

F 88 – family of photoelectric sensors for harsh environmental conditions

The strong and solid series



TYPICAL F 88

- Very long ranges and scanning distances
- PNP or NPN variants with 2 switching outputs or relay with time function
- AC/DC devices with clamping space
- Simple adjustment via potentiometer
- Robust plastic housings
- Additional dovetail slot for simple mounting
- Well thought-out mounting accessories
- UL-certification

Above all else, the sensors of the F 88 series are robust and dependable! Their high system reserves guarantee reliable detection even in critical industrial environments. An F 88 fears neither dust and dirt nor vibrations, and the stable housing/plug unit is designed for these conditions.

The high-level light performance can be seen in the generously proportioned detection ranges: the FT 88 scanner with background suppression even “sees” objects at a distance of 700 mm, while the FS/FE 88 through-beam photoelectric sensor manages a range of 65 m. With these performance data, the F 88 series can be used in many demanding applications in sectors such as the automotive industry, wood processing or in mechanical engineering.

The robust sensors are also ideally suited for heavy industry as well as for protecting gates and doors.

The sensors of the F 88 series are also generously proportioned when it comes to signal outputs: they have two switching outputs (PNP or NPN), and a variant with relay output and time function is also available. The right output is therefore available for every supply voltage and the sensor offers flexible adaptation to operating conditions. User-friendly sensor mounting – with dovetail slot and well thought-out mounting accessories – is also typical SensoPart. There is thus something for almost every user requirement!

F 88 – Product Overview					
	Type of light	Adjustment	Scanning distance / range	Special features	Page
Photoelectric proximity sensors with background suppression					
FT 88-RH	LED	Potentiometer	700 mm	PNP, NPN	328
FT 88-RH	LED	Potentiometer	700 mm	Relay output	330
FT 88-IH	Infrared	Potentiometer	2 m	PNP, NPN	332
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Photoelectric proximity sensor					
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Retroreflective photoelectric sensors					
FR 88-R	LED	Potentiometer	12 m	PNP, NPN	338
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Through-beam photoelectric sensors					
FS/FE 88-R	LED	Potentiometer	30 m / 65 m	PNP, NPN	342
FS/FE 88-R	LED	Potentiometer	30 m / 65 m	Relay output	344



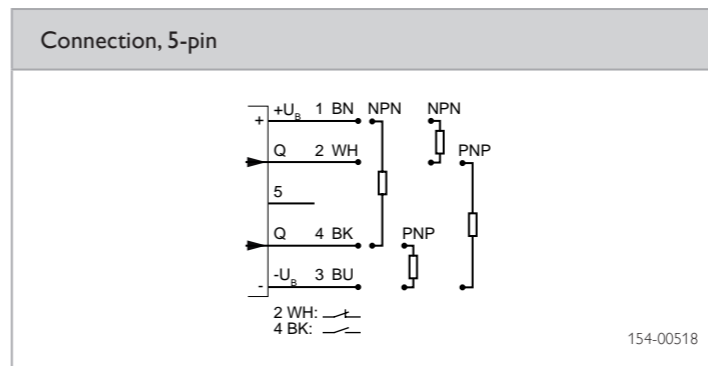
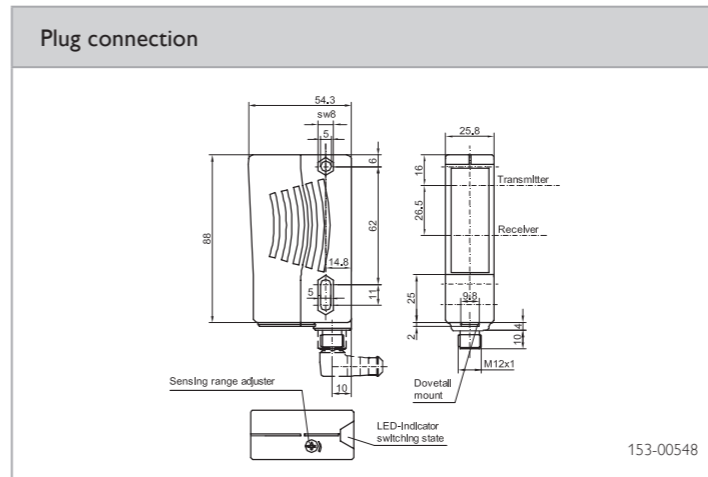
PRODUCT HIGHLIGHTS

- Long scanning distance of 700 mm
- Precise background suppression
- Antivalent switching output

Optical data		Functions	
Scanning distance	20 ... 700 mm ¹	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 660 nm	Scanning distance adjustment	Via potentiometer
Light spot size ²	Ø 15 mm	Default setting	Max. scanning distance
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30 V DC ³	Dimensions	88 x 54.3 x 25.8 mm ³
No-load current, I ₀	≤ 40 mA	Enclosure rating	IP 67 ⁴
Output current, I _e	≤ 200 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)
Standby time	≤ 300 ms	Ambient temperature: operation	-40 ... +60 °C
Switching output, Q	PNP/NPN antivalent (see Selection Table)	Ambient temperature: storage	-40 ... +75 °C
Output function	N.O./N.C.	Weight (plug device)	70 g
Switching frequency, f (ti/tp 1:1)	≤ 250 Hz	Vibration and impact resistance	EN 60947-5-2
Response time	2 ms		
Connection, BK	N.O.		
Connection, WH	N.C.		

¹ Reference material: grey, 18 % reflectivity ² At scanning distance of 700 mm ³ Max. 10 % ripple, within U_B ⁴ With connected IP 67 plug

Scanning distance	Switching output	Type of connection	Part number	Article number
20 ... 700 mm	PNP	Plug, M12x1, 5-pin	FT 88-RH-PA-L5	821-11010
20 ... 700 mm	NPN	Plug, M12x1, 5-pin	FT 88-RH-NA-L5	821-11011



Accessories

Connection cables	From Page 670
Brackets	From Page 642



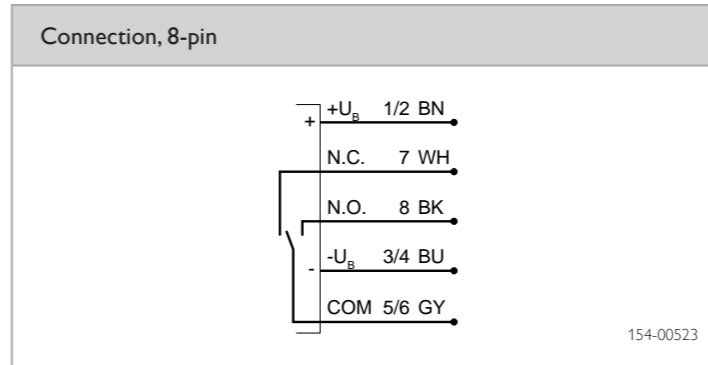
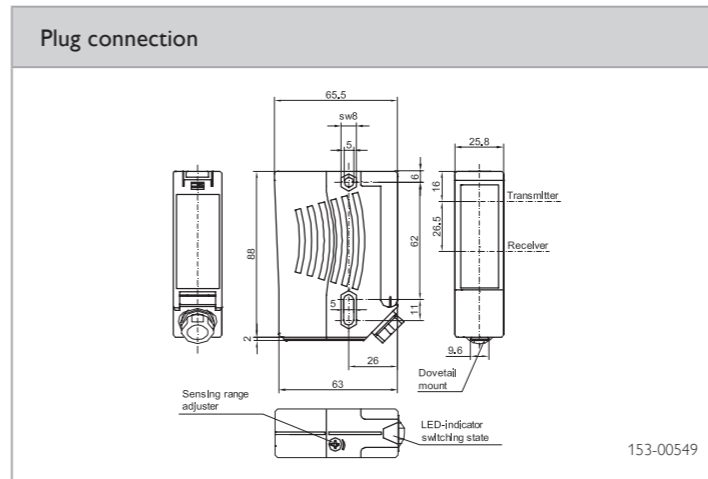
PRODUCT HIGHLIGHTS

- Long scanning distance of 700 mm
- Precise background suppression
- Relay output
- Adjustable time function
- N.O. / N.C. switchable

Optical data		Functions	
Scanning distance	20 ... 700 mm ¹	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 660 nm	Sensitivity adjustment	Via potentiometer
Light spot size ²	Ø 15 mm	Adjustment possibilities	Time and output function (N.O./N.C.) via operating elements in clamping space
		Default setting	Max. scanning distance
Electrical data		Mechanical data	
Operating voltage, ~U _B	12 ... 240 V AC / DC	Dimensions	88 x 65,5 x 25,8 mm ³
Power consumption	≤ 3.5 VA	Enclosure rating	IP 67 ⁴
Output current, I _e	≤ 2 A (≤ 250 V AC/DC)	Material, housing	ABS
Protection Class	2 ³	Material, front screen	PMMA
Standby time	≤ 300 ms	Type of connection	(See Selection Table)
Switching output, Q	Relay	Ambient temperature: operation	-25 ... +60 °C
Output function	Change-over contact (N.O./N.C.)	Ambient temperature: storage	-40 ... +75 °C
Switching frequency, f (ti/tp 1:1)	≤ 25 Hz	Weight (clamping space device)	120 g
		Vibration and impact resistance	EN 60947-5-2

¹ Reference material: grey, 18 % reflectivity ² At scanning distance of 700 mm ³ With closed clamping space ⁴ With connected IP 67 plug

Scanning distance	Switching output	Type of connection	Part number	Article number
20 ... 700 mm	Relay	Clamping space, 8 spring clamp terminals, cable gland, M16x1.5	FT 88-RH-RAT-PM	821-11009



Connection, relay

Adjustment t_{off}, t_{POFF}

Adjustment t_{on}

Relay N.O. BK
Relay N.C. WH
Relay center contact GY

12...240 V AC/DC BU
12...240 V AC/DC BU
BN BN

DIP-switch

ON 1 2 3 4
OFF 1 2 3 4

1 Dark = OFF / Light = ON
2 DON = ON Delay
3 DOFF = OFF Delay
4 POFF = ONE Shot

155-00640

Time functions

Die Zeiten t_{ON} , t_{OFF} und t_{POFF} sind von 0.1 ... 10 s einstellbar.
Times t_{ON} , t_{OFF} and t_{POFF} are adjustable from 0.1 ... 10 s.
Les temps t_{ON} , t_{OFF} et t_{POFF} sont réglables de 0.1 ... 10 s.

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Accessories

Connection cables	From Page 670
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Infrared photoelectric proximity sensor with background suppression



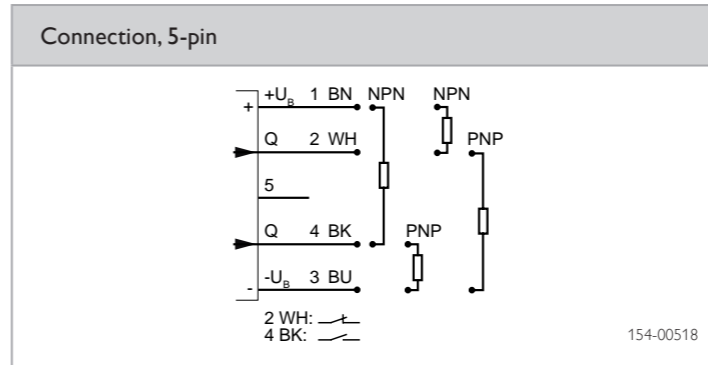
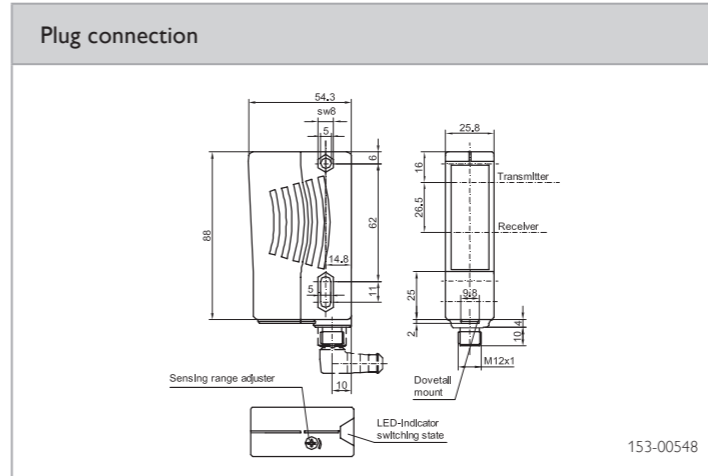
PRODUCT HIGHLIGHTS

- Long scanning distance of 2000 mm
- Precise background suppression
- Antivalent switching output

Optical data		Functions	
Scanning distance	20 ... 2000 mm ¹	Indicator LED, yellow	Switching output indicator
Type of light	LED, infrared, 880 nm	Scanning distance adjustment	Via potentiometer
Light spot size ²	Ø 70 mm	Default setting	Max. scanning distance
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30 V DC ³	Dimensions	88 x 54.3 x 25.8 mm ³
No-load current, I ₀	≤ 40 mA	Enclosure rating	IP 67 ⁴
Output current, I _e	≤ 200 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)
Standby time	≤ 300 ms	Ambient temperature: operation	-40 ... +60 °C
Switching output, Q	PNP/NPN antivalent (see Selection Table)	Ambient temperature: storage	-40 ... +75 °C
Output function	N.O./N.C.	Weight (plug device)	70 g
Switching frequency, f (ti/tp 1:1)	≤ 250 Hz	Vibration and impact resistance	EN 60947-5-2
Response time	2 ms		
Connection, BK	N.O.		
Connection, WH	N.C.		

¹ Reference material: grey, 18 % reflectivity ² At scanning distance of 2000 mm ³ Max. 10 % ripple, within U_B ⁴ With connected IP 67 plug

Scanning distance	Switching output	Type of connection	Part number	Article number
20 ... 2000 mm	PNP	Plug, M12x1, 5-pin	FT 88-IH-PA-L5	821-11013
20 ... 2000 mm	NPN	Plug, M12x1, 5-pin	FT 88-IH-NA-L5	821-11014



Accessories

Connection cables	From Page 670
Brackets	From Page 642

Infrared photoelectric proximity sensor with background suppression, relay output



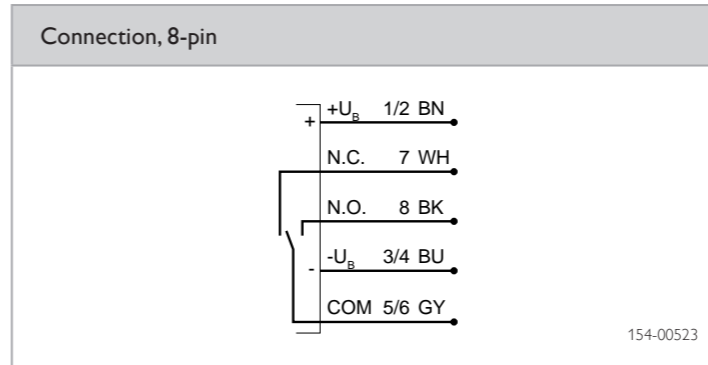
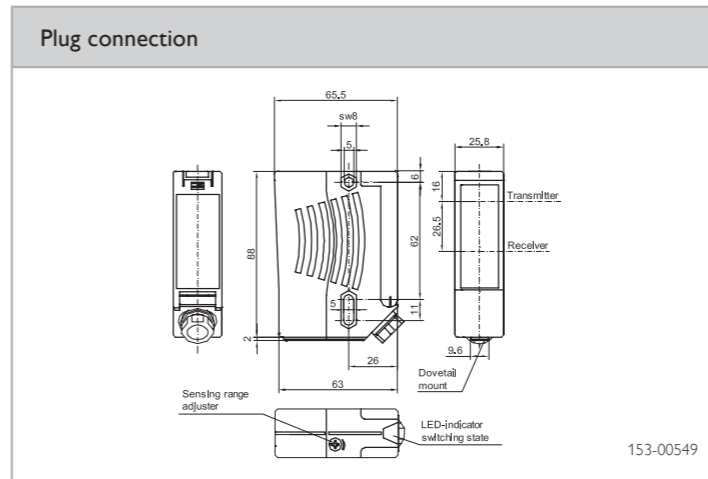
PRODUCT HIGHLIGHTS

- Long scanning distance of 2000 mm
- Precise background suppression
- Relay output
- Adjustable time function
- N.O./N.C. switchable

Optical data		Functions	
Scanning distance	20 ... 2000 mm ¹	Indicator LED, yellow	Switching output indicator
Type of light	LED, infrared, 880 nm	Scanning distance adjustment	Via potentiometer
Light spot size ²	Ø 70 mm	Adjustment possibilities	Time and output function (N.O./N.C.) via operating elements in clamping space
		Default setting	Max. scanning distance
Electrical data		Mechanical data	
Operating voltage, ~U _B	12 ... 240 V AC / DC	Dimensions	88 x 65,5 x 25,8 mm ³
Power consumption	≤ 3.5 VA	Enclosure rating	IP 67 ⁴
Output current, I _e	≤ 2 A (≤ 250 V AC / DC)	Material, housing	ABS
Protection Class	2 ³	Material, front screen	PMMA
Standby time	≤ 300 ms	Type of connection	(See Selection Table)
Switching output, Q	Relay	Ambient temperature: operation	-40 ... +60 °C
Output function	Change-over contact (N.O./N.C.)	Ambient temperature: storage	-40 ... +75 °C
Switching frequency, f (ti/tp 1:1)	≤ 25 Hz	Weight (clamping space device)	120 g
		Vibration and impact resistance	EN 60947-5-2

¹ Reference material: grey, 18 % reflectivity ² At scanning distance of 2000 mm ³ With closed clamping space ⁴ With connected IP 67 plug

Scanning distance	Switching output	Type of connection	Part number	Article number
20 ... 2000 mm	Relay	Clamping space, 8 spring clamp terminals, cable gland, M16x1.5	FT 88-IH-RAT-PM	821-11012



Connection, relay

Adjustment t_{off}, t_{poFF}

Adjustment t_{on}

Relay N.O. BK
Relay N.C. WH
Relay center contact GY

12...240 V AC/DC BU
12...240 V AC/DC BN
BN

DIP-switch

ON 1 2 3 4
OFF

1 Dark = OFF / Light = ON
2 DON = ON Delay
3 DOFF = OFF Delay
4 POFF = ONE Shot

155-00640

Time functions

Switching type

Receiver exposed Receiver dark

no timer

t_{ON}

t_{OFF}

t_{POFF}

Die Zeiten t_{ON}, t_{OFF} und t_{POFF} sind von 0.1 ... 10 s einstellbar.
Times t_{ON}, t_{OFF} and t_{POFF} are adjustable from 0.1 ... 10 s.
Les temps t_{ON}, t_{OFF} et t_{POFF} sont réglables de 0.1 ... 10 s.

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Accessories

Connection cables	From Page 670
Brackets	From Page 642



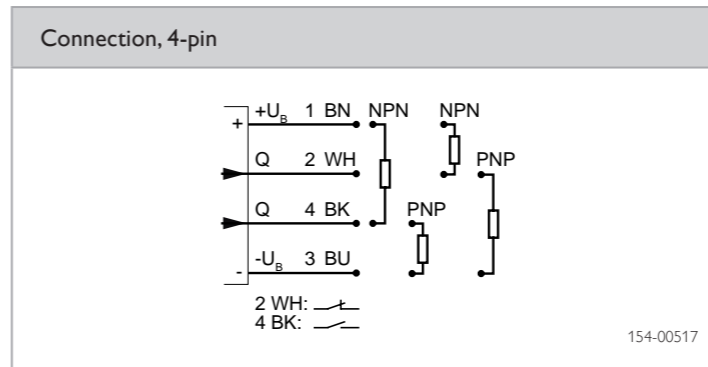
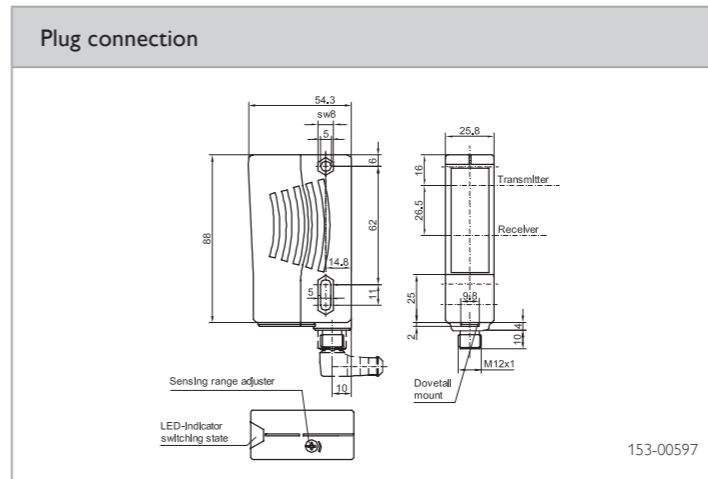
PRODUCT HIGHLIGHTS

- Push-pull output, antivalent
- Simple alignment thanks to easily visible light spot
- Precise sensitivity adjustment by means of potentiometer

Optical data		Functions	
Scanning distance	50 ... 2000 mm ¹	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 660 nm	Sensitivity adjustment	Via potentiometer
Light spot size ²	Ø 50 mm	Default setting	Max. scanning distance
Hysteresis	< 12 %		
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ³	Dimensions	88 x 54.3 x 25.8 mm ³
No-load current, I ₀	≤ 40 mA	Enclosure rating	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)
Standby time	300 ms	Ambient temperature: operation	-25 ... +60 °C
Switching output, Q	PNP/NPN, push-pull, antivalent	Ambient temperature: storage	-40 ... +75 °C
Output function	N.O./N.C.	Weight (plug device)	70 g
Switching frequency, f (ti/tp 1:1)	≤ 125 Hz	Vibration and impact resistance	EN 60947-5-2
Response time	4 ms		
Connection, BK	N.O.		
Connection, WH	N.C.		

¹ Reference material, white, 90 % reflectivity ² At scanning distance of 2000 mm ³ Max. 10 % ripple, within U_B ⁴ With connected IP 67 plug

Scanning distance	Switching output	Type of connection	Part number	Article number
50 ... 2000 mm	PNP/NPN, push-pull, antivalent	Plug, M12x1, 4-pin	FT 88-R-GA-L4	821-21009



Accessories

Connection cables	From Page 670
Brackets	From Page 642



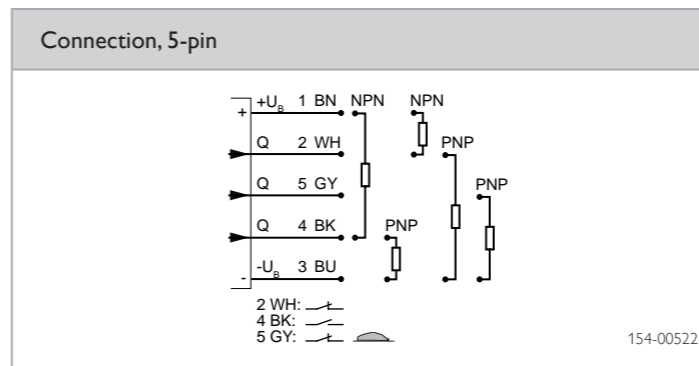
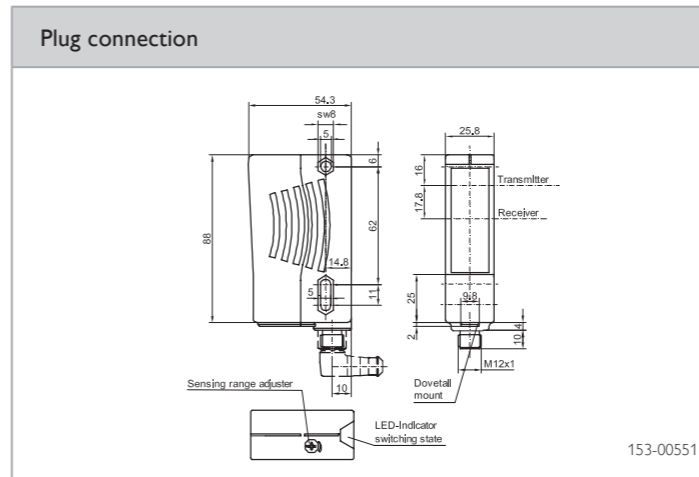
PRODUCT HIGHLIGHTS

- Antivalent switching output
- Simple alignment thanks to easily visible light spot
- Precise sensitivity adjustment by means of potentiometer

Optical data		Functions	
Operating range	0.05 ... 12 m ¹	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 660 nm	Sensitivity adjustment	Via potentiometer
Light spot size ²	Ø 200 mm	Default setting	Max. range
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30 V DC ³	Dimensions	88 x 54.3 x 25.8 mm ³
No-load current, I ₀	≤ 40 mA	Enclosure rating	IP 67 ⁴
Output current, I _e	≤ 200 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)
Standby time	≤ 300 ms	Ambient temperature: operation	-40 ... +60 °C
Switching output, Q	PNP/NPN antivalent (see Selection Table)	Ambient temperature: storage	-40 ... +75 °C
Output function	N.O./N.C.	Weight (plug device)	70 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Vibration and impact resistance	EN 60947-5-2
Response time	500 μs		
Connection, BK	N.O.		
Connection, WH	N.C.		
Contamination output, Gy (optional)	N.C.		

¹ Reference material: R10 reflector ² At range of 12 m ³ Max. 10 % ripple, within U_B ⁴ With connected IP 67 plug

Operating range	Switching output	Type of connection	Part number	Article number
0.05 ... 12 m	PNP	Plug, M12x1, 5-pin	FR 88-R-PAV-L5	823-11010
0.05 ... 12 m	NPN	Plug, M12x1, 5-pin	FR 88-R-NAV-L5	823-11011



Accessories

Reflectors	From Page 654
Connection cables	From Page 670
Brackets	From Page 642



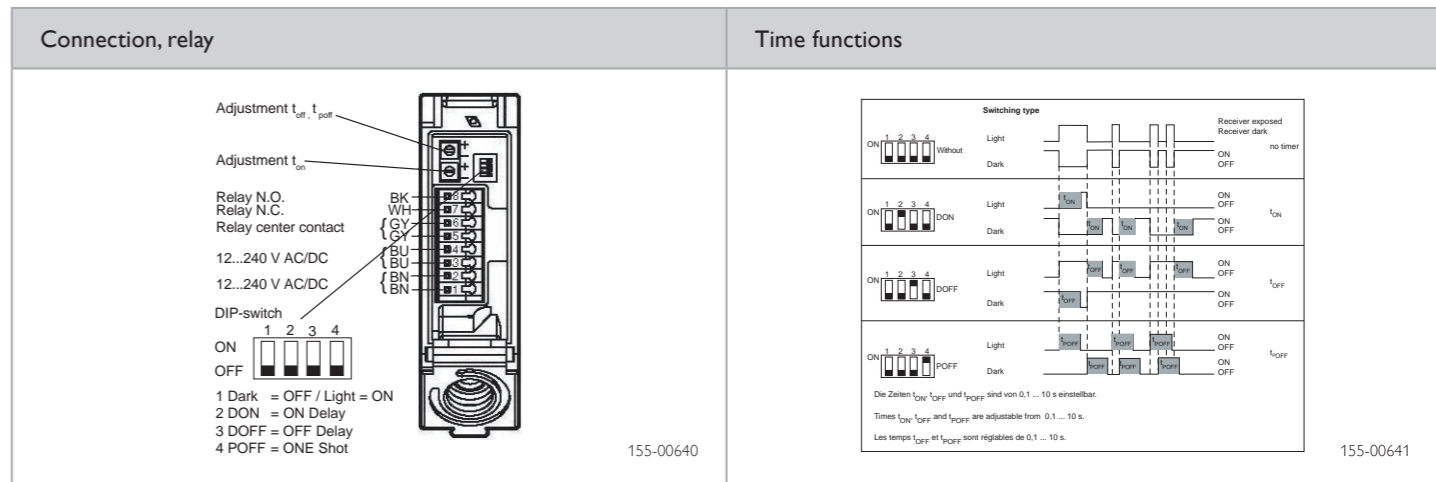
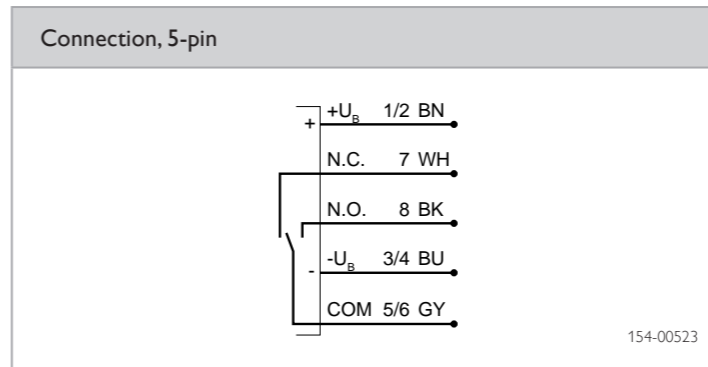
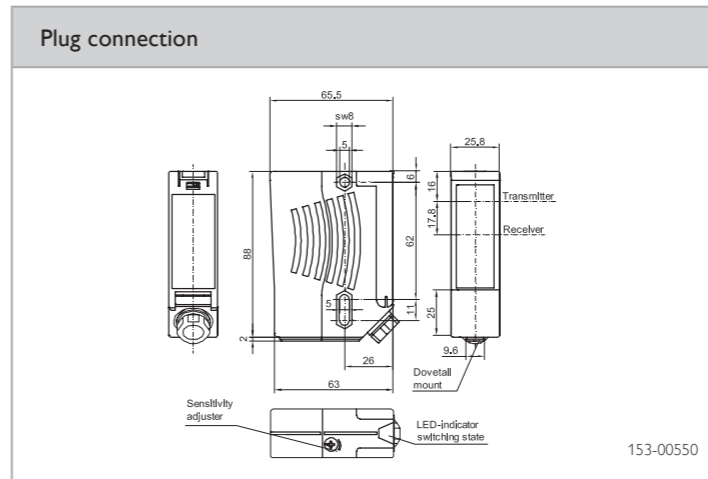
PRODUCT HIGHLIGHTS

- Relay output
- Simple alignment thanks to easily visible light spot
- Precise sensitivity adjustment by means of potentiometer
- Adjustable time function
- N.O./N.C. switchable

Optical data		Functions	
Operating range	0.05 ... 12 m ¹	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 660 nm	Sensitivity adjustment	Via potentiometer
Light spot size ²	Ø 200 mm	Adjustment possibilities	Time and output function (N.O./N.C.) via operating elements in clamping space
		Default setting	Max. range
Electrical data		Mechanical data	
Operating voltage, ~U _B	12 ... 240 V AC / DC	Dimensions	88 x 65.5 x 25.8 mm ³
Power consumption	≤ 3.5 VA	Enclosure rating	IP 67 ⁴
Output current, I _e	≤ 2 A (≤ 250 V AC / DC)	Material, housing	ABS
Protection Class	2 ³	Material, front screen	PMMA
Standby time	≤ 300 ms	Type of connection	(See Selection Table)
Switching output, Q	Relay	Ambient temperature: operation	-40 ... +60 °C
Output function	Change-over contact (N.O./N.C.)	Ambient temperature: storage	-40 ... +75 °C
Switching frequency, f (ti/tp 1:1)	≤ 25 Hz	Weight (clamping space device)	120 g
		Vibration and impact resistance	EN 60947-5-2

¹ Reference material: R10 reflector ² At range of 12 m ³ With closed clamping space ⁴ With connected IP 67 plug

Operating range	Switching output	Type of connection	Part number	Article number
0.05 ... 12 m	Relay	Clamping space, 8 spring clamp terminals, cable gland, M16x1.5	FR 88-R-RAT-PM	823-11009



Accessories

Reflectors	From Page 654
Connection cables	From Page 670
Brackets	From Page 642



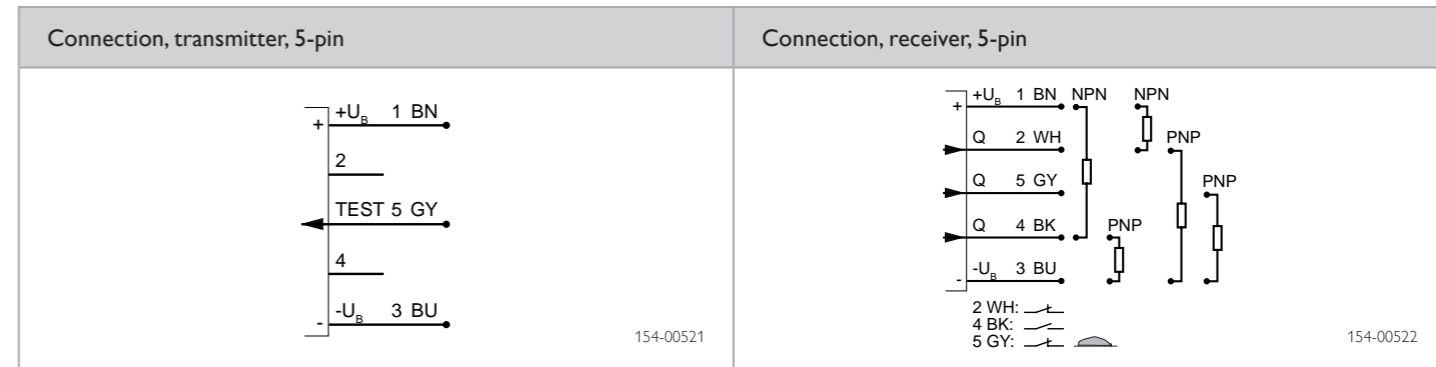
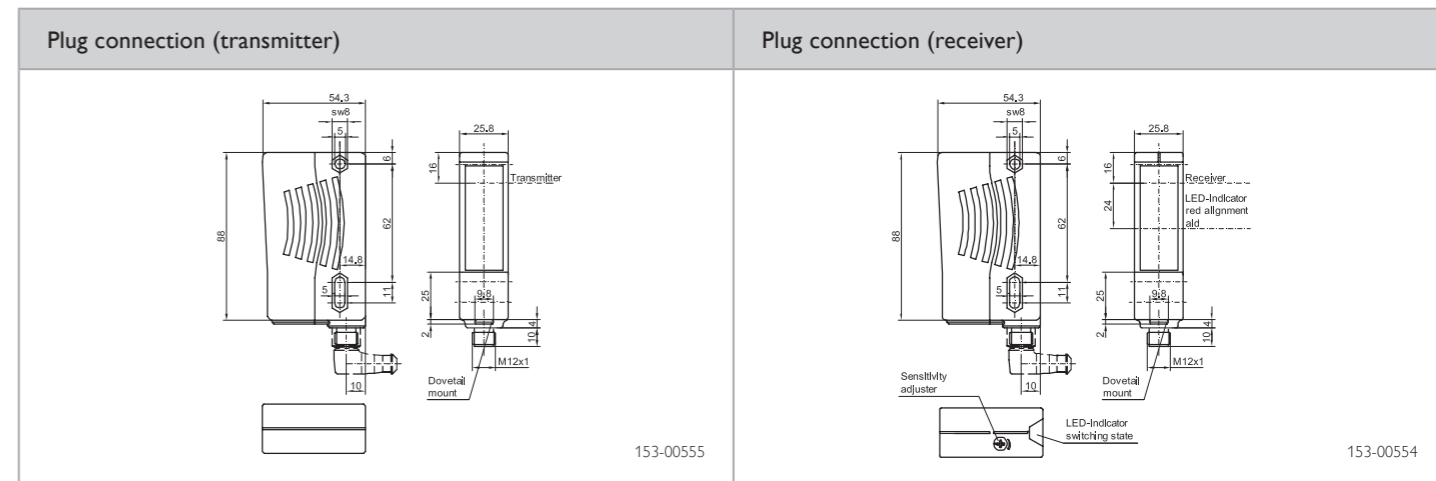
PRODUCT HIGHLIGHTS

- Antivalent switching output
- Simple alignment thanks to easily visible light spot
- Precise sensitivity adjustment by means of potentiometer
- Contamination output

Optical data		Functions	
Operating range	30 m	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 660 nm	Sensitivity adjustment (receiver)	Via potentiometer
Light spot size ¹	Ø 600 mm	Default setting	Max. range
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	88 x 54.3 x 25.8 mm ³
No-load current, I ₀ (transmitter)	≤ 50 mA	Enclosure rating	IP 67 ⁴
No-load current, I ₀ (receiver)	≤ 35 mA	Material, housing	ABS
Output current, I _e	≤ 200 mA	Material, front screen	PMMA
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Type of connection	(See Selection Table)
Protection Class	2	Ambient temperature: operation	-40 ... +60 °C
Standby time	≤ 300 ms	Ambient temperature: storage	-40 ... +75 °C
Switching output, Q	PNP/NPN antivalent (see Selection Table)	Weight (plug device) ⁵	140 g
Output function	N.O./N.C.	Vibration and impact resistance	EN 60947-5-2
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz		
Response time	500 µs		
Connection, BK	N.O.		
Connection, WH	N.C.		
Contamination output, Gy (receiver / optional)	N.C.		
Control input, Test (transmitter)	+U _B = Test (transmitter off) ³ -U _B / Open = normal operation		

¹ At range of 30 m ² Max. 10 % ripple, within U_B ³ I_{max} < 3 mA at 30V DC ⁴ With connected IP 67 plug ⁵ Sensor pair

Operating range	Switching output	Type of connection	Part number	Article number
30 m	PNP	Plug, M12x1, 5-pin	FE 88-R-PAV-L5	822-21010
30 m	NPN	Plug, M12x1, 5-pin	FE 88-R-NAV-L5	822-21011
30 m	—	Plug, M12x1, 5-pin	FS 88-R-L5	822-11004



Accessories	
Connection cables	From Page 670
Brackets	From Page 642



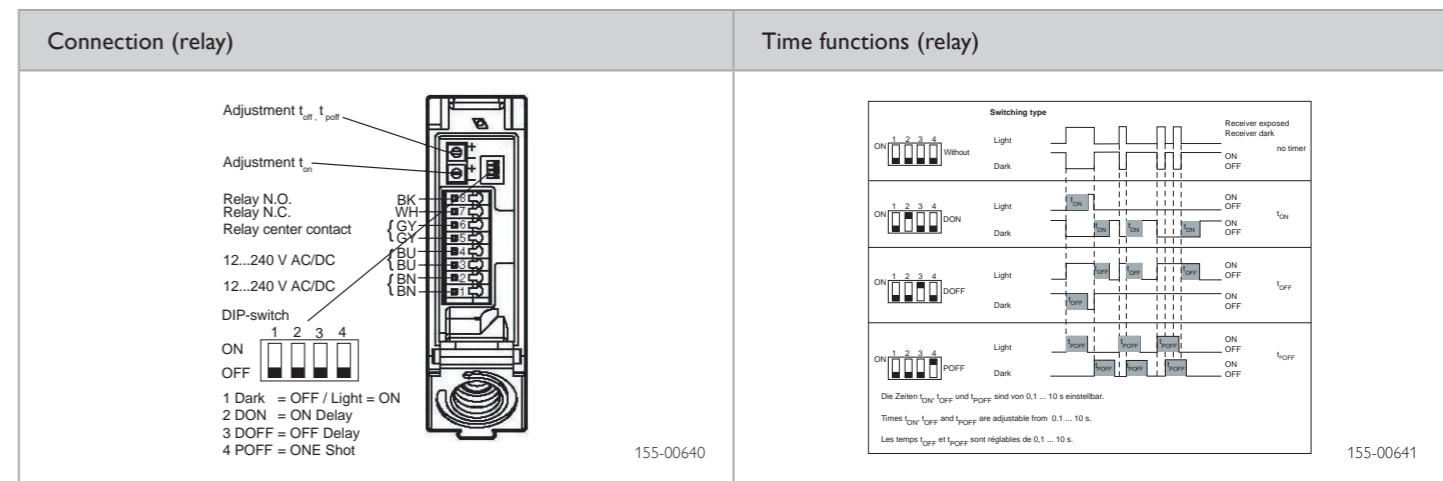
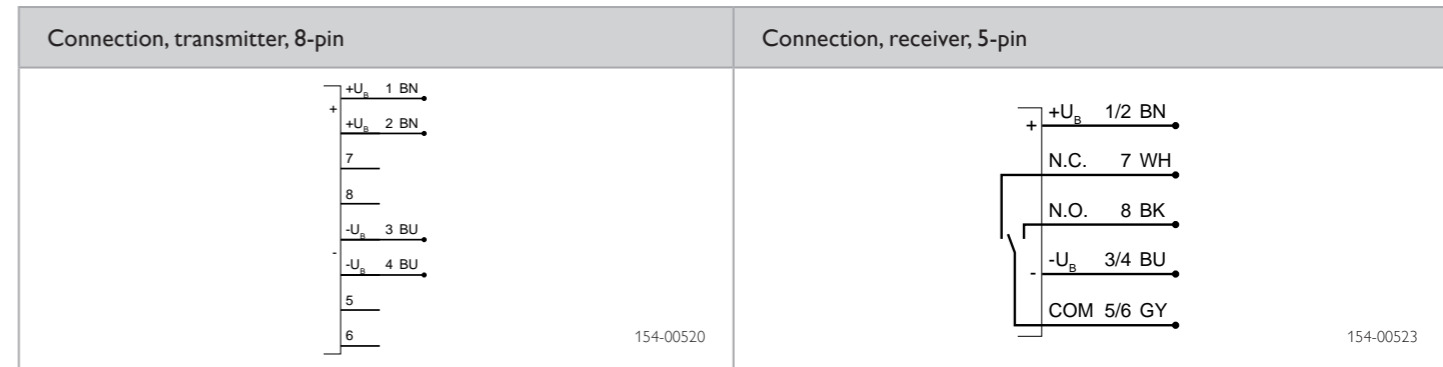
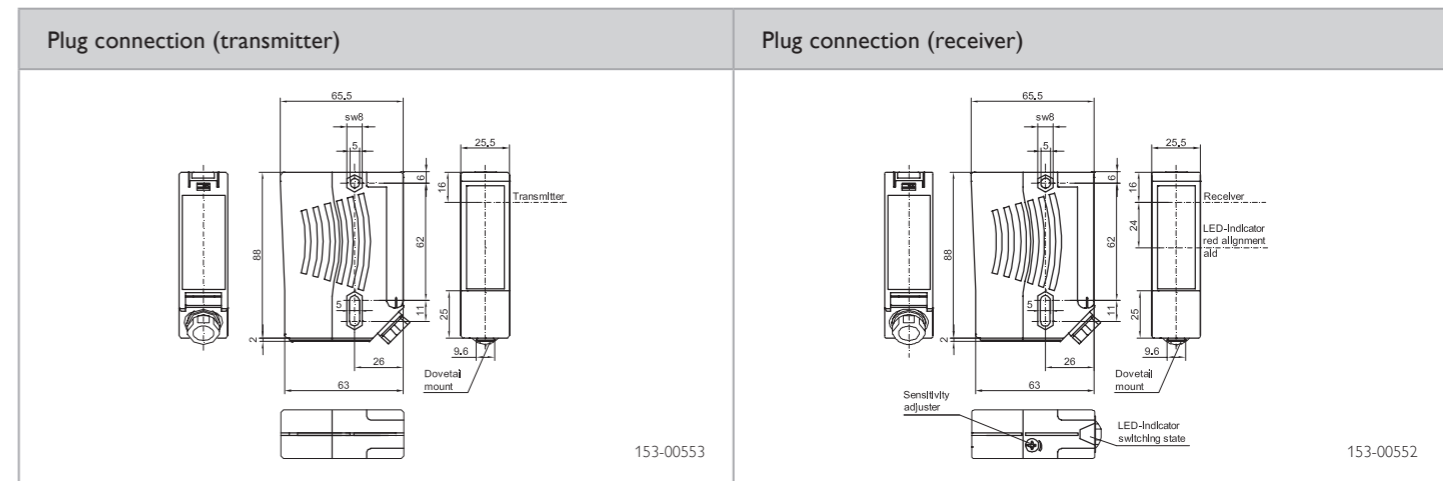
PRODUCT HIGHLIGHTS

- Long operating range of 65 m
- Simple alignment thanks to easily visible light spot
- Adjustable time function
- N.O./N.C. switchable

Optical data		Functions	
Operating range	65 m	Indicator LED, yellow	Switching output indicator
Type of light	LED, red, 660 nm	Sensitivity adjustment (receiver)	Via potentiometer
Light spot size ¹	Ø 1.3 m	Adjustment possibilities	Time and output function (N.O./N.C.) via operating elements in clamping space
		Default setting	Max. range
Electrical data		Mechanical data	
Operating voltage, ~U _B	12 ... 240 V AC / DC ²	Dimensions	88 x 65.5 x 25.8 mm ³
Power consumption	≤ 3.5 VA	Enclosure rating	IP 67 ⁴
Protection Class	2 ³	Material, housing	ABS
Standby time	≤ 300 ms	Material, front screen	PMMA
Switching output, Q	Relay	Type of connection	(See Selection Table)
Output function	Change-over contact (N.O./N.C.)	Ambient temperature: operation	-40 ... +60 °C
Switching frequency, f (ti/tp 1:1)	≤ 25 Hz	Ambient temperature: storage	-40 ... +75 °C
		Weight (clamping space device) ⁵	200 g
		Vibration and impact resistance	EN 60947-5-2

¹ At range of 65 m ² Max. 10 % ripple, within U_B ³ With closed clamping space ⁴ With connected IP 67 plug ⁵ Sensor pair

Operating range	Switching output	Type of connection	Part number	Article number
65 m	Relay	Clamping space, 8 spring clamp terminals, cable gland, M16x1.5	FE 88-R-RAT-PM	822-21009
65 m	–	Clamping space, 8 spring clamp terminals, cable gland, M16x1.5	FS 88-R-PM	822-11003



Accessories	
Connection cables	From Page 670
Brackets	From Page 642