

F 55 – New standards in a compact shape

The compact class with long ranges



TYPICAL F 55

- Glass-fibre-reinforced plastic (IP 69K & IP 67, Ecolab)
- Bright, easily visible, light spot with sharp contour even in daylight
- Precise background suppression and minimal black/white-shift
- User-friendly operation of all diffuse variants via electronic Teach-in button or control line
- Laser or LED options
- Two dovetail guides for simple sensor alignment
- Well thought-out mounting accessories



SensoPart sets new standards in the compact class with its F 55 family of photoelectric sensors. The products in this series combine excellent performance data with a robust housing design and many user-friendly details. They guarantee reliable detection by means of focused laser light or red-light LED with precise background suppression.

The sensors of the F 55 series have a very high light intensity: the photoelectric proximity sensor with background suppression, for example, reaches a scanning distance of up to 5000 mm. The bright, sharply contoured light spot is still easily visible even at

long distances in bright daylight, considerably simplifying commissioning.

The F 55 series covers all standard applications in industrial automation: whether for part detection in the automotive industry or for sorting tasks in machine construction – the sensors excel everywhere with their excellent performance.

F 55 – Product Overview						
	Type of light		Adjustment	Scanning distance / range	Special features	Page
Photoelectric proximity sensors with background suppression						
FT 55- RLH	Laser		Potentiometer 	5 ... 800 mm		348
FT 55-RLH2	Laser		Potentiometer 	5 ... 1000 mm	Precise small-part detection at long scanning distances	350
FT 55-RLHP2	Laser		Teach-in 	0 ... 5000 mm	Very long scanning distances	352
FT 55B-RH	LED		Potentiometer 	3 ... 800 mm		354
FT 55-RH	LED		Potentiometer 	3 ... 1200 mm		356
FT 55-BH	LED		Potentiometer 	3 ... 1200 mm	Bluelight	358
Photoelectric proximity sensors						
FT 55-RL	Laser		Teach-in 	5 ... 1200 mm	Detection of slightest grey value differences	360
FT 55-R	LED		Teach-in 	5 ... 2000 mm		362
Retroreflective photoelectric sensors						
FR 55-RLO	Laser		Teach-in 	0 ... 20 m	Autocollimation, most accurate small-part detection	364
FR 55-RL	Laser		Teach-in 	0.3 ... 14 m		366
FR 55-R	LED		Teach-in 	0.3 ... 14 m		368
Through-beam photoelectric sensors						
FS/FE 55-RL	Laser		Teach-in 	0 ... 30 m		370
FS/FE 55-R	LED		Teach-in 	0 ... 25 m		372

FT 55-RLH

Laser photoelectric proximity sensor with background suppression



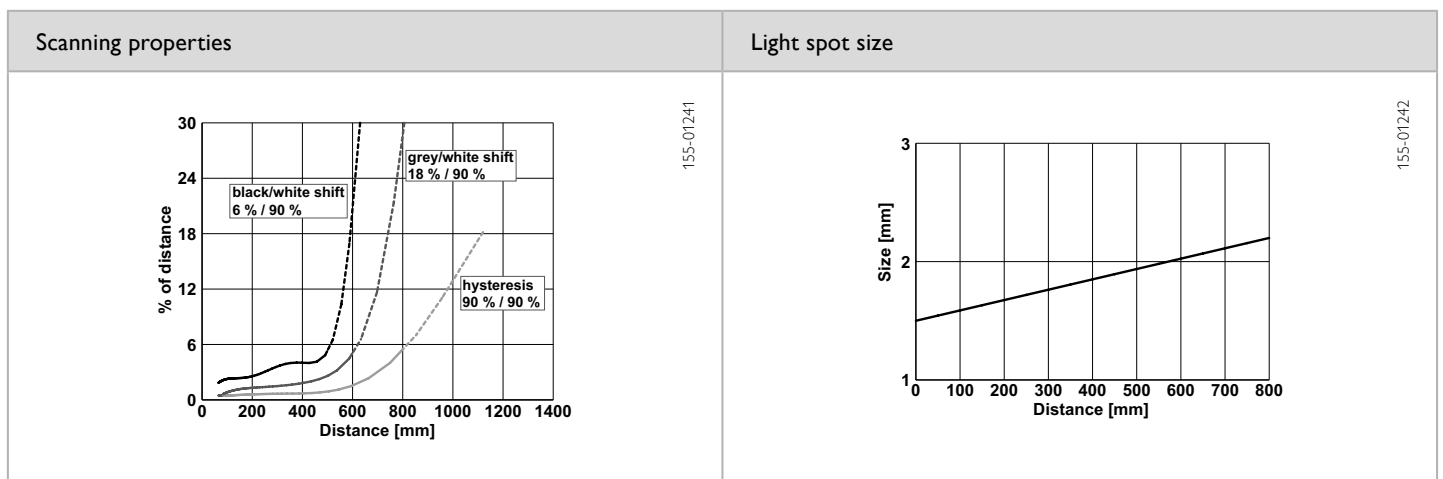
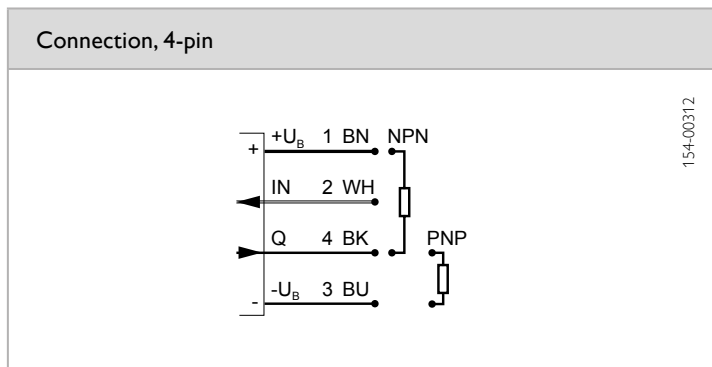
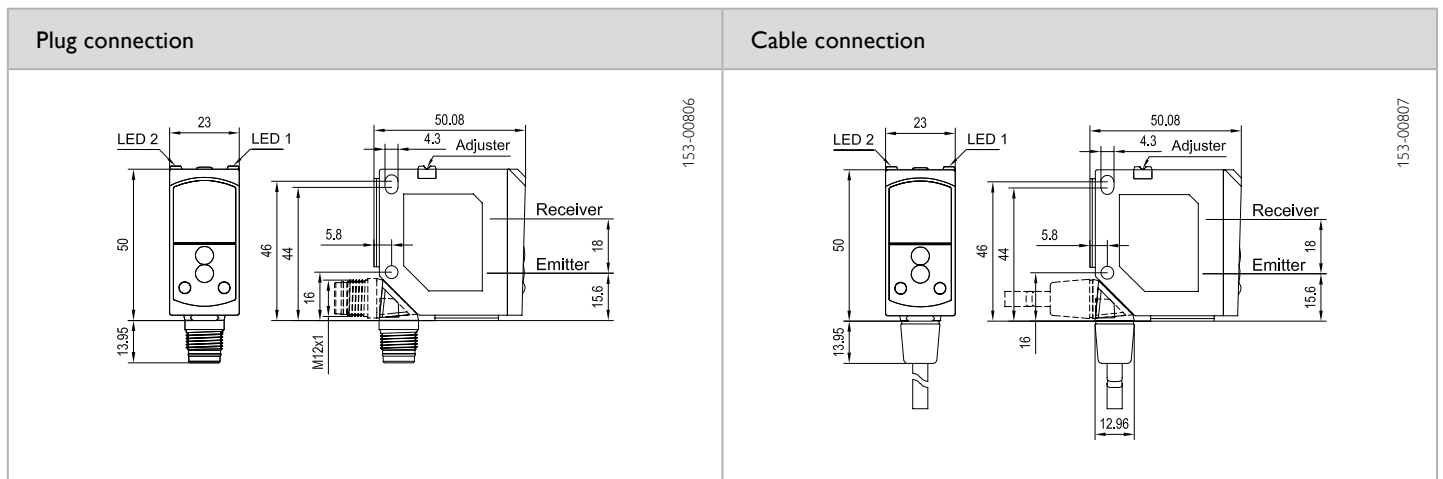
PRODUCT HIGHLIGHTS

- Precisely adjustable background suppression – reliable operation even with highly reflective and glossy backgrounds
- Particularly suitable for the detection of the smallest of objects
- Very small, easily visible laser light spot
- Precise scanning distance adjustment by means of potentiometer
- Plug and cable connection rotatable

Optical data		Functions	
Scanning distance	5 ... 800 mm ¹	Indicator LED, green	Operating voltage indicator
Type of light	Laser, red, 655 nm	Indicator LED, yellow	Switching output indicator / contamination indicator
Light spot size	See diagram	Scanning distance adjustment	Via potentiometer
Laser Class (IEC 60825-1)	1	Adjustment possibilities	N.O./N.C. via control input
		Default settings	Max. scanning distance (6 %)
Electrical data		Mechanical data	
Operating voltage, +U _B	12 ... 30V DC ²	Dimensions	50 × 50,1 × 23 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	PC-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)	35 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (cable device)	125 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 Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ³ With connected IP 67 / IP 69K plug ⁴ UL: -20 ... +45 °C

Scanning distance	Switching output	Type of connection	Part number	Article number
5 ... 800 mm	PNP	Plug, M12x1, 4-pin	FT 55-RLH-PS-L4	623-11018
5 ... 800 mm	NPN	Plug, M12x1, 4-pin	FT 55-RLH-NS-L4	623-11019
5 ... 800 mm	PNP	Cable, 3 m, 4-wire	FT 55-RLH-PS-K4	623-11021
5 ... 800 mm	NPN	Cable, 3 m, 4-wire	FT 55-RLH-NS-K4	623-11022



Reference material	Detection range
White (90 %)	5 ... 800 mm
Grey (18 %)	10 ... 600 mm
Black (6 %)	30 ... 500 mm

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

FT 55-RLH2

Laser photoelectric proximity sensor with background suppression



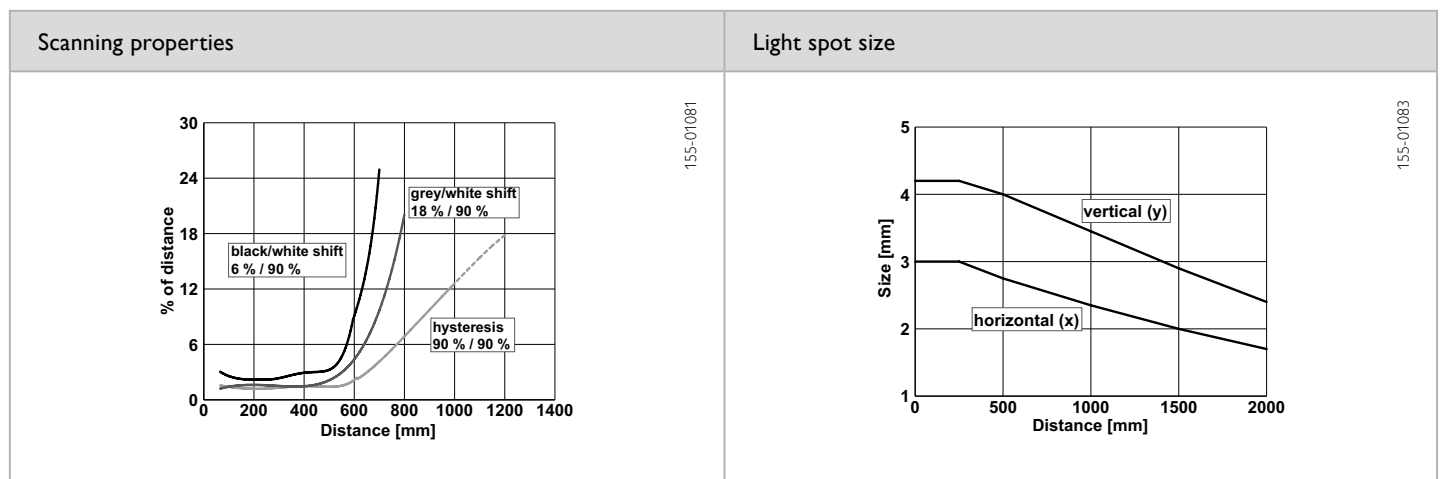
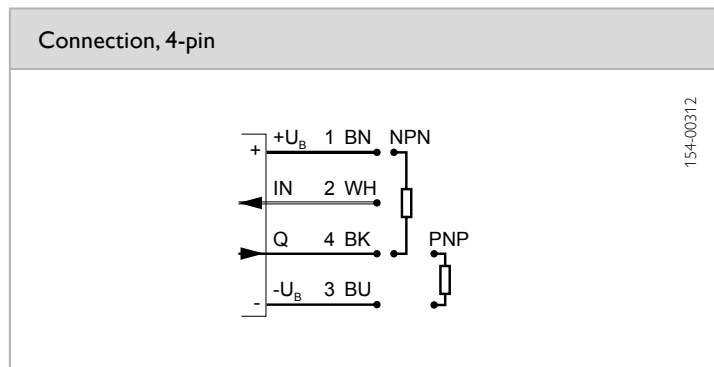
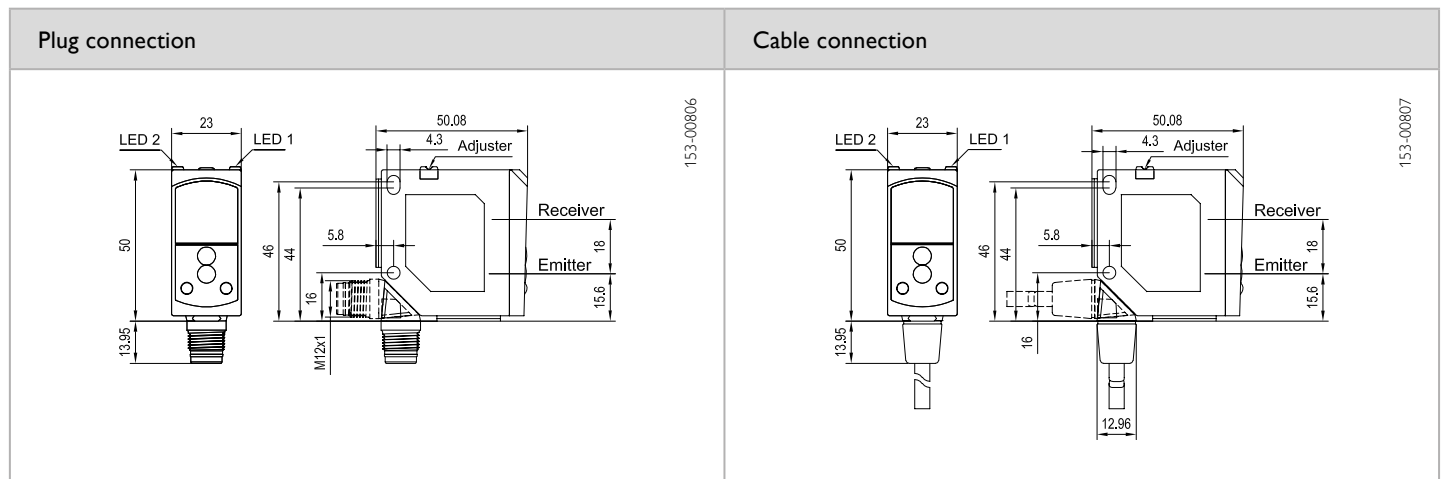
PRODUCT HIGHLIGHTS

- Long scanning distance of 1 m combined with extremely accurate small-part detection
- Precisely adjustable background suppression – reliable operation even with highly reflective and glossy backgrounds
- Very small, easily visible laser light spot
- Precise scanning distance adjustment by means of potentiometer
- Integrated display window for scanning distance adjustment

Optical data		Functions	
Scanning distance	5 ... 1000 mm ¹	Indicator LED, green	Operating voltage indicator
Type of light	Laser, red, 655 nm	Indicator LED, yellow	Switching output indicator / contamination indicator
Light spot size	See diagram	Scanning distance adjustment	Via potentiometer
Laser Class (IEC 60825-1)	1	Adjustment possibilities	N.O./N.C. via control input
		Default settings	S _n = 500 mm (6 %)
Electrical data		Mechanical data	
Operating voltage, +U _B	12 ... 30V DC ²	Dimensions	50 x 50,1 x 23 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	PC-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)	35 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (cable device)	125 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 Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ³ With connected IP 67 / IP 69K plug ⁴ UL: -20 ... +45 °C

Scanning distance	Switching output	Type of connection	Part number	Article number
5 ... 1000 mm	PNP	Plug, M12x1, 4-pin	FT 55-RLH2-PS-L4	623-11006
5 ... 1000 mm	NPN	Plug, M12x1, 4-pin	FT 55-RLH2-NS-L4	623-11007
5 ... 1000 mm	PNP	Cable, 3 m, 4-wire	FT 55-RLH2-PS-K4	623-11009
5 ... 1000 mm	NPN	Cable, 3 m, 4-wire	FT 55-RLH2-NS-K4	623-11010



Reference material	Detection range
White (90 %)	5 ... 1000 mm
Grey (18 %)	10 ... 800 mm
Black (6 %)	15 ... 700 mm

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

FT 55-RLHP2

Laser photoelectric proximity sensor with background suppression – Time-of-flight technology



PRODUCT HIGHLIGHTS

- For detection tasks with all object surfaces at high scanning distances
- Reliable object detection even with tilted objects and with bright, highly reflective or shiny backgrounds
- Compact housing for an easy integration
- Simple teach-in (also external)
- Clearly visible laser light spot (laser class 1) for an easy alignment and full eye safety

Optical data		Functions	
Scanning distance	0 ... 5 m (see Selection Table) ¹	Indicator LED 2 green	Operating voltage indicator
Hysteresis	20 mm	Indicator LED 2 yellow ²	Switching output indicator Q2
Black/white shift (6%/90%)	≤ ± 40 mm	Indicator LED 1 yellow	Switching output indicator Q resp. Q1
Grey value shift (18%/90%)	≤ ± 40 mm	Scanning distance adjustment	Via Teach-in Button and control input
Type of light	Laser, red 655 nm	Adjustment possibilities	N.O. / N.C. / antivalent ² via Teach-in Button and control input
Laser class (IEC 60825-1)	1		Key lock via control input
		Default settings	3 m, N.O.
Electrical data		Mechanical data	
Operating voltage +U _B	18 ... 30V DC	Dimensions	50 × 50,1 × 23 mm
No-load current I ₀	≤ 60 mA	Enclosure rating	IP 67 & IP 69K ⁴
Output current I _e Q	≤ 100 mA	Material, housing	ABS
Protection 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	< 5 s	Ambient temperature: operation	-40 ... +60 °C ⁵
Switching output Q	1 × Auto-Detect (PNP/NPN) ³ 2 × Auto-Detect (PNP/NPN) ³	Ambient temperature: storage	-40 ... +80 °C
Output function	N.O. / N.C. / antivalent ²	Weight (plug device)	42 g
Switching frequency f (ti/tp 1:1) Q	≤ 500 Hz	Resistance to vibration and impacts	EN 60947-5-2
Response time Q	1 ms		
Temperature drift	< 2 mm / K		
Warm-up time	20 min.		
Control input IN	+U _B = Teach-in -U _B = Button locked Open = normal operation		

¹ Reference material 90 % reflectivity

² For variant FT 55-RLHP2-2PNS-L5

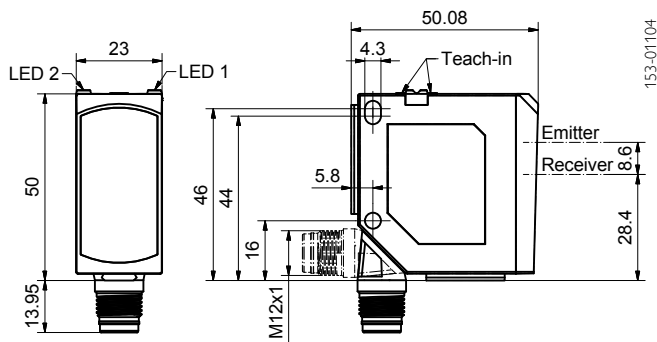
³ Auto-Detect: Automatic selection of PNP or NPN by the sensor; PNP or NPN can be fixed

⁴ With connected IP 67 / IP 69K plug

⁵ UL: -20 ... +45 °C

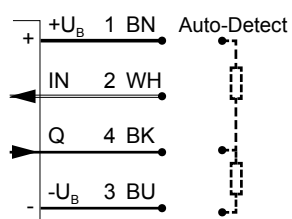
Scanning distance	Switching output	Type of connection	Part Number	Article number
0 ... 5 m	1 × Auto-Detect	Plug, M12x1, 4-pin	FT 55-RLHP2-PNS-L4	623-11031
0 ... 5 m	2 × Auto-Detect	Plug, M12x1, 5-pin	FT 55-RLHP2-2PNS-L5	623-11034

Plug connection⁴



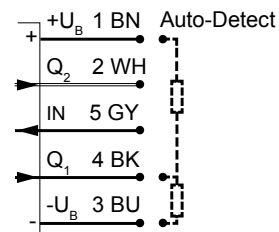
⁴ FT 55-RLHP2-PNS-L4 with a teach-in button

Connection, 4-pin, Auto-Detect



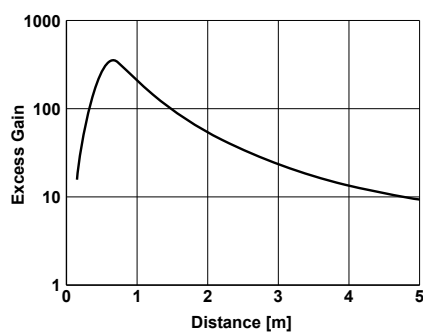
154-00313

Connection, 5-pin, Auto-Detect



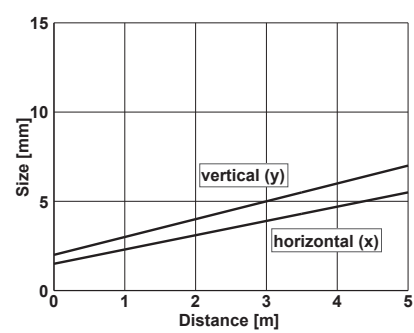
154-00541

Scanning properties



155-01838

Light spot size



155-01741

Reference material	Scanning distance
White (90 %)	0 ... 5 m
Grey (18 %)	0 ... 5 m
Black (6 %)	0.05... 3 m

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

FT 55B-RH

Photoelectric proximity sensor with background suppression



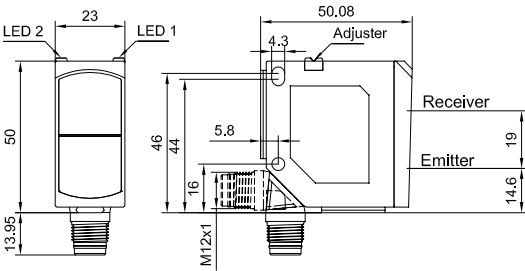
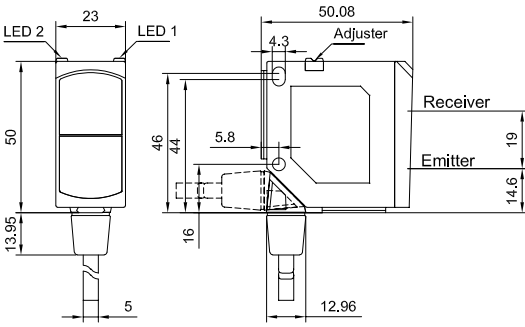
PRODUCT HIGHLIGHTS

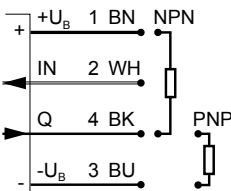
- Precisely adjustable background suppression
- Reliable switching despite differing object colours and surfaces
- Simple alignment thanks to easily visible light spot
- Plug and cable connection rotatable

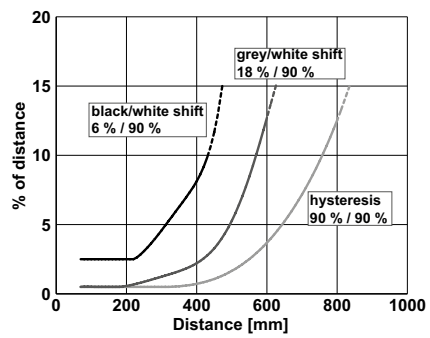
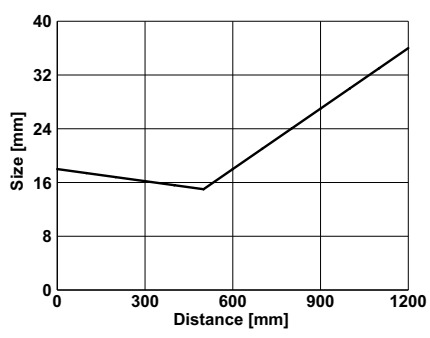
Optical data		Functions	
Scanning distance	3 ... 800 mm ¹	Indicator LED, green	Operating voltage indicator
Type of light	LED, red, 640 nm	Indicator LED, yellow	Switching output indicator / contamination indicator
Light spot size	See diagram	Scanning distance adjustment	Via potentiometer
		Adjustment possibilities	N.O./N.C. via control input
		Default settings	Max. scanning distance (6 %)
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	50 x 50,1 x 23 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	PC-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)	35 g
Switching frequency, f (ti/tp 1:1)	≤ 600 Hz	Weight (cable)	125 g
Response time	830 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 Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ³ With connected IP 67 / IP 69K plug ⁴ UL: -20 ... +45 °C

Scanning distance	Switching output	Type of connection	Part number	Article number
3 ... 800 mm	PNP	Plug, M12x1, 4-pin	FT 55B-RH-PS-L4	623-11012
3 ... 800 mm	NPN	Plug, M12x1, 4-pin	FT 55B-RH-NS-L4	623-11013
3 ... 800 mm	PNP	Cable 3 m, 4-wire	FT 55B-RH-PS-K4	623-11014
3 ... 800 mm	NPN	Cable 3 m, 4-wire	FT 55B-RH-NS-K4	623-11015

Plug connection	Cable connection
	

Connection, 4-pin


Scanning properties	Light spot size
	

Reference material	Detection range
White (90 %)	3 ... 800 mm
Grey (18 %)	5 ... 600 mm
Black (6 %)	15 ... 450 mm

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

FT 55-RH

Photoelectric proximity sensor with background suppression



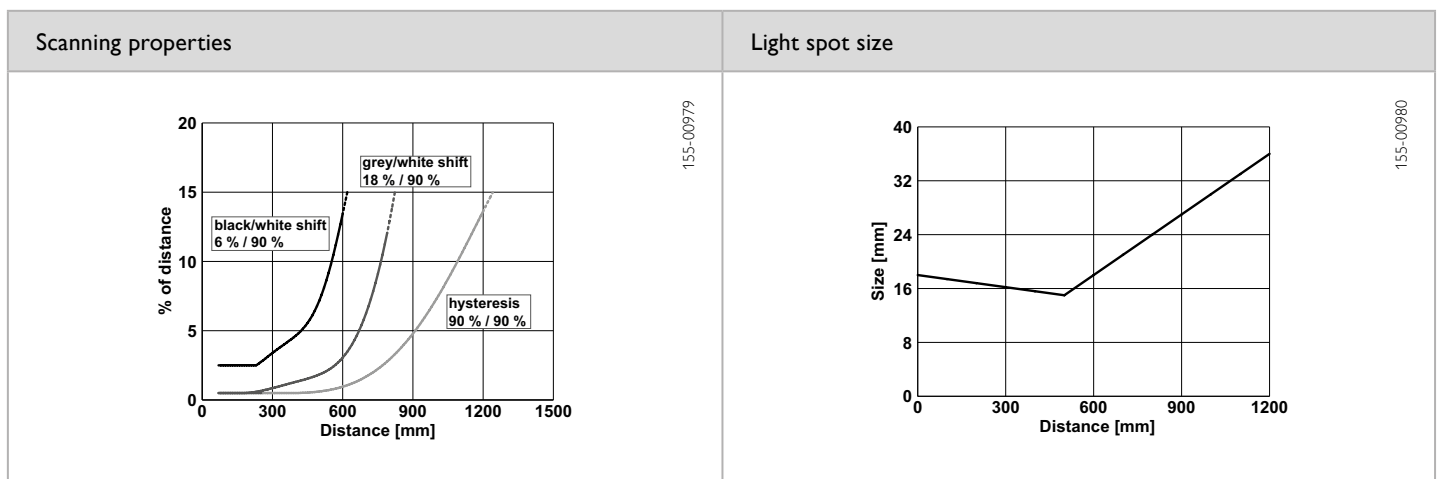
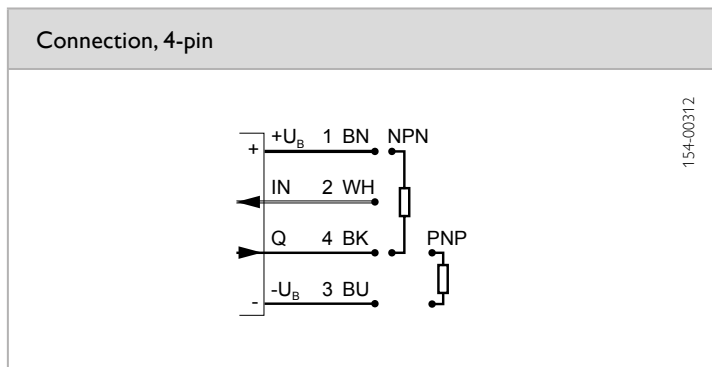
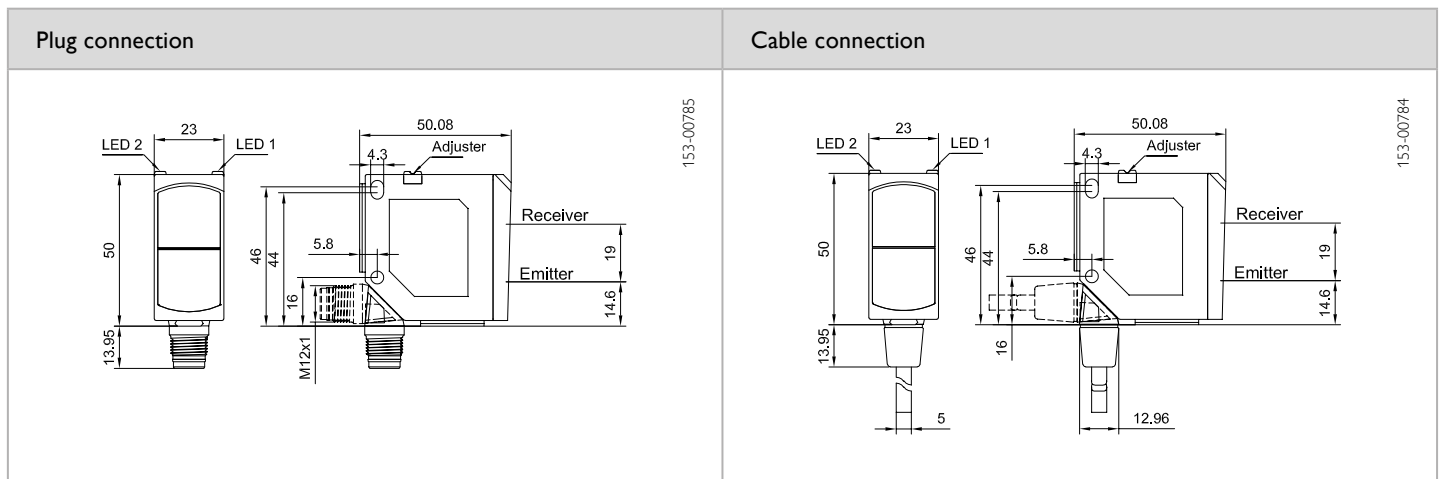
PRODUCT HIGHLIGHTS

- Long scanning distance of 1.20 m
- Precisely adjustable background suppression – reliable operation even with highly reflective and glossy backgrounds
- Reliable suppression of ambient light, such as sunlight and halogen lamps
- Precise scanning distance adjustment by means of potentiometer

Optical data		Functions	
Scanning distance	3 ... 1200 mm ¹	Indicator LED, green	Operating voltage indicator
Type of light	LED, red, 640 nm	Indicator LED, yellow	Switching output indicator / contamination indicator
Light spot size	See diagram	Scanning distance adjustment	Via potentiometer
		Adjustment possibilities	N.O./N.C. via control input
		Default settings	S _n = 500 mm (6 %)
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	50 x 50,1 x 23 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	PC-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)	35 g
Switching frequency, f (ti/tp 1:1)	≤ 600 Hz	Weight (cable device)	125 g
Response time	830 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 Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ³ With connected IP 67 / IP 69K plug ⁴ UL: -20 ... +45 °C

Scanning distance	Switching output	Type of connection	Part number	Article number
3 ... 1200 mm	PNP	Plug, M12x1, 4-pin	FT 55-RH-PS-L4	623-11000
3 ... 1200 mm	NPN	Plug, M12x1, 4-pin	FT 55-RH-NS-L4	623-11001
3 ... 1200 mm	PNP	Cable, 3 m, 4-wire	FT 55-RH-PS-K4	623-11003
3 ... 1200 mm	NPN	Cable, 3 m, 4-wire	FT 55-RH-NS-K4	623-11004



Reference material	Detection range
White (90 %)	3 ... 1200 mm
Grey (18 %)	5 ... 800 mm
Black (6 %)	10 ... 600 mm

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

FT 55-BH

Photoelectric proximity sensor with background suppression



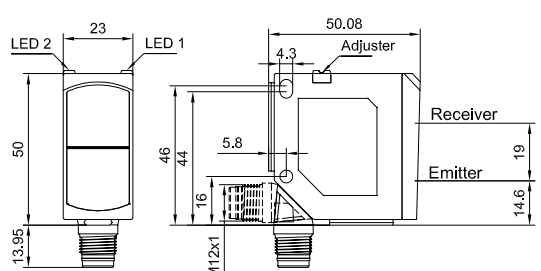
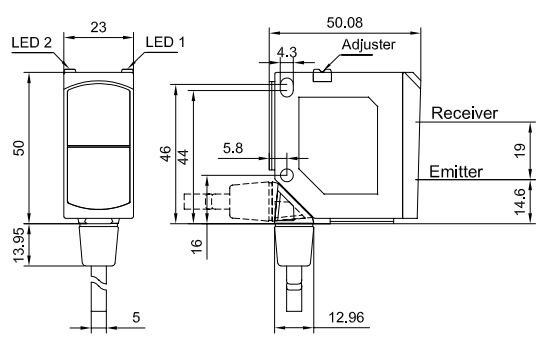
PRODUCT HIGHLIGHTS

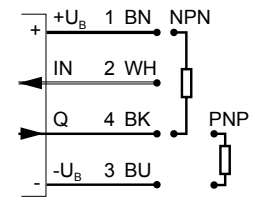
- Long scanning distance of 1.20 m
- Precisely adjustable background suppression – reliable operation even with highly reflective and glossy backgrounds
- Precise scanning distance adjustment by means of potentiometer
- Reliable detection of highly transparent or strongly light-absorbing objects
- Reliable detection even with angles of up to 90°

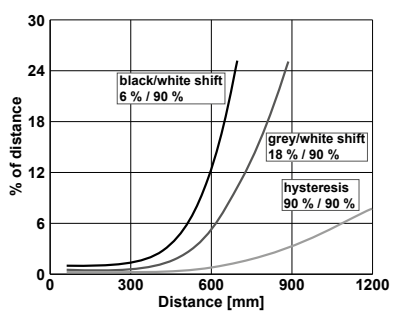
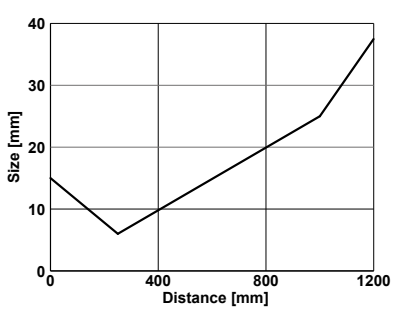
Optical data		Functions	
Scanning distance	3 ... 1200 mm ¹	Indicator LED, green	Operating voltage indicator
Type of light	LED, blue, 450 nm	Indicator LED, yellow	Switching output indicator / contamination indicator
Light spot size	See diagram	Scanning distance adjustment	Via potentiometer
		Adjustment possibilities	N.O./N.C. via control input
		Default settings	S _n = 500 mm (6 %)
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	50 x 50,1 x 23 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	PC-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)	35 g
Switching frequency, f (ti/tp 1:1)	≤ 600 Hz	Weight (cable device)	125 g
Response time	830 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 Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ³ With connected IP 67 / IP 69K plug ⁴ UL: -20 ... +45 °C

Scanning distance	Switching output	Type of connection	Part number	Article number
3 ... 1200 mm	PNP	Plug, M12x1, 4-pin	FT 55-BH-PS-L4	623-11036
3 ... 1200 mm	NPN	Plug, M12x1, 4-pin	FT 55-BH-NS-L4	623-11037

Plug connection	Cable connection
 153-00785	 153-00784

Connection, 4-pin
 154-00312

Scanning properties	Light spot size
 155-02031	 155-02032

Reference material	Detection range
White (90 %)	3 ... 1200 mm
Grey (18 %)	5 ... 750 mm
Black (6 %)	10 ... 600 mm

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

FT 55-RL

Diffuse laser photoelectric proximity sensor



PRODUCT HIGHLIGHTS

- Differentiation of even the slightest of grey value differences
- Sensor adjustment via teach-in and control input
- Very small, easily visible laser light spot
- Plug and cable connection rotatable

Optical data		Functions	
Scanning distance	5 ... 1200 mm ¹	Indicator LED, green	Operating voltage indicator
Type of light	Laser, red, 655 nm	Indicator LED, yellow	Switching output indicator / contamination indicator
Light spot size	See diagram	Sensitivity adjustment	Via Teach-in button and control input
Laser Class (IEC 60825-1)	1	Teach-in modes	Mode 1: during running process
Hysteresis	≤ 15 %	Adjustment possibilities	Mode 2: during standing process
		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 ²	Dimensions	50 × 50,1 × 23 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	PC-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)	35 g
Switching frequency, f (ti/tp 1:1)	≤ 600 Hz	Weight (cable device)	125 g
Response time	830 μs	Vibration and impact resistance	EN 60947-5-2
Control input, IN	+U _B = teach-in -U _B = button locked Open = normal operation		

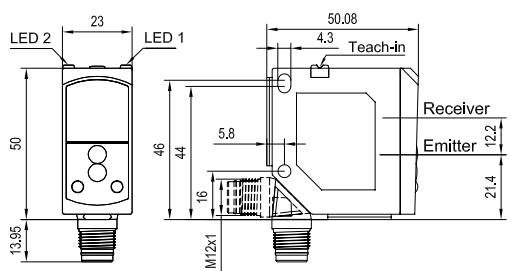
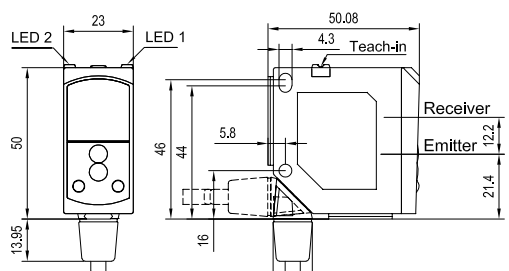
¹ Reference material: white, 90 % reflectivity

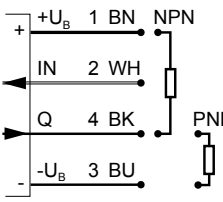
² Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz

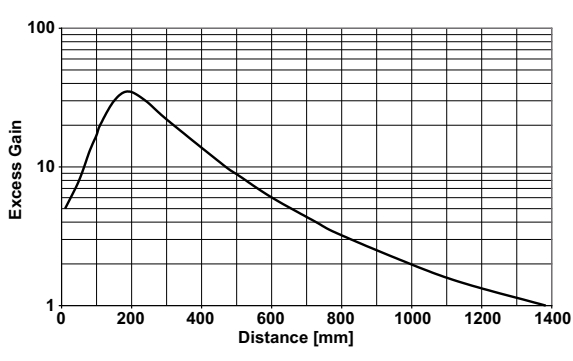
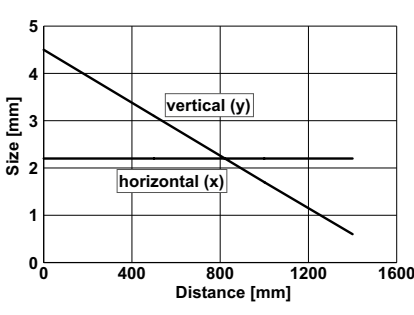
³ With connected IP 67 / IP 69K plug

⁴ UL: -20 ... +45 °C

Scanning distance	Switching output	Type of connection	Part number	Article number
5 ... 1200 mm	PNP	Plug, M12x1, 4-pin	FT 55-RL-PS-L4	622-21006
5 ... 1200 mm	NPN	Plug, M12x1, 4-pin	FT 55-RL-NS-L4	622-21007
5 ... 1200 mm	PNP	Cable, 3 m, 4-wire	FT 55-RL-PS-K4	622-21009
5 ... 1200 mm	NPN	Cable, 3 m, 4-wire	FT 55-RL-NS-K4	622-21010

Plug connection	Cable connection
	

Connection, 4-pin


Functional reserves	Light spot size
	

Reference material	Detection range
White (90 %)	5 ... 1200 mm
Grey (18 %)	10 ... 700 mm
Black (6 %)	100 ... 400 mm

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

FT 55-R

Diffuse photoelectric proximity sensor



PRODUCT HIGHLIGHTS

- Differentiation of even the slightest of grey value differences
- Sensor adjustment via teach-in and control input
- Simple alignment thanks to easily visible light spot
- Plug and cable connection rotatable

Optical data		Functions	
Scanning distance	5 ... 2000 mm ¹	Indicator LED, green	Operating voltage indicator
Type of light	LED, red, 640 nm	Indicator LED, yellow	Switching output indicator / contamination indicator
Light spot size	See diagram	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. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	50 x 50,1 x 23 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	PC-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)	35 g
Switching frequency, f (ti/tp 1:1)	≤ 600 Hz	Weight (cable device)	125 g
Response time	830 μs	Vibration and impact resistance	EN 60947-5-2
Control input, IN	+U _B = teach-in -U _B = button locked Open = normal operation		

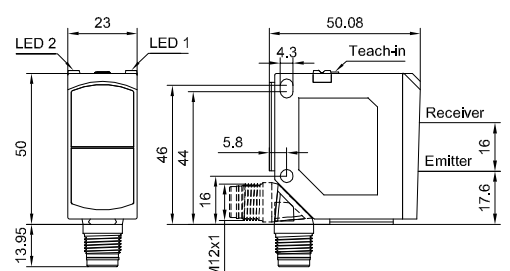
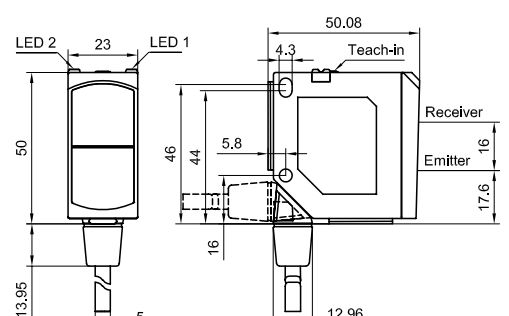
¹ Reference material: white, 90 % reflectivity

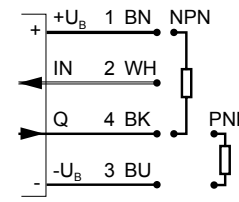
² Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz

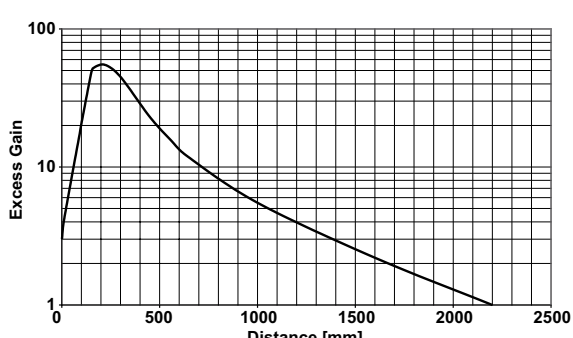
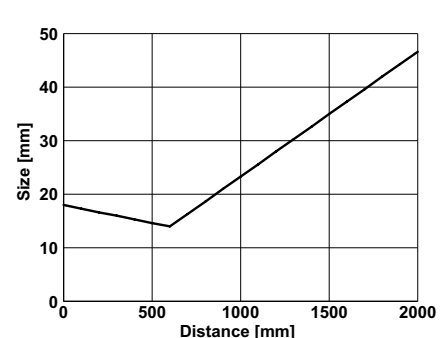
³ With connected IP 67 / IP 69K plug

⁴ UL: -20 ... +45 °C

Scanning distance	Switching output	Type of connection	Part number	Article number
5 ... 2000 mm	PNP	Plug, M12x1, 4-pin	FT 55-R-PS-L4	622-21000
5 ... 2000 mm	NPN	Plug, M12x1, 4-pin	FT 55-R-NS-L4	622-21001
5 ... 2000 mm	PNP	Cable, 3 m, 4-wire	FT 55-R-PS-K4	622-21003
5 ... 2000 mm	NPN	Cable, 3 m, 4-wire	FT 55-R-NS-K4	622-21004

Plug connection	Cable connection
	

Connection, 4-pin


Functional reserves	Light spot size
	

Reference material	Detection range
White (90 %)	5 ... 2000 mm
Grey (18 %)	10 ... 1200 mm
Black (6 %)	90 ... 600 mm

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

FR 55-RLO

Autocollimation laser retroreflective photoelectric sensor



PRODUCT HIGHLIGHTS

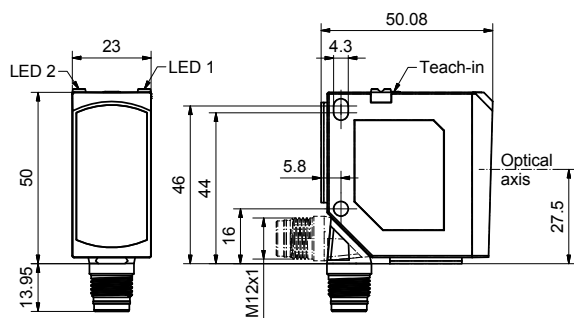
- Reliable small-part detection from a size of 0.2 mm at a scanning distance of 0–5 m
- Precise front-edge detection even in fastest automation processes thanks to a high switching frequency of 5 kHz
- Reliable detection of objects through the smallest of openings thanks to autocollimation; therefore sensor can be placed outside any danger zone
- No blind zone - detection from a range of 0 mm

Optical data		Functions	
Limit range	0 ... 25 m ¹	Indicator LED, green	Operating voltage indicator
Operating range	0 ... 20 m ¹	Indicator LED, yellow	Switching output indicator / contamination indicator
Type of light	Laser, red, 655 nm	Sensitivity adjustment	Via Teach-in button and control input
Light spot size	See diagram	Teach-in modes	Mode 1: during running process
Laser Class (IEC 60825-1)	1	Adjustment possibilities	Mode 2: during standing process
Polarising filter	Yes	Default settings	N.O./N.C. via Teach-in button and control input
			Button lock via control input
			Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	50 x 50.1 x 23 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	PC-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)	35 g
Switching frequency, f (ti/tp 1:1)	See Selection Table	Vibration and impact resistance	EN 60947-5-2
Response time	See Selection Table		
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 ... +45 °C

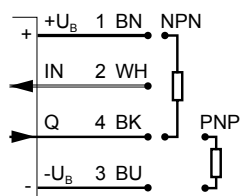
Switching frequency f (ti/tp 1:1) ²	Response time	Switching output	Type of connection	Part number	Article number
≤ 5 kHz	100 μs	PNP	Plug M12x1, 4-pin	FR 55-RLO1-PS-L4	621-11021
≤ 5 kHz	100 μs	NPN	Plug M12x1, 4-pin	FR 55-RLO1-NS-L4	621-11022
≤ 2,5 kHz	200 μs	PNP	Plug M12x1, 4-pin	FR 55-RLO2-PS-L4	621-11023
≤ 2,5 kHz	200 μs	NPN	Plug M12x1, 4-pin	FR 55-RLO2-NS-L4	621-11024

Plug connection



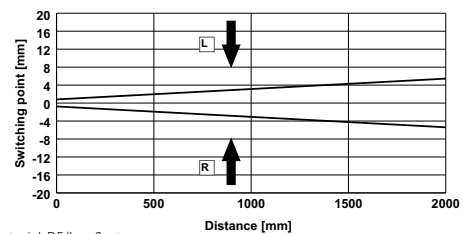
153-01090

Connection, 4-pin



154-00312

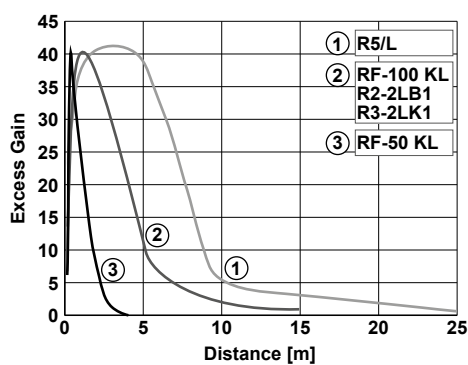
Lateral object approach



Reference material: R5/L reflector

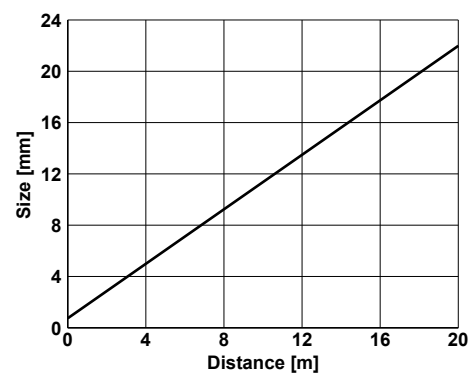
155-01724

Functional reserves



155-01723

Light spot size



155-01722

Reflector / Reflective foil*

Operating range (min./max. reflector distance)

R5/L	0 ... 20 m
RF-100 KL*	0 ... 15 m
R2-2LB1	0 ... 15 m
R3-2LK1	0 ... 15 m
RF-50 KL*	0 ... 3 m

Accessories

Connection cables
Brackets

From Page A-38
From Page A-4

FR 55-RL

Laser retroreflective photoelectric sensor



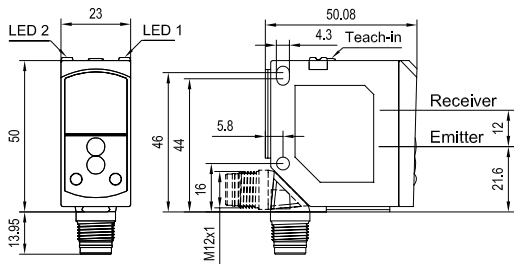
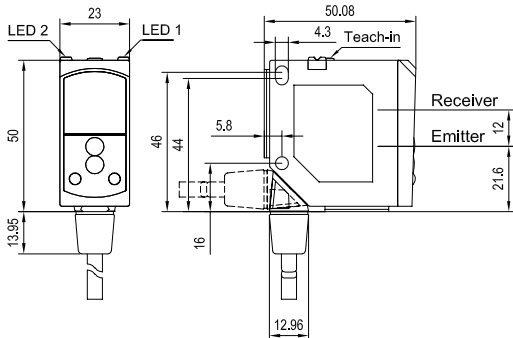
PRODUCT HIGHLIGHTS

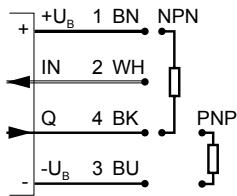
- Particularly suitable for the detection of the smallest of objects – smallest detectable part < 2 mm
- Bright, precise laser light spot in Laser Class 1
- Suitable for a wide variety of different reflectors
- Sensor adjustment via teach-in and control input

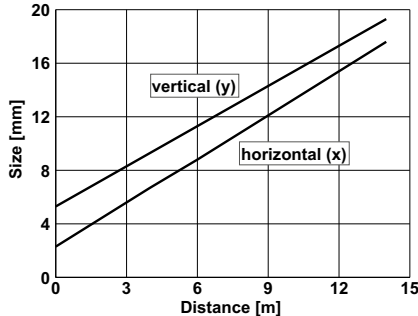
Optical data		Functions	
Limit range	0.3 ... 14 m ¹	Indicator LED, green	Operating voltage indicator
Operating range	0.3 ... 12 m ¹	Indicator LED, yellow	Switching output indicator / contamination indicator
Type of light	Laser, red, 655 nm	Sensitivity adjustment	Via Teach-in button and control input
Light spot size	See diagram	Teach-in modes	Mode 1: during running process
Laser Class (IEC 60825-1)	1	Adjustment possibilities	Mode 2: during standing process
Polarising filter	Yes	Default settings	N.O./N.C. via Teach-in button and control input
			Button lock via control input
			Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	50 x 50.1 x 23 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	PC-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)	35 g
Switching frequency, f (ti/tp 1:1)	≤ 2000 Hz	Weight (cable device)	125 g
Response time	250 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: 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 ... +45 °C

Operating range	Switching output	Type of connection	Part number	Article number
0.3 ... 12 m	PNP	Plug, M12x1, 4-pin	FR 55-RL-PS-L4	621-11006
0.3 ... 12 m	NPN	Plug, M12x1, 4-pin	FR 55-RL-NS-L4	621-11007
0.3 ... 12 m	PNP	Cable, 3 m, 4-wire	FR 55-RL-PS-K4	621-11009
0.3 ... 12 m	NPN	Cable, 3 m, 4-wire	FR 55-RL-NS-K4	621-11010

Plug connection	Cable connection
	

Connection, 4-pin


Light spot size


Reflector / Reflective foil*	Operating range
R5/L	0.3 ... 12 m
RF-100 KL*	0.2 ... 6 m

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

FR 55-R

Retroreflective photoelectric sensor



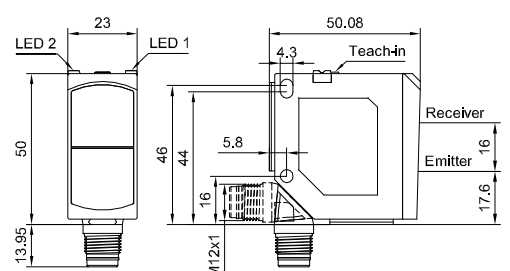
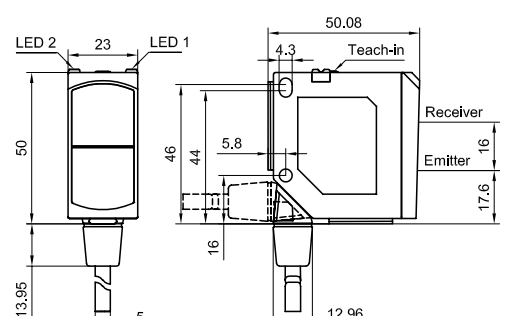
PRODUCT HIGHLIGHTS

- Simple alignment thanks to easily visible light spot
- Suitable for a wide variety of different reflectors
- Sensor adjustment via teach-in and control input
- Plug and cable connection rotatable

Optical data		Functions	
Limit range	0.3 ... 14 m ¹	Indicator LED, green	Operating voltage indicator
Operating range	0.3 ... 12 m ¹	Indicator LED, yellow	Switching output indicator / contamination indicator
Type of light	LED, red, 640 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
		Default settings	N.O./N.C. via Teach-in button and control input
			Button lock via control input
			S _n = 8 m and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	50 x 50.1 x 23 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	PC-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)	35 g
Switching frequency, f (ti/tp 1:1)	≤ 600 Hz	Weight (cable device)	125 g
Response time	830 μs	Vibration and impact resistance	EN 60947-5-2
Control input, IN	+U _B = teach-in -U _B = button locked Open = normal operation		

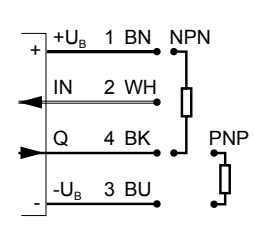
¹ Reference material: R10 reflector ² Max. 10 % ripple, within U_B ~ 50 Hz / 100 Hz ³ With connected IP 67 / IP 69K plug ⁴ UL: -20 ... +45 °C

Operating range	Switching output	Type of connection	Part number	Article number
0.3 ... 12 m	PNP	Plug, M12x1, 4-pin	FR 55-R-PS-L4	621-11000
0.3 ... 12 m	NPN	Plug, M12x1, 4-pin	FR 55-R-NS-L4	621-11001
0.3 ... 12 m	PNP	Cable, 3 m, 4-wire	FR 55-R-PS-K4	621-11003
0.3 ... 12 m	NPN	Cable, 3 m, 4-wire	FR 55-R-NS-K4	621-11004

Plug connection	Cable connection
	

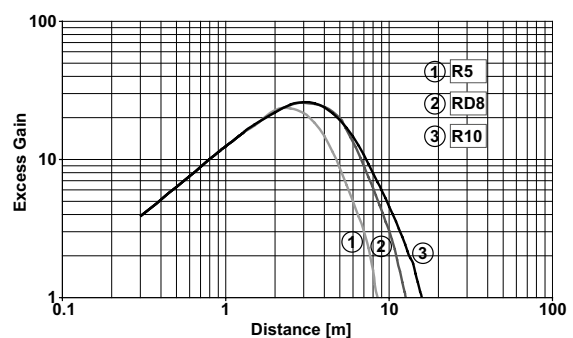
153-00782

153-00783

Connection, 4-pin


154-00312

8

Functional reserves	Light spot size
	

155-00985

155-00984

Reflector / Reflective foil*	Operating range	Accessories
R10	0.3 ... 12 m	Reflectors
RD8	0.3 ... 10 m	Connection cables
R5	0.3 ... 6 m	Brackets
RF-100 KL*	0.25 ... 6 m	

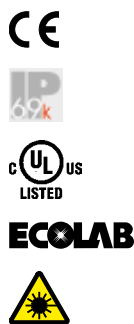
From Page A-18

From Page A-38

From Page A-4

FS/FE 55-RL

Laser through-beam photoelectric sensor



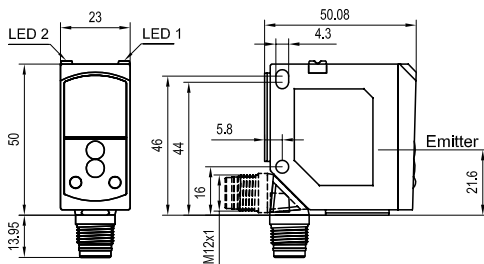
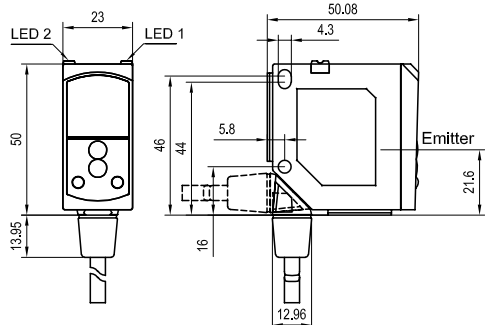
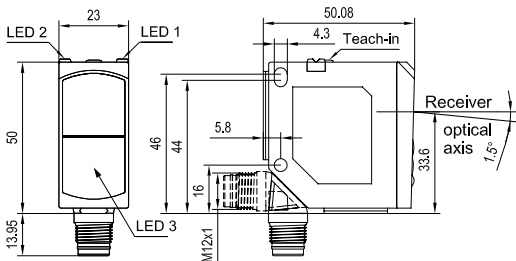
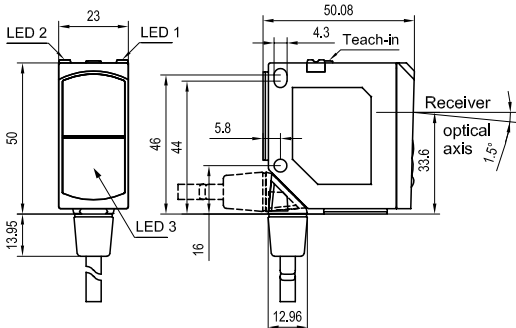
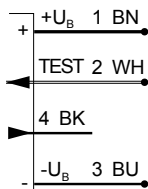
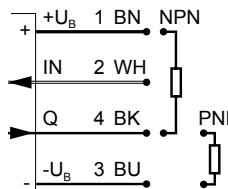
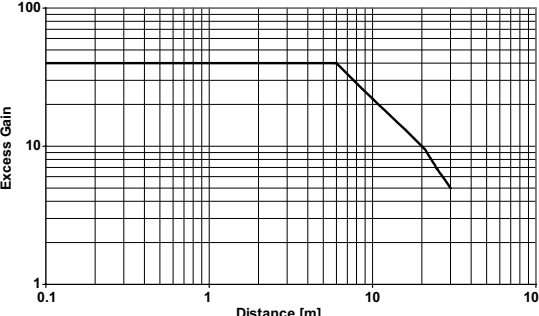
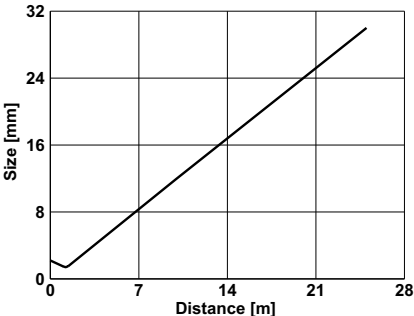
PRODUCT HIGHLIGHTS

- Long range combined with precise laser light spot for extremely accurate small-part detection
- High switching frequency for the reliable detection of even the most rapid processes
- Sensor adjustment via teach-in and control input
- Plug and cable connection rotatable

Optical data		Functions	
Limit range	0 ... 30 m	Indicator LED, green	Operating voltage indicator
Operating range	0 ... 25 m	Indicator LED, yellow	Switching output indicator / contamination indicator
Type of light	Laser, red, 655 nm	Indicator LED, red (receiver)	Alignment indicator
Light spot size	See diagram	Sensitivity adjustment (receiver)	Via Teach-in button and control input
Laser Class (IEC 60825-1)	1	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	50 x 50.1 x 23 mm
No-load current, I_0	≤ 30mA	Enclosure rating	IP 69K & IP 67 ²
Output current, I_e	≤ 100 mA	Material, housing	PC-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)	35 g
Switching frequency, f (ti/tp 1:1)	≤ 3500 Hz	Weight (cable device)	125 g
Response time	140 µs	Vibration and impact resistance	EN 60947-5-2
Control input, IN (receiver)	+ U_B = teach-in - U_B = button locked Open = normal operation		
Control input, TEST (transmitter)	+ U_B = Test (transmitter off) - U_B / Open = normal operation		

¹ Max. 10 % ripple, within U_B , ~ 50 Hz / 100 Hz ² With connected IP 67 / IP 69K plug ³ UL: -20 ... +45 °C

Operating range	Switching output	Type of connection	Part number	Article number
0 ... 25 m	PNP	Plug, M12x1, 4-pin	FE 55-RL-PS-L4	620-21006
0 ... 25 m	NPN	Plug, M12x1, 4-pin	FE 55-RL-NS-L4	620-21007
0 ... 25 m	—	Plug, M12x1, 4-pin	FS 55-RL-L4	620-11002
0 ... 25 m	PNP	Cable, 3 m, 4-wire	FE 55-RL-PS-K4	620-21009
0 ... 25 m	NPN	Cable, 3 m, 4-wire	FE 55-RL-NS-K4	620-21010
0 ... 25 m	—	Cable, 3 m, 4-wire	FS 55-RL-K4	620-11003

Plug connection (transmitter)		Cable connection (transmitter)	
			
153-00808		153-00809	
Plug connection (receiver)		Cable connection (receiver)	
			
153-00812		153-00813	
Connection, transmitter, 4-pin		Connection, receiver, 4-pin	
			
154-00315		154-00312	
Functional reserves		Light spot size	
			
155-01138		155-01139	
Accessories			
Connection cables		From Page A-38	
		Brackets	
		From Page A-4	

FS/FE 55-R

Through-beam photoelectric sensor



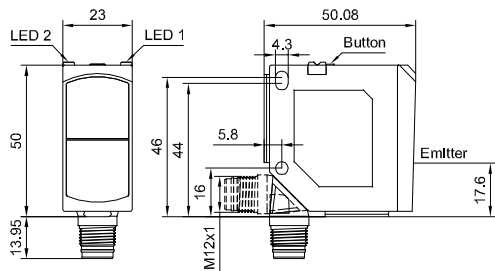
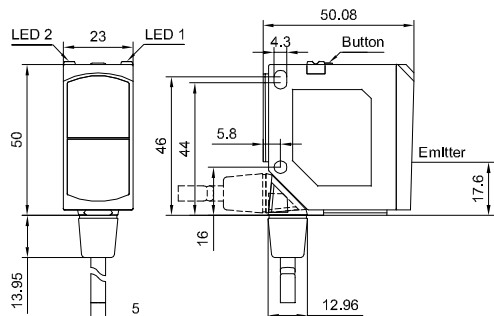
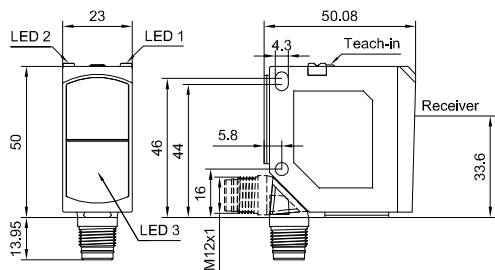
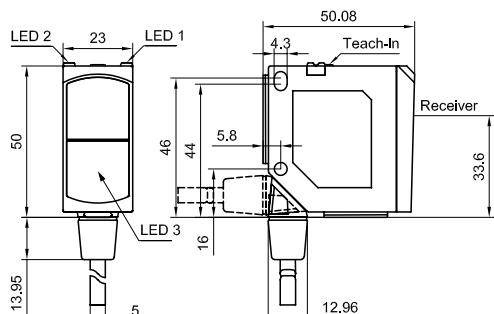
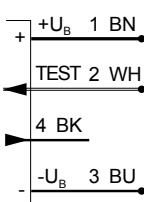
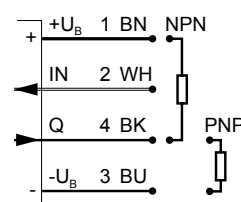
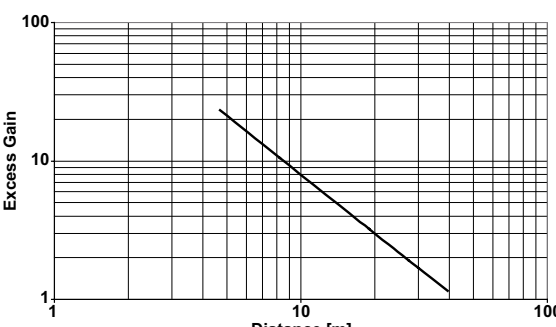
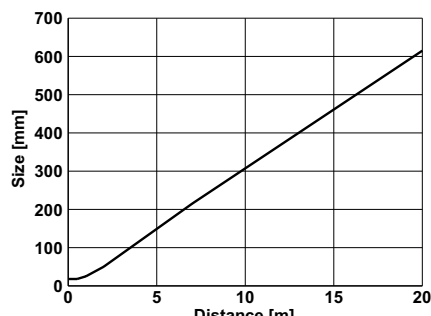
PRODUCT HIGHLIGHTS

- Alignment indicator and easily visible light spot for simple alignment of the through-beam system
- Test input to check sensor pair function
- Sensor adjustment via teach-in and control input
- Plug and cable connection rotatable

Optical data		Functions	
Limit range	0 ... 25 m	Indicator LED, green	Operating voltage indicator
Operating range	0 ... 20 m	Indicator LED, yellow	Switching output indicator / contamination indicator
Type of light	LED, red, 640 nm	Indicator LED, red (receiver)	Alignment indicator
Light spot size	See diagram	Sensitivity adjustment (receiver)	Via Teach-in button and control input
		Teach-in modes	Mode 1: during running process Mode 2: during standing process
		Adjustment possibilities (receiver)	N.O./N.C. via Teach-in button and control input
		Default settings	Button lock via control input
			Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ¹	Dimensions	50 x 50.1 x 23 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 69K & IP 67 ²
Output current, I _e	≤ 100 mA	Material, housing	PC-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)	35 g
Switching frequency, f (ti/tp 1:1)	≤ 500 Hz	Weight (cable device)	125 g
Response time	1 ms	Vibration and impact resistance	EN 60947-5-2
Control input, IN (receiver)	+U _B = teach-in -U _B = button locked Open = normal operation		
Control input, TEST (transmitter)	+U _B = Test (transmitter off) -U _B / Open = normal operation		

¹ Max. 10 % ripple, within U_B, ~ 50 Hz / 100 Hz ² With connected IP 67 / IP 69K plug ³ UL: -20 ... +45 °C

Operating range	Switching output	Type of connection	Part number	Article number
0 ... 20 m	PNP	Plug, M12x1, 4-pin	FE 55-R-PS-L4	620-21000
0 ... 20 m	NPN	Plug, M12x1, 4-pin	FE 55-R-NS-L4	620-21001
0 ... 20 m	—	Plug, M12x1, 4-pin	FS 55-R-L4	620-11000
0 ... 20 m	PNP	Cable, 3 m, 4-wire	FE 55-R-PS-K4	620-21003
0 ... 20 m	NPN	Cable, 3 m, 4-wire	FE 55-R-NS-K4	620-21004
0 ... 20 m	—	Cable, 3 m, 4-wire	FS 55-R-K4	620-11001

Plug connection (transmitter)		Cable connection (transmitter)	
			
153-00787		153-00786	
Plug connection (receiver)		Cable connection (receiver)	
			
153-00790		153-00791	
Connection, transmitter, 4-pin		Connection, receiver, 4-pin	
			
154-00315		154-00312	
Functional reserves		Light spot size	
			
155-00986		155-00994	
Accessories			
Connection cables		From Page A-38	Brackets
			From Page A-4