

F 04/05/12/18/30 – photoelectric sensors and proximity sensors in cylindrical housings

All-round performance








TYPICAL F 04/05/12/18/30

Sensors in cylindrical housings have several special aspects compared to those with cubic housings. They are not only particularly robust but also, thanks to their integrated thread, offer easy and space-saving installation. Special designs that can “see around corners” are also available: they are equipped with a special optical system that deflects the transmission and reception beams around the sensor axis by 90°, expanding the mounting options available.

The sensors of the F 04/05/12/18/30 series differ in the diameter of the integrated metal threaded sleeve (4, 5, 12, 18 or 30 mm). Each series offers the usual functional variants: through-beam and retroreflective photoelectric sensors, energetic scanners, and scanners with background suppression. The sensors are optionally available with red-light or infrared LED or with pulsed red-light laser. Variants with potentiometer or teach-in operation are also available.

- Robust housings
- Very easy installation
- Straight or angled optics options
- Metric threads in 5 sizes: 4, 5, 12, 18 or 30 mm
- Red-light / infrared LED or laser light options
- FMF 18 for detection of liquid limit levels

F 04/05/12/18/30 – Product Overview					
	Type of light	Adjustment	Scanning distance / range	Special features	Page
Photoelectric proximity sensors with background suppression					
FT 12 RH	Red light	Teach-in 	10 ... 60 mm	M12 housing, dynamic teach-in	352
FMH 18	Red light	Potentiometer	40 ... 120 mm	M18 housing, very precise detection	354
FT 12 RF	Red light	None	24 mm	M12 housing	356
Photoelectric proximity sensors					
FM 04	Infrared	None	0 ... 50 mm	Very small housing, M4	358
FM 05	Infrared	None	0 ... 50 mm	Very small housing, M5	360
FT 12 R	Red light	Potentiometer	1 ... 300 mm		362
FT 18-2	Red light / infrared light	Potentiometer	0 ... 800 mm	M18 metal housing	364
FT 18-2	Red light / infrared light	Potentiometer	0 ... 800 mm	M18 plastic housing	366
FMS 18-34 B	Infrared	Potentiometer	5 ... 400 mm	M18 housing	368
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Retroreflective photoelectric sensors					
FR 12 R	Red light	Potentiometer	60 ... 1500 mm	M12 housing	372
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Through-beam photoelectric sensors					
FS/FE 12 RL	Laser 	Control line	0 ... 5 mm	M12 housing	378
FSE 18-2	Infrared light		10 mm	M18 housing	380
FS/FE 18 RL	Laser 	Control line	0 ... 50 mm	M18 housing	382
FL 18 W	Laser 	Potentiometer	0 ... 50 mm	M18 housing, adjustable transmission beam size	384
FL 18	Laser 	Potentiometer	0 ... 50 mm	M18 housing, adjustable transmission beam size	386
Filling level sensor					
FMF 18-34	Infrared	Fixed		M18 housing, detection of liquids	388



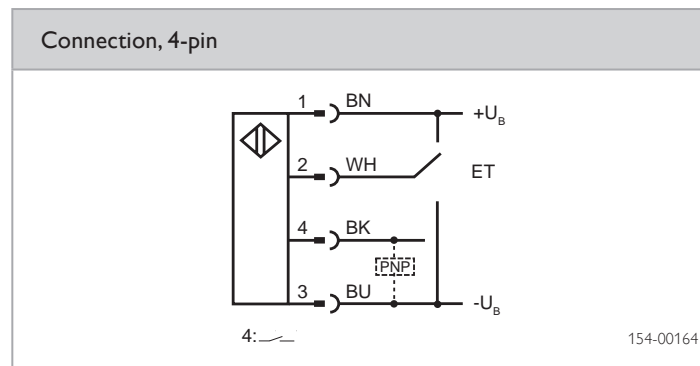
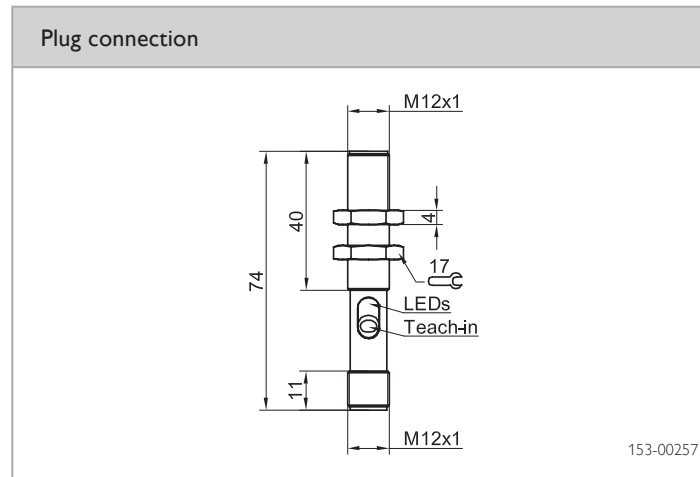
PRODUCT HIGHLIGHTS

- Adjustable background suppression
- Dynamic teach-in via button / control line without machine stoppage
- Lockable Teach-in button

Optical data		Functions	
Scanning distance	10 ... 60 mm ¹	Indicator LED, green	Stability indicator
Type of light	Red, 660 nm	Indicator LED, yellow	Switching state indicator
Light spot size	5 x 5 mm ²	Scanning distance adjustment	Via Teach-in button and control input
Grey value shift (90 % white / 18 % grey)	< 6 %	Adjustment possibilities	Control line for setting or locking N.O./N.C. selectable
		Default settings	Max. scanning distance, PNP and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30 V DC	Dimensions (cable devices)	M12 x 74 mm
No-load current, I ₀	≤ 25 mA	Enclosure rating	IP 67 ³
Output current, I _e	≤ 100 mA	Material, housing	Brass, nickel-plated
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection	Material, front screen	PMMA
Protection Class	2	Type of connection	(See Selection Table)
Switching output, Q	PNP	Ambient temperature: operation	-20 ... +60 °C
Output function	N.O./N.C.	Ambient temperature: storage	-20 ... +80 °C
Switching frequency, f (ti/tp 1:1)	1000 Hz	Weight (plug device)	30 g
Response time	≤ 500 μs		
Control input, ET	+U _B = teach-in -U _B = button locked Open = normal operation		

¹ Reference material: Kodak white, 90 % reflectivity ² At scanning distance of 50 mm ³ With connected IP 67 plug

Type of connection	Part number	Article number
Plug, M12x1, 4-pin	FT 12 RH-PSL4	506-11000



Accessories

Connection cables	From Page 670
Brackets	From Page 642



PRODUCT HIGHLIGHTS

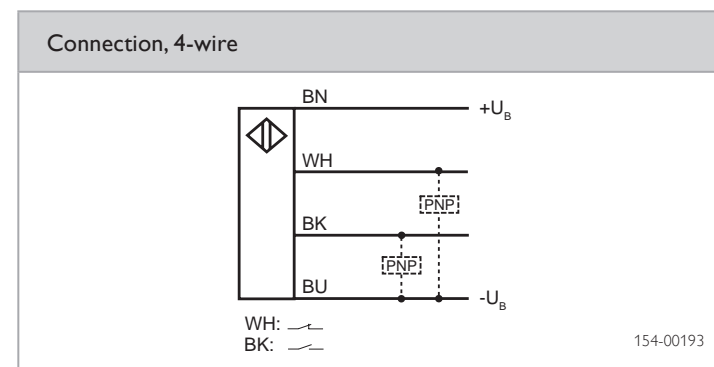
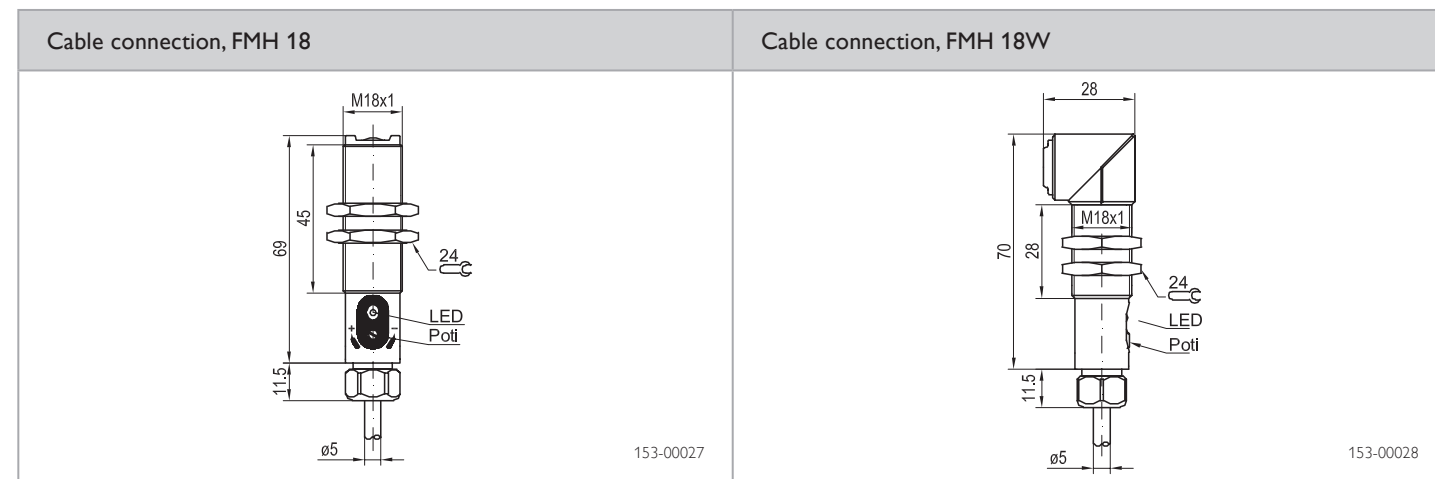
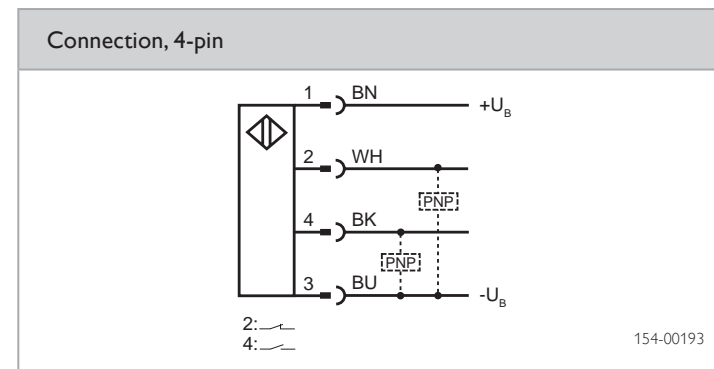
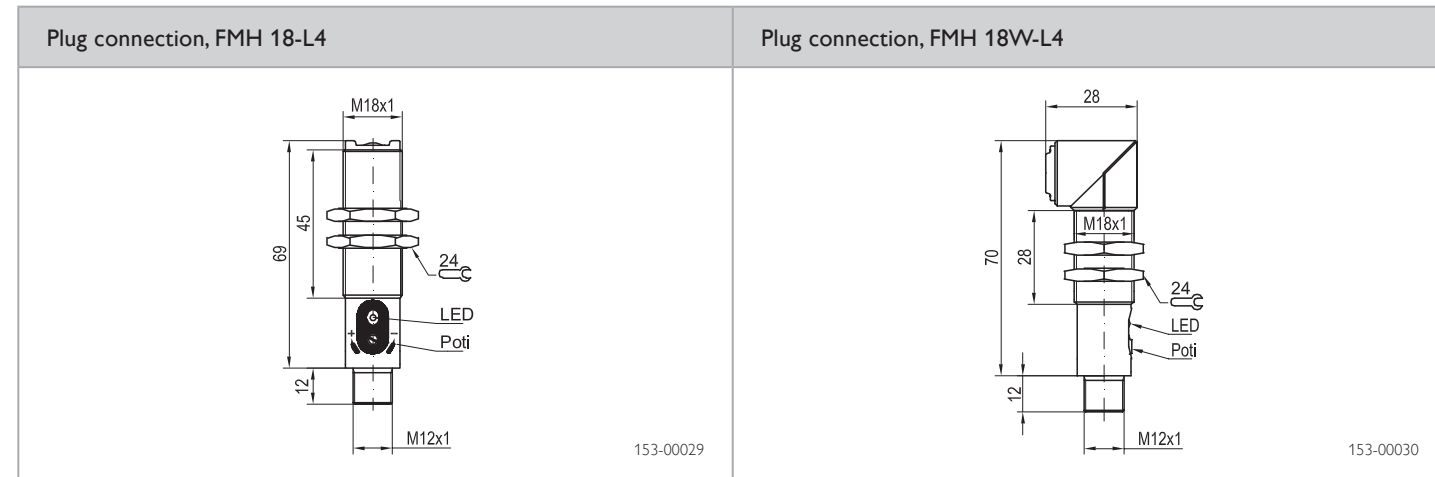
- Scanning distance: 40 ... 120 mm
- Red light, 660 nm
- Background suppression
- Robust metal housing
- Metal M18 threaded sleeve
- Antivalent switching outputs

Optical data		Functions	
Scanning distance	40 ... 120 mm ¹	Indicator LED, yellow	Switching state indicator
Type of light	Red, 660 nm	Scanning distance adjustment	Via 18-step potentiometer
Light spot size	8 x 10 mm ²		
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30 V DC ³	Dimensions	M18 x 69 mm
No-load current, I ₀	≤ 30 mA	Dimensions (angled)	M18 x 70 mm
Output current, I _e	200 mA	Enclosure rating	IP 67 ⁴
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection	Material, housing	Brass, nickel-plated
Protection Class	2	Material, front screen	Glass
Standby time	≤ 300 ms	Type of connection	(See Selection Table)
Switching output, Q	PNP	Ambient temperature: operation	-20 ... +60 °C
Output function	N.O./N.C.	Ambient temperature: storage	-20 ... +80 °C
Switching frequency, f (ti/tp 1:1)	600 Hz	Weight (plug device)	60 g
Connection, BK	N.O.	Weight (cable device)	160 g
Connection, WH	N.C.		

¹ Reference material: Kodak grey, 18 % reflectivity ² At scanning distance of 100 mm ³ 10 % ripple, within U_B ⁴ With connected IP 67 plug

Scanning distance	Light exit	Switching output	Type of connection	Part number	Article number
40 ... 120 mm	Straight	PNP, antivalent	Plug, M12, 4-pin	FMH 18-L4	518-51505
40 ... 120 mm	90° angle	PNP, antivalent	Plug, M12, 4-pin	FMH 18W-L4	518-51507
40 ... 120 mm	Straight	PNP, antivalent	Cable, 3 m, 4-wire	FMH 18	518-51504
40 ... 120 mm	90° angle	PNP, antivalent	Cable, 3 m, 4-wire	FMH 18W	518-51506

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Fixed focus photoelectric proximity sensor with background suppression



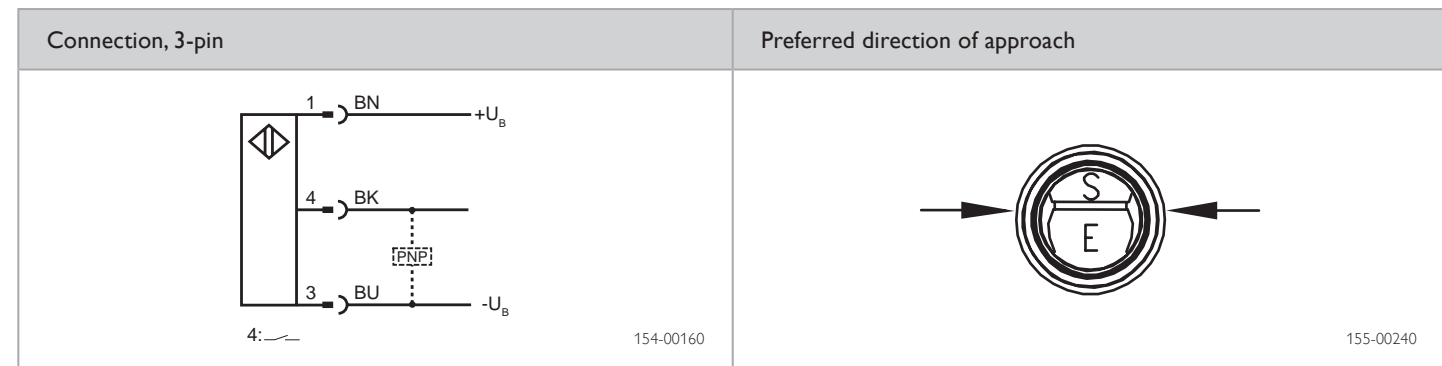
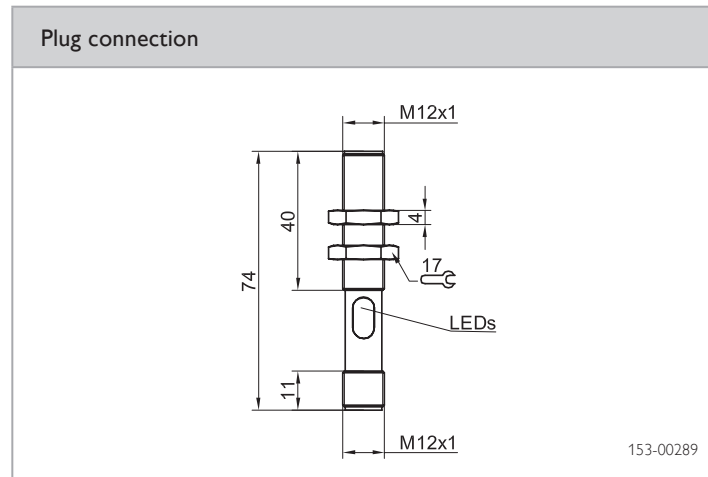
PRODUCT HIGHLIGHTS

- Simple installation thanks to standard M12 metal thread
- High immunity to dirt due to high signal reserves
- Indicator for detection stability

Optical data		Functions	
Scanning distance	24 mm ¹	Indicator LED, green	Operating voltage indicator
Type of light	Red, 660 nm	Indicator LED, yellow	Switching state indicator
Hysteresis (18 %)	< 5 %	Scanning distance adjustment	Fixed setting
Grey value shift (90 % white / 18 % grey)	< 5 %	Default settings	PNP N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC	Dimensions	M12 x 74 mm
No-load current, I ₀	≤ 25 mA	Enclosure rating	IP 67 ²
Output current, I _e	≤ 100 mA	Material, housing	Brass, nickel-plated
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection	Material, front screen	PMMA
Protection Class	2	Type of connection	(See Selection Table)
Switching output, Q	PNP	Ambient temperature: operation	-20 ... +60 °C
Output function	N.O.	Ambient temperature: storage	-20 ... +80 °C
Switching frequency, f (ti/tp 1:1)	1000 Hz	Weight (plug device)	30 g
Response time	≤ 500 μs		

¹ Reference material: Kodak white, 90 % reflectivity ² With connected IP 67 plug

Type of connection	Part number	Article number
Plug, M12x1, 4-pin	FT 12 RF-PSL4	506-11004



Accessories

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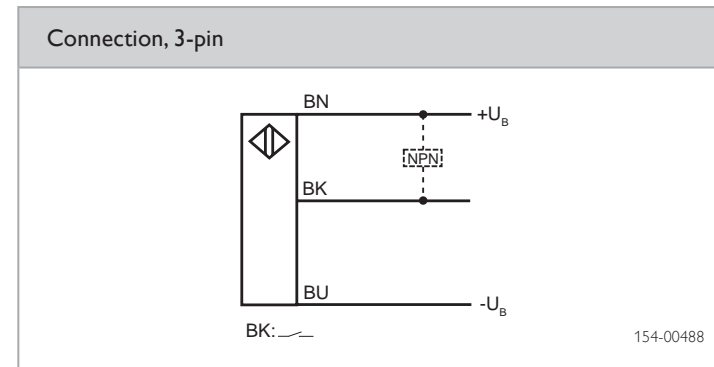
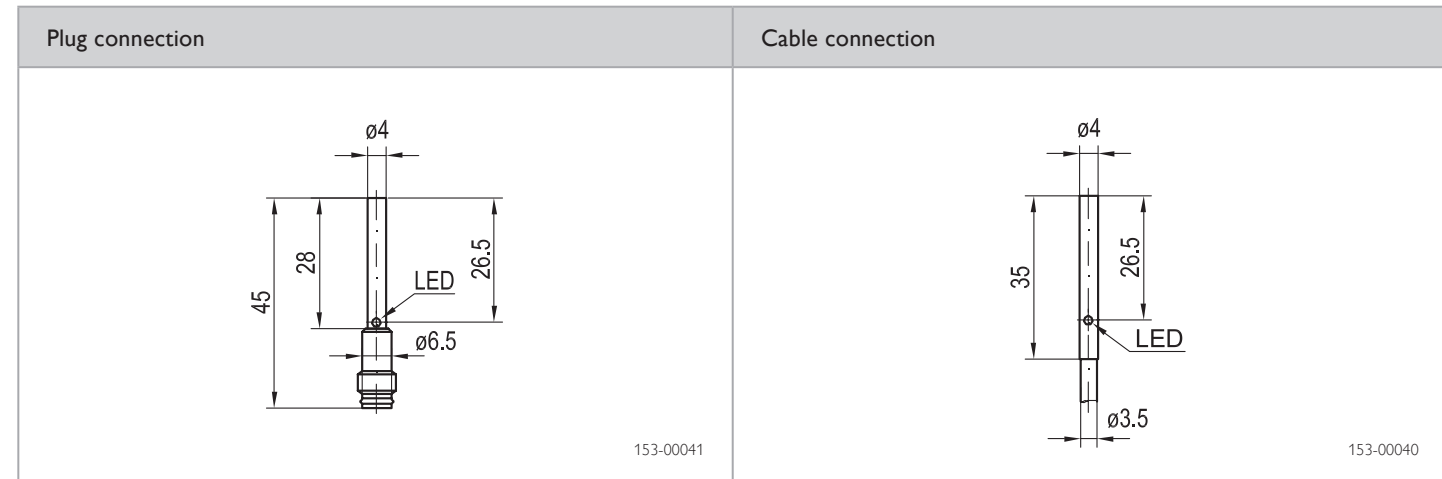
PRODUCT HIGHLIGHTS

- Very small housing diameter: 4 mm
- Long switching distance of 50 mm
- Glass optics for easy cleaning
- Fully sealed under vacuum, enclosure rating of IP 67

Optical data		Functions	
Scanning distance	0 ... 50 mm ¹	Indicator LED, yellow	Switching state indicator
Type of light	Infrared, 880 nm		
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30 V DC	Dimensions (plug device)	Ø 4 x 45 mm
No-load current, I ₀	≤ 15 mA	Dimensions (cable device)	Ø 4 x 35 mm
Output current, I _e	≤ 100 mA	Enclosure rating	IP 67 ²
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection	Material, housing	Stainless steel, V2A
Standby time	120 msec	Material, front screen	Glass
Switching output, Q	PNP/NPN / max. 100 mA	Type of connection	(See Selection Table)
Output function	N.O.	Ambient temperature: operation	0 ... +55 °C
Switching frequency, f (ti/tp 1:1)	≤ 250 Hz	Vibration and impact resistance	IEC 60947-5-2
Response time	≤ 2.5 ms		

¹ Reference material: Kodak white, 90 % reflectivity ² With connected IP 67 plug

Switching output	Type of connection	Part number	Article number
PNP	Plug, M8, 3-pin	FM 04-163	718-51400
NPN	Plug, M8, 3-pin	FM 04-153	718-51401
PNP	Cable, PVC, 3 x 0.14 mm ²	FM 04-161	718-51398
NPN	Cable, PVC, 3 x 0.14 mm ²	FM 04-151	718-51399



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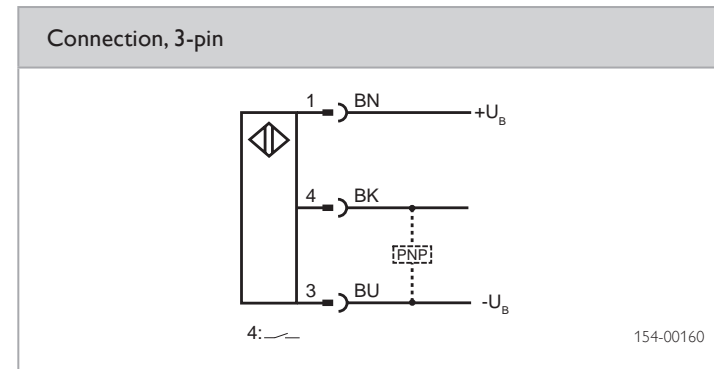
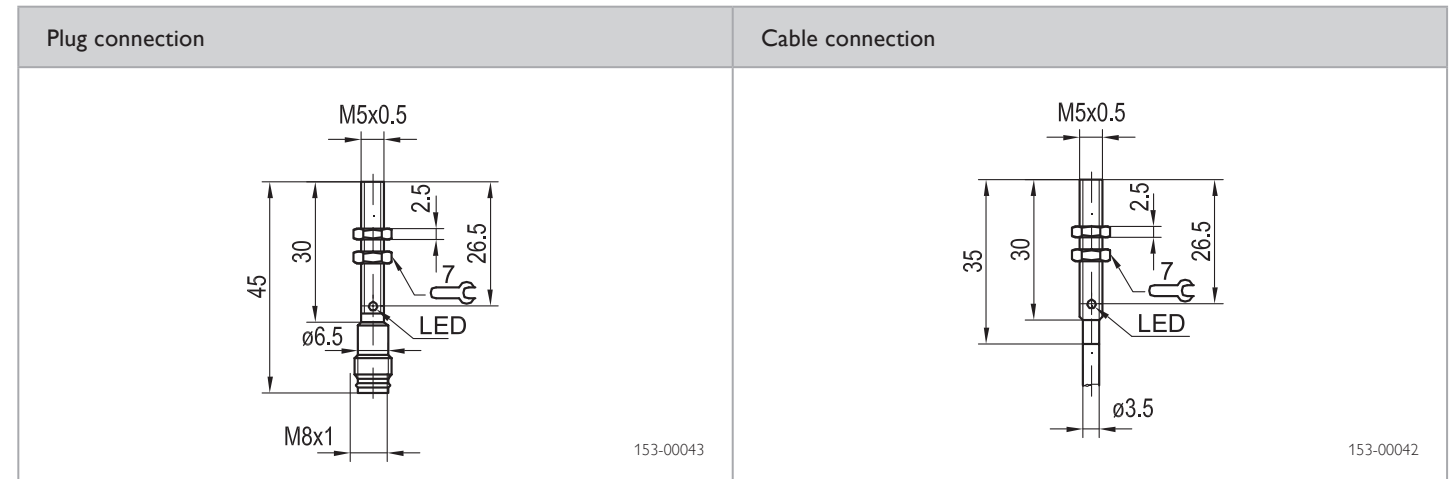
PRODUCT HIGHLIGHTS

- Very small housing: cylindrical, M5
- Simple installation due to standard thread
- Glass optics for easy cleaning
- Fully sealed under vacuum, enclosure rating of IP 67

Optical data		Functions	
Scanning distance	0 ... 50 mm ¹	Indicator LED, yellow	Switching state indicator
Type of light	Infrared, 880 nm		
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30 V DC	Dimensions (cable device)	M5 x 45 mm
No-load current, I ₀	≤ 15 mA	Dimensions (plug device)	M5 x 35 mm
Output current, I _e	≤ 100 mA	Enclosure rating	IP 67 ²
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection	Material, housing	Stainless steel, V2A
Standby time	120 ms	Material, front screen	Glass
Switching output, Q	PNP/NPN / max. 100 mA	Type of connection	(See Selection Table)
Output function	N.O.	Ambient temperature: operation	0 ... +55 °C
Switching frequency, f (ti/tp 1:1)	≤ 250 Hz	Vibration and impact resistance	IEC 60947-5-2
Response time	≤ 2.5 ms		

¹ Reference material: Kodak white, 90 % reflectivity ² With connected IP 67 plug

Switching output	Type of connection	Part number	Article number
PNP	Plug, M8, 3-pin	FM 05-163	718-51404
NPN	Plug, M8, 3-pin	FM 05-153	718-51405
PNP	Cable, PVC, 3 x 0.14 mm ²	FM 05-161	718-51402
NPN	Cable, PVC, 3 x 0.14 mm ²	FM 05-151	718-51403



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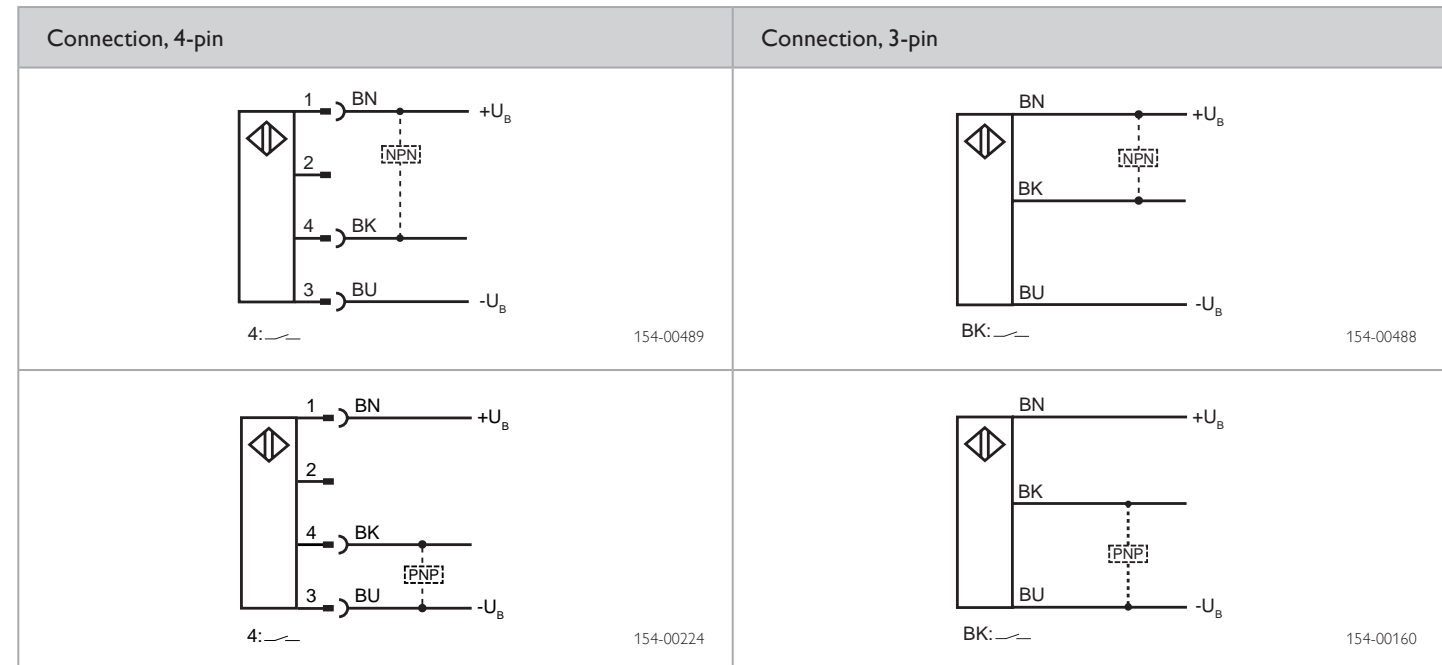
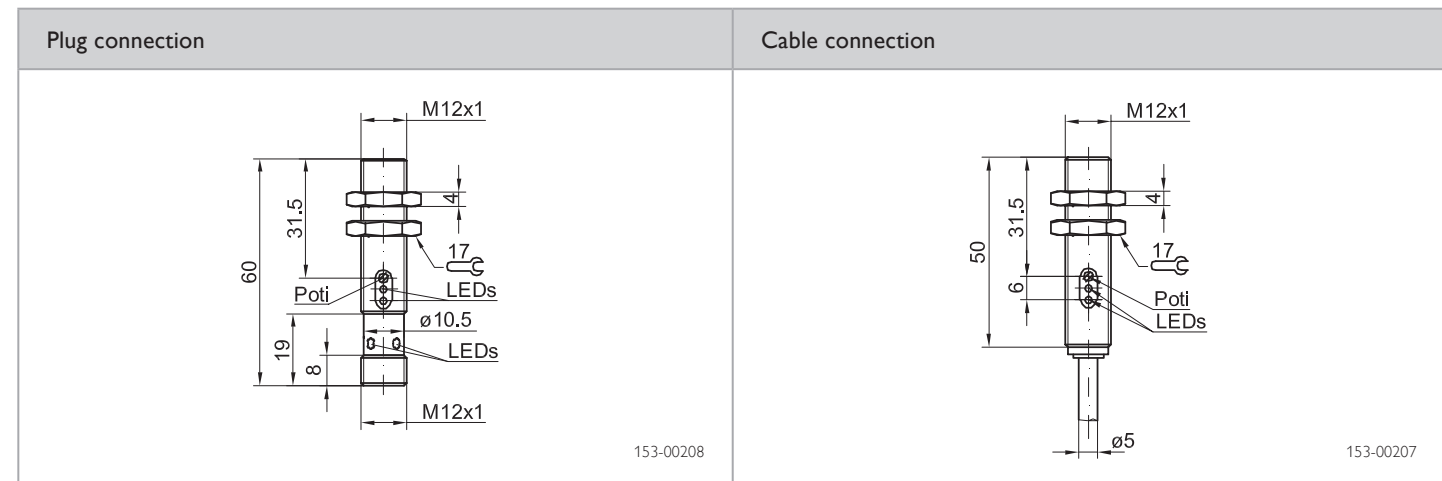
PRODUCT HIGHLIGHTS

- Scanning distance: 1 ... 300 mm, adjustable
- Red light, 660 nm
- Easy installation thanks to standard M12 metal thread
- Functional reserve indicator
- N.O./N.C. switchable

Optical data		Functions	
Scanning distance	1 ... 300 mm ¹	Indicator LED, green	Functional reserve indicator
Type of light	Red, 660 nm	Indicator LED, yellow	Switching state indicator
Light spot size	Ø 5 mm ²	Scanning distance adjustment	Via potentiometer
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 36 V DC	Dimensions (plug device)	M12 x 60 mm
No-load current, I ₀	≤ 15 mA	Dimensions (cable device)	M12 x 50 mm
Output current, I _e	≤ 200 mA	Enclosure rating	IP 67 ³
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection	Material, housing	Brass, chromium-plated
Protection Class	2	Material, front screen	Glass
Standby time	60 msec	Type of connection	(See Selection Table)
Switching output, Q	PNP/NPN / max. 200 mA	Ambient temperature: operation	-25 ... +55 °C
Output function	N.O.	Weight (plug device)	20 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (cable device)	100 g
Response time	≤ 500 µs	Vibration and impact resistance	IEC 60947-5-2

¹ Reference material: Kodak white, 90 % reflectivity ² At scanning distance of 10 mm ³ With connected IP 67 plug

Switching output	Type of connection	Part number	Article number
PNP	Plug, M12, 4-pin	FT 12 R-PSL4	701-21000
NPN	Plug, M12, 4-pin	FT 12 R-NSL4	701-21001
PNP	Cable, PVC, 3 x 0.34 mm ² , 2 m	FT 12 R-PSK3	701-21002
NPN	Cable, PVC, 3 x 0.34 mm ² , 2 m	FT 12 R-NSK3	701-21003



Accessories	
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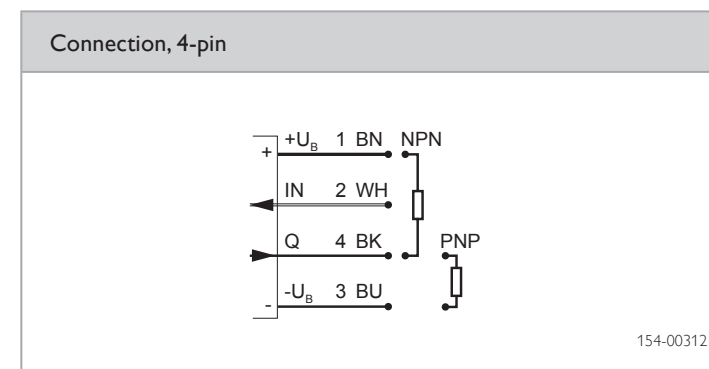
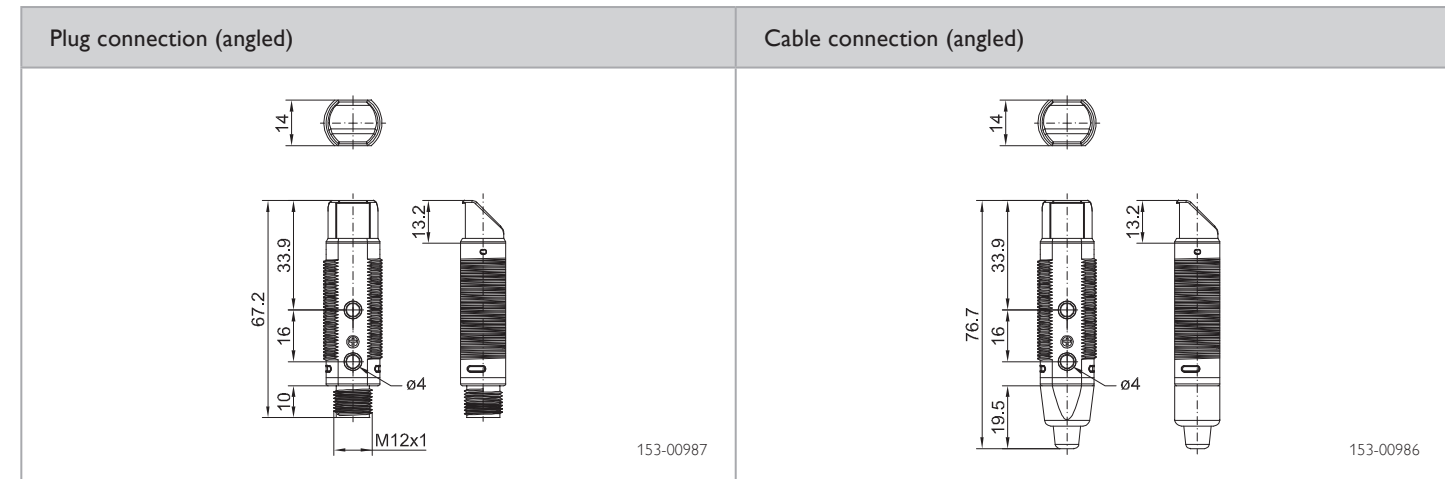
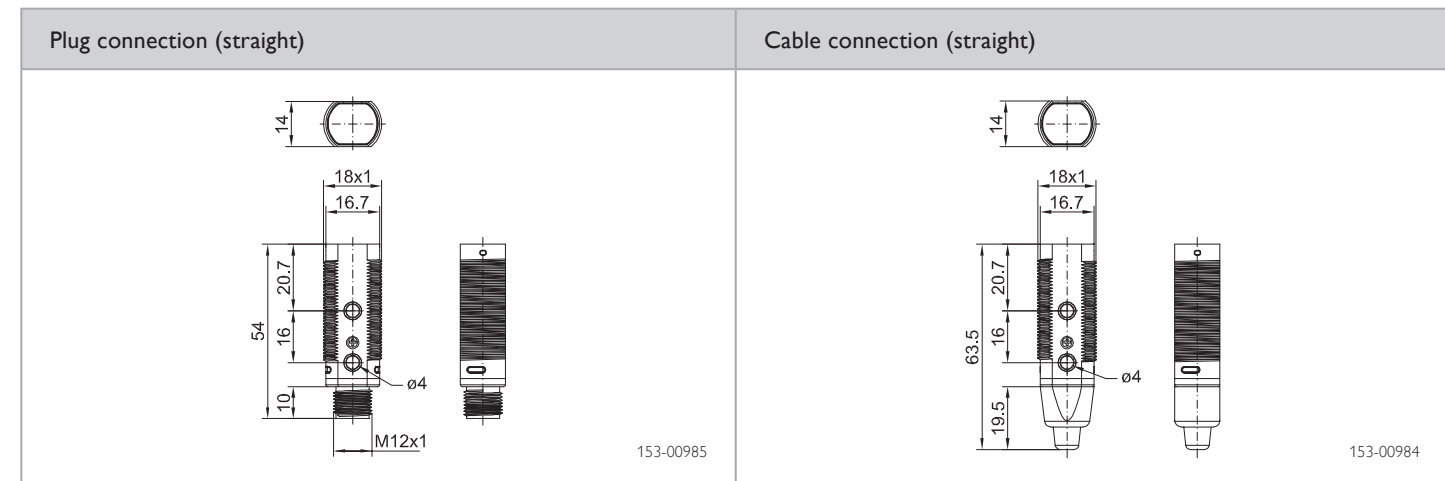
PRODUCT HIGHLIGHTS

- Economical solution for numerous applications
- Scanning distance of up to 800 mm, adjustable via potentiometer
- Red light or infrared
- Variants with angled light exit
- Robust metal housings (IP 67)
- Simple adjustment via potentiometer
- 2 through holes as additional mounting possibility

Optical data		Functions	
Scanning distance	(See Selection Table)	Indicator LED, green	Operating voltage indicator
Type of light	(See Selection Table)	Indicator LED, yellow	Switching output indicator
		Sensitivity adjustment	Via potentiometer
		Adjustment possibilities	N.O./N.C. via control input (IN)
		Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC	Dimensions	M18 x 44 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 67 ¹
Output current, I _e	≤ 100 mA	Material, housing	Metal
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection	Material, front screen	PMMA
Switching output, Q	PNP/NPN (see Selection Table)	Type of connection	(See Selection Table)
Output function	-U _B = N.O. / +U _B = N.C.	Ambient temperature: operation	-25 ... +55 °C
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (plug device)	23 g ² / 25 g ³
Response time	≤ 1 ms	Weight (cable device)	63 g ² / 65 g ³

¹With connected IP 67 plug ²Straight light exit variant ³Angled light exit variant

Scanning distance	Type of light	Light exit	Switching output	Type of connection	Part number	Article number
0 ... 400 mm	Red light	Straight	PNP	Metal plug, M12, 4-pin	FT 18-2 RM-PS-L4	740-21021
0 ... 400 mm	Red light	Straight	NPN	Metal plug, M12, 4-pin	FT 18-2 RM-NS-L4	740-21022
0 ... 400 mm	Red light	Straight	PNP	Cable, 2 m, 4-wire	FT 18-2 RM-PS-K4	740-21023
0 ... 400 mm	Red light	Straight	NPN	Cable, 2 m, 4-wire	FT 18-2 RM-NS-K4	740-21024
0 ... 320 mm	Red light	90° angle	PNP	Metal plug, M12, 4-pin	FT 18-2 RWM-PS-L4	740-21025
0 ... 320 mm	Red light	90° angle	NPN	Metal plug, M12, 4-pin	FT 18-2 RWM-NS-L4	740-21026
0 ... 320 mm	Red light	90° angle	PNP	Cable, 2 m, 4-wire	FT 18-2 RWM-PS-K4	740-21027
0 ... 320 mm	Red light	90° angle	NPN	Cable, 2 m, 4-wire	FT 18-2 RWM-NS-K4	740-21028
0 ... 800 mm	Infrared	Straight	PNP	Metal plug, M12, 4-pin	FT 18-2 IDM-PS-L4	740-21029
0 ... 800 mm	Infrared	Straight	NPN	Metal plug, M12, 4-pin	FT 18-2 IDM-NS-L4	740-21030
0 ... 800 mm	Infrared	Straight	PNP	Cable, 2 m, 4-wire	FT 18-2 IDM-PS-K4	740-21031
0 ... 800 mm	Infrared	Straight	NPN	Cable, 2 m, 4-wire	FT 18-2 IDM-NS-K4	740-21032



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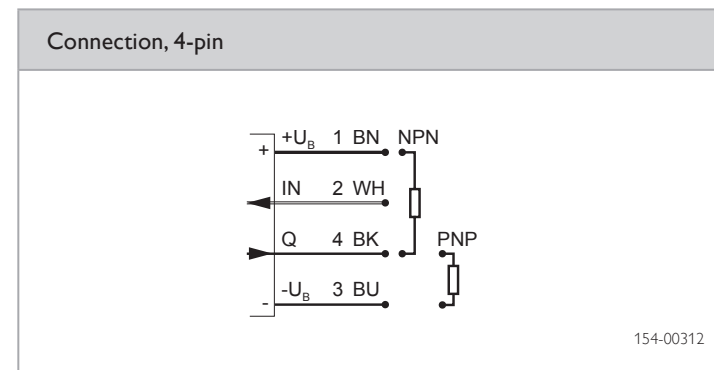
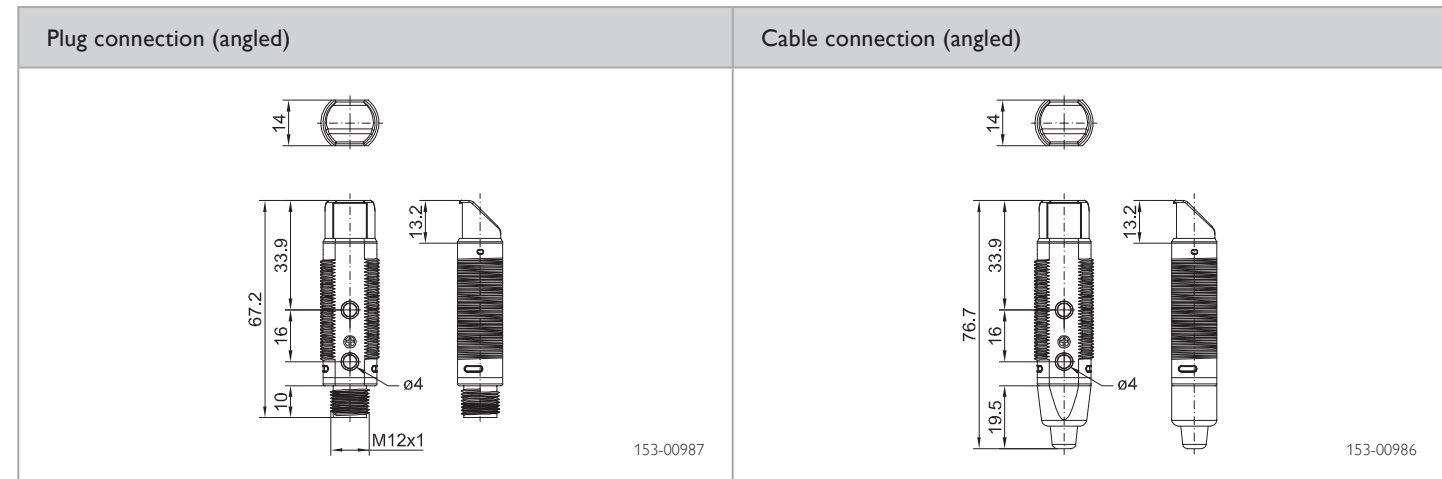
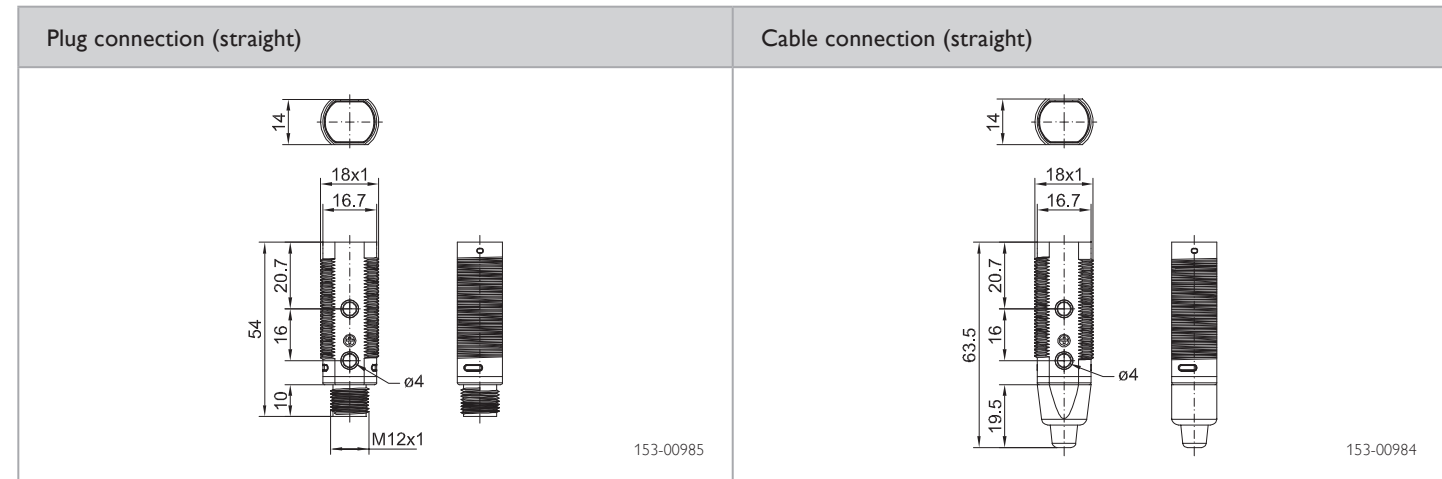
PRODUCT HIGHLIGHTS

- Economical solution for numerous applications
- Scanning distance of up to 800 mm, adjustable via potentiometer
- Red light or infrared
- Variants with angled light exit
- Robust plastic housings (IP 67)
- Simple adjustment via potentiometer
- 2 through holes as additional mounting possibility

Optical data		Functions	
Scanning distance	(See Selection Table)	Indicator LED, green	Operating voltage indicator
Type of light	(See Selection Table)	Indicator LED, yellow	Switching output indicator
		Sensitivity adjustment	Via potentiometer
		Adjustment possibilities	N.O./N.C. via control input (IN)
		Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC	Dimensions	M18 x 44 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 67 ¹
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection	Material, front screen	PMMA
Switching output, Q	PNP/NPN (see Selection Table)	Type of connection	(See Selection Table)
Output function	N.O./N.C. / -U _B = N.O. / +U _B = N.C.	Ambient temperature: operation	-25 ... +55 °C
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (plug device)	11 g ² / 13 g ³
Response time	≤ 1 ms	Weight (cable device)	55 g ² / 57g ³

¹With connected IP 67 plug ²Straight light exit variant ³Angled light exit variant

Scanning distance	Type of light	Light exit	Switching output	Type of connection	Part number	Article number
0 ... 400 mm	Red light	Straight	PNP	Plug, M12, 4-pin	FT 18-2 R-PS-L4	740-21033
0 ... 400 mm	Red light	Straight	NPN	Plug, M12, 4-pin	FT 18-2 R-NS-L4	740-21034
0 ... 400 mm	Red light	Straight	PNP	Cable, 2 m, 4-wire	FT 18-2 R-PS-K4	740-21020
0 ... 400 mm	Red light	Straight	NPN	Cable, 2 m, 4-wire	FT 18-2 R-NS-K4	740-21035
0 ... 320 mm	Red light	90° angle	PNP	Plug, M12, 4-pin	FT 18-2 RW-PS-L4	740-21036
0 ... 320 mm	Red light	90° angle	NPN	Plug, M12, 4-pin	FT 18-2 RW-NS-L4	740-21037
0 ... 320 mm	Red light	90° angle	PNP	Cable, 2 m, 4-wire	FT 18-2 RW-PS-K4	740-21038
0 ... 320 mm	Red light	90° angle	NPN	Cable, 2 m, 4-wire	FT 18-2 RW-NS-K4	740-21039
0 ... 800 mm	Infrared	Straight	PNP	Plug, M12, 4-pin	FT 18-2 ID-PS-L4	740-21040
0 ... 800 mm	Infrared	Straight	NPN	Plug, M12, 4-pin	FT 18-2 ID-NS-L4	740-21041
0 ... 800 mm	Infrared	Straight	PNP	Cable, 2 m, 4-wire	FT 18-2 ID-PS-K4	740-21042
0 ... 800 mm	Infrared	Straight	NPN	Cable, 2 m, 4-wire	FT 18-2 ID-NS-K4	740-21043



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FMS 18-34 B

Photoelectric proximity sensor



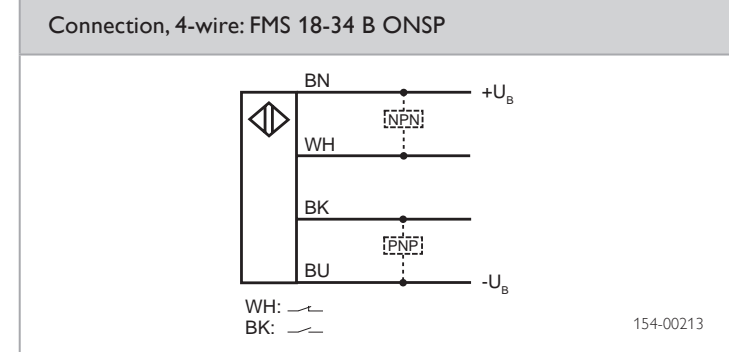
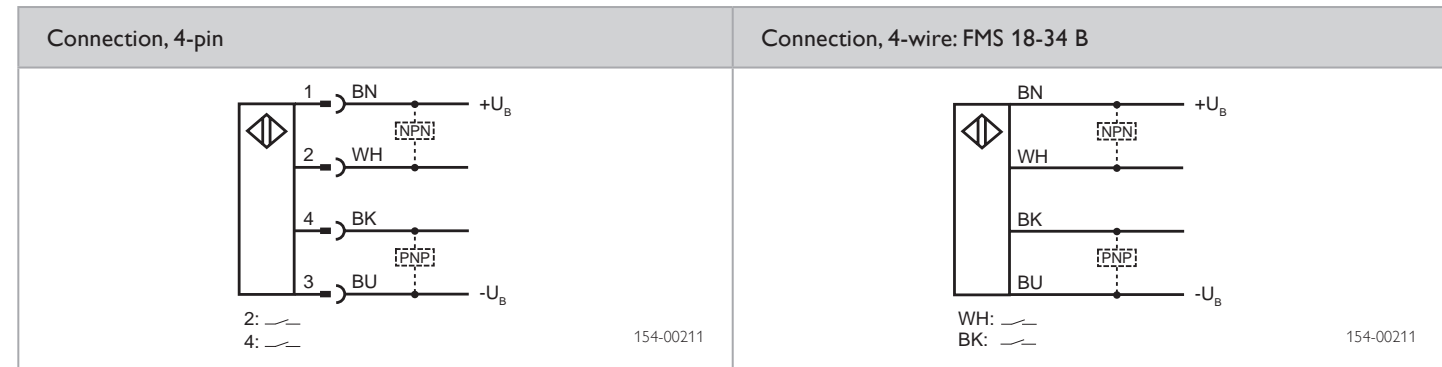
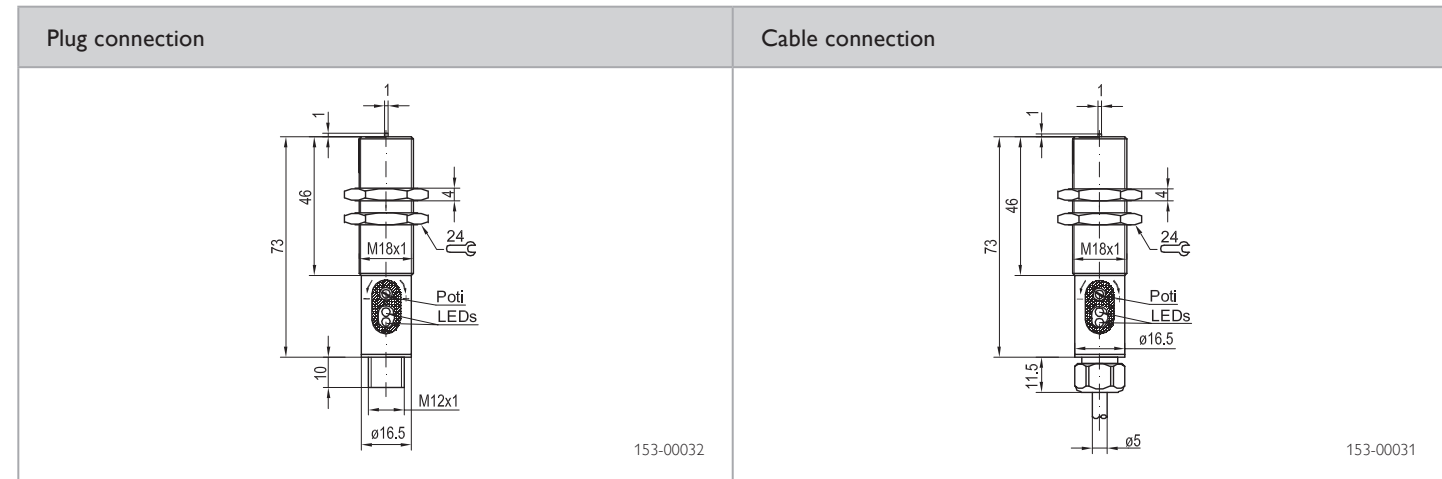
PRODUCT HIGHLIGHTS

- Scanning distance: 5 ... 400 mm, adjustable
- Wide beam (large aperture angle)
- Separating seam
- Metal M18 threaded sleeve
- Contamination indicator

Optical data		Functions	
Scanning distance	5 ... 400 mm ¹	Indicator LED, green	Operating voltage indicator
Type of light	Infrared, 880 nm	Indicator LED, yellow	Switching output indicator
Distance hysteresis	≤ 10 % of set scanning distance	Indicator LED, red	Contamination indicator
Aperture angle	25°	Sensitivity adjustment	Via 18-step potentiometer
		Default setting	Max. scanning distance
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ²	Dimensions	M18 x 73 mm
No-load current, I ₀	≤ 25 mA	Enclosure rating	IP 65 ³
Output current, I _e	≤ 200 mA	Material, housing	Brass, nickel-plated
Pull-up resistance	22 kΩ	Type of connection	(See Selection Table)
Pull-down resistance	22 kΩ	Ambient temperature: operation	-20 ... +60 °C
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Ambient temperature: storage	-40 ... +80 °C
Protection Class	2	Weight (plug device)	65 g
Standby time	≤ 300 ms	Weight (receiver device)	165 g
Switching output, Q	(See Selection Table)	Vibration and impact resistance	EN 60947-5-2
Output function	(See Selection Table)		
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz		
Response time	500 μs		

¹ Reference material: Kodak white, 90 % reflectivity ² 10 % ripple, within U_B ³ With connected IP 65 plug

Scanning distance	Switching output	Type of connection	Part number	Article number
5 ... 400 mm	PNP (N.O.) / NPN (N.O.)	Plug, M12x1, 4-pin	FMS 18-34 B-L4	516-50781
5 ... 400 mm	PNP (N.O.) / NPN (N.O.)	Cable, 3 m, 4-wire	FMS 18-34 B	516-50781
5 ... 400 mm	PNP (N.O.) / NPN (N.C.)	Cable, 3 m, 4-wire	FMS 18-34 B ONSP	516-50783



Accessories	
Connection cables	From Page 670
Brackets	From Page 642

FMS 30-34 B

Photoelectric proximity sensor



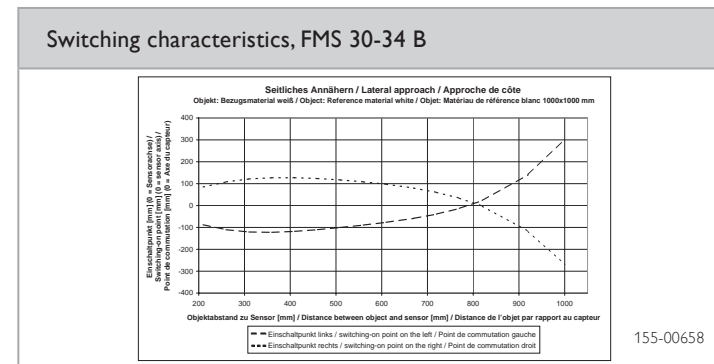
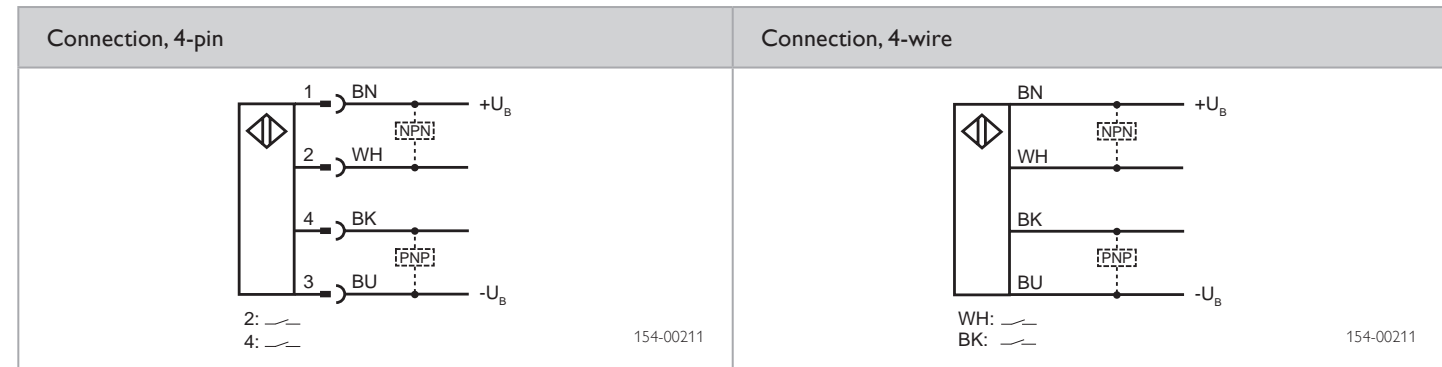
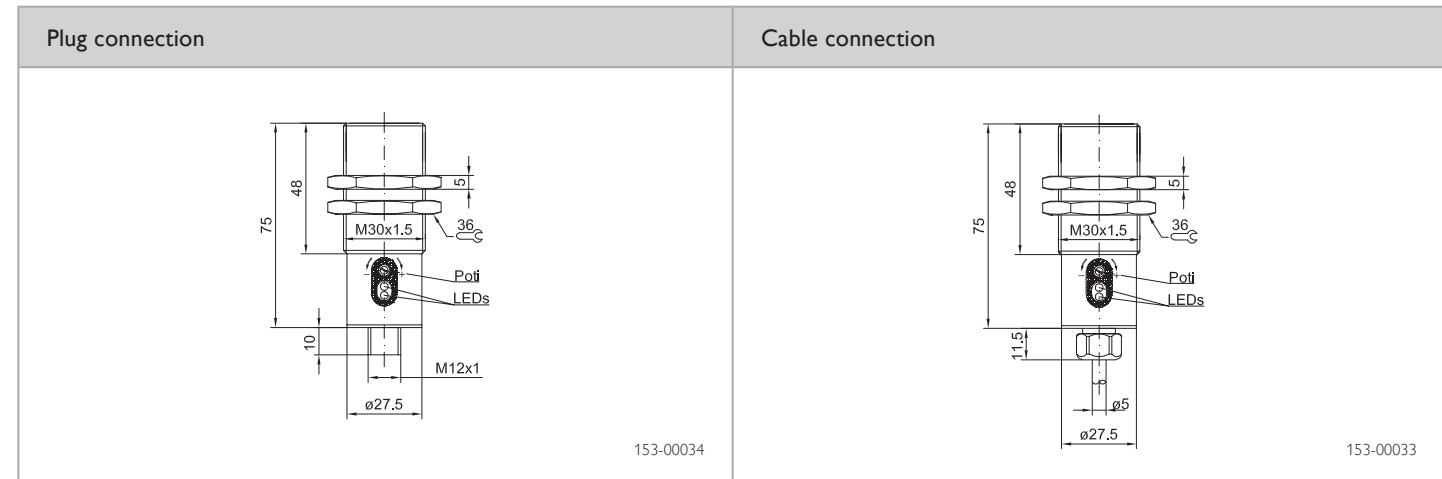
PRODUCT HIGHLIGHTS

- Scanning distance: 5 ... 1000 mm, adjustable
- Wide beam (large aperture angle)
- Separating seam
- Metal M30 threaded sleeve
- Contamination indicator

Optical data		Functions	
Scanning distance	5 ... 1000 mm ¹	Indicator LED, green	Operating voltage indicator
Type of light	Infrared, 880 nm	Indicator LED, yellow	Switching output indicator
Distance hysteresis	≤ 10 % of set scanning distance	Indicator LED, red	Contamination indicator
Aperture angle	50°	Sensitivity adjustment	Via 18-step potentiometer
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30 V DC ²	Dimensions	M12 x 75 mm
No-load current, I ₀	≤ 40 mA	Enclosure rating	IP 65 ³
Output current, I _e	≤ 200 mA	Material, housing	Brass, nickel-plated
Pull-up resistance	22 kΩ	Type of connection	(See Selection Table)
Pull-down resistance	22 kΩ	Ambient temperature: operation	-20 ... +60 °C
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Ambient temperature: storage	-40 ... +80 °C
Protection Class	2	Weight (plug device)	170 g
Standby time	≤ 300 ms	Weight (cable device)	280 g
Switching output, Q	PNP/NPN	Vibration and impact resistance	60947-5-2
Output function	N.O.		
Switching frequency, f (ti/tp 1:1)	50 Hz		

¹ Reference material: white, 90 % reflectivity ² 10 % ripple, within U_B ³ With connected IP 65 plug

Scanning distance	Type of connection	Part number	Article number
5 ... 1000 mm	Plug, M12x1, 4-pin	FMS 30-34 B-L4	550-51596
5 ... 1000 mm	Cable, 3 m, 4-wire	FMS 30-34 B	550-51595



Accessories	
Connection cables	From Page 670
Brackets	From Page 642



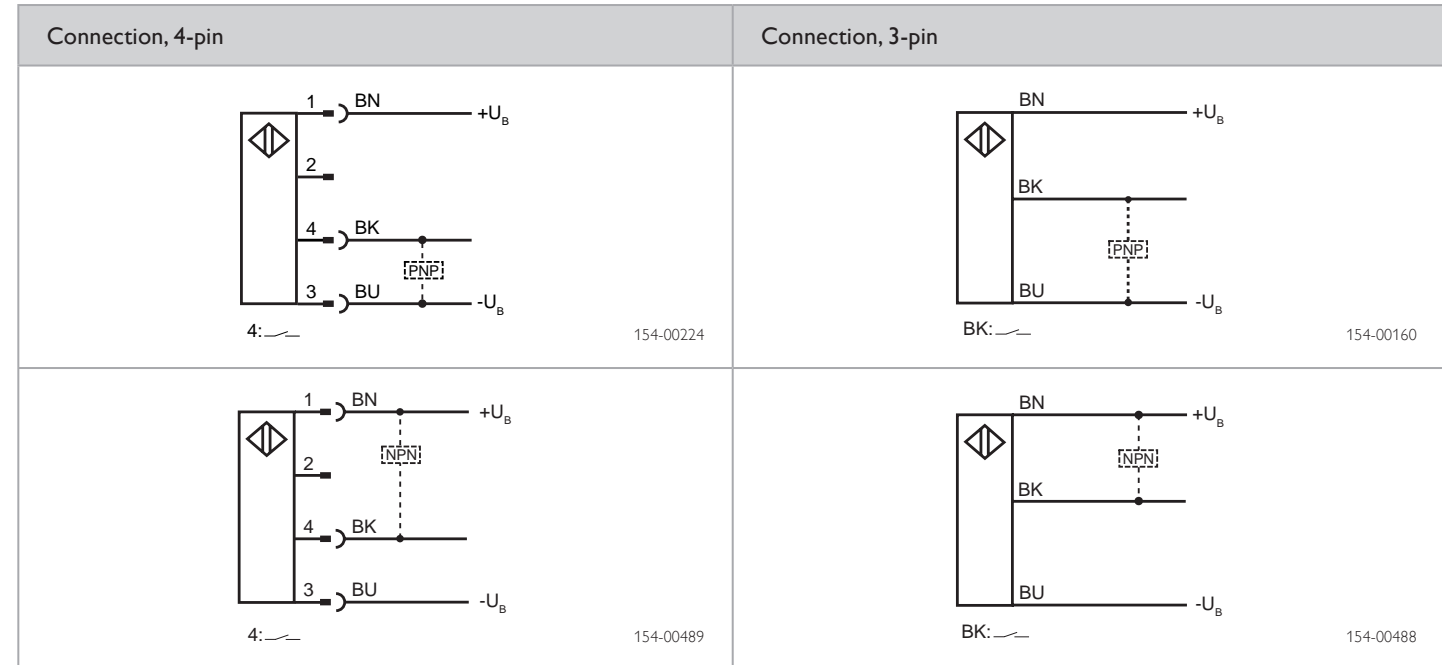
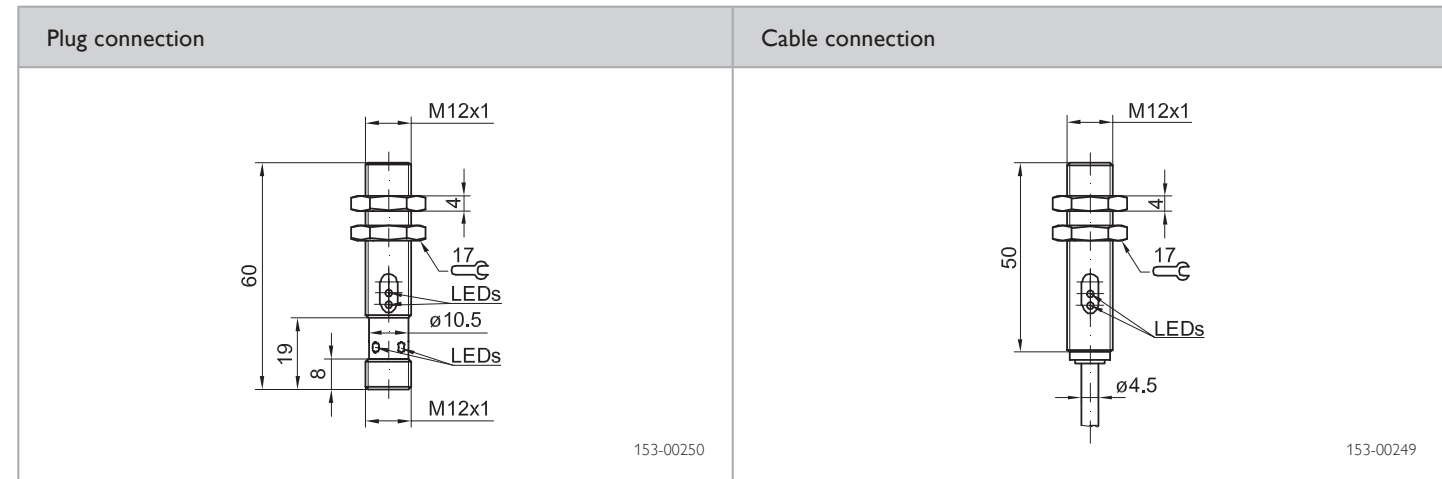
PRODUCT HIGHLIGHTS

- Robust M12 metal housings with short mounting lengths
- Operating range: 60 ... 1500 mm
- Red light, 660 nm
- Switching state and functional reserve indicators

Optical data		Functions	
Scanning distance	60 ... 1500 mm ¹	Indicator LED, green	Functional reserve indicator
Type of light	Red, 660 nm	Indicator LED, yellow	Switching state indicator
Light spot size	Ø 10 mm ²	Scanning distance adjustment	Fixed setting
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 36 V DC	Dimensions (plug device)	M12 x 60 mm
No-load current, I ₀	≤ 15 mA	Dimensions (cable device)	M12 x 50 mm
Output current, I _e	≤ 200 mA	Enclosure rating	IP 67 ³
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection	Material, housing	Brass, chromium-plated
Protection Class	2	Material, front screen	Glass
Standby time	20 msec	Type of connection	(See Selection Table)
Switching output, Q	PNP/NPN / max 200 mA	Ambient temperature: operation	-25 ... +55 °C
Output function	N.O.	Weight (plug device)	20 g
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (cable device)	100 g
Response time	≤ 500 µs	Vibration and impact resistance	IEC 60947-5-2

¹ Reference material: RD8 reflector; Ø 84 mm ² At scanning distance of 50 mm ³ With connected IP 67 plug

Switching output	Type of connection	Part number	Article number
PNP	Plug, M12, 4-pin	FR 12 R-PSL4	703-11000
NPN	Plug, M12, 4-pin	FR 12 R-NSL4	703-11001
PNP	Cable, PVC, 3 x 0.34 mm ² , 2 m	FR 12 R-PSK3	703-11002
NPN	Cable, PVC, 3 x 0.34 mm ² , 2 m	FR 12 R-NSK3	703-11003



Accessories	
Connection cables	From Page 670
Brackets	From Page 642



PRODUCT HIGHLIGHTS

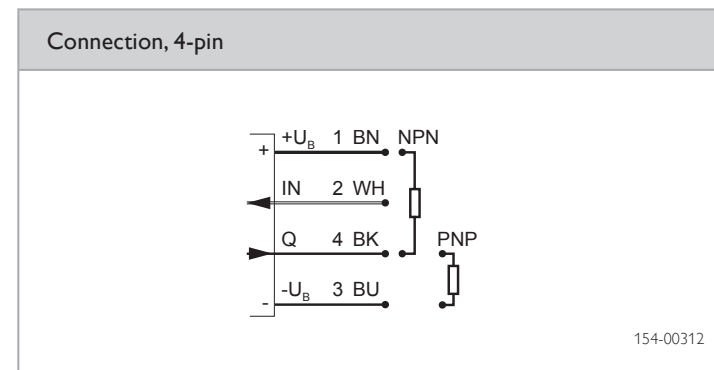
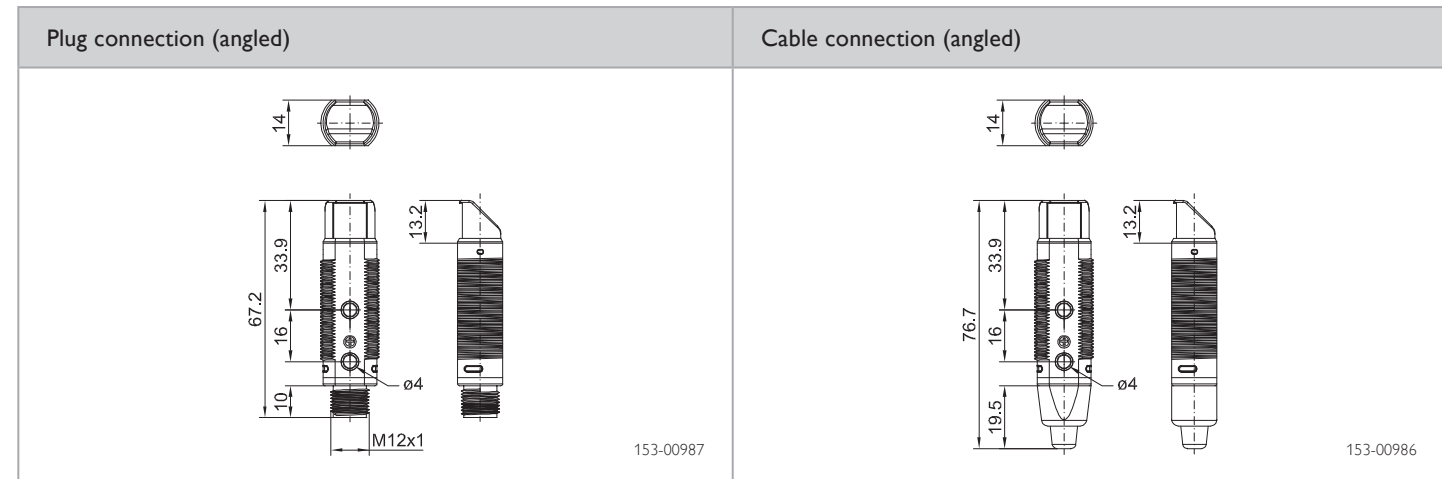
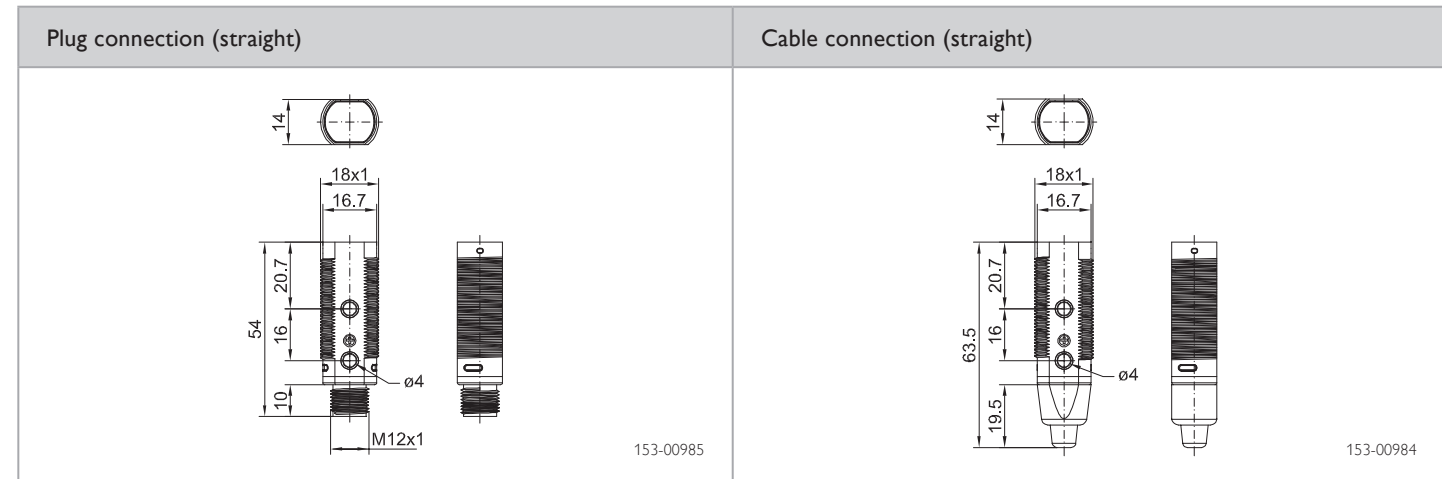
- Economical solution for numerous applications
- Range of up to 3.0 m
- Variants with angled light exit
- Robust metal housings (IP 67)
- Polarisation filter for reliable detection of highly reflective surfaces
- Simple adjustment via potentiometer
- 2 through holes as additional mounting possibility

Optical data		Functions	
Operating range	(See Selection Table) ¹	Indicator LED, green	Operating voltage indicator
Type of light	(See Selection Table)	Indicator LED, yellow	Switching output indicator
Polarising filter	Yes	Sensitivity adjustment	Via potentiometer
		Adjustment possibilities	N.O./N.C. via control input (IN)
		Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC	Dimensions	M18 x 44 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 67 ²
Output current, I _e	≤ 100 mA	Material, housing	Metal
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection	Material, front screen	PMMA
Switching output, Q	PNP/NPN (see Selection Table)	Type of connection	(See Selection Table)
Output function	N.O./N.C.	Ambient temperature: operation	-25 ... +55 °C
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (plug device)	34 g ³ / 36 g ⁴
Response time	≤ 1 ms	Weight (cable device)	74 g ³ / 76 g ⁴

¹ Reference material: R5 reflector ² With connected IP 67 plug ³ Straight light exit variant ⁴ Angled light exit variant

Operating range	Type of light	Light exit	Switching output	Type of connection	Part number	Article number
3.0 m	Red light	Straight	PNP	Metal plug, M12, 4-pin	FR 18-2 RM-PS-L4	741-11014
3.0 m	Red light	Straight	NPN	Metal plug, M12, 4-pin	FR 18-2 RM-NS-L4	741-11015
3.0 m	Red light	Straight	PNP	Cable, 2 m, 4-wire	FR 18-2 RM-PS-K4	741-11016
3.0 m	Red light	Straight	NPN	Cable, 2 m, 4-wire	FR 18-2 RM-NS-K4	741-11017
2.4 m	Red light	90° angle	PNP	Metal plug, M12, 4-pin	FR 18-2 RWM-PS-L4	741-11018
2.4 m	Red light	90° angle	NPN	Metal plug, M12, 4-pin	FR 18-2 RWM-NS-L4	741-11019
2.4 m	Red light	90° angle	PNP	Cable, 2 m, 4-wire	FR 18-2 RWM-PS-K4	741-11020
2.4 m	Red light	90° angle	NPN	Cable, 2 m, 4-wire	FR 18-2 RWM-NS-K4	741-11021

Scope of delivery
Reflector: 53.4 x 53.4 mm ²
2 x securing nuts



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



PRODUCT HIGHLIGHTS

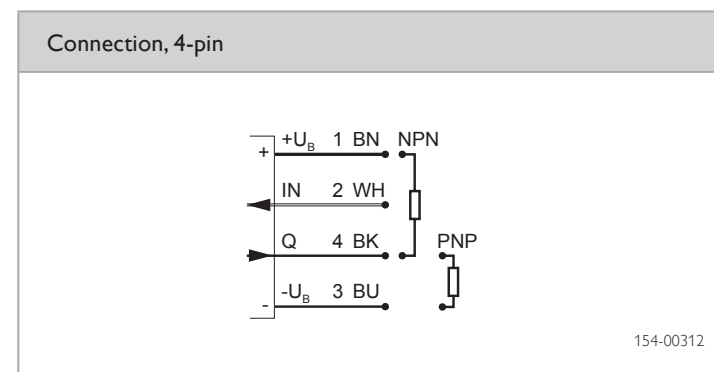
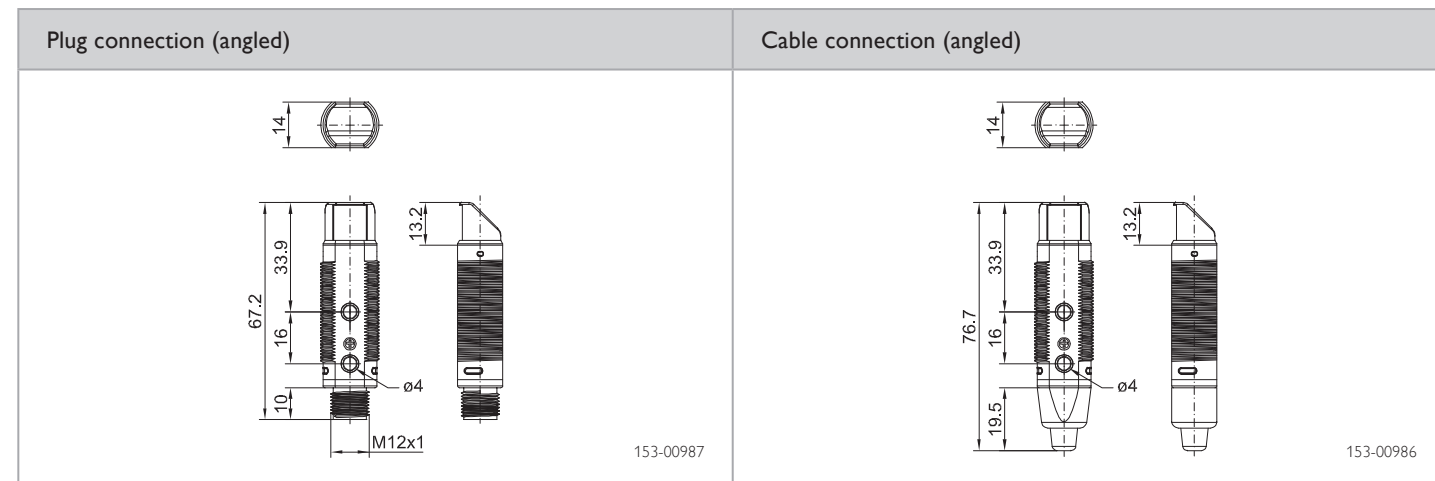
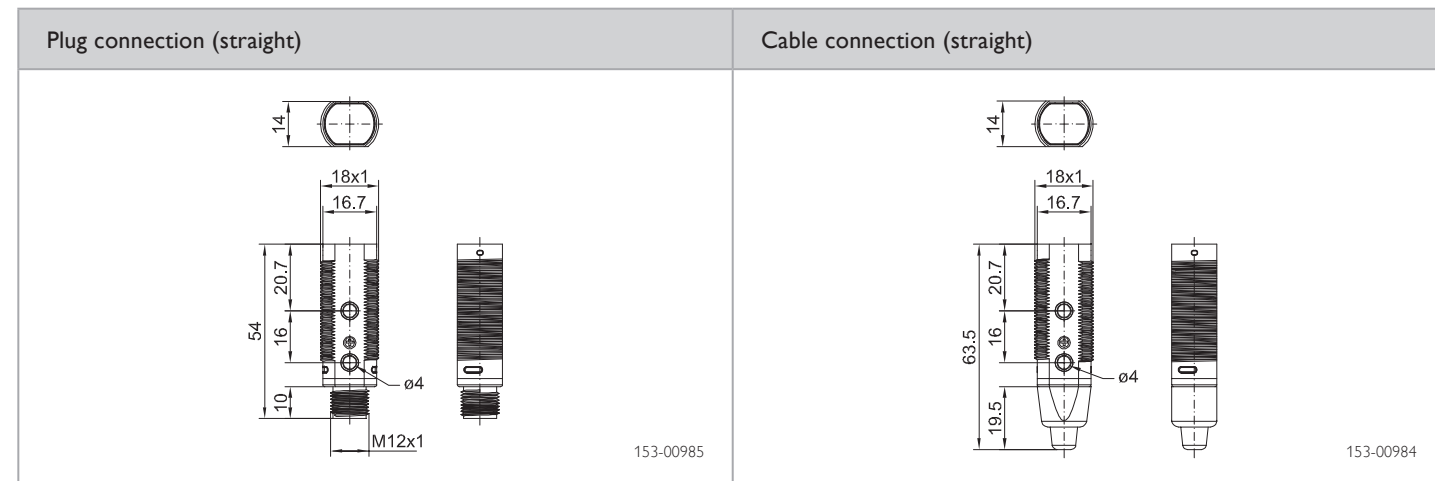
- Economical solution for numerous applications
- Range of up to 3.60 m
- Variants with angled light exit
- Robust plastic housings (IP 67)
- Simple adjustment via potentiometer
- 2 through holes as additional mounting possibility

Optical data		Functions	
Operating range	(See Selection Table) ¹	Indicator LED, yellow	Switching output indicator
Type of light	(See Selection Table)	Sensitivity adjustment	Via potentiometer
Polarising filter	No	Adjustment possibilities	N.O./N.C. via control input (IN)
		Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC	Dimensions	M18 x 44 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 67 ²
Output current, I _e	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection	Material, front screen	PMMA
Switching output, Q	PNP/NPN (see Selection Table)	Type of connection	(See Selection Table)
Output function	N.O./N.C.	Ambient temperature: operation	-25 ... +55 °C
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (plug device)	11 g ³ / 13 g ⁴
Response time	≤ 1 ms	Weight (cable device)	55 g ³ / 57 g ⁴

¹ Reference material: R5 reflector ² With connected IP 67 plug ³ Straight light exit variant ⁴ Angled light exit variant

Operating range	Type of light	Light exit	Switching output	Type of connection	Part number	Article number
3.6 m	Infrared	Straight	PNP	Plug, M12, 4-pin	FR 18-2 I-PS-L4	741-11022
3.6 m	Infrared	Straight	NPN	Plug, M12, 4-pin	FR 18-2 I-NS-L4	741-11023
3.6 m	Infrared	Straight	PNP	Cable, 2 m, 4-wire	FR 18-2 I-PS-K4	741-11024
3.6 m	Infrared	Straight	NPN	Cable, 2 m, 4-wire	FR 18-2 I-NS-K4	741-11025
2.5 m	Infrared	90° angle	PNP	Plug, M12, 4-pin	FR 18-2 IW-PS-L4	741-11026
2.5 m	Infrared	90° angle	NPN	Plug, M12, 4-pin	FR 18-2 IW-NS-L4	741-11027
2.5 m	Infrared	90° angle	PNP	Cable, 2 m, 4-wire	FR 18-2 IW-PS-K4	741-11028
2.5 m	Infrared	90° angle	NPN	Cable, 2 m, 4-wire	FR 18-2 IW-NS-K4	741-11029

Scope of delivery
Reflector: 53.4 x 53.4 mm ²
2 x securing nuts



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



PRODUCT HIGHLIGHTS

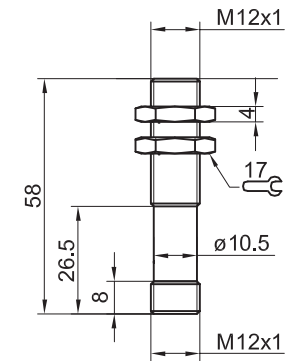
- Fine, parallel light beam
- Small part detection to 0.2 mm at a max. distance of 1 m
- Simple installation thanks to standard M 12 metal thread
- Control line for setting of 3 sensitivity levels
- Test input

Optical data		Functions	
Range	0 ... 5 m	Indicator LED, yellow	Switching state indicator
Type of light	Laser, red, 650 nm	Sensitivity adjustment	Via control line
Laser Class (DIN EN 60825-1:2008-5)	2		
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC	Dimensions	M12 x 58 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 67 ²
Output current, I _e	≤ 100 mA	Material, housing	Brass, nickel-plated
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection	Material, front screen	PMMA
Protection Class	2	Type of connection	(See Selection Table)
Standby time	≤ 300 ms	Ambient temperature: operation	-20 ... +60 °C
Switching output, Q	PNP/NPN (see Selection Table)	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (transmitter / receiver)	30 g
Switching frequency, f (ti/tp 1:1)	10 kHz		
Control input, Test, transmitter	-U _B : transmitter = off +U _B or Open: transmitter = on		
Control input, Gain, receiver ¹	1 Open = medium sensitivity 2 -U _B = high sensitivity 3 +U _B = low sensitivity		

¹Change in Gain setting is only effective after renewed switch on / switch off ²With connected IP 67 plug

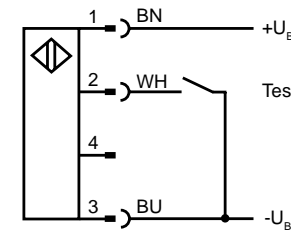
Transmitter / receiver	Switching output	Type of connection	Part number	Article number
Receiver	PNP N.O.	Plug, M12, 4-pin	FE 12 RL-PS-L4	580-51402
Receiver	PNP N.C.	Plug, M12, 4-pin	FE 12 RL-PO-L4	580-51403
Receiver	NPN N.C.	Plug, M12, 4-pin	FE 12 RL-NS-L4	580-51405
Transmitter	—	Plug, M12, 4-pin	FS 12 RL-L4	580-51401

Plug connection (transmitter / receiver)



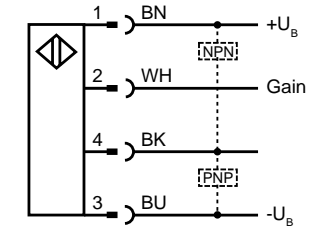
153-00345

Connection, transmitter, 4-pin



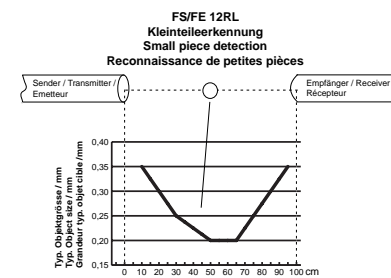
154-00171

Connection, receiver, 4-pin: PNP/NPN



154-00265

Small part detection



155-00215

Accessories

Connection cables	From Page 670
Brackets	From Page 642



PRODUCT HIGHLIGHTS

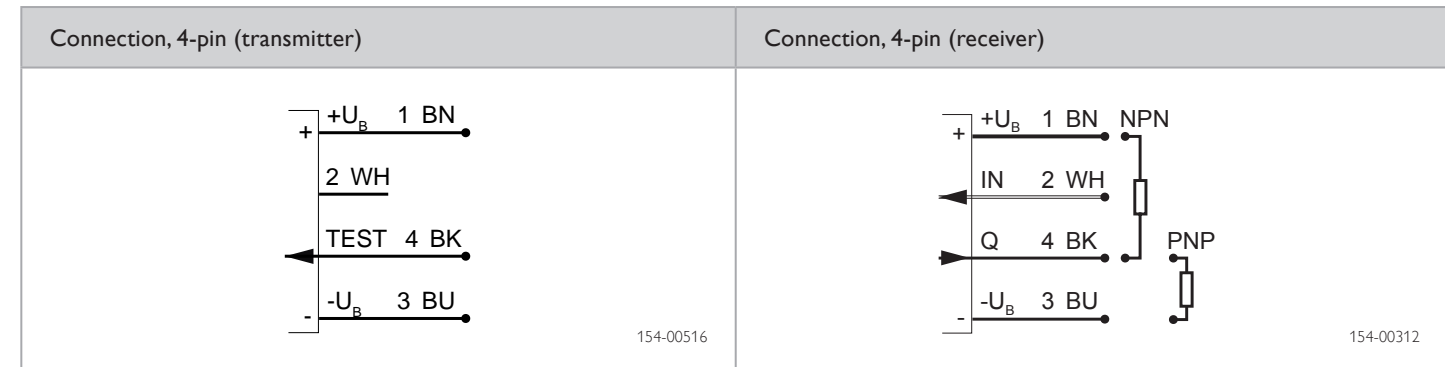
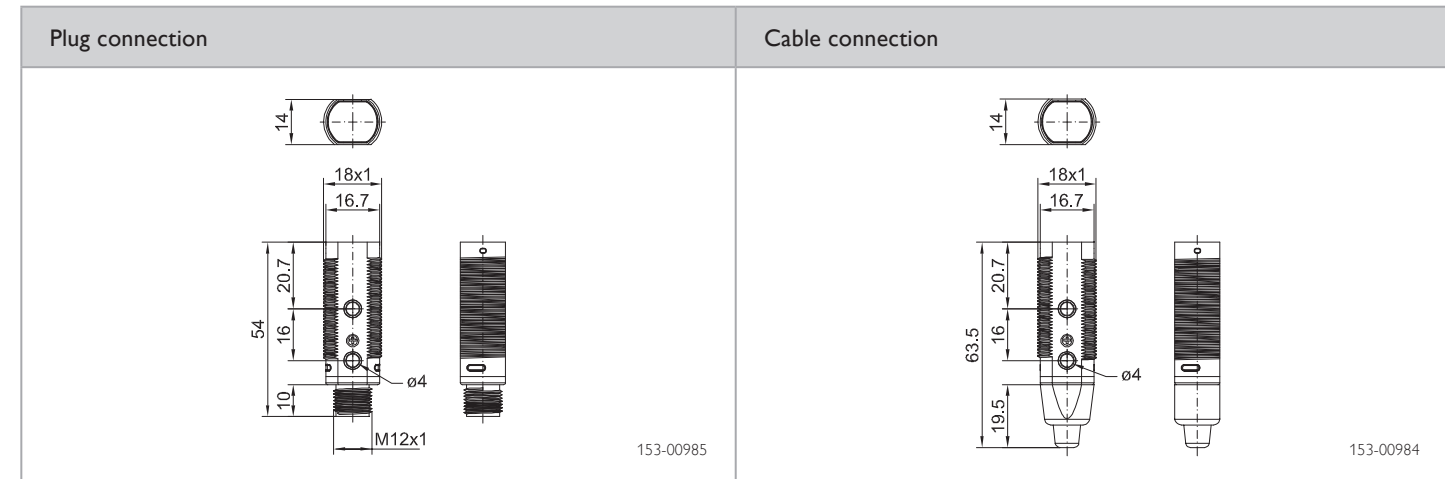
- Economical solution for numerous applications
- Long range of up to 10 m
- Robust metal housings (IP 67)
- Simple adjustment via potentiometer
- 2 through holes as additional mounting possibility

Optical data		Functions	
Operating range	10 m	Indicator LED, green	Operating voltage indicator
Type of light	(See Selection Table)	Indicator LED, yellow	Switching output indicator
		Sensitivity adjustment	Via potentiometer
		Adjustment possibilities	N.O./N.C. via control input (IN)
		Default settings	Max. scanning distance and N.O.
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC	Dimensions	M18 x 44 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 67 ¹
Output current, I _e	≤ 100 mA	Material, housing	Metal
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection	Material, front screen	PMMA
Switching output, Q	PNP/NPN (see Selection Table)	Type of connection	(See Selection Table)
Output function	N.O./N.C.	Ambient temperature: operation	-25 ... +55 °C
Switching frequency, f (ti/tp 1:1)	≤ 400 Hz	Weight (plug device)	46 g
Response time	≤ 2.5 ms	Weight (cable device)	130 g

¹With connected IP 67 plug

Transmitter / receiver	Type of light	Light exit	Switching output	Type of connection	Part number	Article number
Transmitter / receiver	Infrared	Straight	PNP	Metal plug, M12, 4-pin	FSE 18-2 IM-PS-L4	742-51004
Transmitter / receiver	Infrared	Straight	NPN	Metal plug, M12, 4-pin	FSE 18-2 IM-NS-L4	742-51005
Transmitter / receiver	Infrared	Straight	PNP	Cable, 2 m, 4-wire	FSE 18-2 IM-PS-K4	742-51006
Transmitter / receiver	Infrared	Straight	NPN	Cable, 2 m, 4-wire	FSE 18-2 IM-NS-K4	742-51007

Scope of delivery
Transmitter & receiver
2 x securing nuts



Accessories	
Connection cables	From Page 670
Brackets	From Page 642



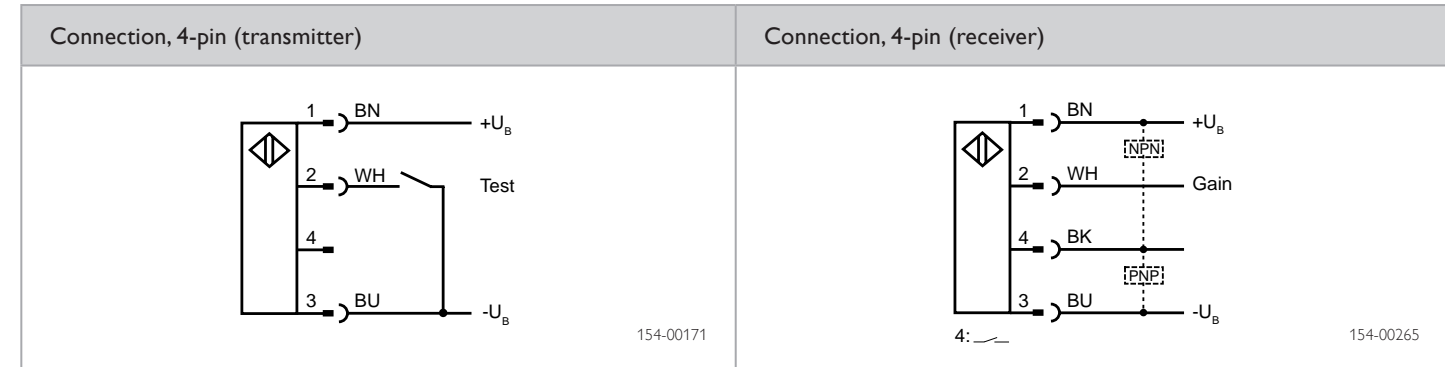
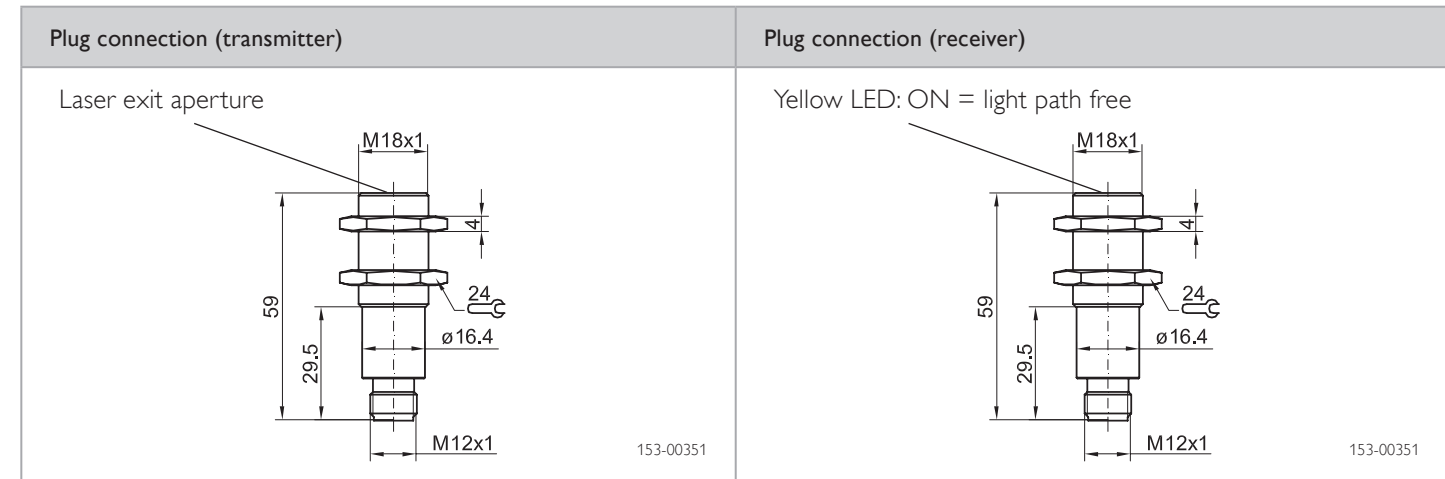
PRODUCT HIGHLIGHTS

- Operating range: 50 m
- Small housings
- Red light laser, 650 nm
- Control line for setting of 3 sensitivity levels
- Test input

Optical data		Functions	
Operating range	0 ... 50 m	Indicator LED, yellow	Switching output indicator
Type of light	Laser, pulsed, red, 650 nm	Sensitivity adjustment	Via control line
Laser Class (DIN EN 60825-1:2008-5)	2		
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30 V DC	Dimensions (plug device)	M18x1 x 59 mm
No-load current, I ₀	≤ 30 mA	Enclosure rating	IP 67 ²
Output current, I _e	≤ 100 mA	Material, housing	Brass, nickel-plated
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection (Q)	Type of connection	(See Selection Table)
Protection Class	2	Ambient temperature: operation	-20 ... +60 °C
Standby time	≤ 300 ms	Ambient temperature: storage	-20 ... +80 °C
Switching output, Q	PNP/NPN (see Selection Table)	Weight (transmitter / receiver)	70 g
Output function	N.O.		
Switching frequency, f (ti/tp 1:1)	≤ 10000 Hz		
Response time	50 μs		
Control input, Test	Test input (transmitter) -U _B : transmitter = off +U _B or Open: transmitter = on		
Control input, Gain	Open: medium sensitivity – medium distance ¹ -U _B : high sensitivity – high distance ¹ +U _B : low sensitivity – low distance		

¹ Change in Gain setting is only effective after renewed switch on / switch off ² With connected IP 67 plug

Transmitter / receiver	Switching output	Type of connection	Part number	Article number
Receiver	PNP	Plug, M12x1, 4-pin	FE 18 RL-PS-L4	580-51400
Receiver	NPN	Plug, M12x1, 4-pin	FE 18 RL-NS-L4	580-51399
Transmitter	–	Plug, M12x1, 4-pin	FS 18 RL-L4	580-51398



Accessories	
Connection cables	From Page 670
Brackets	From Page 642



PRODUCT HIGHLIGHTS

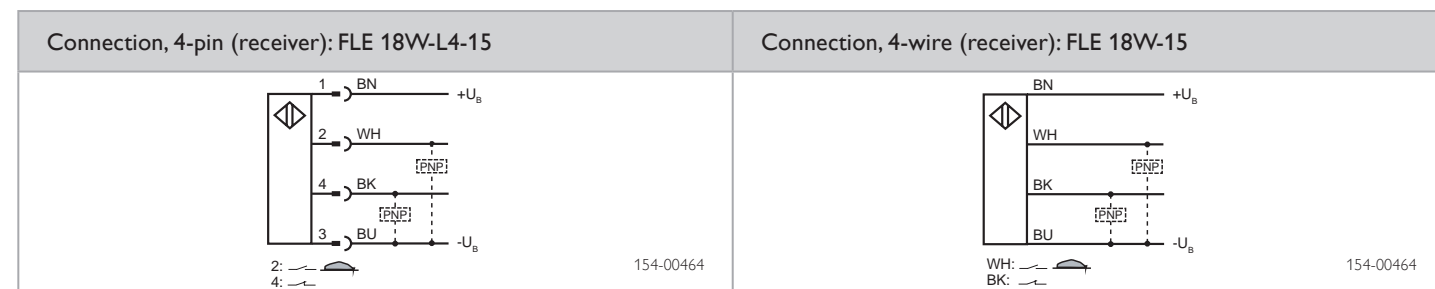
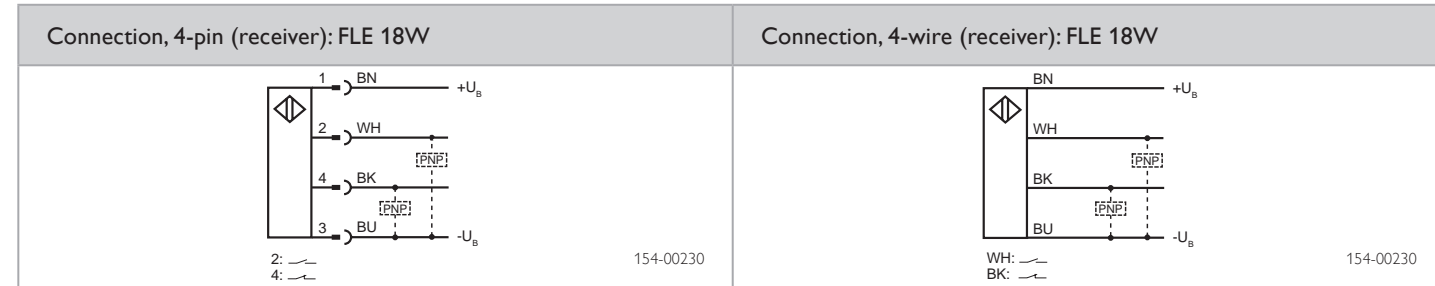
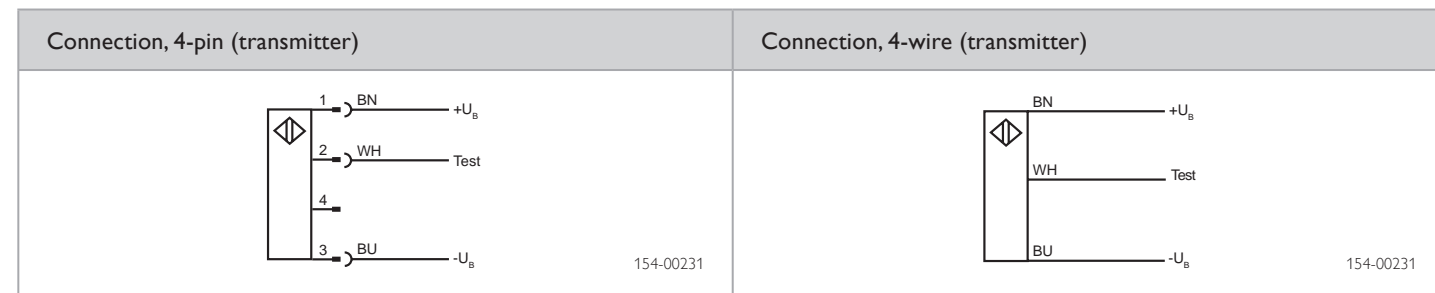
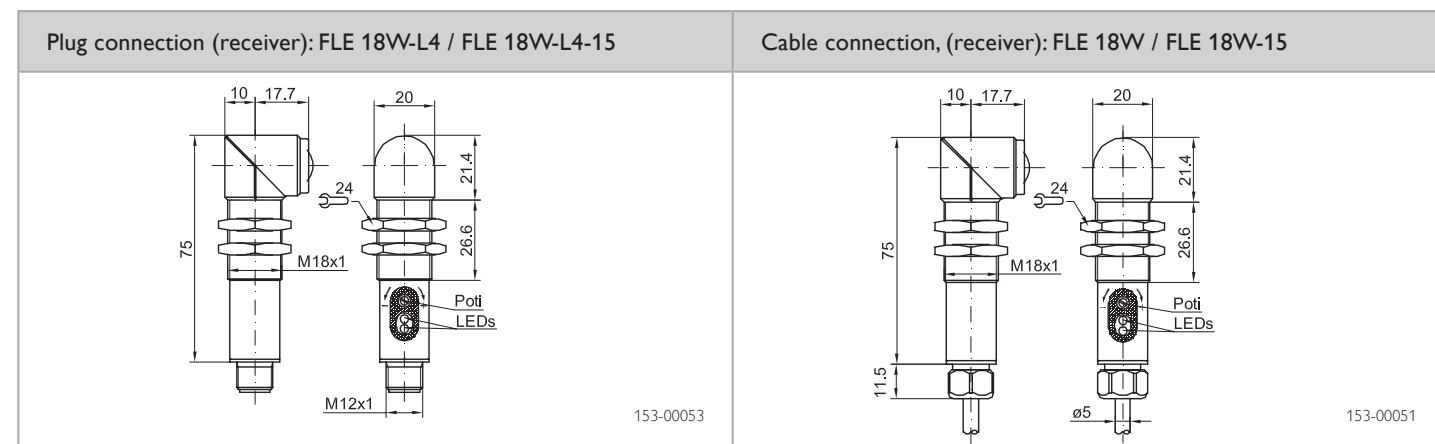
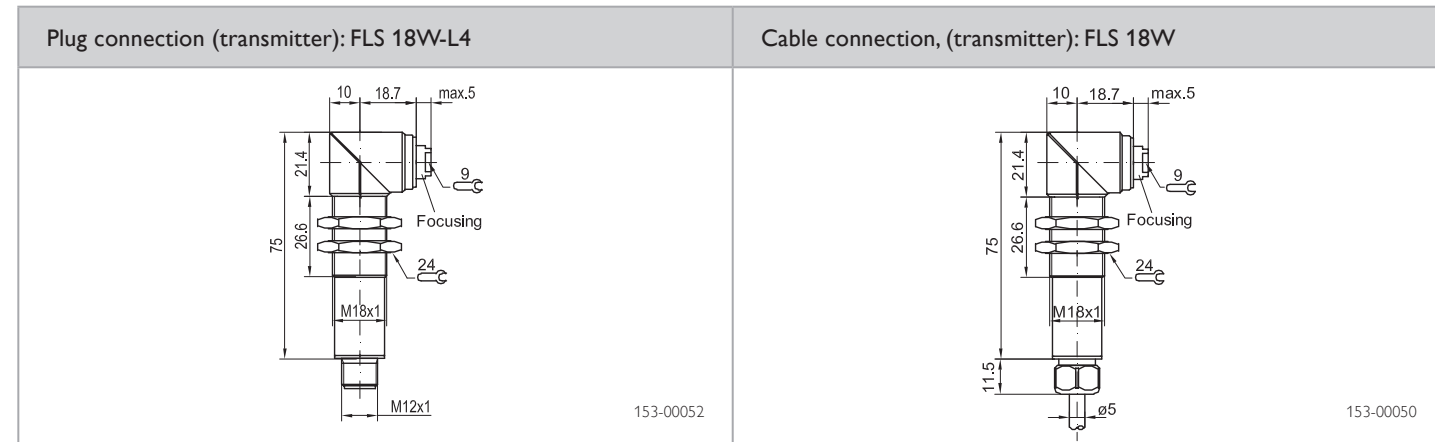
- Operating range: 50 m
- Red light laser, 650 nm
- Transmitter beam can be focused according to application
- Accuracy adjustable via beam spot size
- Smallest detectable part: 0.03 mm
- Switching frequency, 6000 Hz
- Metal M18 threaded sleeve

Optical data		Functions	
Operating range	0 ... 50 m	Indicator LED, green	Operating voltage indicator
Type of light	Laser, red, 650 nm	Indicator LED, yellow	Switching output indicator
Laser Class (DIN EN 60825-1:2008-5)	2	Indicator LED, red	Contamination indicator
		Sensitivity adjustment	Via 18-step potentiometer
		Default settings	Max. operating range
Electrical data		Mechanical data	
Operating voltage, +U _b	10 ... 30V DC ¹	Dimensions	(See dimensional drawings)
No-load current, I ₀	≤ 25 mA	Enclosure rating	IP 65 ²
Output current, I _e	≤ 200 mA	Material, housing	Brass, nickel-plated
Protective circuits	Reverse-polarity protection, U _b / short-circuit protection (Q)	Type of connection	(See Selection Table)
Protection Class	2	Ambient temperature: operation	-10 ... +50 °C
Standby time	≤ 300 ms	Ambient temperature: storage	-20 ... +80 °C
Switching output, Q	PNP	Weight (plug device)	85 g
Output function	N.O./N.C. (see Selection Table)	Weight (receiver device)	190 g
Switching frequency, f (ti/tp 1:1)	≤ 6000 Hz		
Response time	83 μs		
Control input, Test	< 2V: transmitter off > 10V or Open: transmitter on		

¹ 10 % ripple, within U_b ² With connected IP 65 plug

Transmitter / receiver	Switching output	Type of connection	Part number	Article number
Transmitter	-	Plug, M12x1, 4-pin	FLS 18W-L4	580-51408
Receiver	PNP (N.O./N.C.)	Plug, M12x1, 4-pin	FLE 18W-L4	580-51414
Receiver	PNP (N.C.)	Plug, M12x1, 4-pin	FLE 18W-L4-15	580-51415
Transmitter	-	Cable, 3 m, 4-wire	FLS 18W	580-51407
Receiver	PNP (N.O./N.C.)	Cable, 3 m, 4-wire	FLE 18W	580-51416
Receiver	PNP (N.C.)	Cable, 3 m, 4-wire	FLE 18W-15	580-51417

Accessories	
Connection cables	From Page 670
Brackets	From Page 642





PRODUCT HIGHLIGHTS

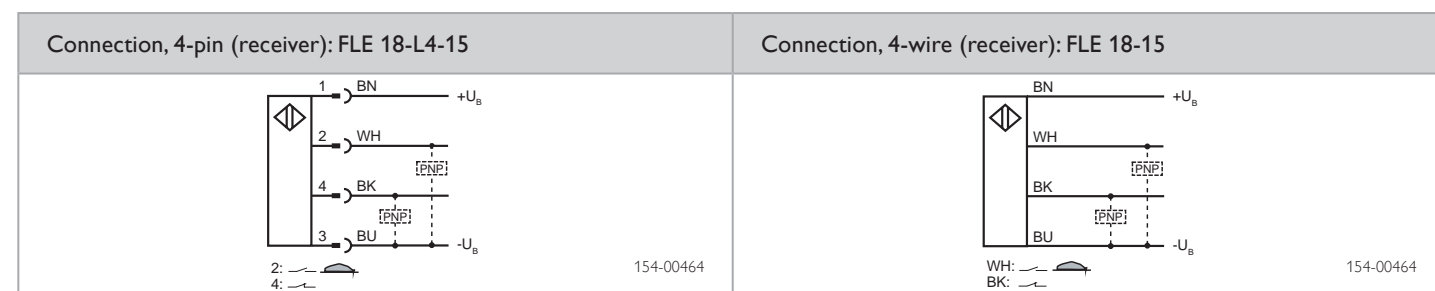
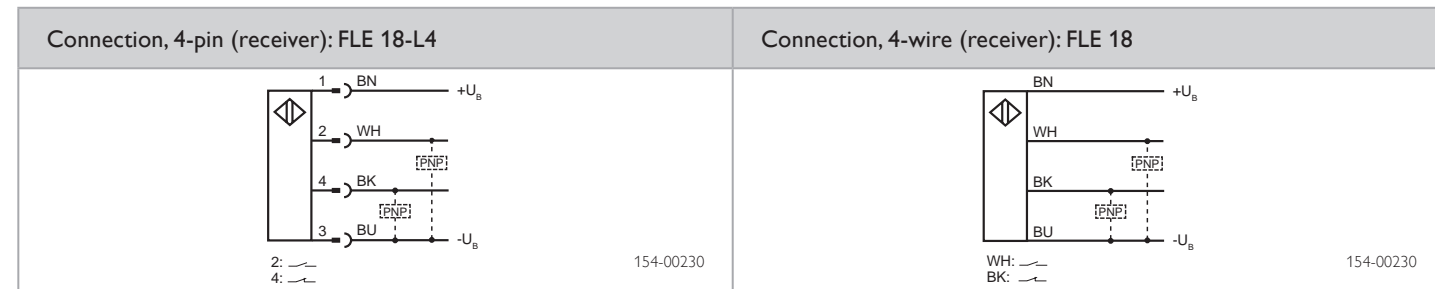
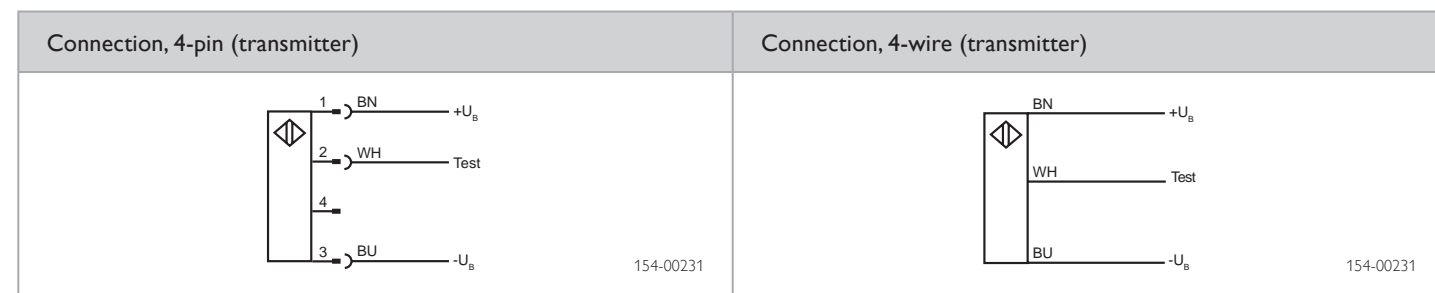
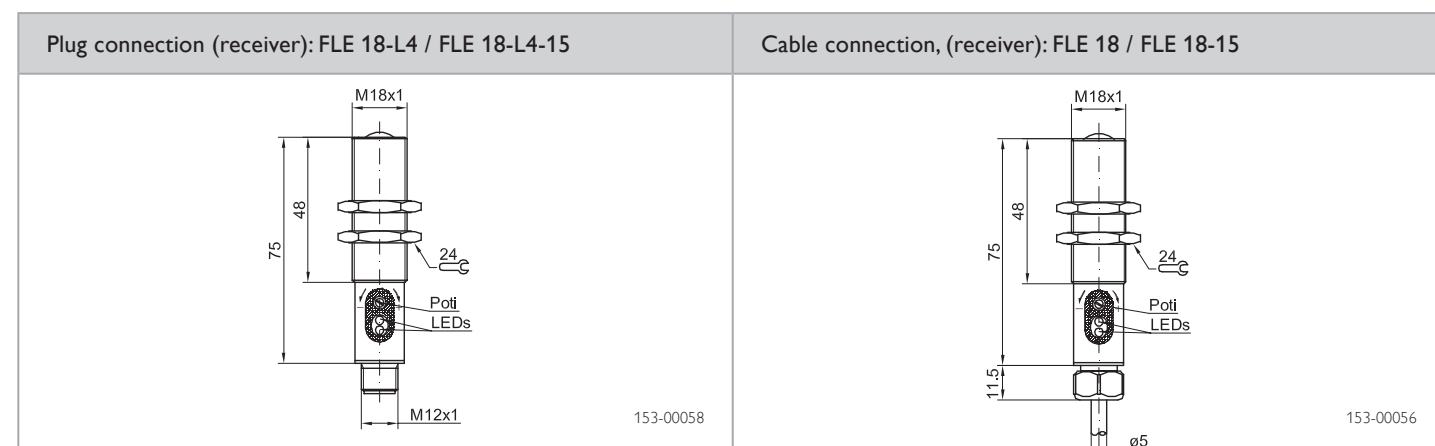
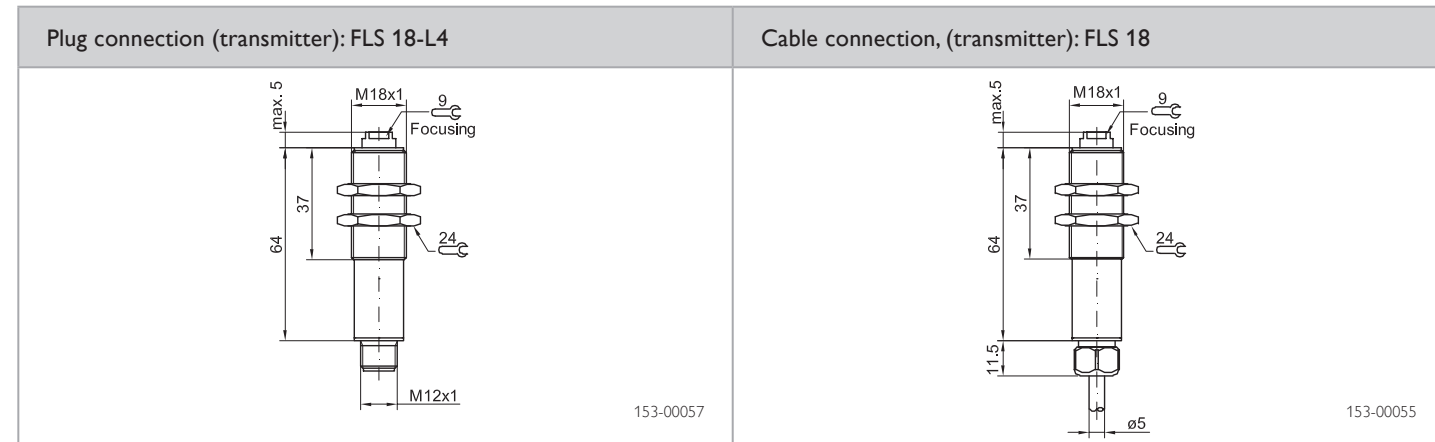
- Operating range: 50 m
- Red light laser, 650 nm
- Transmitter beam can be focused according to application
- Accuracy adjustable via beam spot size
- Smallest detectable part: 0.03 mm
- Switching frequency, 6000 Hz
- Metal M18 threaded sleeve

Optical data		Functions	
Operating range	0 ... 50 m	Indicator LED, green	Operating voltage indicator
Type of light	Laser, red, 650 nm	Indicator LED, yellow	Switching output indicator
Laser Class (DIN EN 60825-1:2008-5)	2	Indicator LED, red	Contamination indicator
		Sensitivity adjustment	Via 18-step potentiometer
		Default settings	Max. operating range
Electrical data		Mechanical data	
Operating voltage, +U _b	10 ... 30V DC ¹	Dimensions	(See dimensional drawings)
No-load current, I ₀	≤ 25 mA	Enclosure rating	IP 65 ²
Output current, I _e	≤ 200 mA	Material, housing	Brass, nickel-plated
Protective circuits	Reverse-polarity protection, U _b / short-circuit protection (Q)	Type of connection	(See Selection Table)
Protection Class	2	Ambient temperature: operation	-10 ... +50 °C
Standby time	≤ 300 ms	Ambient temperature: storage	-20 ... +80 °C
Switching output, Q	PNP	Weight (plug device)	85 g
Output function	N.O./N.C. (see Selection Table)	Weight (receiver device)	190 g
Switching frequency, f (ti/tp 1:1)	≤ 6000 Hz		
Response time	83 μs		
Control input, Test	< 2V: transmitter off > 10V or Open: transmitter on		

¹ 10 % ripple, within U_b ² With connected IP 65 plug

Transmitter / receiver	Switching output	Type of connection	Part number	Article number
Transmitter	-	Plug, M12x1, 4-pin	FLS 18-L4	580-51406
Receiver	PNP (N.O./N.C.)	Plug, M12x1, 4-pin	FLE 18-L4	580-51410
Receiver	PNP (N.C.)	Plug, M12x1, 4-pin	FLE 18-L4-15	580-51411
Transmitter	-	Cable, 3 m, 4-wire	FLS 18	580-51407
Receiver	PNP (N.O./N.C.)	Cable, 3 m, 4-wire	FLE 18	580-51412
Receiver	PNP (N.C.)	Cable, 3 m, 4-wire	FLE 18-15	580-51413

Accessories	
Connection cables	From Page 670
Brackets	From Page 642





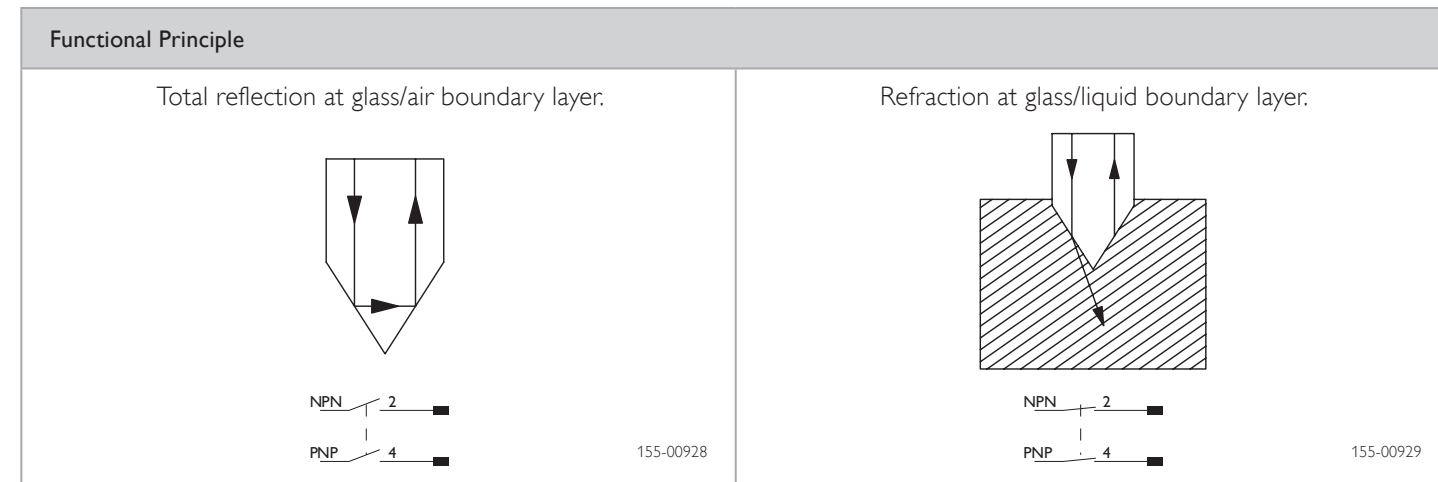
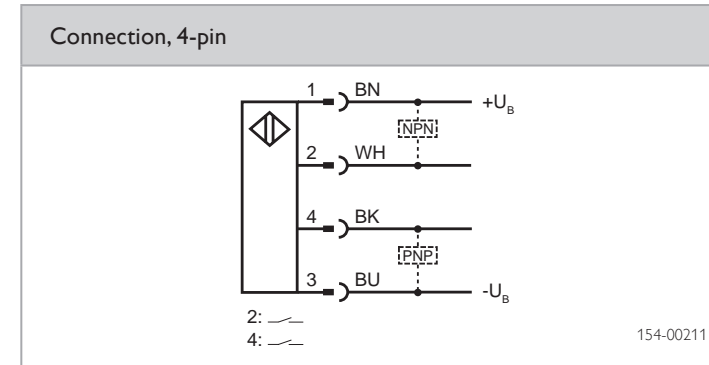
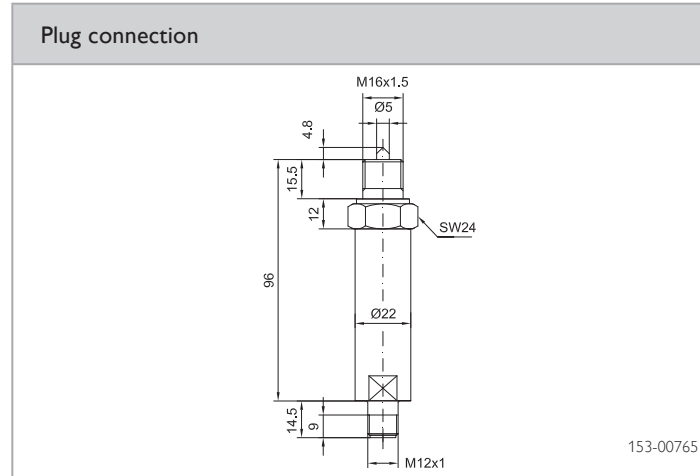
PRODUCT HIGHLIGHTS

- Sensor with glass rod prism for detecting liquids
- M16 x 1.5 thread for screwing into containers and pipes
- Reliable differentiation between liquids and foam
- Stainless steel

Optical data		Functions	
Scanning distance	(See Functional Principle)	Default settings	Switching process on submersion in a medium
Type of light	Infrared, pulsed, 880 nm	Condition	The refractive index of a liquid must be at least 1.20 Examples: reference air = 880 nm air = ca. 1.00 water = ca. 1.33 benzene = ca. 1.50 alcohol = ca. 1.32
Ambient light limit	1200 Lux		
Electrical data		Mechanical data	
Operating voltage, +U _B	10 ... 30V DC ¹	Dimensions	M16 x 96 mm
No-load current, I ₀	≤ 25 mA	Enclosure rating	IP 65 ²
Output current, I _e	≤ 200 mA	Material, housing	Stainless steel, V2A
Pull-up resistance	22 kΩ	Material, front screen	Glass
Pull-down resistance	22 kΩ	Type of connection	(See Selection Table)
Protective circuits	Reverse-polarity protection, U _B / short-circuit protection	Pressure resistance	10 bar
Protection Class	2	Impact resistance	EN 60947-5-2
Switching output, Q	PNP/NPN, antivalent	Ambient temperature: operation	-20 ... +60 °C
Output function	N.O.	Ambient temperature: storage	-40 ... +80 °C
Switching frequency, f (ti/tp 1:1)	≤ 1000 Hz	Weight (plug device)	140 g
Response time	500 μs		

¹ 10 % ripple, within U_B ² With connected IP 65 plug

Scanning distance	Type of connection	Part number	Article number
(See Functional Principle)	Plug, M12x1, 4-pin	FMF 18-34 L4-SP	504-50929



Accessories

Connection cables	From Page 670
Brackets	From Page 642