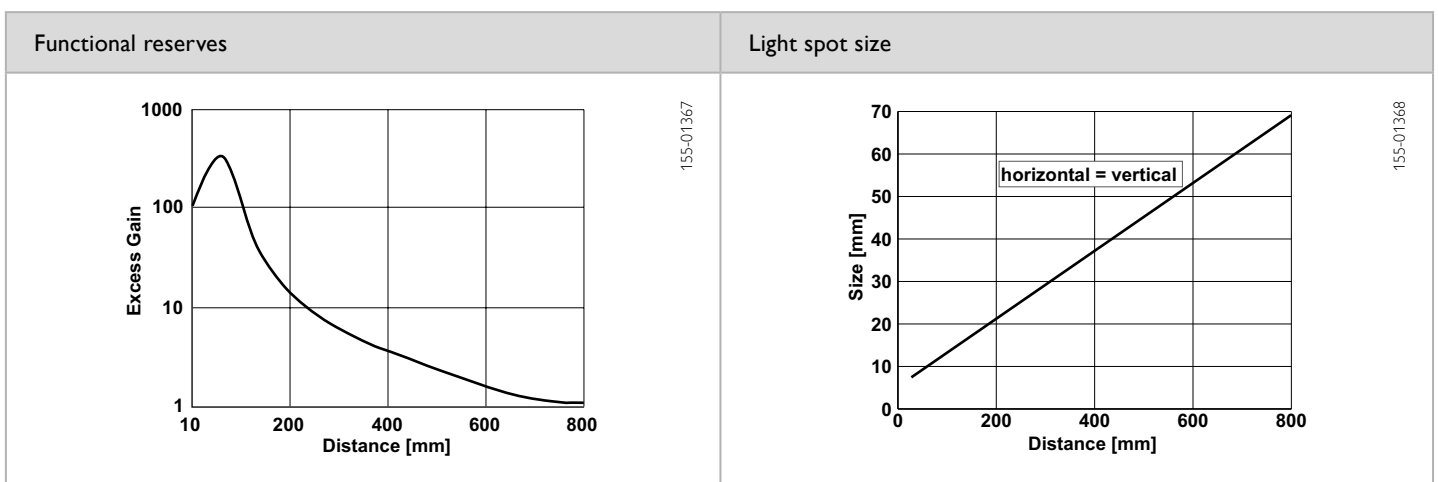
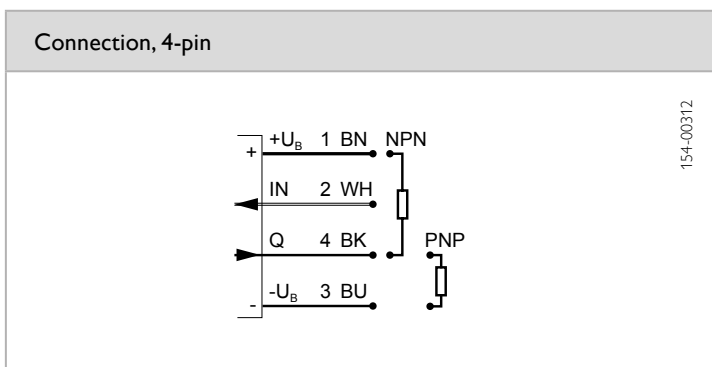
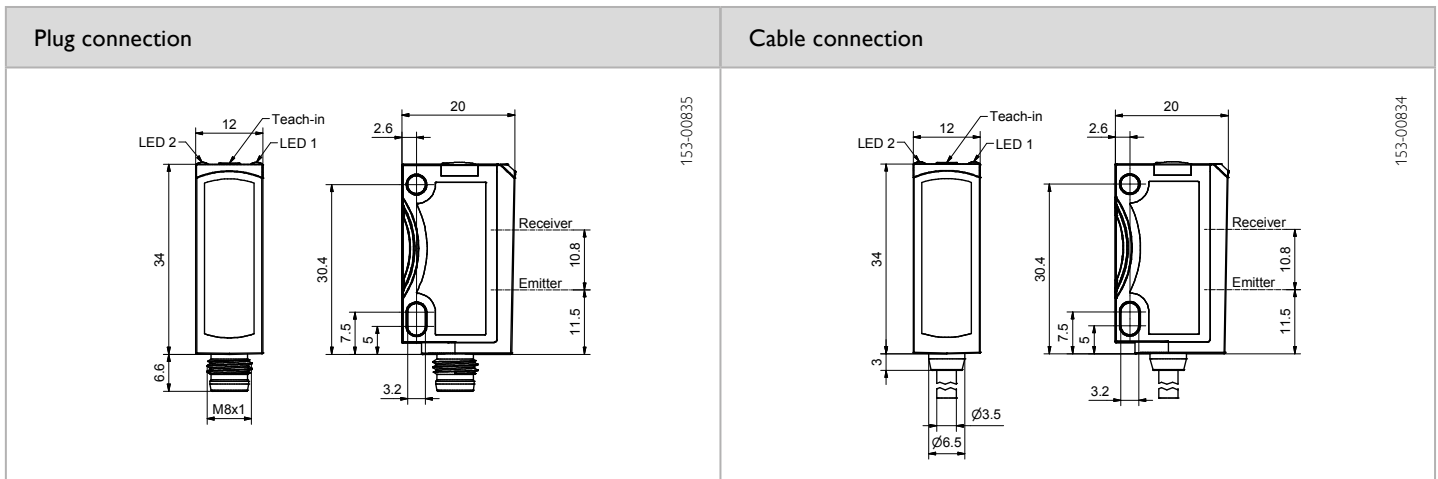
³ With connected IP 67 / IP 69K plug

⁴ UL: -20 ... +50 °C

⁵ No Ecolab

Scanning distance	Switching output	Type of connection	Part number	Article number
0 ... 800 mm	PNP	Plug, M8x1, 4-pin	FT 25-R-PS-M4	607-21000
0 ... 800 mm	NPN	Plug, M8x1, 4-pin	FT 25-R-NS-M4	607-21002
0 ... 800 mm	PNP	Metal plug, M8x1, 4-pin	FT 25-R-PS-M4M	607-21006
0 ... 800 mm	NPN	Metal plug, M8x1, 4-pin	FT 25-R-NS-M4M	607-21007
0 ... 800 mm	PNP	Cable, 2 m, 4-wire	FT 25-R-PS-K4	607-21001
0 ... 800 mm	NPN	Cable, 2 m, 4-wire	FT 25-R-NS-K4	607-21003
0 ... 800 mm	PNP	Pigtail, 150 mm with plug, M8, 4-pin	FT 25-R-PS-KM4	607-21022
0 ... 800 mm	NPN	Pigtail, 150 mm with plug, M8, 4-pin	FT 25-R-NS-KM4	607-21023

Scanning distance	Switching output	Type of connection	Part number	Article number
0 ... 800 mm	PNP	Pigtail, 150 mm with plug, M12, 4-pin	FT 25-R-PS-KL4	607-21004
0 ... 800 mm	NPN	Pigtail, 150 mm with plug, M12, 4-pin	FT 25-R-NS-KL4	607-21005



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

FR 25-RGO

Retroreflective photoelectric sensor for detection of transparent objects



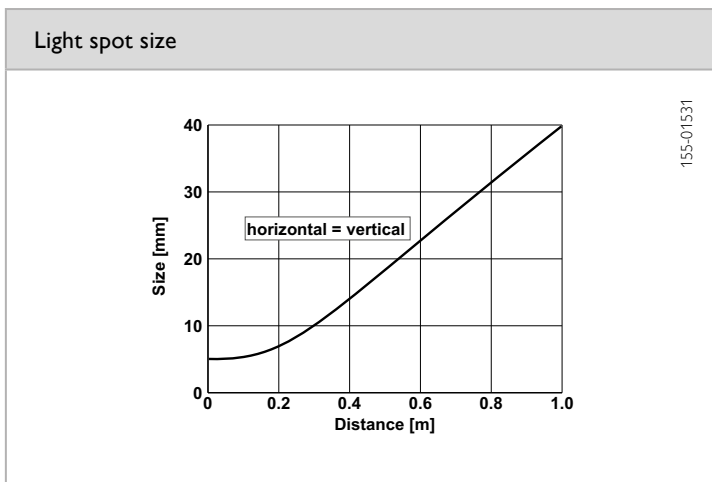
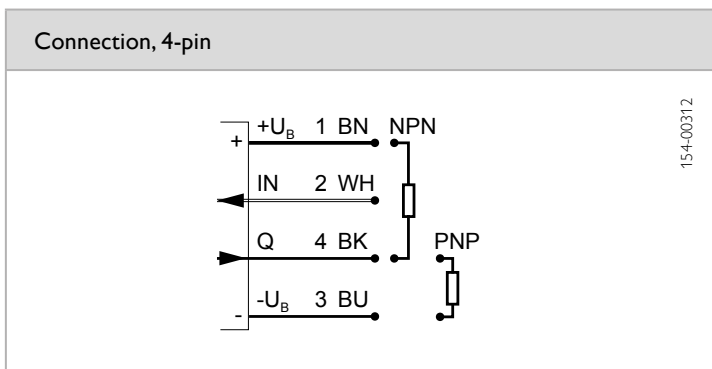
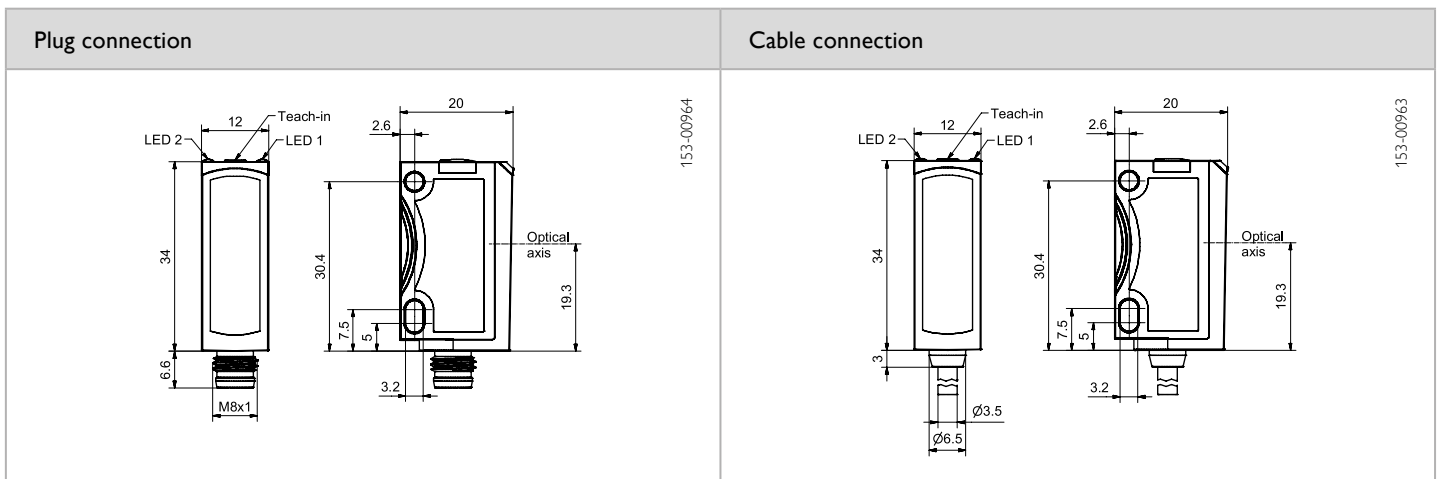
PRODUCT HIGHLIGHTS

- 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

Optical data		Functions	
Operating range	0 ... 2 m ¹	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. via Teach-in button and control input Button lock via control input
		Default settings	Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	34 x 20 x 12 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C ⁴
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 (metal plug device ⁵)	10 g
Response time	500 μs	Weight (cable device)	40 g
Control input, IN	+ U _B = teach-in - U _B = button locked Open = normal operation	Vibration and impact resistance	EN 60947-5-2

¹ Reference material: R5/L reflector ² Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ³ With connected IP 67 / IP 69K plug ⁴ UL: -20 ... +50 °C ⁵ No Ecolab

Operating range	Switching output	Type of connection	Part number	Article number
0 ... 2 m	PNP	Plug, M8x1, 4-pin	FR 25-RGO-PS-M4	606-11020
0 ... 2 m	NPN	Plug, M8x1, 4-pin	FR 25-RGO-NS-M4	606-11021
0 ... 2 m	PNP	Metal plug, M8x1, 4-pin	FR 25-RGO-PS-M4M	606-11016
0 ... 2 m	NPN	Metal plug, M8x1, 4-pin	FR 25-RGO-NS-M4M	606-11017
0 ... 2 m	PNP	Cable, 2 m, 4-wire	FR 25-RGO-PS-K4	606-11018
0 ... 2 m	NPN	Cable, 2 m, 4-wire	FR 25-RGO-NS-K4	606-11019
0 ... 2 m	PNP	Pigtail, 150 mm with plug, M8, 4-pin	FR 25-RGO-PS-KM4	606-11030
0 ... 2 m	NPN	Pigtail, 150 mm with plug, M8, 4-pin	FR 25-RGO-NS-KM4	606-11031
0 ... 2 m	PNP	Pigtail, 500 mm with plug, M8, 4-pin	FR 25-RGO-PS-KM4-X04	606-11032



Reflector / Reflective foil*	Operating range (min./max. reflector distance)
R5/L	0.5... 2 m
RF-100 KL*	0 ... 2 m
R2-2LB1	0 ... 500 mm
R3-2LK1	0 ... 500 mm

Accessories

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

FR 25-RGO2

Autocollimation retroreflective photoelectric sensor



PRODUCT HIGHLIGHTS

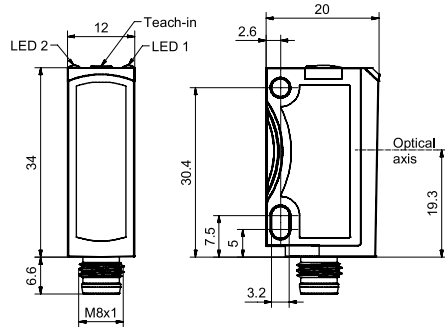
- Autocollimation principle: reliable and precise detection from a range of 0 mm
- Precise detection, even through narrow openings and drilled holes
- Compact miniature housings for installation in the smallest of spaces
- Simple operation via electronic Teach-in button or control input
- Robust glass-fibre-reinforced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

Optical data		Functions	
Operating range	0 ... 2 m ¹	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. via Teach-in button and control input Button lock via control input
		Default settings	Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	34 x 20 x 12 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C ⁴
Switching output, Q	PNP/NPN (see Selection Table)	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight	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	+U _B = teach-in -U _B = button locked Open = normal operation		

¹ Reference material: R5/L reflector ² Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ³ With connected IP 67 / IP 69K plug ⁴ UL: -20 ... +50 °C

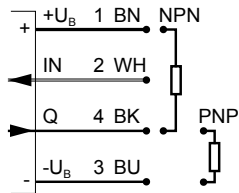
Operating range	Switching output	Type of connection	Part number	Article number
0 ... 2 m	PNP	Plug, M8x1, 4-pin	FR 25-RGO2-PS-M4	606-11022
0 ... 2 m	NPN	Plug, M8x1, 4-pin	FR 25-RGO2-NS-M4	606-11023

Plug connection



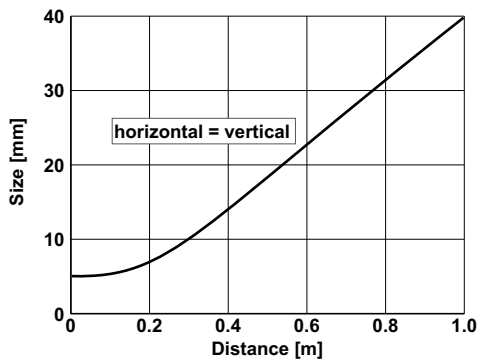
153-00964

Connection, 4-pin



154-00312

Light spot size



155-01531

Reflector / Reflective foil*	Operating range (min./max. reflector distance)
R5/L	0.5 ... 2 m
RF-100 KL*	0 ... 2 m
R2-2LB1	0 ... 500 mm
R3-2LK1	0 ... 500 mm

Accessories

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

FR 25-RLO

Autocollimation laser retroreflective photoelectric sensor



PRODUCT HIGHLIGHTS

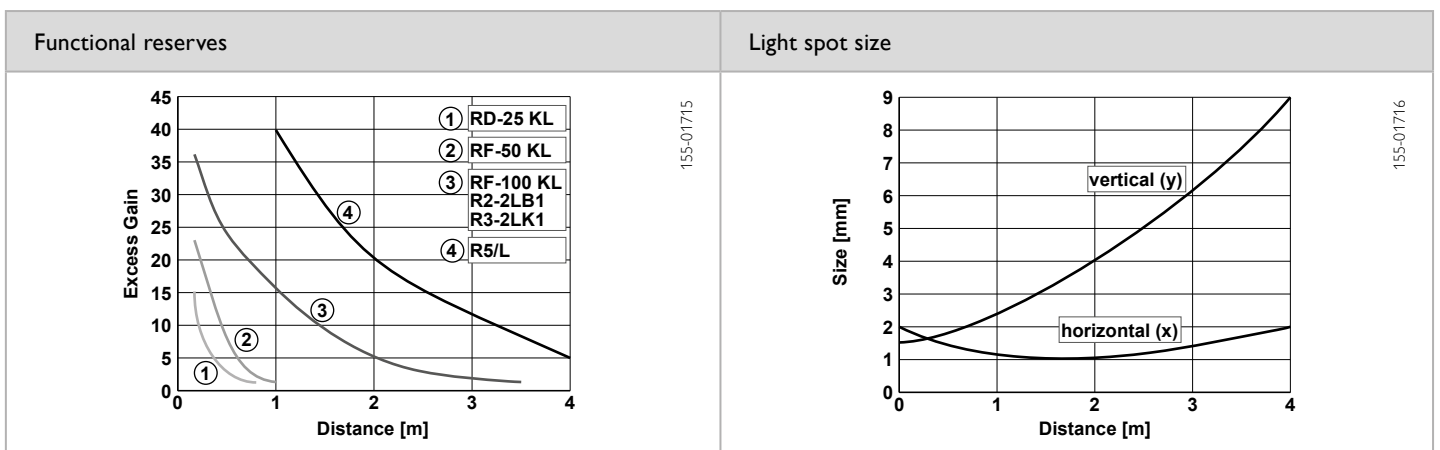
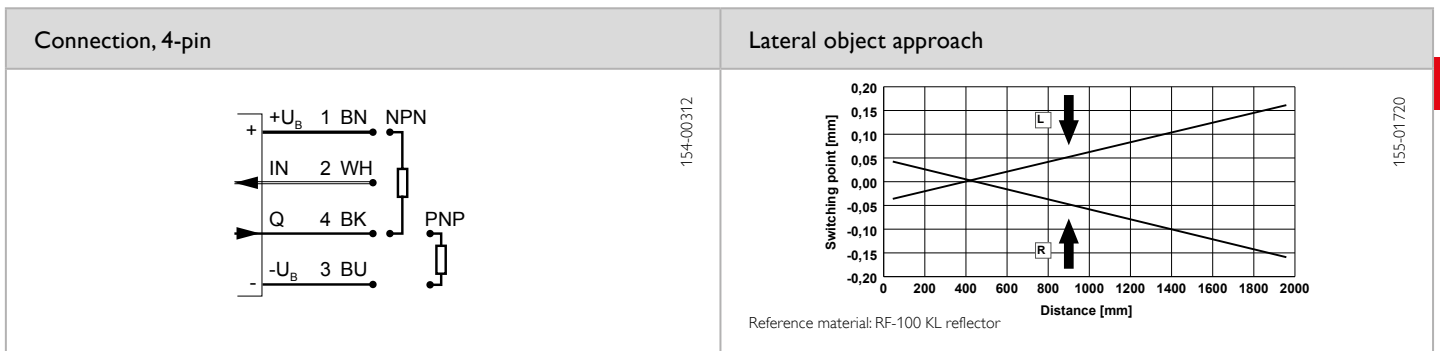
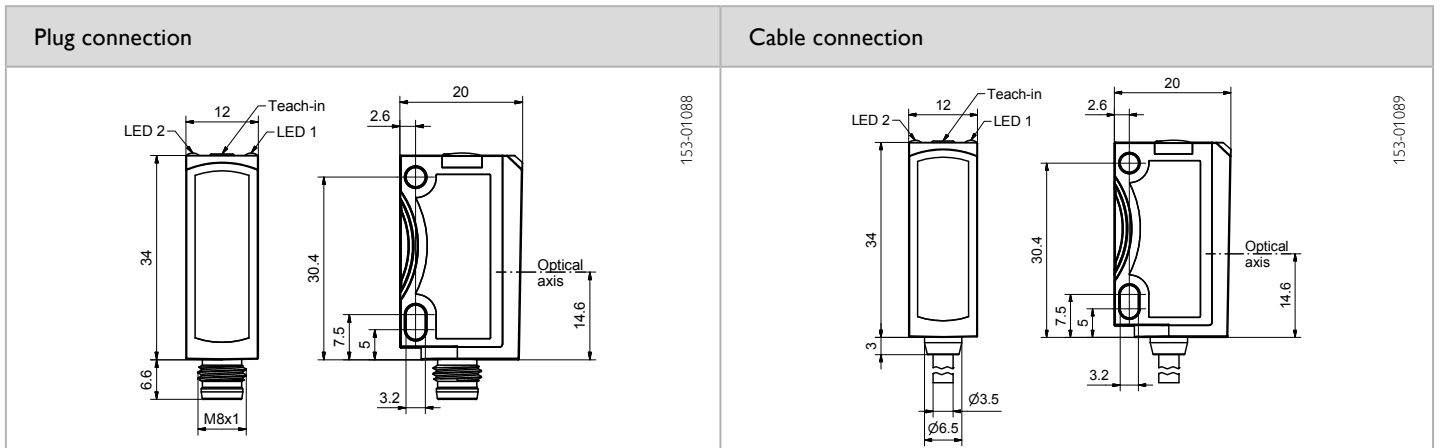
- Reliable small-part detection over the entire operating range from a size of 0.2 mm
- Precise front-edge detection even in fastest automation processes thanks to a high switching frequency of 10 kHz
- Constant detection position with lateral object approach over the entire operating range for maximum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

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

¹ Reference material: R5/L reflector ² Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ³ With connected IP 67 / IP 69K plug ⁴ UL: -20 ... +50 °C ⁵ No Ecolab

Switching frequency, f (ti/tp 1:1) ²	Response time	Switching output	Type of connection	Part number	Article number
≤ 10 kHz	50 μs	PNP	Metal plug, M8x1, 4-pin	FR 25-RLO1-PS-M4M	609-31003
≤ 10 kHz	50 μs	NPN	Metal plug, M8x1, 4-pin	FR 25-RLO1-NS-M4M	609-31004
≤ 10 kHz	50 μs	PNP	Cable, 2 m, 4-wire	FR 25-RLO1-PS-K4	609-31005
≤ 10 kHz	50 μs	NPN	Cable, 2 m, 4-wire	FR 25-RLO1-NS-K4	609-31006
≤ 4 kHz	125 μs	PNP	Plug, M8x1, 4-pin	FR 25-RLO2-PS-M4	609-31007
≤ 4 kHz	125 μs	NPN	Plug, M8x1, 4-pin	FR 25-RLO2-NS-M4	609-31008
≤ 4 kHz	125 μs	PNP	Cable, 2 m, 4-wire	FR 25-RLO2-PS-K4	609-31009
≤ 4 kHz	125 μs	NPN	Cable, 2 m, 4-wire	FR 25-RLO2-NS-K4	609-31010
≤ 4 kHz	125 μs	PNP	Pigtail, 150 mm with plug, M8, 4-pin	FR 25-RLO2-PS-KM4	609-31011

Switching frequency, f (t_i/t_p 1:1) ²	Response time	Switching output	Type of connection	Part number	Article number
≤ 4 kHz	125 μs	NPN	Pigtail, 150 mm with plug, M8, 4-pin	FR 25-RLO2-NS-KM4	609-31012
≤ 4 kHz	125 μs	PNP	Pigtail, 500 mm with plug, M8, 4-pin	FR 25-RLO2-PS-KM4-X05	609-31013



Small part detection				Reflector / Reflective foil*	Operating range (min./max. reflector distance)
Reflector / Reflective foil*	Reflector distance	Scanning distance	Smallest detectable part		
R5L	1000 ... 4000 mm	0 ... 4000 mm	≥ 1 mm	R5L	0 ... 4000 mm
RD-25 KL	50 ... 500 mm	50 ... 500 mm	≥ 0.2 mm	RD-25 KL	50 ... 600 mm
RF-100 KL*	500 ... 2500 mm	0 ... 500 mm	≥ 0.2 mm	RF-100 KL*	0 ... 2500 mm
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

Laser retroreflective photoelectric sensor



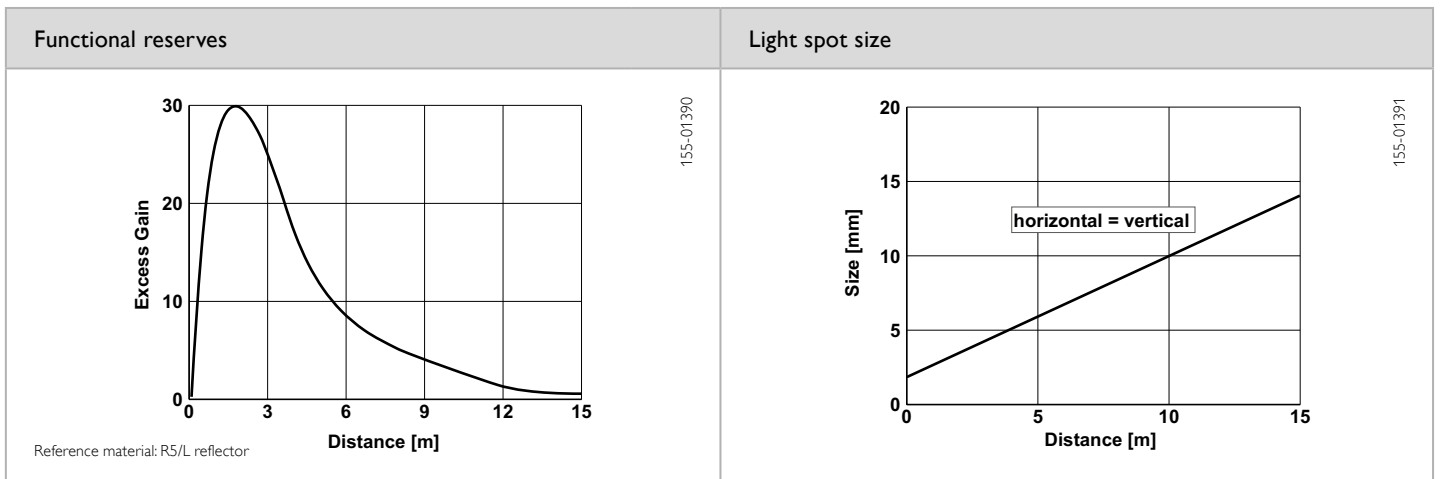
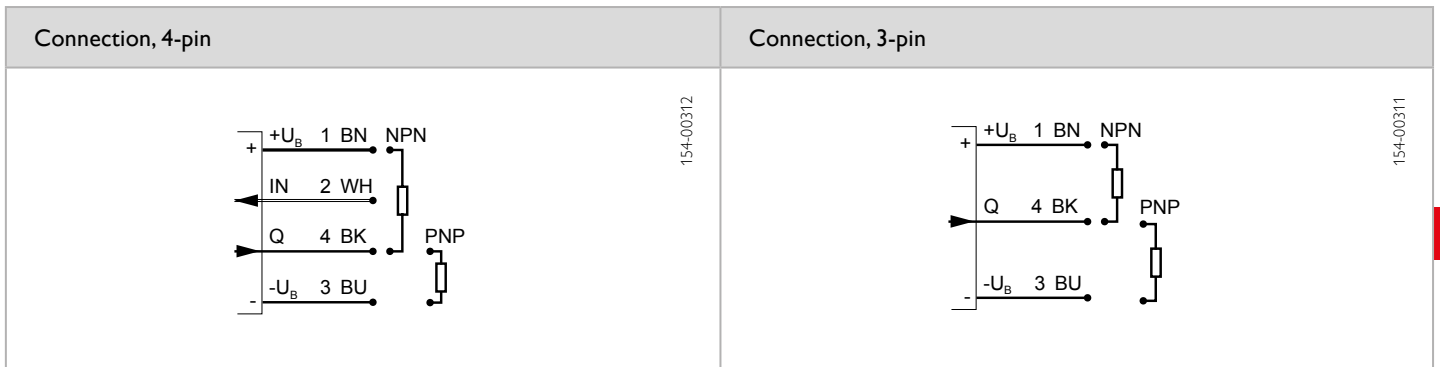
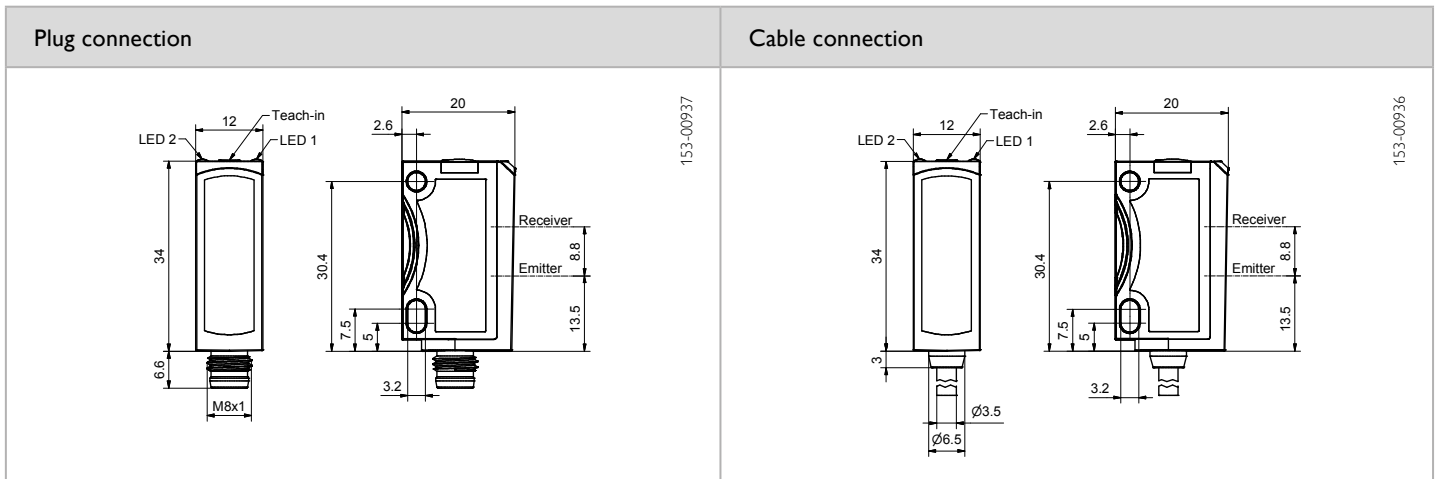
PRODUCT HIGHLIGHTS

- 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

Optical data		Functions	
Limit range	0.1 ... 15 m ¹	Indicator LED, green	Operating voltage indicator
Operating range	0.1 ... 13 m ¹	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 650 nm	Sensitivity adjustment	Via Teach-in button and control input
Light spot size	See diagram	Teach-in modes	Mode 1: during running process
Laser Class (IEC 60825-1)	1	Adjustment possibilities	Mode 2: during standing process
Polarising filter	Yes		N.O./N.C. via Teach-in button and control input
		Default settings	Button lock via control input
			Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	34 × 20 × 12 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ⁴
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C ⁵
Switching output, Q	PNP/NPN (see Selection Table)	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Switching frequency, f (ti/tp 1:1)	≤ 4000 Hz	Weight (metal plug device ⁶)	10 g
Response time	250 µs	Weight (cable device)	40 g
Control input, IN ³	+ U _B = teach-in - U _B = button locked Open = normal operation	Weight (pigtail)	20 g
		Vibration and impact resistance	EN 60947-5-2

¹ Reference material: R5/L reflector ² Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ³ Only 4-pin design ⁴ With connected IP 67 / IP 69K plug ⁵ UL: -20 ... +50 °C ⁶ No Ecolab

Operating range	Switching output	Type of connection	Part number	Article number
1 ... 13 m	PNP	Metal plug, M8x1, 3-pin	FR 25-RL-PS-M3M	609-31000
1 ... 13 m	PNP	Metal plug, M8x1, 4-pin	FR 25-RL-PS-M4M	609-31001
1 ... 13 m	NPN	Metal plug, M8x1, 4-pin	FR 25-RL-NS-M4M	609-31002
1 ... 13 m	PNP	Cable, 2 m, 4-wire	FR 25-RL-PS-K4	609-21004
1 ... 13 m	NPN	Cable, 2 m, 4-wire	FR 25-RL-NS-K4	609-21001
1 ... 13 m	PNP	Pigtail, 150 mm with plug, M8, 4-pin	FR 25-RL-PS-KM4	609-21016
1 ... 13 m	NPN	Pigtail, 150 mm with plug, M8, 4-pin	FR 25-RL-NS-KM4	609-21017
1 ... 13 m	PNP	Pigtail, 150 mm with plug, M12, 4-pin	FR 25-RL-PS-KL4	609-21006
1 ... 13 m	NPN	Pigtail, 150 mm with plug, M12, 4-pin	FR 25-RL-NS-KL4	609-21003



Reflector (especially for short range)	Operating range
RD-25 KL	0.15 ... 1 m

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

FR 25-R

Retroreflective photoelectric sensor



PRODUCT HIGHLIGHTS

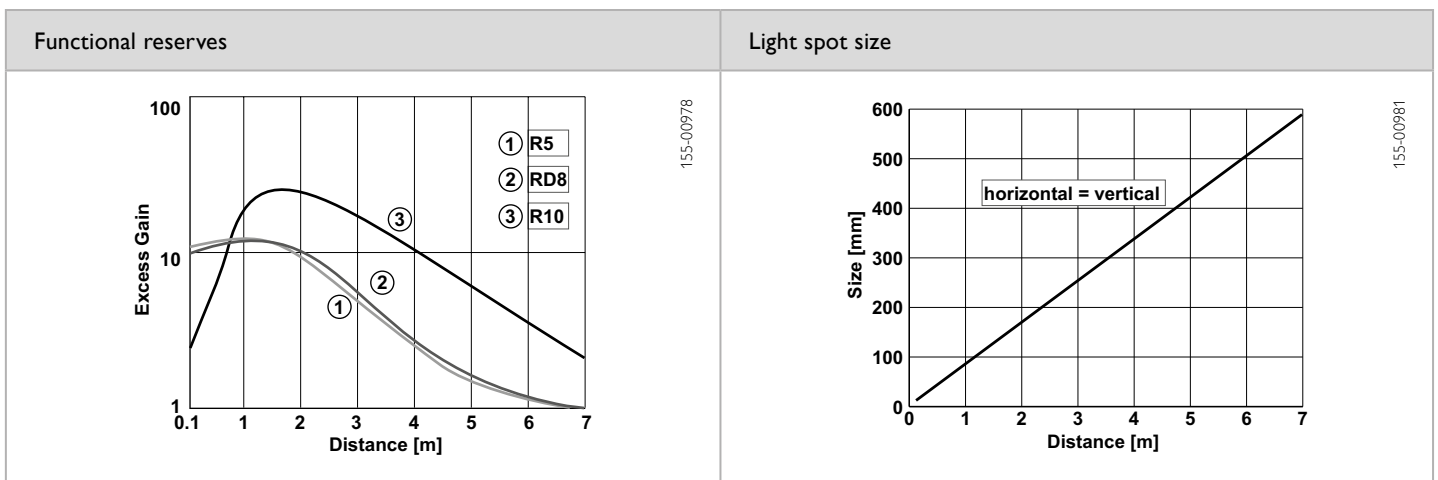
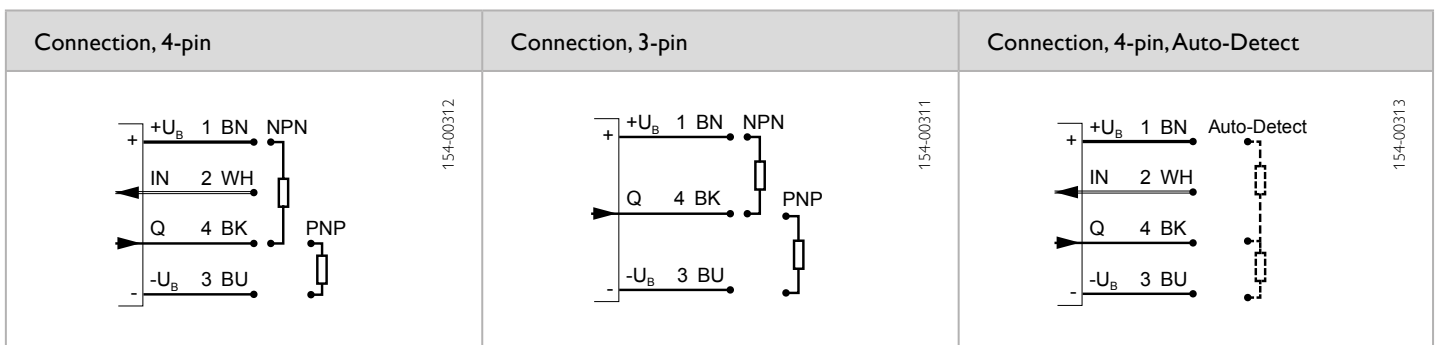
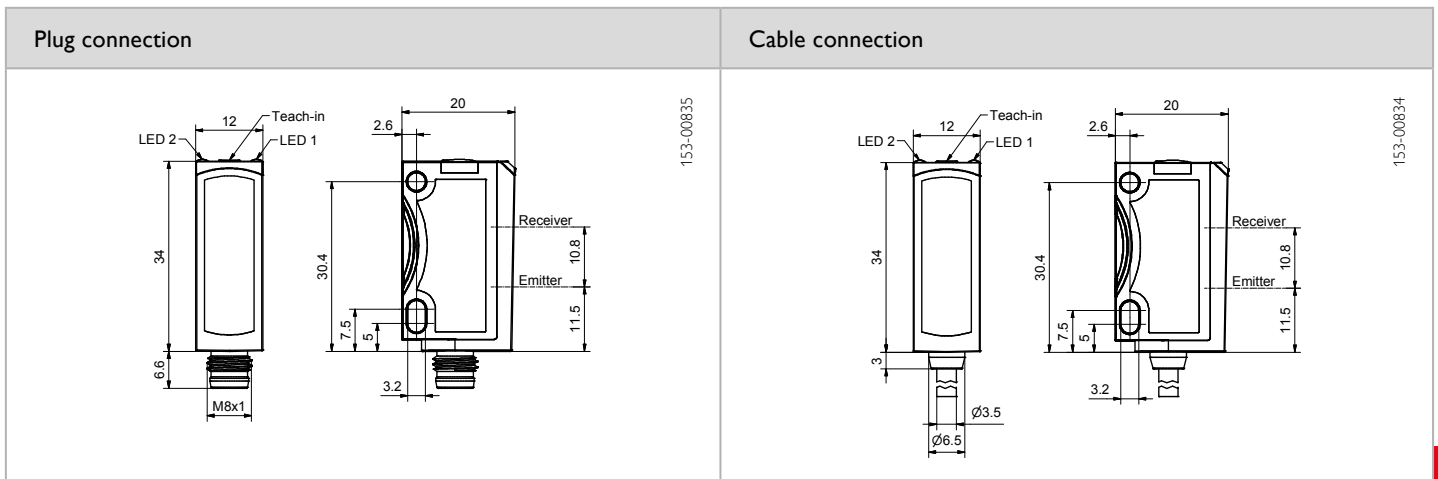
- Auto-detect retroreflective photoelectric sensor with real PNP and real NPN functions
- Particularly suitable for short-range applications
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings
- Durable laser printing
- Wide range of variants

Optical data		Functions	
Limit range	0.1 ... 7 m ¹	Indicator LED, green	Operating voltage indicator
Operating range	0.1 ... 6 m ¹	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 632 nm	Sensitivity adjustment	Via Teach-in button and control input
Light spot size	See diagram	Teach-in modes	Mode 1: during running process
Polarising filter	Yes	Adjustment possibilities	Mode 2: during standing process
			N.O./N.C. via Teach-in button and control input
			Button lock via control input
			Auto-detect / NPN / PNP via Teach-in button and control input (only Auto-detect variants)
		Default settings	Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	34 × 20 × 12 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ⁴
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C ⁵
Switching output, Q	PNP/NPN/Auto-detect (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 (metal plug device ⁶)	10 g
Response time	500 μs	Weight (cable device)	40 g
Control input, IN ³	+U _B = teach-in -U _B = button locked Open = normal operation	Weight (pigtail)	20 g
		Vibration and impact resistance	EN 60947-5-2

¹ Reference material: R10 reflector ² Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ³ Only 4-pin design ⁴ With connected IP 67 / IP 69K plug ⁵ UL: -20 ... +50 °C ⁶ No Ecolab

Operating range	Switching output	Type of connection	Part number	Article number
0.1 ... 6 m	PNP	Plug, M8x1, 4-pin	FR 25-R-PS-M4	606-11000
0.1 ... 6 m	NPN	Plug, M8x1, 4-pin	FR 25-R-NS-M4	606-11002
0.1 ... 6 m	PNP	Metal plug, M8x1, 3-pin	FR 25-R-PS-M3M	606-11006
0.1 ... 6 m	NPN	Metal plug, M8x1, 3-pin	FR 25-R-NS-M3M	606-11007
0.1 ... 6 m	PNP	Metal plug, M8x1, 4-pin	FR 25-R-PS-M4M	606-11008
0.1 ... 6 m	NPN	Metal plug, M8x1, 4-pin	FR 25-R-NS-M4M	606-11009
0.1 ... 6 m	PNP	Cable, 2 m, 4-wire	FR 25-R-PS-K4	606-11001
0.1 ... 6 m	NPN	Cable, 2 m, 4-wire	FR 25-R-NS-K4	606-11003

Operating range	Switching output	Type of connection	Part number	Article number
0.1 ... 6 m	PNP	Pigtail, 150 mm with plug, M8, 4-pin	FR 25-R-PS-KM4	606-11028
0.1 ... 6 m	NPN	Pigtail, 150 mm with plug, M8, 4-pin	FR 25-R-NS-KM4	606-11029
0.1 ... 6 m	PNP	Pigtail, 150 mm with plug, M12, 4-pin	FR 25-R-PS-KL4	606-11004
0.1 ... 6 m	NPN	Pigtail, 150 mm with plug, M12, 4-pin	FR 25-R-NS-KL4	606-11005
0.1 ... 6 m	Auto-detect	Metal plug, M8x1, 4-pin	FR 25-R-PNS-M4M	606-11011



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

FR 25-RF

Retroreflective photoelectric sensor, fixed setting



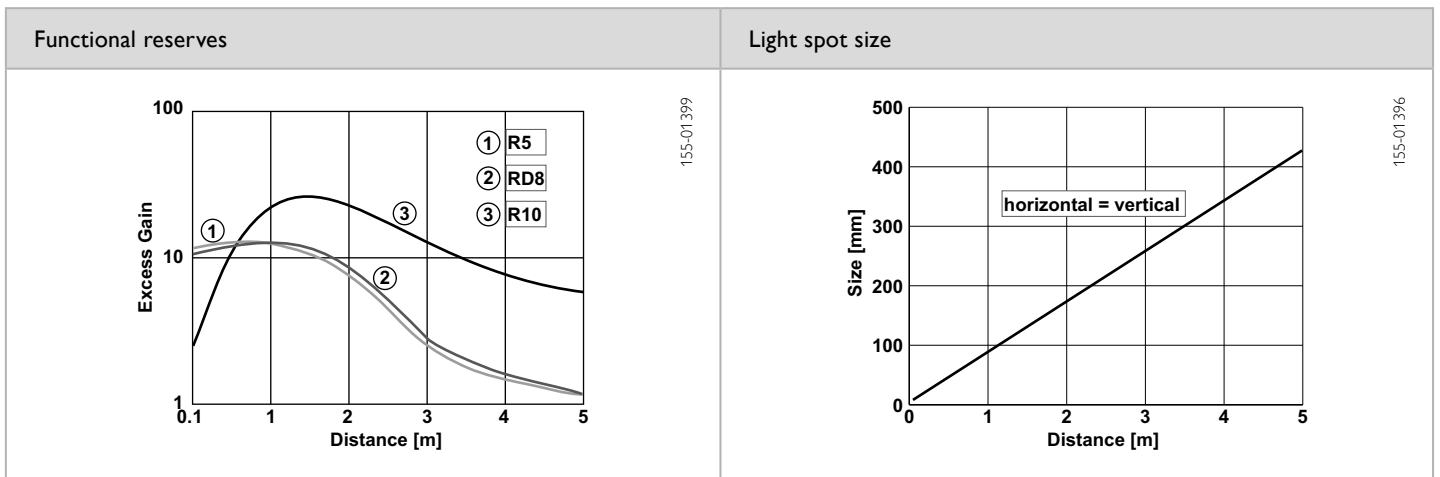
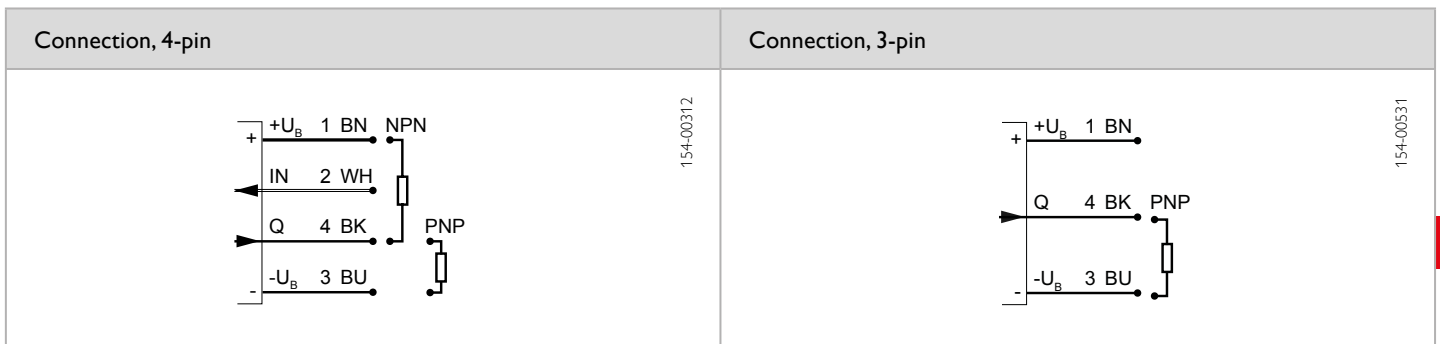
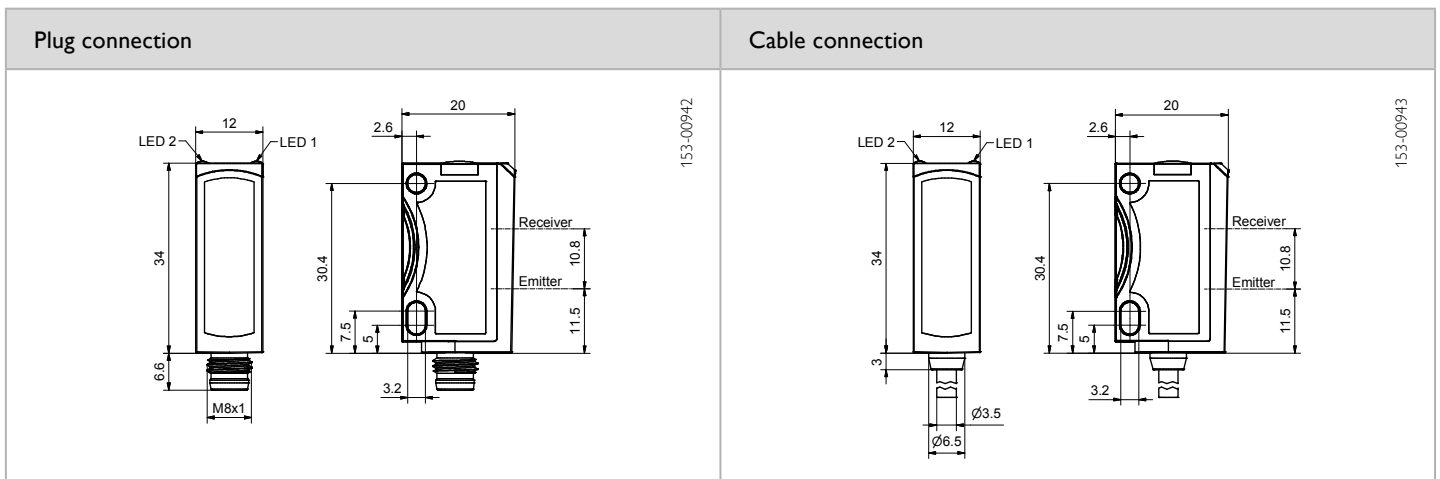
PRODUCT HIGHLIGHTS

- 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 ¹	Indicator LED, green	Operating voltage indicator
Operating range	0.1 ... 3 m ¹	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 _B	10 ... 30V DC ²	Dimensions	34 x 20 x 12 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C ⁴
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 _B = N.C. -U _B / Open = N.O.		

¹ Reference material: R10 reflector ² Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ³ With connected IP 67 / IP 69K plug ⁴ 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



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

Laser through-beam photoelectric 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

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 and control input
Light spot size	See diagram	Teach-in modes	Mode 1: during running process Mode 2: during standing process
Laser Class (IEC 60825-1)	1	Adjustment possibilities (receiver)	N.O./N.C. via Teach-in button and control input Button lock via control input
		Default settings	Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ¹	Dimensions	34 x 20 x 12 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ²
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C ³
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)	≤ 2000 Hz	Weight (metal plug device ⁴)	10 g
Response time	250 μs	Weight (cable device)	40 g
Control input, IN (receiver)	+U _B = teach-in -U _B = button locked Open = normal operation	Vibration and impact resistance	EN 60947-5-2
Control input, Test (transmitter)	+U _B = Test (transmitter off) -U _B / Open = normal operation		

¹ Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ² With connected IP 67 / IP 69K plug ³ UL: -20 ... +50 °C ⁴ No Ecolab

Operating range	Switching output	Type of connection	Part number	Article number
0 ... 18 m	PNP	Metal plug, M8x1, 4-pin	FE 25-RL-PS-M4M	605-21014
0 ... 18 m	NPN	Metal plug, M8x1, 4-pin	FE 25-RL-NS-M4M	605-21015
0 ... 18 m	–	Metal plug, M8x1, 4-pin	FS 25-RL-M4M	605-11007
0 ... 18 m	PNP	Cable, 2 m, 4-wire	FE 25-RL-PS-K4	605-21004
0 ... 18 m	NPN	Cable, 2 m, 4-wire	FE 25-RL-NS-K4	605-21007
0 ... 18 m	–	Cable, 2 m, 4-wire	FS 25-RL-K4	605-11002

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

<p>Connection, transmitter, 4-pin</p> <p>154-00315</p>	<p>Connection, receiver, 4-pin</p> <p>154-00312</p>
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<p>Functional reserves</p> <p>155-01388</p>	<p>Light spot size</p> <p>155-01389</p>
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Accessories			
Connection cables	From Page A-38	Brackets	From Page A-4

FS/FE 25-R

Through-beam photoelectric 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

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 and control input
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. via Teach-in button and control input Button lock via control input
		Default settings	Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ¹	Dimensions	34 x 20 x 12 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ²
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C ³
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 (metal plug device ⁴)	10 g
Response time	500 μs	Weight (cable device)	40 g
Control input, IN (receiver)	+U _B = teach-in -U _B = button locked Open = normal operation	Vibration and impact resistance	EN 60947-5-2
Control input, Test (transmitter)	+U _B = Test (transmitter off) -U _B / Open = normal operation		

¹ Max 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ²With connected IP 67 / IP 69K plug ³UL: -20 ... +50 °C ⁴ No Ecolab

Operating range	Switching output	Type of connection	Part number	Article number
0 ... 13 m	PNP	Metal plug, M8x1, 4-pin	FE 25-R-PS-M4M	605-21012
0 ... 13 m	NPN	Metal plug, M8x1, 4-pin	FE 25-R-NS-M4M	605-21013
0 ... 13 m	–	Metal plug, M8x1, 4-pin	FS 25-R-M4M	605-11006
0 ... 13 m	PNP	Cable, 2 m, 4-wire	FE 25-R-PS-K4	605-21001
0 ... 13 m	NPN	Cable, 2 m, 4-wire	FE 25-R-NS-K4	605-21003
0 ... 13 m	–	Cable, 2 m, 4-wire	FS 25-R-K4	605-11001

<p>Plug connection (transmitter)</p> <p>153-00852</p>	<p>Cable connection (transmitter)</p> <p>153-00851</p>
<p>Plug connection (receiver)</p> <p>153-00854</p>	<p>Cable connection (receiver)</p> <p>153-00853</p>

<p>Connection, transmitter, 4-pin</p> <p>154-00315</p>	<p>Connection, receiver, 4-pin</p> <p>154-00312</p>
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<p>Functional reserves</p> <p>155-01370</p>	<p>Light spot size</p> <p>155-01371</p>
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Accessories			
Connection cables	From Page A-38	Brackets	From Page A-4

FS/FE 25-RF

Through-beam photoelectric sensor, fixed setting



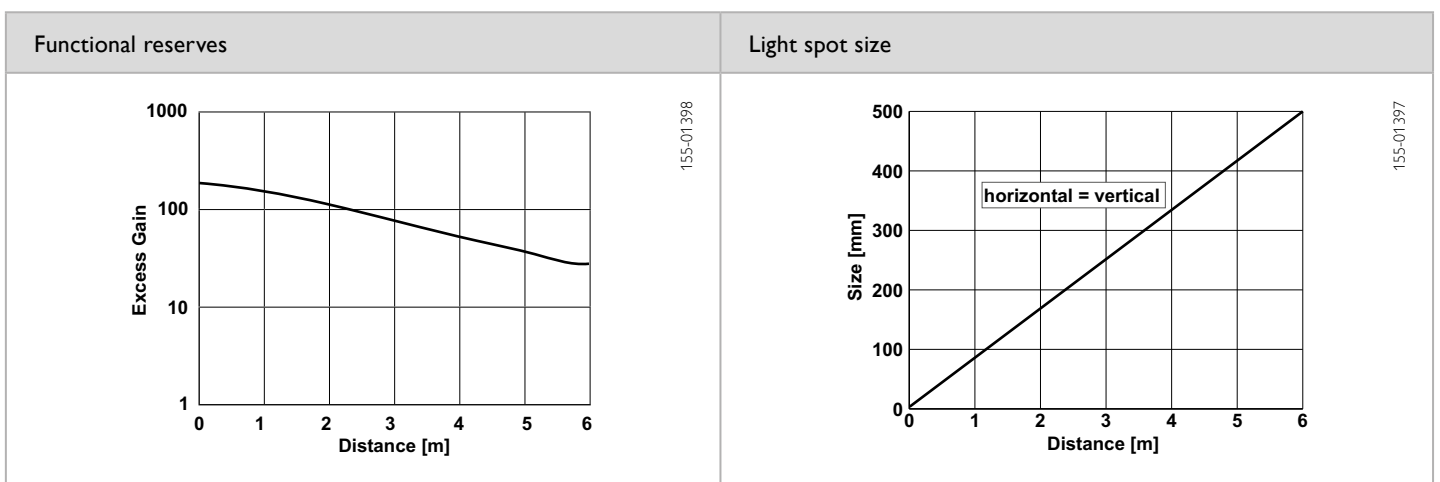
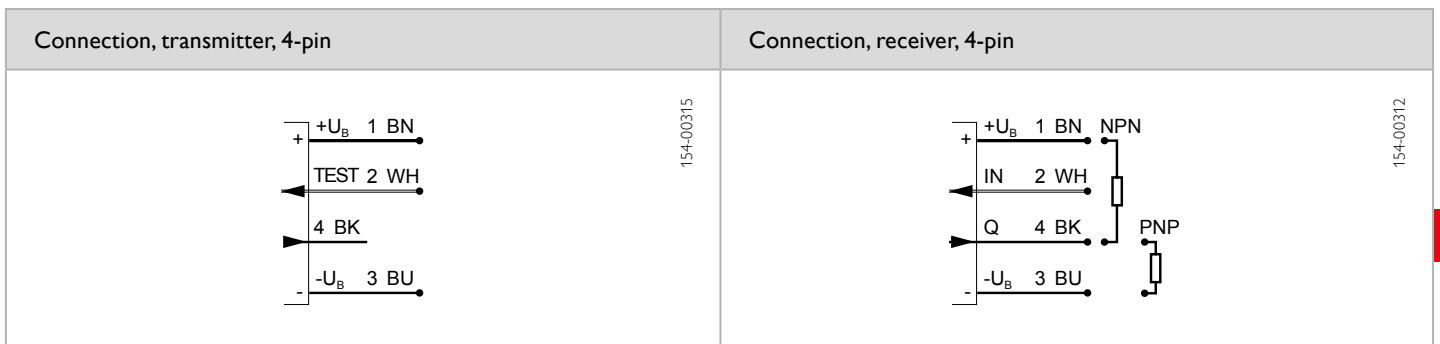
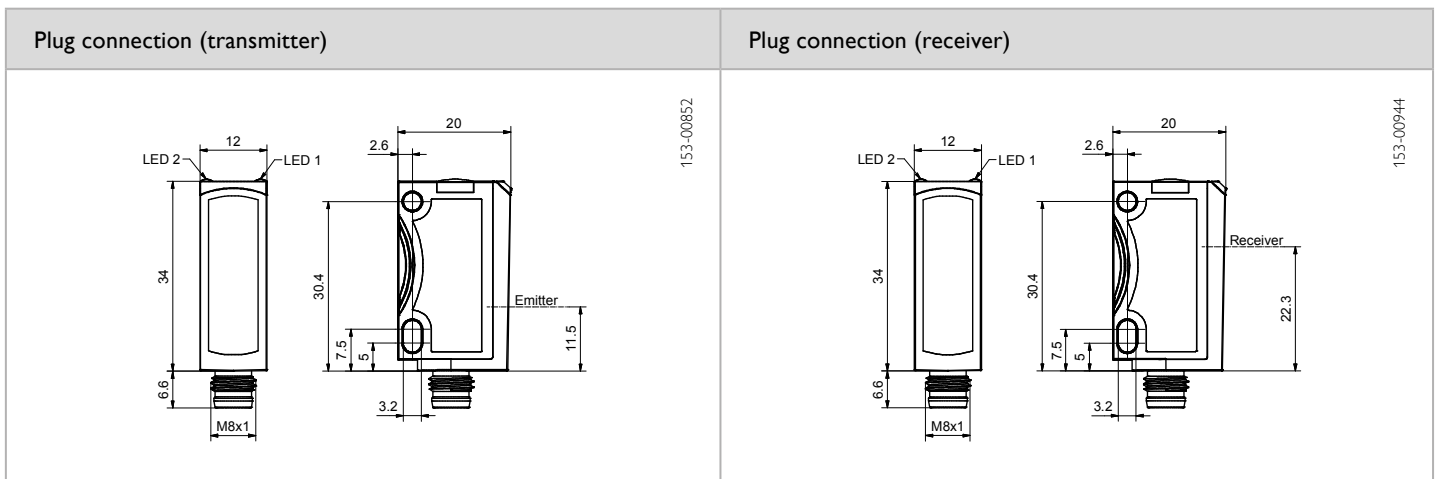
PRODUCT HIGHLIGHTS

- 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 _B	10 ... 30V DC ¹	Dimensions	34 × 20 × 12 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ²
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	See Selection Table
Power On Delay	< 300 ms	Ambient temperature: operation	-20 ... +60 °C ³
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 _B = N.C. -U _B / Open = N.O.		
Control input, Test (transmitter)	+U _B = Test (transmitter off) -U _B / Open = normal operation		

¹ Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ² With connected IP 67 / IP 69K plug ³ 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

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