

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

All-round performance



















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.

TYPICAL F 04/05/12/18/30

- 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 | Teach-in  | 10 ... 60 mm | M12 housing, dynamic teach-in | 392 | |
| FMH 18 | Red | Potentiometer  | 40 ... 120 mm | M18 housing, very precise detection | 394 | |
| FT 12 RF | Red | None | 24 mm | M12 housing | 396 | |
| Photoelectric proximity sensors | | | | | | |
| FM 04 | Infrared | None | 0 ... 50 mm | Very small housing, M4 | 398 | 8 |
| FM 05 | Infrared | None | 0 ... 50 mm | Very small housing, M5 | 400 | |
| FT 12 R | Red | Potentiometer  | 1 ... 300 mm | | 402 | |
| FT 18-2 | Red / infrared | Potentiometer  | 0 ... 800 mm | M18 metal housing | 404 | |
| FT 18-2 | Red / infrared | Potentiometer  | 0 ... 800 mm | M18 plastic housing | 406 | |
| FMS 18-34 B | Infrared | Potentiometer  | 5 ... 400 mm | M18 housing | 408 | |
| FMS 30-34 B | Infrared | Potentiometer  | 5 ... 1000 mm | M30 housing, long operating range | 410 | |
| Retroreflective photoelectric sensors | | | | | | |
| FR 12 R | Red | Potentiometer  | 60 ... 1500 mm | M12 housing | 412 | |
| FR 18-2 | Red | Potentiometer  | 3.0 m | M18 metal housing | 414 | |
| FR 18-2 | Infrared | Potentiometer  | 3.6 m | M18 plastic housing | 416 | |
| Through-beam photoelectric sensors | | | | | | |
| FS/FE 12 RL | Laser  | Control line | 0 ... 5 m | M12 housing | 418 | |
| FSE 18-2 | Infrared | | 10 m | M18 housing | 420 | |
| FS/FE 18 RL | Laser  | Control line | 0 ... 50 m | M18 housing | 422 | |
| FL 18 W | Laser  | Potentiometer  | 0 ... 50 m | M18 housing, adjustable transmission beam size | 424 | |
| FL 18 | Laser  | Potentiometer  | 0 ... 50 m | M18 housing, adjustable transmission beam size | 426 | |
| Filling level sensor | | | | | | |
| FMF 18-34 | Infrared | Fixed | | M18 housing, detection of liquids | 428 | |

FT 12 RH

Photoelectric proximity sensor with background suppression



PRODUCT HIGHLIGHTS

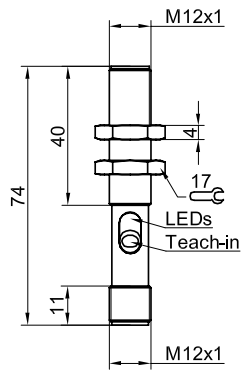
- Adjustable background suppression
- Dynamic teach-in via button / control line without machine stoppage
- Lockable Teach-in button

| 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 ... 30V 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

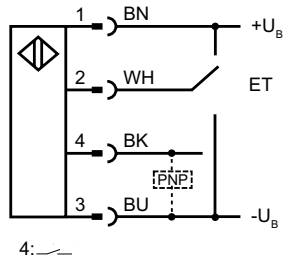
| Type of connection | Part number | Article number |
|--------------------|---------------|----------------|
| Plug, M12x1, 4-pin | FT 12 RH-PSL4 | 506-11000 |

Plug connection



153-00257

Connection, 4-pin



154-00164

Accessories

Connection cables

From Page A-32

Brackets

From Page A-4

FMH 18

Photoelectric proximity sensor with background suppression



PRODUCT HIGHLIGHTS

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

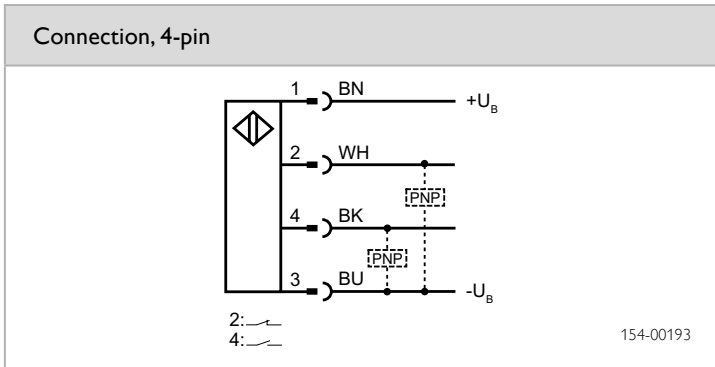
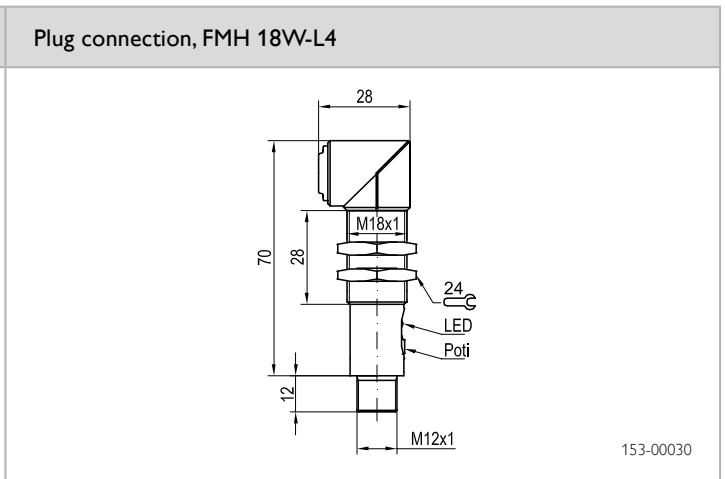
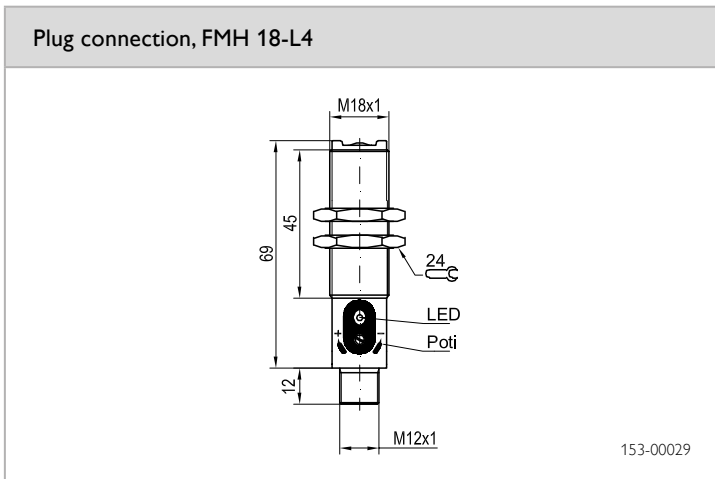
| Optical data | | Functions | |
|------------------------------------|--|--------------------------------|---------------------------|
| Scanning distance | 40 ... 120 mm ¹ | Indicator LED, yellow | Switching state indicator |
| Type of light | Red, 660 nm | Scanning distance adjustment | Via 18-step potentiometer |
| Light spot size | 8 x 10 mm ² | | |
| Electrical data | | Mechanical data | |
| Operating voltage, +U _B | 10 ... 30V 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 |
| Power On Delay | ≤ 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

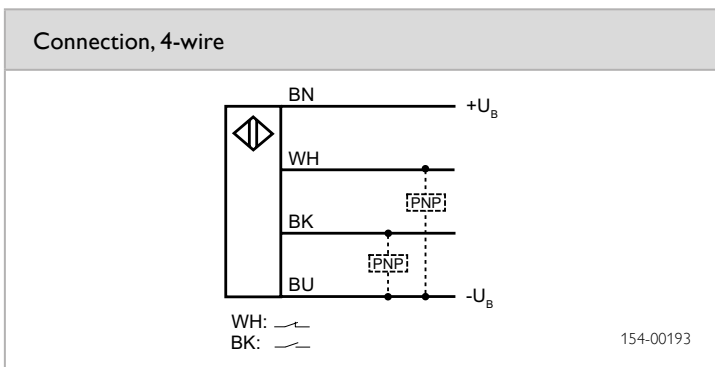
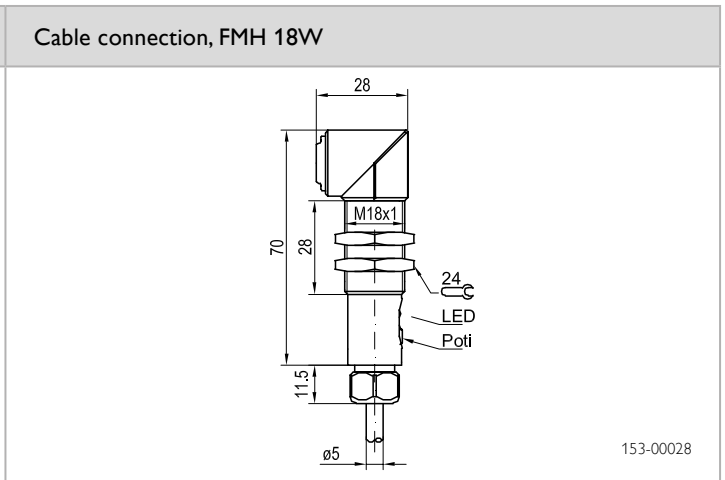
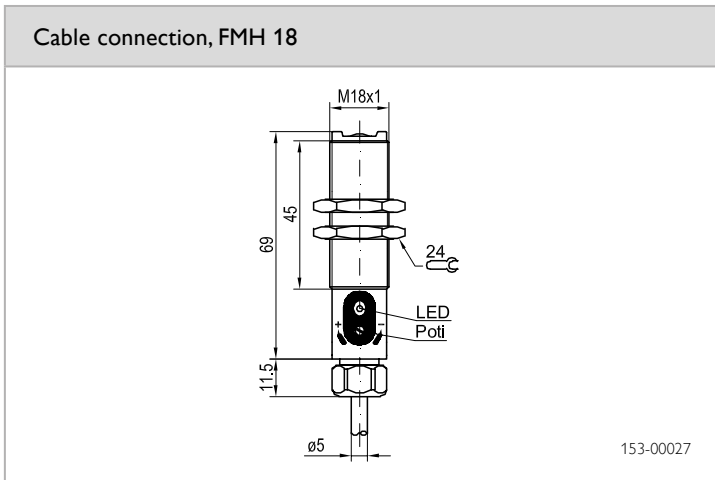
| Scanning distance | Light exit | Switching output | Type of connection | Part number | Article number |
|-------------------|------------|------------------|--------------------|-------------|----------------|
| 40 ... 120 mm | Straight | PNP, antivalent | Plug, M12, 4-pin | FMH 18-L4 | 518-51505 |
| 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 |

Accessories

| | |
|-------------------|----------------|
| Connection cables | From Page A-32 |
| Brackets | From Page A-4 |



8



FT 12 RF

Fixed focus photoelectric proximity sensor with background suppression



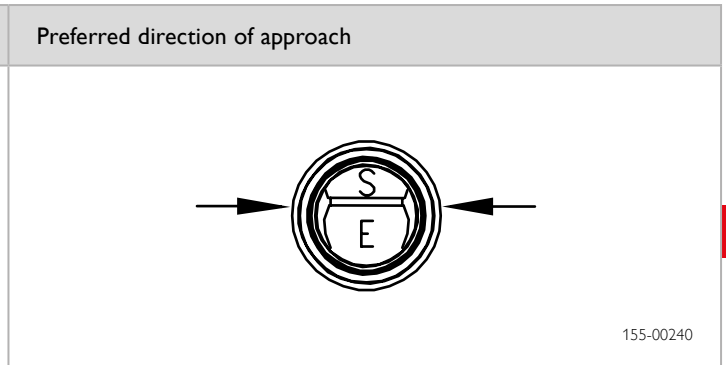
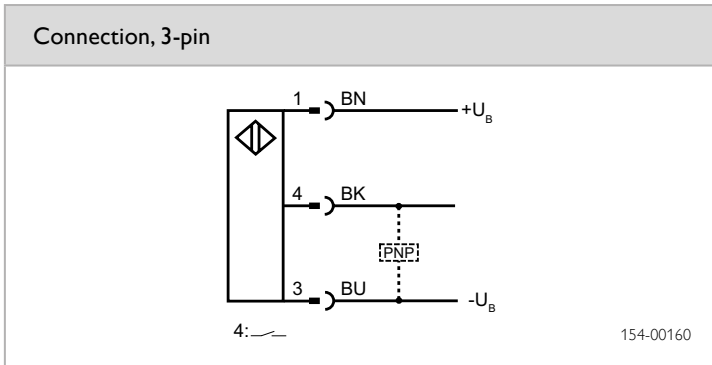
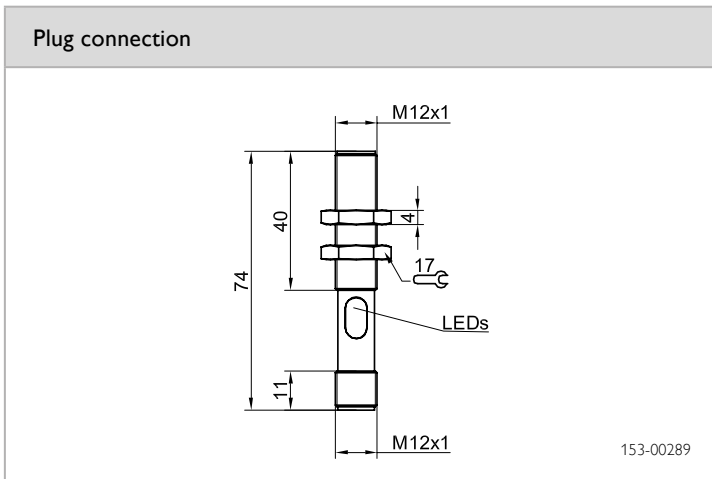
PRODUCT HIGHLIGHTS

- 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 ²With connected IP 67 plug

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



Accessories

| | |
|-------------------|----------------|
| Connection cables | From Page A-32 |
| Brackets | From Page A-4 |

FM 04

Photoelectric proximity sensor



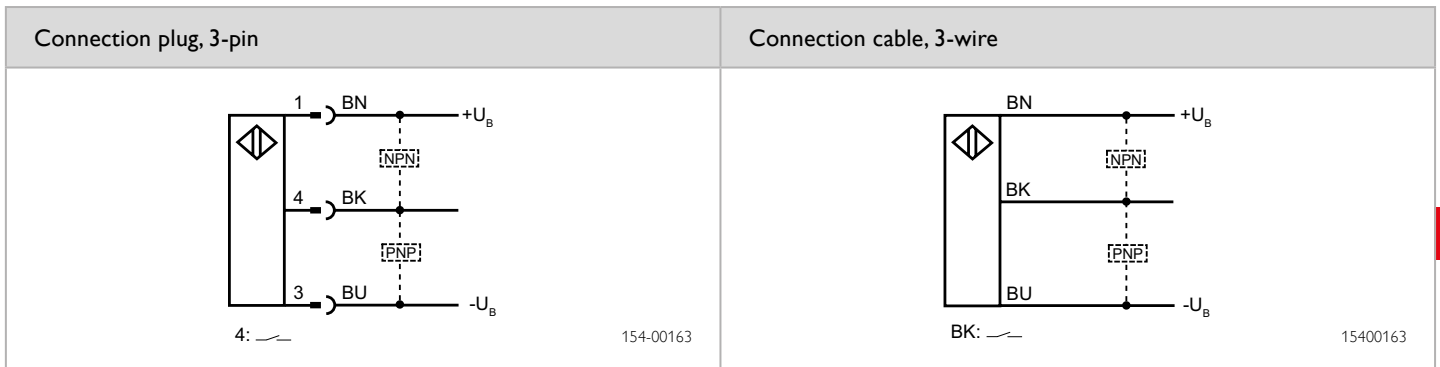
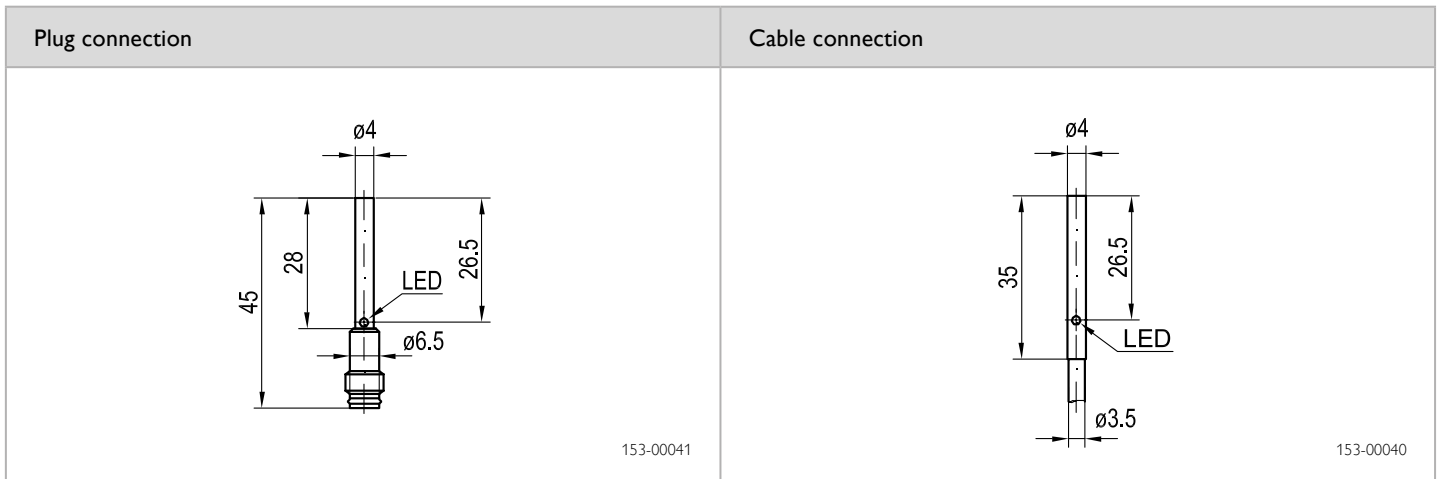
PRODUCT HIGHLIGHTS

- 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 ... 30V 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 |
| Power On Delay | 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 , 2 m | FM 04-161 | 718-51398 |
| NPN | Cable, PVC, 3 x 0.14 mm ² , 2 m | FM 04-151 | 718-51399 |



| Accessories | |
|-------------------|----------------|
| Connection cables | From Page A-32 |
| Brackets | From Page A-4 |

FM 05

Photoelectric proximity sensor



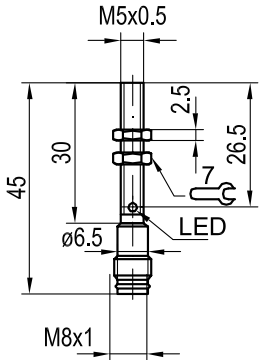
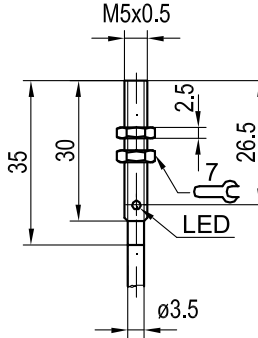
PRODUCT HIGHLIGHTS

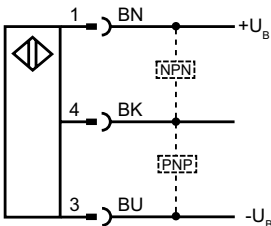

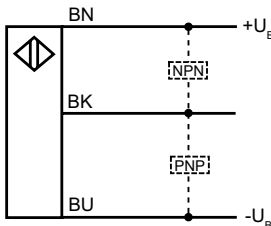

- Very small housing: cylindrical, M5
- Simple installation due to standard thread
- Glass optics for easy cleaning
- Fully sealed under vacuum, enclosure rating of IP 67

| 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 ... 30V 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 |
| Power On Delay | 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 ²With 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 , 2 m | FM 05-161 | 718-51402 |
| NPN | Cable, PVC, 3 x 0.14 mm ² , 2 m | FM 05-151 | 718-51403 |

| Plug connection | Cable connection |
|--|--|
|  <p style="text-align: center;">M5x0.5</p> <p style="text-align: center;">45</p> <p style="text-align: center;">30</p> <p style="text-align: center;">2.5</p> <p style="text-align: center;">7</p> <p style="text-align: center;">26.5</p> <p style="text-align: center;">LED</p> <p style="text-align: center;">ø6.5</p> <p style="text-align: center;">M8x1</p> <p style="text-align: right;">153-00043</p> |  <p style="text-align: center;">M5x0.5</p> <p style="text-align: center;">35</p> <p style="text-align: center;">30</p> <p style="text-align: center;">2.5</p> <p style="text-align: center;">7</p> <p style="text-align: center;">26.5</p> <p style="text-align: center;">LED</p> <p style="text-align: center;">ø3.5</p> <p style="text-align: right;">153-00042</p> |

| Connection plug, 3-pin | Connection cable, 3-wire |
|--|---|
|  <p style="text-align: center;">1 BN +U_B</p> <p style="text-align: center;">[NPN]</p> <p style="text-align: center;">4 BK</p> <p style="text-align: center;">[PNP]</p> <p style="text-align: center;">3 BU -U_B</p> <p style="text-align: center;">4: </p> <p style="text-align: right;">154-00163</p> |  <p style="text-align: center;">BN +U_B</p> <p style="text-align: center;">[NPN]</p> <p style="text-align: center;">BK</p> <p style="text-align: center;">[PNP]</p> <p style="text-align: center;">BU -U_B</p> <p style="text-align: center;">BK: </p> <p style="text-align: right;">154-00163</p> |

| Accessories | |
|-------------------|----------------|
| Connection cables | From Page A-32 |
| Brackets | From Page A-4 |

FT 12 R

Photoelectric proximity sensor



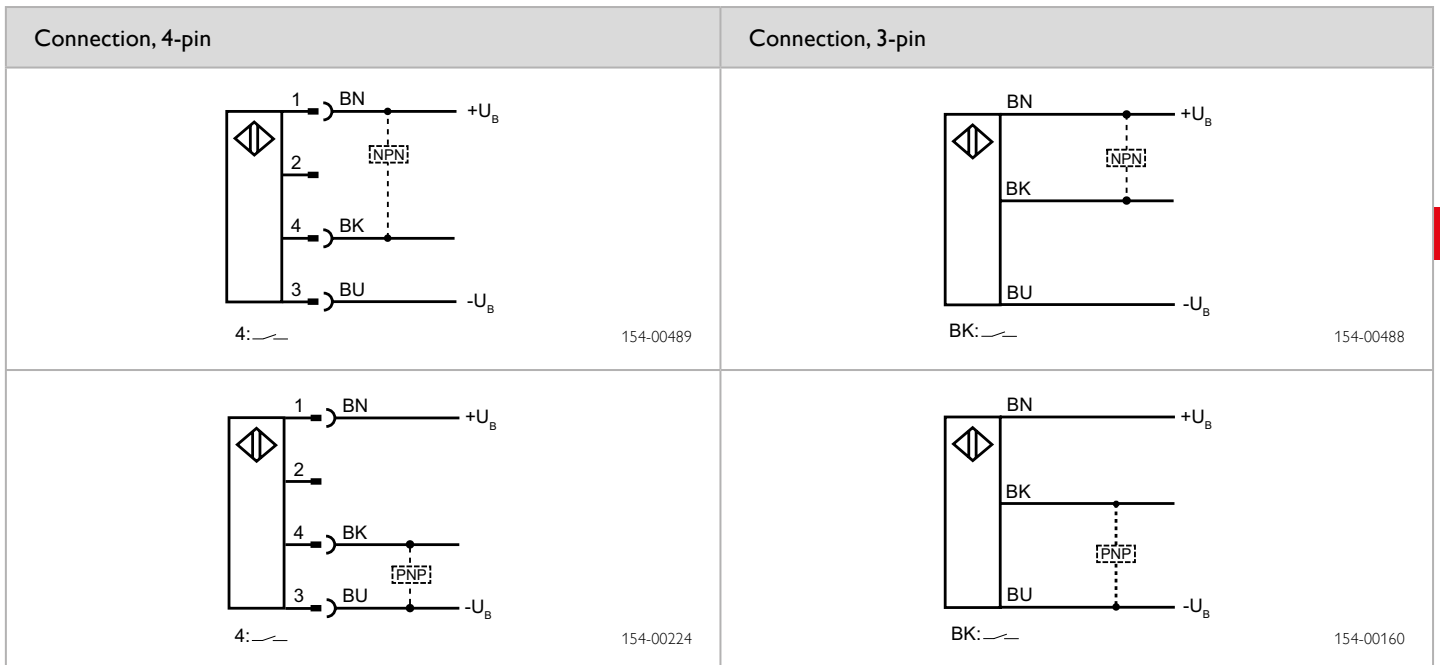
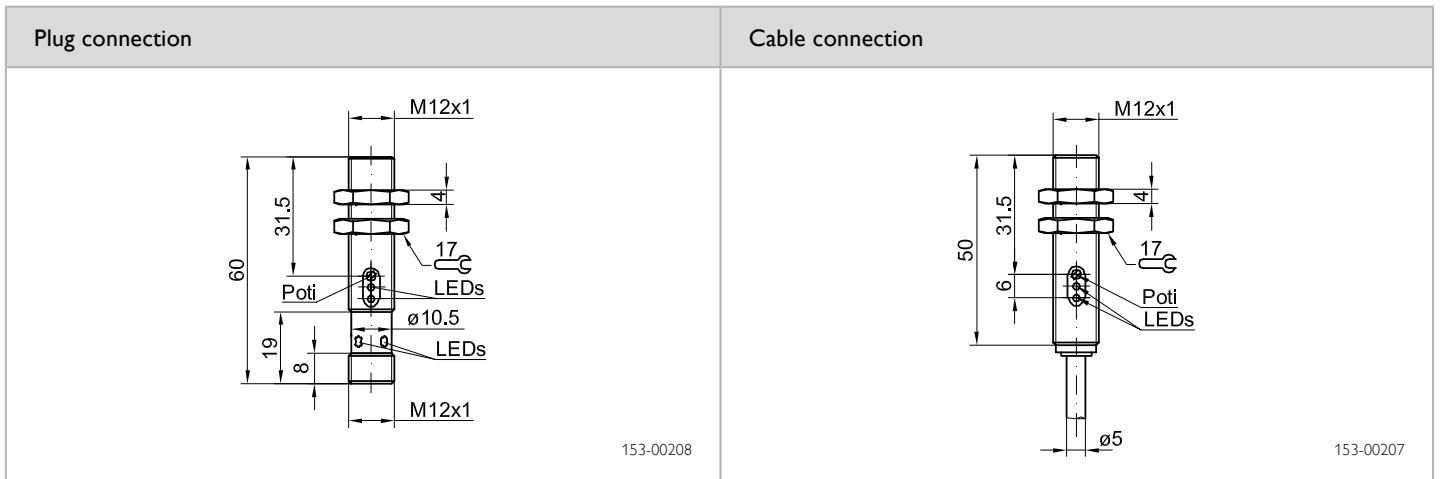
PRODUCT HIGHLIGHTS

- 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 |
| Power On Delay | 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 | |
|-------------------|----------------|
| Connection cables | From Page A-32 |
| Brackets | From Page A-4 |

FT 18-2

Diffuse photoelectric proximity sensor



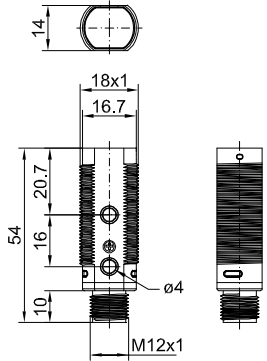
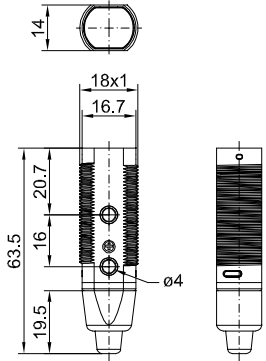
PRODUCT HIGHLIGHTS

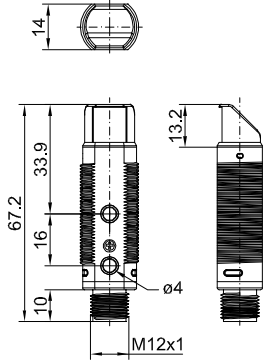
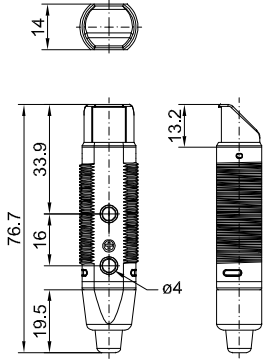
- Economical solution for numerous applications
- Scanning distance of up to 800 mm, adjustable via potentiometer
- Red light or infrared
- Variants with angled light exit
- Robust metal housings (IP 67)
- Simple adjustment via potentiometer
- 2 through holes as additional mounting possibility

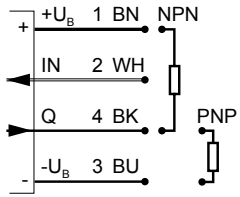
| Optical data | | Functions | |
|------------------------------------|---|--------------------------------|---------------------------------------|
| Scanning distance | See Selection Table | Indicator LED, green | Operating voltage indicator |
| Type of light | See Selection Table | Indicator LED, 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 | $-U_B = \text{N.O.} / +U_B = \text{N.C.}$ | 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 |

| Plug connection (straight) | Cable connection (straight) |
|---|---|
|  <p style="text-align: right;">153-00985</p> |  <p style="text-align: right;">153-00984</p> |

| Plug connection (angled) | Cable connection (angled) |
|--|--|
|  <p style="text-align: right;">153-00987</p> |  <p style="text-align: right;">153-00986</p> |

| Connection, 4-pin |
|---|
|  <p style="text-align: right;">154-00312</p> |

| Accessories | |
|-------------------|----------------|
| Connection cables | From Page A-32 |
| Brackets | From Page A-4 |

FT 18-2

Diffuse photoelectric proximity sensor



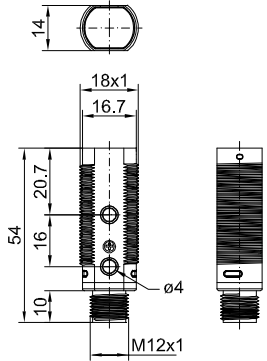
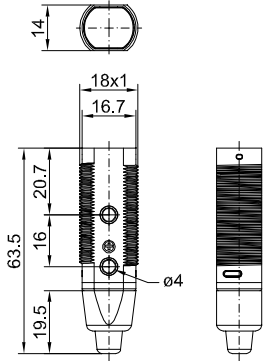
PRODUCT HIGHLIGHTS

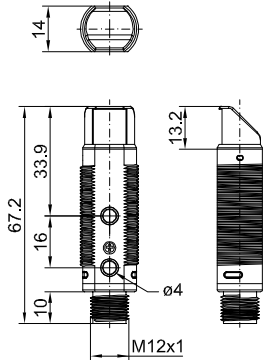
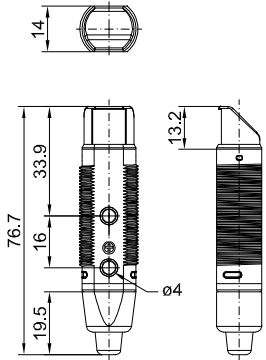
- Economical solution for numerous applications
- Scanning distance of up to 800 mm, adjustable via potentiometer
- Red light or infrared
- Variants with angled light exit
- Robust plastic housings (IP 67)
- Simple adjustment via potentiometer
- 2 through holes as additional mounting possibility

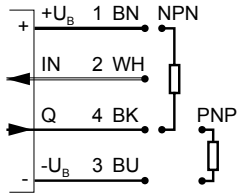
| Optical data | | Functions | |
|------------------------------------|---|--------------------------------|---------------------------------------|
| Scanning distance | See Selection Table | Indicator LED, green | Operating voltage indicator |
| Type of light | See Selection Table | Indicator LED, 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 ² Straight light exit variant ³ Angled 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 |

| Plug connection (straight) | Cable connection (straight) |
|---|---|
|  <p style="text-align: right;">153-00985</p> |  <p style="text-align: right;">153-00984</p> |

| Plug connection (angled) | Cable connection (angled) |
|--|--|
|  <p style="text-align: right;">153-00987</p> |  <p style="text-align: right;">153-00986</p> |

| Connection, 4-pin |
|---|
|  <p style="text-align: right;">154-00312</p> |

| Accessories | |
|-------------------|----------------|
| Connection cables | From Page A-32 |
| Brackets | From Page A-4 |

FMS 18-34 B

Photoelectric proximity sensor



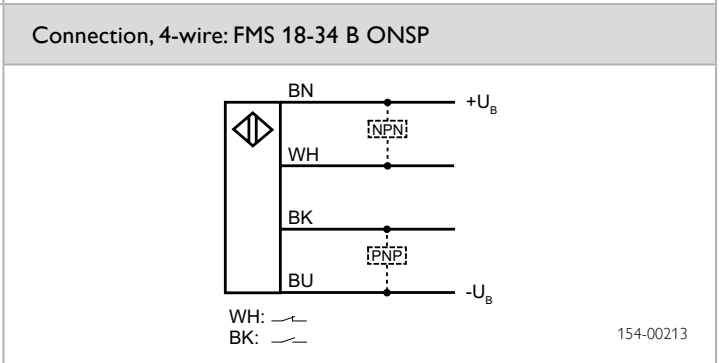
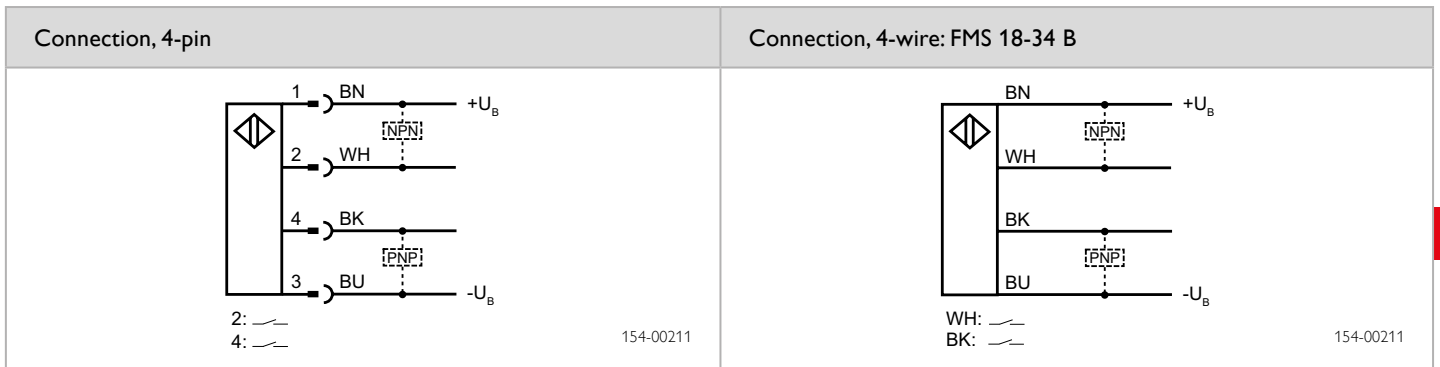
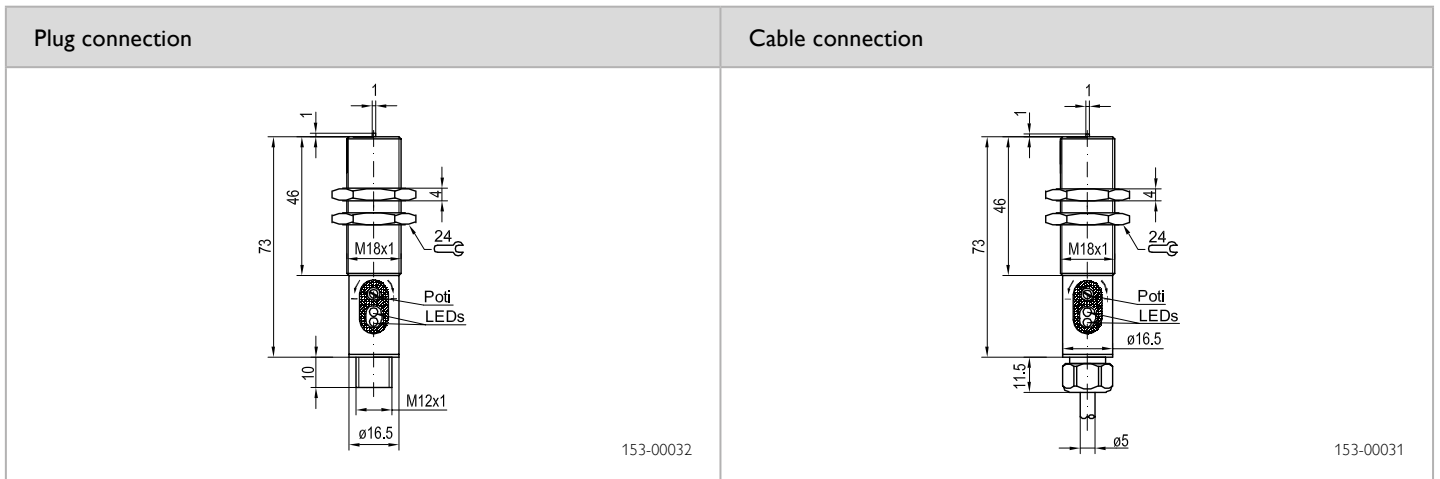
PRODUCT HIGHLIGHTS

- 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 |
| Power On Delay | ≤ 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 | 516-50782 |
| 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 A-32 |
| Brackets | From Page A-4 |

FMS 30-34 B

Photoelectric proximity sensor



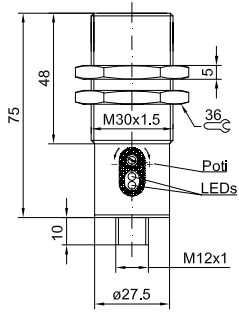
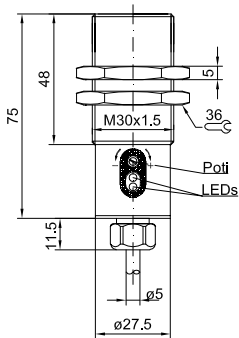
PRODUCT HIGHLIGHTS

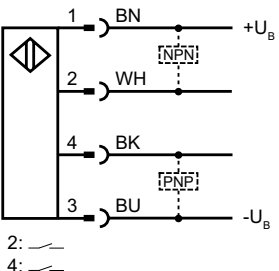
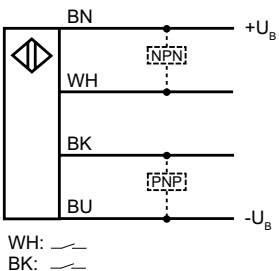
- Scanning distance: 5 ... 1000 mm, adjustable
- Wide beam (large aperture angle)
- Separating seam
- Metal M30 threaded sleeve
- Contamination indicator

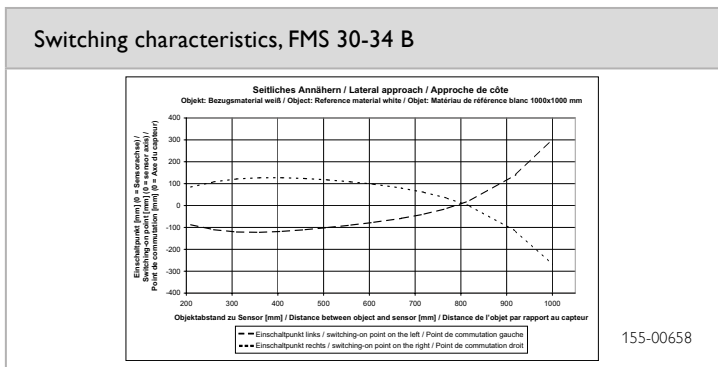
| Optical data | | Functions | |
|------------------------------------|--|---------------------------------|-----------------------------|
| Scanning distance | 5 ... 1000 mm ¹ | Indicator LED, green | Operating voltage indicator |
| Type of light | Infrared, 880 nm | Indicator LED, yellow | Switching 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 ... 30V DC ² | Dimensions | M12 × 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 |
| Power On Delay | ≤ 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 |

| Plug connection | Cable connection |
|---|---|
|  <p style="text-align: right;">153-00034</p> |  <p style="text-align: right;">153-00033</p> |

| Connection, 4-pin | Connection, 4-wire |
|--|--|
|  <p style="text-align: right;">154-00211</p> |  <p style="text-align: right;">154-00211</p> |



| Accessories | |
|-------------------|----------------|
| Connection cables | From Page A-32 |
| Brackets | From Page A-4 |

FR 12 R

Retroreflective photoelectric sensor



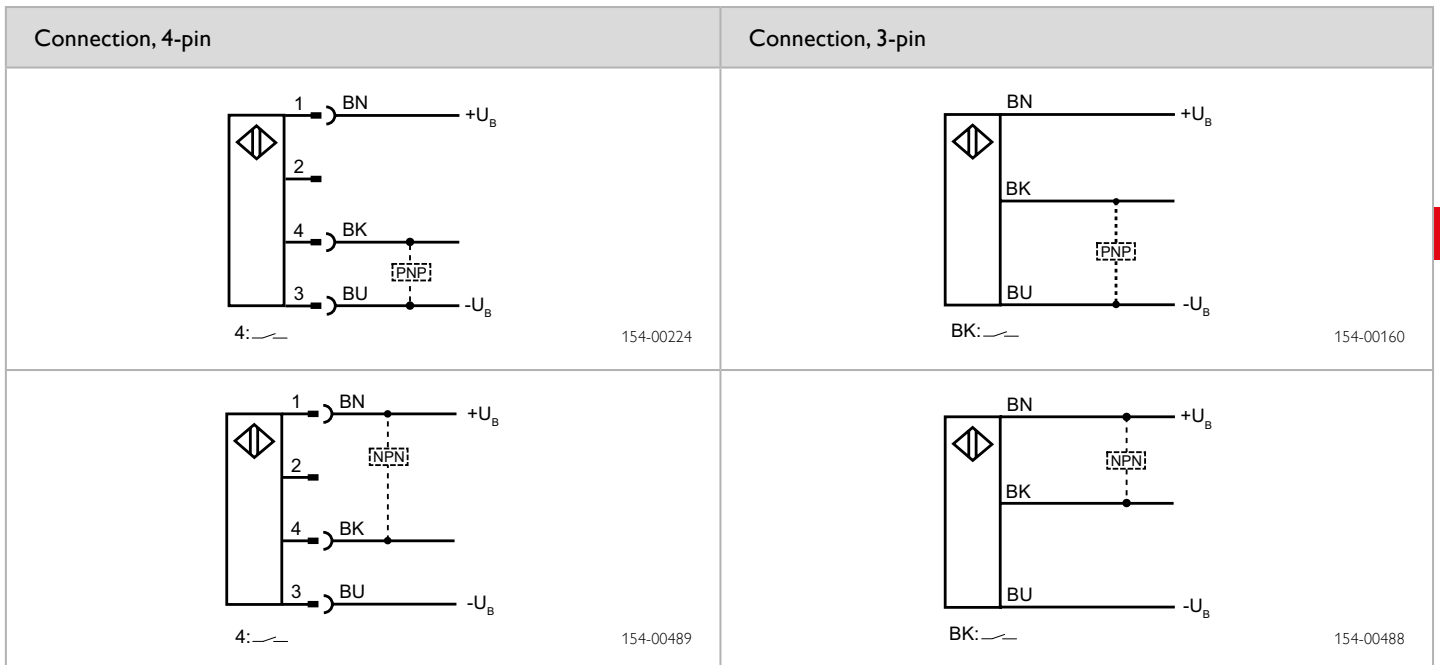
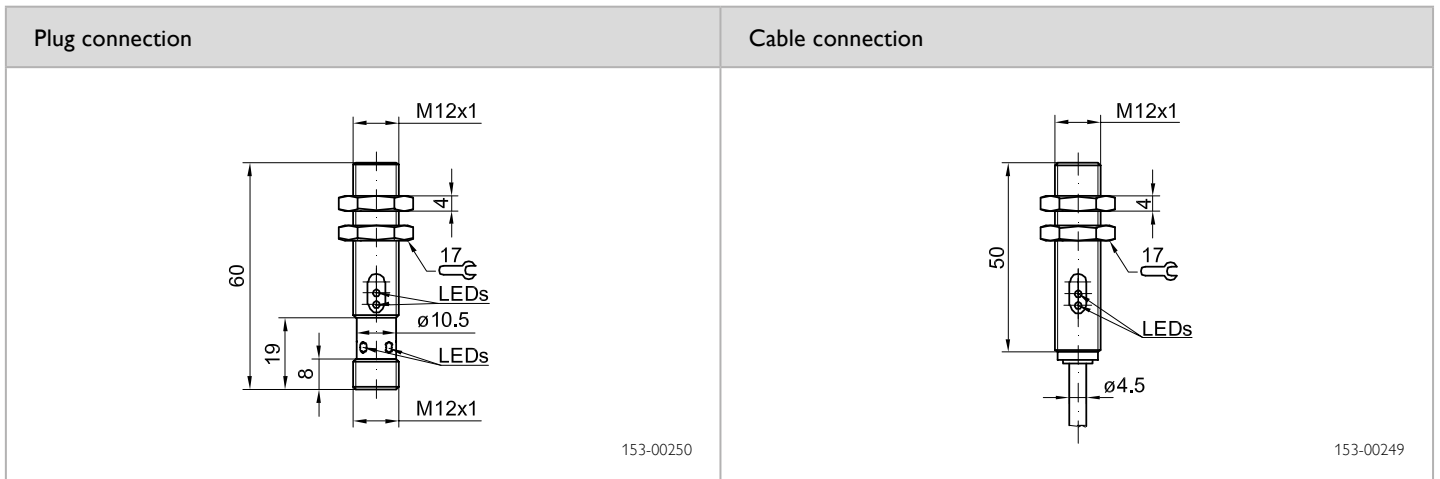
PRODUCT HIGHLIGHTS

- 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 ... 36V 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 |
| Power On Delay | 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 A-32 |
| Brackets | From Page A-4 |

FR 18-2

Retroreflective photoelectric sensor



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

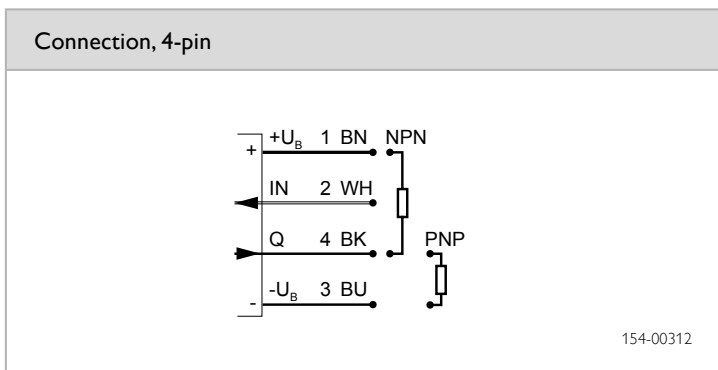
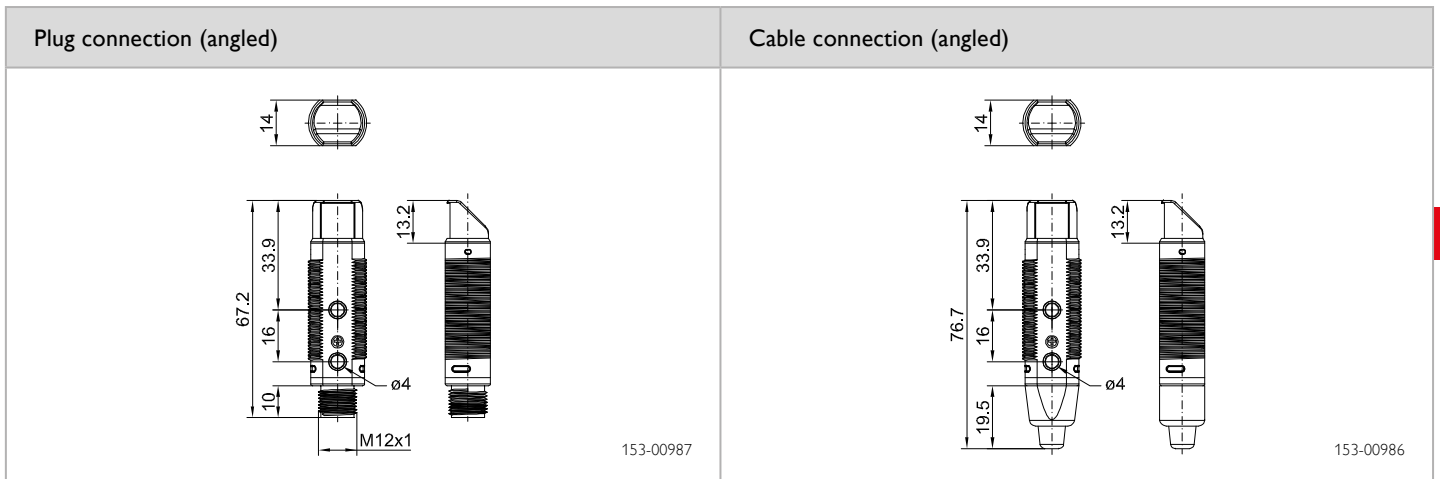
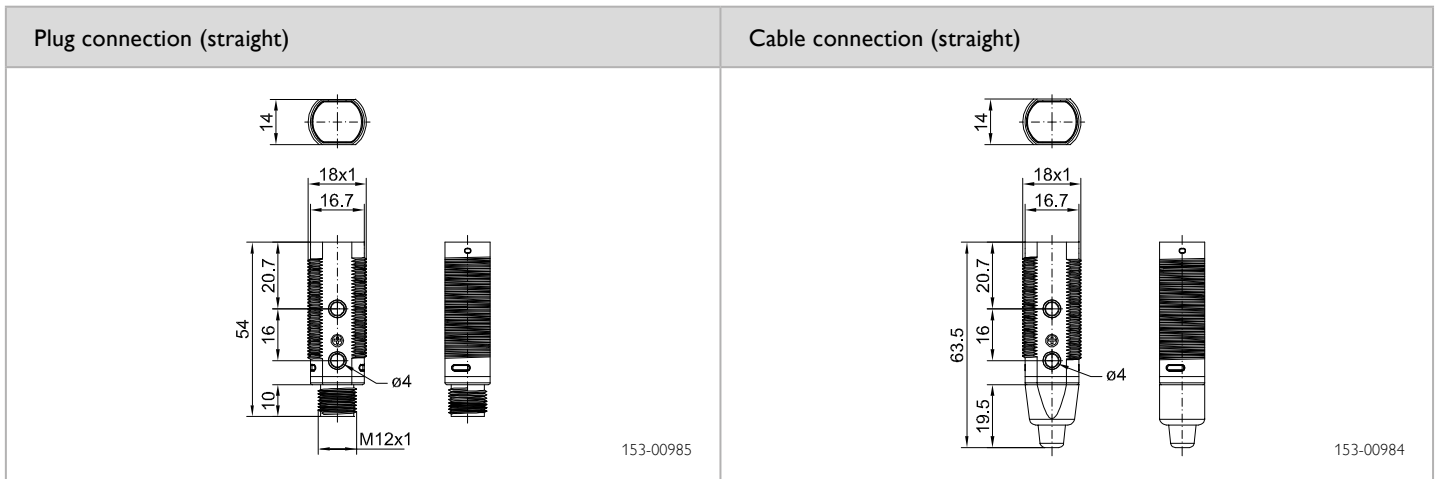
| Optical data | | Functions | |
|------------------------------------|--|--------------------------------|---------------------------------------|
| Operating range | See Selection Table ¹ | Indicator LED, green | Operating voltage indicator |
| Type of light | See Selection Table | Indicator LED, yellow | 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 mm²
2 x securing nuts



| Accessories | |
|-------------------|----------------|
| Reflectors | From Page A-16 |
| Connection cables | From Page A-32 |
| Brackets | From Page A-4 |

FR 18-2

Retroreflective photoelectric sensor



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

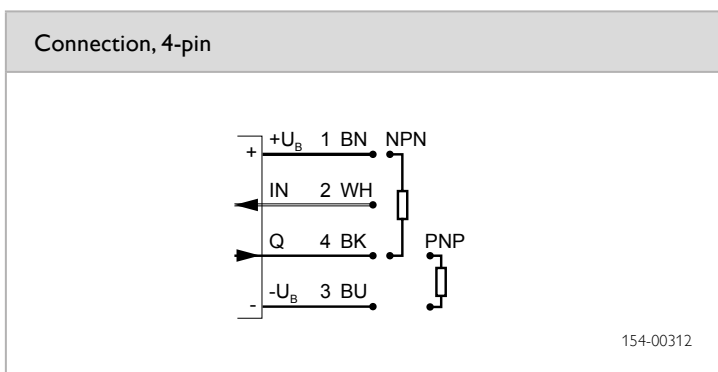
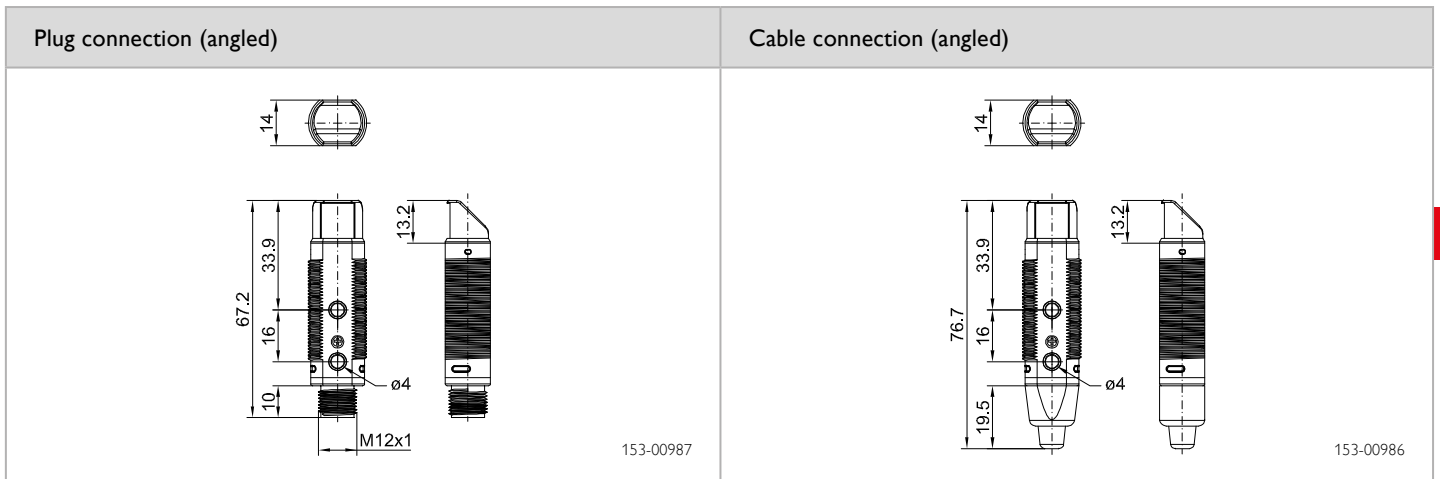
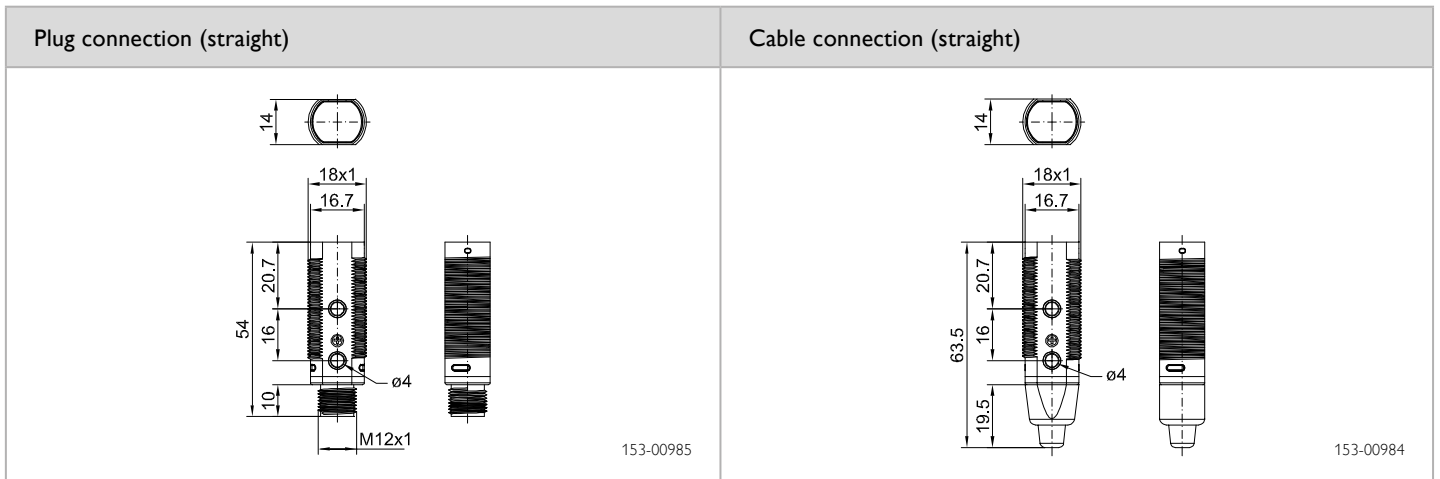
| Optical data | | Functions | |
|------------------------------------|--|--------------------------------|---------------------------------------|
| Operating range | See Selection Table ¹ | Indicator LED, yellow | Switching output indicator |
| Type of light | See Selection Table | Sensitivity adjustment | 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 mm²
2 x securing nuts



| Accessories | |
|-------------------|----------------|
| Reflectors | From Page A-16 |
| Connection cables | From Page A-32 |
| Brackets | From Page A-4 |

FS/FE 12 RL

Laser through-beam photoelectric sensor



CE

IP
67



PRODUCT HIGHLIGHTS

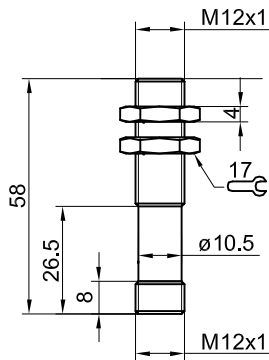
- Fine, parallel light beam
- Small part detection to 0.2 mm at a max. distance of 1 m
- Simple installation thanks to standard M12 metal thread
- Control line for setting of 3 sensitivity levels
- Test input

| 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 |
| Power On Delay | ≤ 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 | | |

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

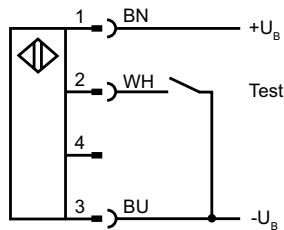
| Transmitter / receiver | Switching output | Type of connection | Part number | Article number |
|------------------------|------------------|--------------------|----------------|----------------|
| Receiver | PNP N.O. | Plug, M12, 4-pin | FE 12 RL-PS-L4 | 580-51402 |
| Receiver | PNP N.C. | Plug, 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)



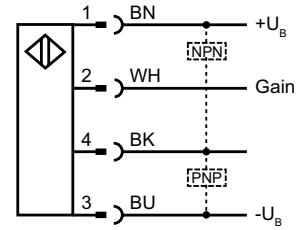
153-00345

Connection, transmitter, 4-pin



154-00171

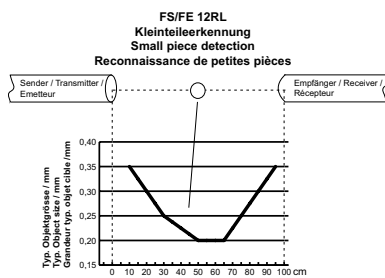
Connection, receiver, 4-pin: PNP/NPN



154-00265

8

Small part detection



155-00215

Accessories

Connection cables

From Page A-32

Brackets

From Page A-4

FSE 18-2

Through-beam photoelectric sensor



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 |

¹ With 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

| Plug connection | Cable connection |
|------------------|------------------|
| <p>153-00985</p> | <p>153-00984</p> |

| Connection, 4-pin (transmitter) | Connection, 4-pin (receiver) |
|---------------------------------|------------------------------|
| <p>154-00516</p> | <p>154-00312</p> |

| Accessories | |
|-------------------|----------------|
| Connection cables | From Page A-32 |
| Brackets | From Page A-4 |

FS/FE 18 RL

Laser through-beam photoelectric sensor



CE

IP
67



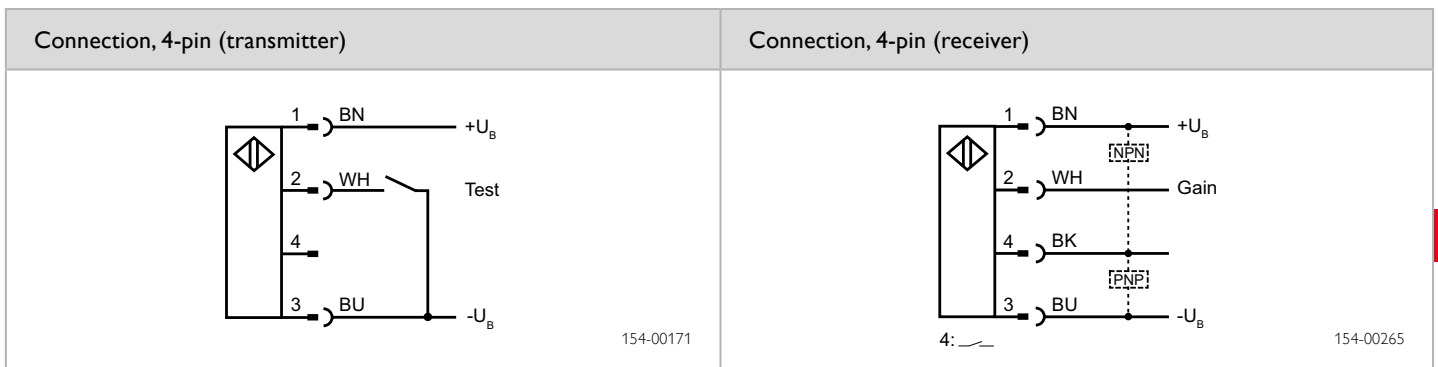
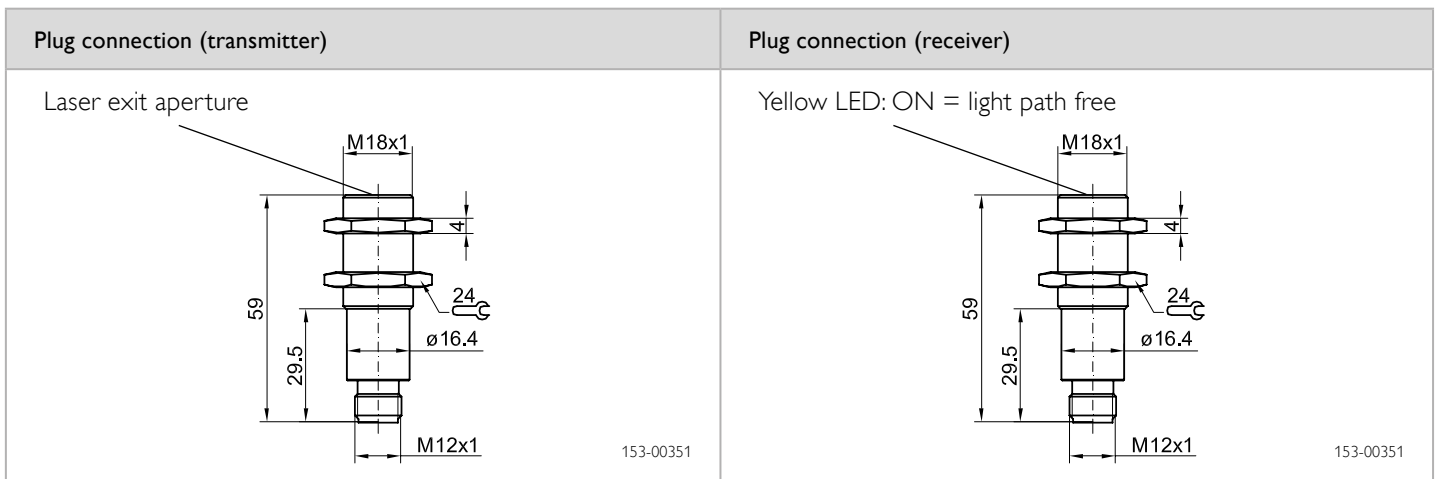
PRODUCT HIGHLIGHTS

- 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 ... 30V 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 |
| Power On Delay | ≤ 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 A-32 |
| Brackets | From Page A-4 |

FL 18 W

Laser through-beam photoelectric sensor



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 |
| Power On Delay | ≤ 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 ²With 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 | 580-51409 |
| 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 A-32 |
| Brackets | From Page A-4 |

| | |
|---|--|
| <p>Plug connection (transmitter): FLS 18W-L4</p> | <p>Cable connection, (transmitter): FLS 18W</p> |
| <p>153-00052</p> | <p>153-00050</p> |

| | |
|--|--|
| <p>Plug connection (receiver): FLE 18W-L4 / FLE 18W-L4-15</p> | <p>Cable connection, (receiver): FLE 18W / FLE 18W-15</p> |
| <p>153-00053</p> | <p>153-00051</p> |

| | |
|---|--|
| <p>Connection, 4-pin (transmitter)</p> | <p>Connection, 4-wire (transmitter)</p> |
| <p>154-00231</p> | <p>154-00231</p> |

| | |
|---|--|
| <p>Connection, 4-pin (receiver): FLE 18W</p> | <p>Connection, 4-wire (receiver): FLE 18W</p> |
| <p>154-00230</p> | <p>154-00230</p> |

| | |
|---|---|
| <p>Connection, 4-pin (receiver): FLE 18W-L4-15</p> | <p>Connection, 4-wire (receiver): FLE 18W-15</p> |
| <p>154-00464</p> | <p>154-00464</p> |

FL 18

Laser through-beam photoelectric sensor



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 |
| Power On Delay | ≤ 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 | | |

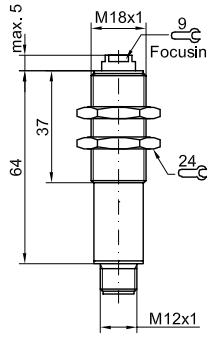
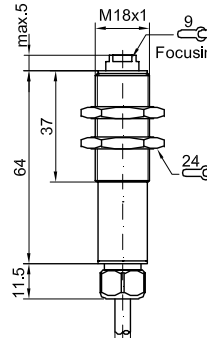
¹ 10 % ripple, within U_B ²With connected IP 65 plug

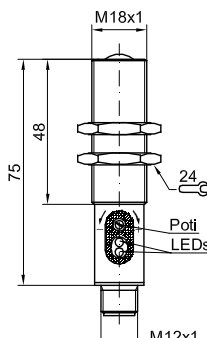
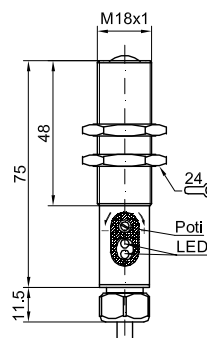
| Transmitter / receiver | Switching output | Type of connection | Part number | Article number |
|------------------------|------------------|--------------------|--------------|----------------|
| Transmitter | – | Plug, M12x1, 4-pin | FLS 18-L4 | 580-51406 |
| Receiver | PNP (N.O./N.C.) | Plug, M12x1, 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 |

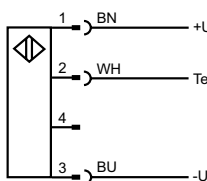
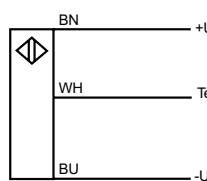
Accessories

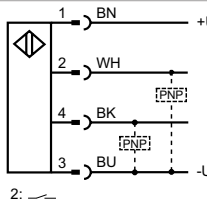
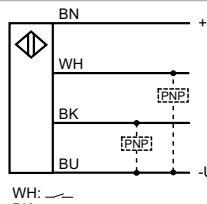
Connection cables
Brackets

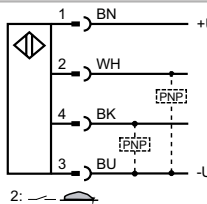
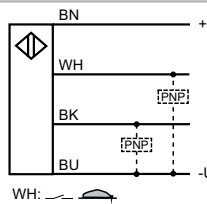
From Page A-32
From Page A-4

| Plug connection (transmitter): FLS 18-L4 | Cable connection, (transmitter): FLS 18 |
|--|--|
|  <p>153-00057</p> |  <p>153-00055</p> |

| Plug connection (receiver): FLE 18-L4 / FLE 18-L4-15 | Cable connection, (receiver): FLE 18 / FLE 18-15 |
|---|---|
|  <p>153-00058</p> |  <p>153-00056</p> |

| Connection, 4-pin (transmitter) | Connection, 4-wire (transmitter) |
|--|--|
|  <p>154-00231</p> |  <p>154-00231</p> |

| Connection, 4-pin (receiver): FLE 18-L4 | Connection, 4-wire (receiver): FLE 18 |
|--|--|
|  <p>154-00230</p> |  <p>154-00230</p> |

| Connection, 4-pin (receiver): FLE 18-L4-15 | Connection, 4-wire (receiver): FLE 18-15 |
|--|--|
|  <p>154-00464</p> |  <p>154-00464</p> |

FMF 18-34

Filling level sensor



PRODUCT HIGHLIGHTS

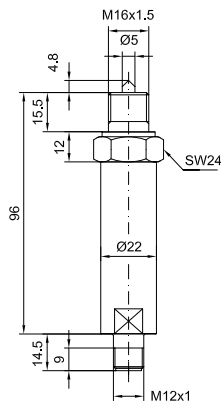
- Sensor with glass rod prism for detecting liquids
- M16 x 1.5 thread for screwing into containers and pipes
- Reliable differentiation between liquids and foam
- Stainless steel

| 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

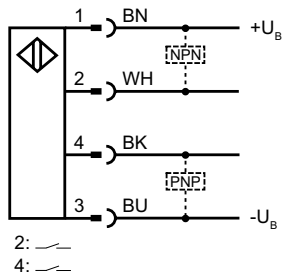
| Scanning distance | Type of connection | Part number | Article number |
|----------------------------|--------------------|-----------------|----------------|
| (See Functional Principle) | Plug, M12x1, 4-pin | FMF 18-34 L4-SP | 504-50929 |

Plug connection



153-00765

Connection, 4-pin

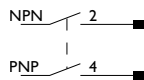
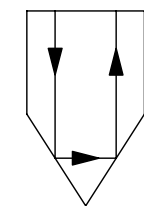


154-00211

8

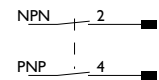
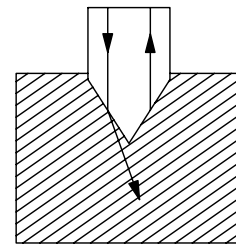
Functional Principle

Total reflection at glass/air boundary layer:



155-00928

Refraction at glass/liquid boundary layer:



155-00929

Accessories

Connection cables

From Page A-32

Brackets

From Page A-4