


# F 25 – the miniature sensor family of the new generation

The best of its type



 made in Germany



## The specialist for glass detection:

The FR 25-RGO retroreflective photoelectric sensor has been specially designed for detecting transparent objects. It offers absolutely precise and reproducible switching behaviour thanks to its autocollimation principle and automatic adaptation of the switching threshold (the DELTA function).

(Left) **Simple mounting, precise adjustment:** The robust aluminium dovetail mounting is particularly suitable when installation space is limited. It allows easy and accurate fine adjustment of the sensor after installation.

## Precise background suppression:

Thanks to extremely precise background suppression, the sensors of the F 25 series are completely immune to reflective and glossy machine parts and background effects. Together with switching that is independent of colour and object properties, F 25 sensors are the best on the market.



## TYPICAL F 25




















- The best black/white-shift on the market in this sensor class
- Precise background suppression thanks to the ASIC microchip
- Auto-detect: automatic adjustment of the switching output (PNP/NPN), unique on the market
- Precise detection of transparent objects of any shape (FR-25-RGO with DELTA function)
- Long ranges with compact miniature housing
- All sensors available in laser and LED designs
- Robust glass-fibre-reinforced plastic housings (IP 69K & IP 67, Ecolab)
- Robust sensor design with metal plug and mounting holes reinforced with metal inserts
- Simplest mounting thanks to dovetail, patented rod mounting and clamping jaws
- Safe operation thanks to Laser Class 1

The right sensor for every application: the new F 25 sensor family from SensoPart offers a very large range of variants – from the LED through-beam photoelectric sensor to the laser photoelectric proximity sensor with adjustable background suppression. Everything that the user could want is in the programme, including special applications: the FR 25-RGO autocollimation sensor detects transparent objects of any shape whilst automatically adapting its switching threshold to the operating conditions (the DELTA function).

Whether small-part detection or checking presence on a conveyor belt, the excellent performance of the F 25 series is always

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

The robust design with tightly sealed housings (IP 69K & IP 67), the tough metal plugs and mounting holes with metal inserts, the simple dovetail mounting, the easy setup via teach-in or control input, and the many other clever details ensure uncomplicated and efficient operating processes. Not to mention the Auto-detect function that is exclusive to SensoPart: sensors equipped with it autonomously detect whether there is PNP or NPN wiring.

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

# FT 25-RLH

Laser photoelectric proximity sensor with background suppression



## PRODUCT HIGHLIGHTS

- Precisely adjustable background suppression
- Reliable switching despite varying object colours and surfaces
- Reliable operation even with highly reflective backgrounds, thanks to SensoPart ASIC technology
- Particularly suitable for the detection of the smallest of objects
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings

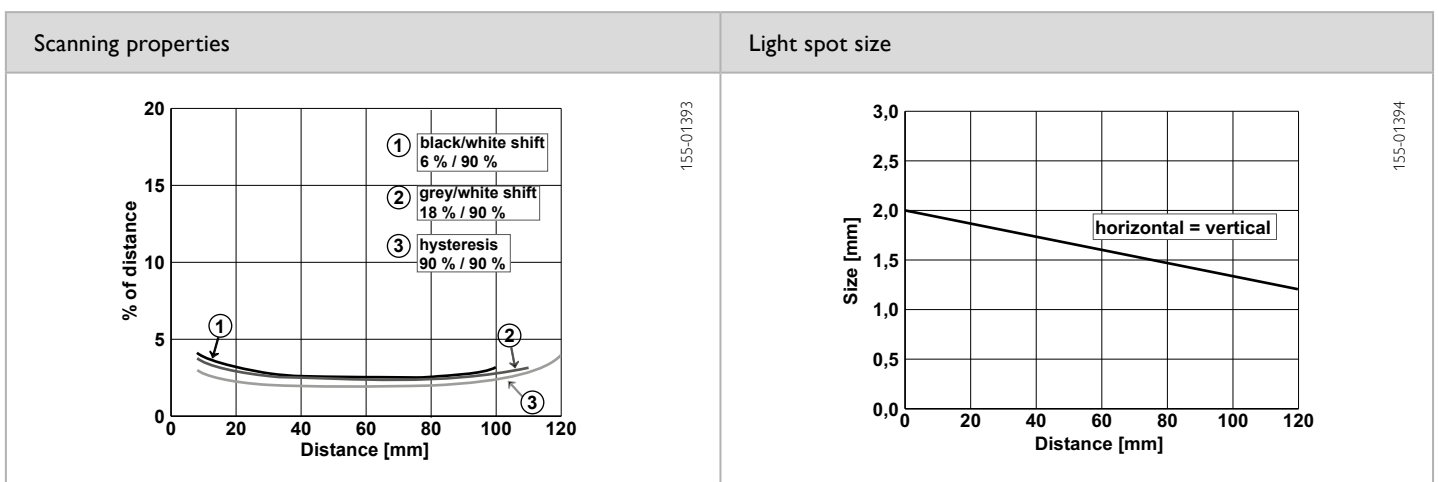
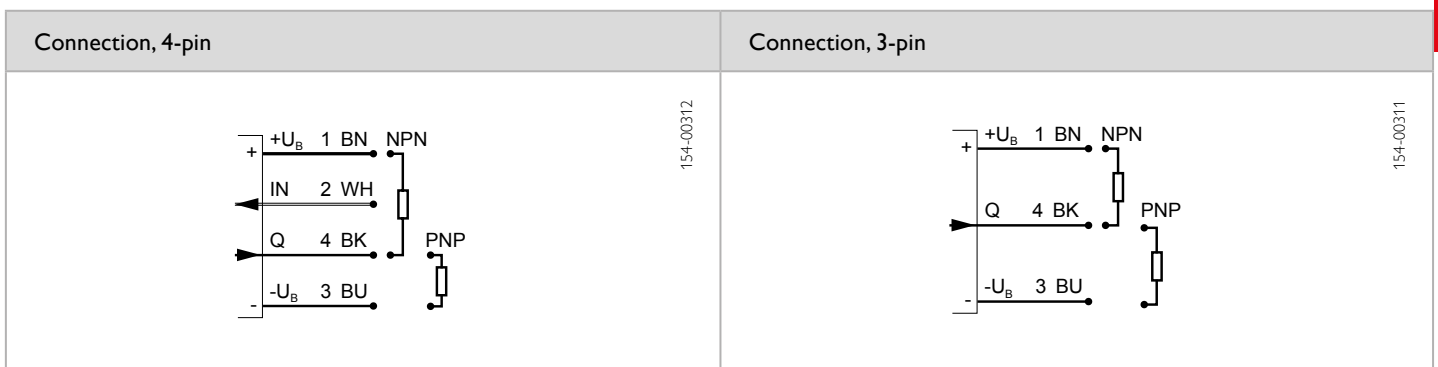
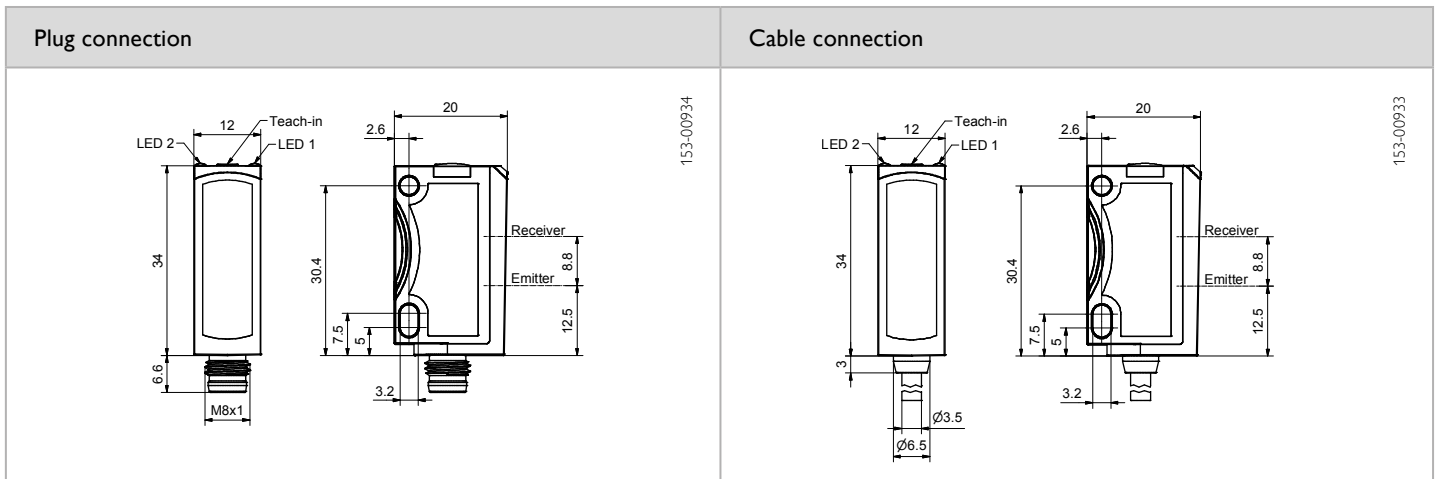
| Optical data                       |  | Functions                                |  |
|------------------------------------|--|--|--|
| Scanning distance                  | 4 ... 120 mm <sup>1</sup>  | Indicator LED, green                     | Operating voltage indicator  |
| Adjustment range    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

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

<sup>6</sup> No Ecolab

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

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



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

# FT 25-RH

Photoelectric proximity sensor with background suppression



## PRODUCT HIGHLIGHTS

- Precisely adjustable background suppression
- Reliable switching despite varying object colours and surfaces
- Reliable operation even with highly reflective backgrounds, thanks to SensoPart ASIC technology
- Simple alignment thanks to easily visible light spot
- Sensor setting via teach-in and control input
- Robust glass-fibre-reinforced plastic housings

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

<sup>1</sup> Reference material: white, 90 % reflectivity

<sup>2</sup> Max. 10 % ripple, within U<sub>b</sub>, ~ 50 Hz / 100 Hz

<sup>3</sup> Only 4-pin design

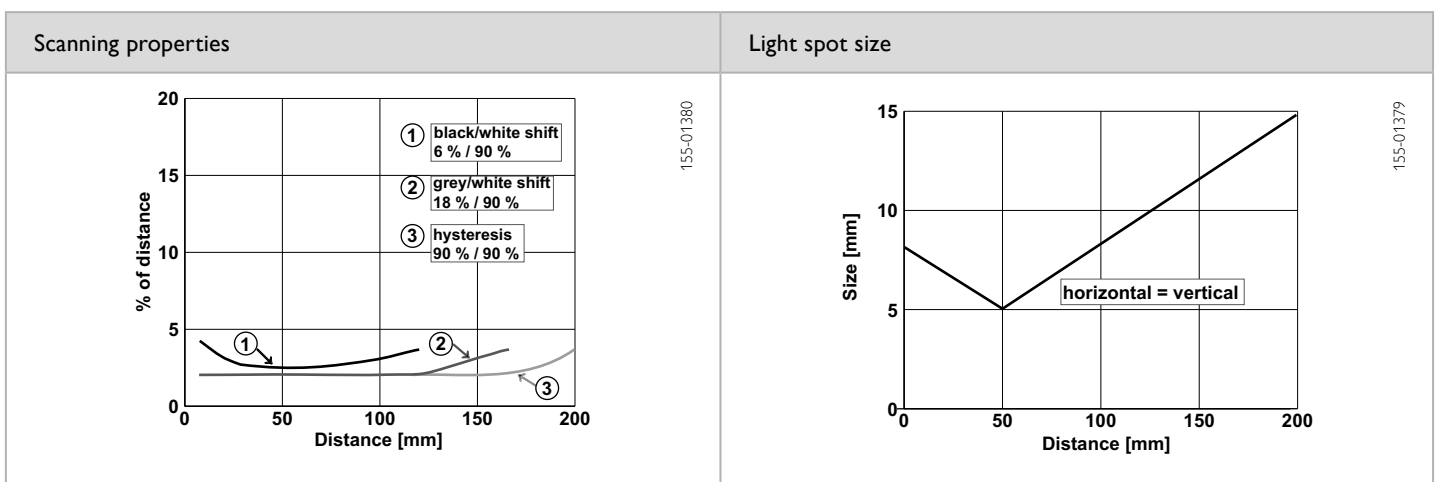
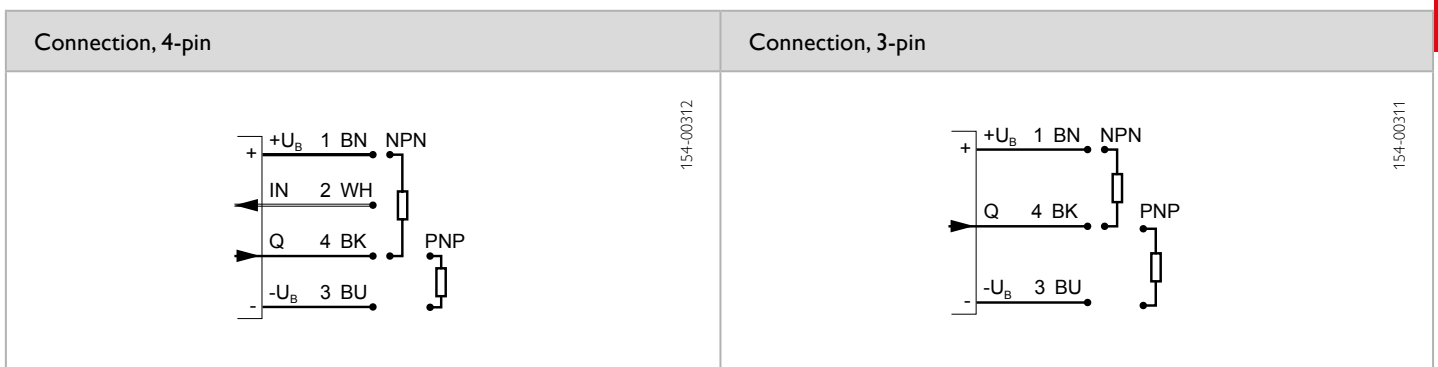
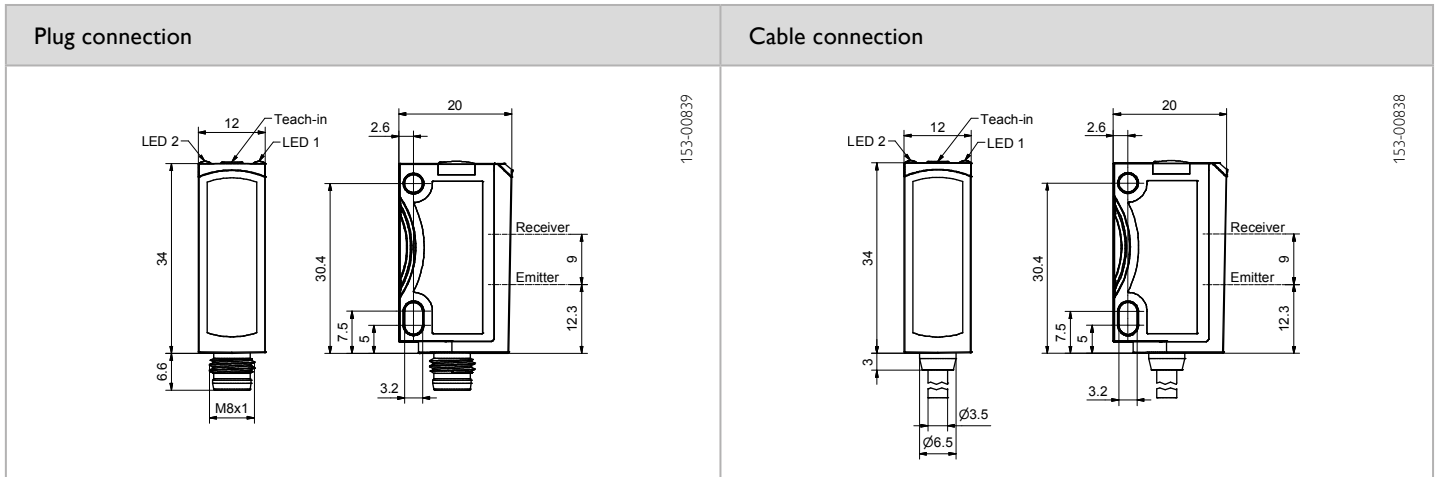
<sup>4</sup> With connected IP 67 / IP 69K plug

<sup>5</sup> UL: -20 ... +50 °C

<sup>6</sup> No Ecolab

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

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



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

# FT 25-RHD

Photoelectric proximity sensor with background suppression



## PRODUCT HIGHLIGHTS

- Auto-detect photoelectric proximity sensor with real PNP and real NPN functions
- Precisely adjustable background suppression
- Long scanning distance of 400 mm with small and compact housings
- Reliable operation even with highly reflective backgrounds, thanks to SensoPart ASIC technology
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings

| Optical data                       |  | Functions                                |  |
|------------------------------------|--|--|--|
| Scanning distance                  | 3 ... 400 mm <sup>1</sup>  | Indicator LED, green                     | Operating voltage indicator  |
| Adjustment range                   | 30 ... 400 mm <sup>1</sup>   | Indicator LED, yellow                    | Switching output indicator   |
| Type of light                      | LED, red, 632 nm   | Scanning distance adjustment             | Via Teach-in button and control input  |
| Light spot size                    | See diagram  | Teach-in modes                           | Mode 1: during running process<br>Mode 2: during standing process  |
|                                    |  | Adjustment possibilities                 | N.O./N.C. via Teach-in button and control input<br>Button lock via control input<br>Auto-detect / NPN/ PNP via Teach-in button and control input (only Auto-detect variants) |
|                                    |  | Default settings                         | Max. scanning distance and N.O.  |
| Electrical data                    |  | Mechanical data                          |  |
| Operating voltage, +U <sub>B</sub> | 10 ... 30V DC <sup>2</sup>   | Dimensions                               | 34 x 20 x 12 mm  |
| No-load current, I <sub>0</sub>    | ≤ 30 mA  | Enclosure rating                         | IP 69K & IP 67 <sup>3</sup>  |
| Output current, I <sub>e</sub>     | ≤ 100 mA   | Material, housing                        | ABS  |
| Protective circuits                | Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)             | Material, front screen                   | PMMA   |
| Protection Class                   | 2  | Type of connection                       | See Selection Table  |
| Power On Delay                     | < 300 ms   | Ambient temperature: operation           | -20 ... +60 °C <sup>4</sup>  |
| Switching output, Q                | PNP/NPN / Auto-Detect (PNP/NPN) (see Selection Table)                                  | Ambient temperature: storage             | -20 ... +80 °C   |
| Output function                    | N.O./N.C.  | Weight (plug device)                     | 10 g   |
| Switching frequency, f (ti/tp 1:1) | ≤ 1000 Hz  | Weight (metal plug device <sup>5</sup> ) | 10 g   |
| Response time                      | 500 μs   | Weight (cable device)                    | 40 g   |
| Control input, IN                  | +U <sub>B</sub> = teach-in, -U <sub>B</sub> = button locked<br>Open = normal operation | Weight (pigtail)                         | 20 g   |
|                                    |  | Vibration and impact resistance          | EN 60947-5-2   |

<sup>1</sup> Reference material: white, 90 % reflectivity

<sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz

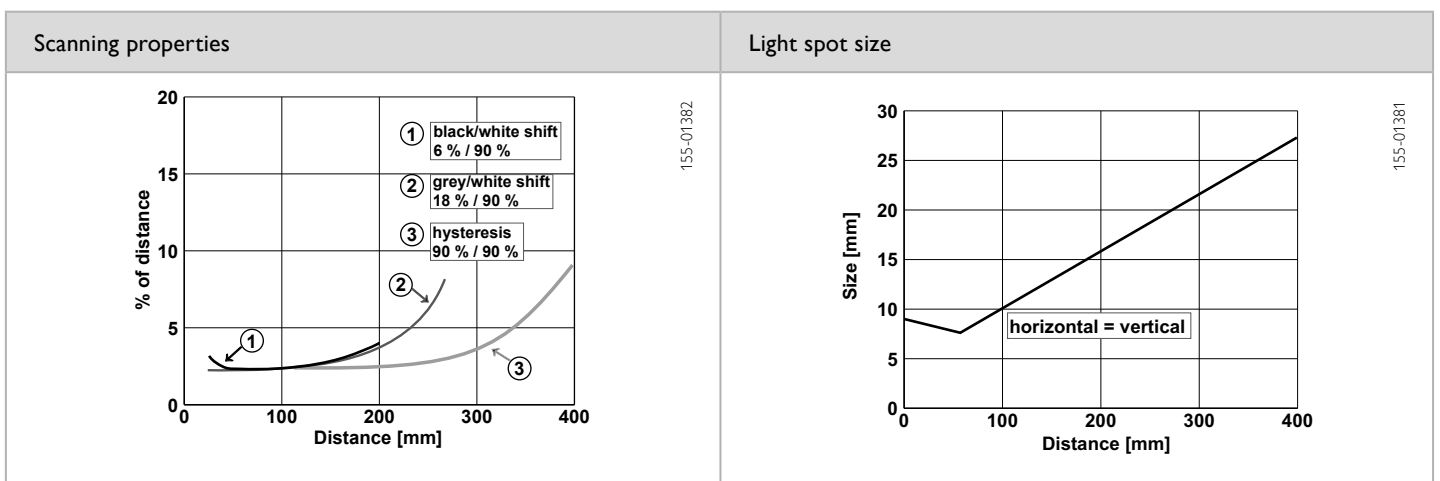
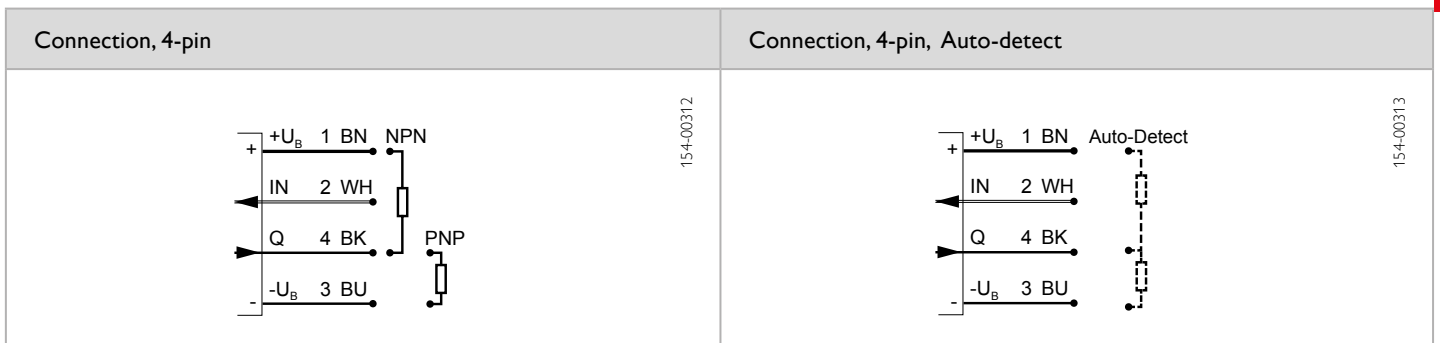
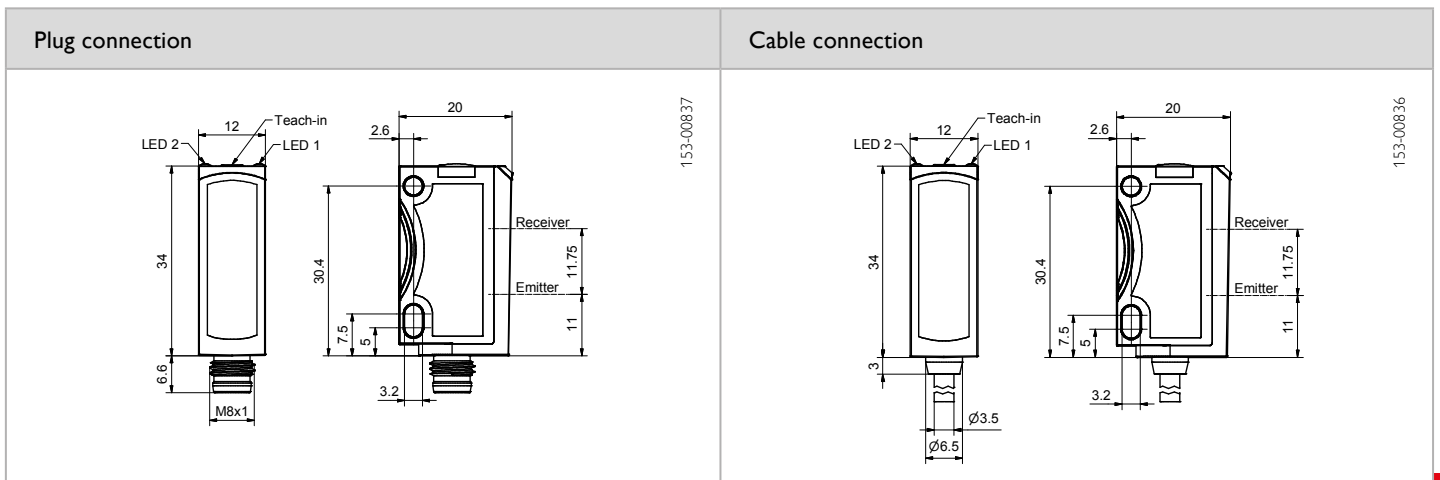
<sup>3</sup> With connected IP 67 / IP 69K plug

<sup>4</sup> UL: -20 ... +50 °C

<sup>5</sup> No Ecolab

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

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



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



# FT 25-RF

Photoelectric proximity sensor with background suppression, fixed focus



## PRODUCT HIGHLIGHTS

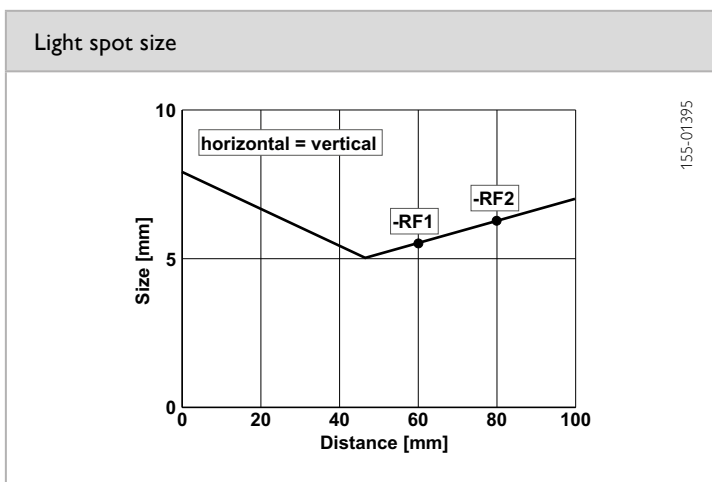
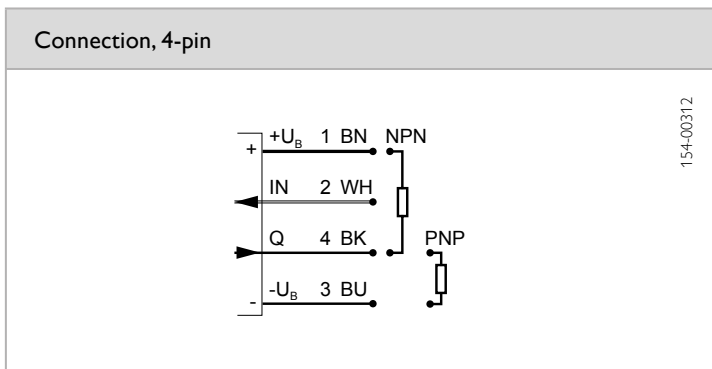
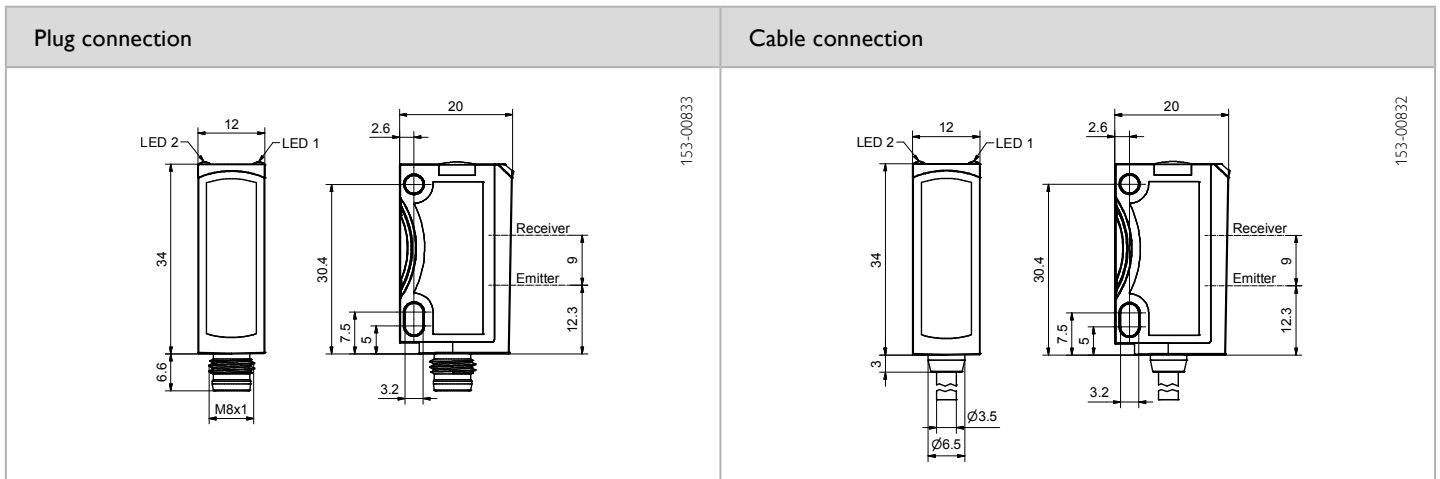
- Precise fixed background suppression
- Economical solution for numerous applications
- Tamper-proof sensor design – no misalignment possible
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings

| Optical data                       |  | Functions                                |                             |
|------------------------------------|--|--|-----------------------------|
| Scanning distance                  | 1 ... 60 mm <sup>1</sup> / 1 ... 80 mm <sup>1</sup>                        | Indicator LED, green                     | Operating voltage indicator |
| Type of light                      | LED, red, 632 nm   | Indicator LED, yellow                    | Switching output indicator  |
| Light spot size                    | See diagram  | Adjustment possibilities                 | N.O./N.C. via control input |
| Hysteresis                         | ~ 5% <sup>2</sup>  |  |                             |
| Electrical data                    |  | Mechanical data                          |                             |
| Operating voltage, +U <sub>B</sub> | 10 ... 30V DC <sup>3</sup>   | Dimensions                               | 34 x 20 x 12 mm             |
| No-load current, I <sub>0</sub>    | ≤ 30 mA  | Enclosure rating                         | IP 69K & IP 67 <sup>4</sup> |
| Output current, I <sub>e</sub>     | ≤ 100 mA   | Material, housing                        | ABS                         |
| Protective circuits                | Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q) | Material, front screen                   | PMMA                        |
| Protection Class                   | 2  | Type of connection                       | See Selection Table         |
| Power On Delay                     | < 300ms  | Ambient temperature: operation           | -20 ... +60 °C <sup>5</sup> |
| Switching output, Q                | PNP/NPN (see Selection Table)  | Ambient temperature: storage             | -20 ... +80 °C              |
| Output function                    | N.O./N.C.  | Weight (plug device)                     | 10 g                        |
| Switching frequency, f (ti/tp 1:1) | ≤ 1000 Hz  | Weight (metal plug device <sup>6</sup> ) | 10 g                        |
| Response time                      | 500 μs   | Weight (cable device)                    | 40 g                        |
| Control input, IN                  | +U <sub>B</sub> = N.C.<br>-U <sub>B</sub> / Open = N.O.                    | Vibration and impact resistance          | EN 60947-5-2                |

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

<sup>5</sup> UL: -20 ... +50 °C    <sup>6</sup> No Ecolab

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



| Reference material | Detection range     |
|--------------------|---------------------|
| White (90 %)       | 1 ... 60 mm / 80 mm |
| Grey (18 %)        | 2 ... 60 mm / 80 mm |
| Black (6 %)        | 4 ... 60 mm / 80 mm |

**Accessories**

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

# FT 25-BF2

BlueLight-Photoelectric proximity sensor with background suppression, fixed focus



## PRODUCT HIGHLIGHTS

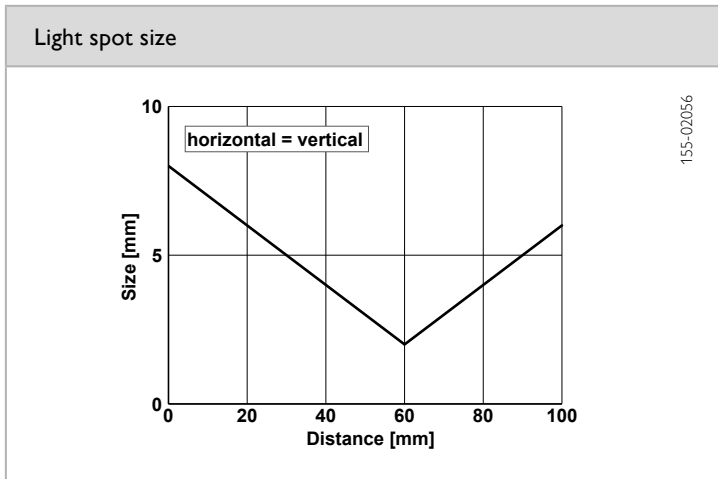
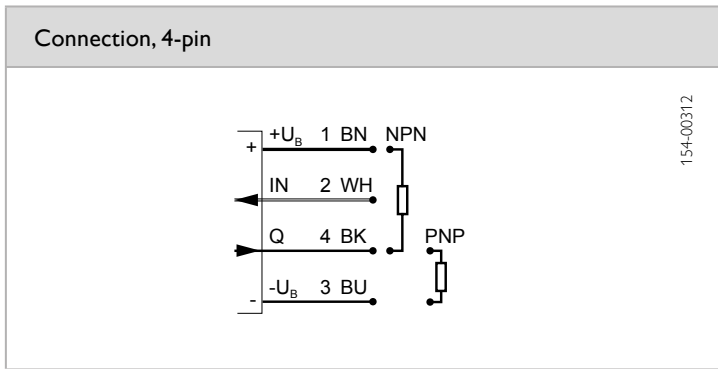
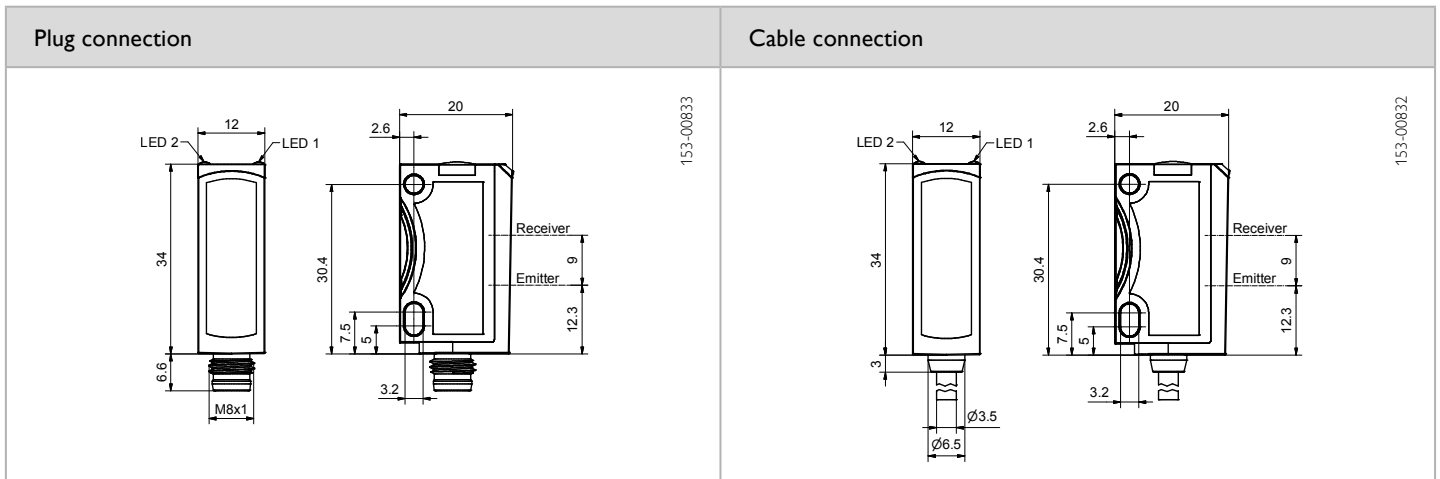
- Sub-miniature sensor with BlueLight technology and precise fixed background suppression
- Reliable switching behaviour with strongly light-absorbing and highly transparent objects
- Reliable operation without reflector - even with critical surfaces
- Tamper-proof sensor design - no misalignment possible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

| Optical data                       |  | Functions                       |                             |
|------------------------------------|--|---------------------------------|-----------------------------|
| Scanning distance                  | 0 ... 80 mm <sup>1</sup>   | Indicator LED, green            | Operating voltage indicator |
| Background suppression from        | 100 mm   | Indicator LED, yellow           | Switching output indicator  |
| Type of light                      | LED, blue, 450 nm  | Adjustment possibilities        | N.O./N.C. via control input |
| Light spot size                    | See diagram  |                                 |                             |
| Hysteresis                         | ~ 1% <sup>2</sup>  |                                 |                             |
| Electrical data                    |  | Mechanical data                 |                             |
| Operating voltage, +U <sub>B</sub> | 10 ... 30V DC <sup>3</sup>   | Dimensions                      | 34 x 20 x 12 mm             |
| No-load current, I <sub>0</sub>    | ≤ 30 mA  | Enclosure rating                | IP 69K & IP 67 <sup>4</sup> |
| Output current, I <sub>e</sub>     | ≤ 100 mA   | Material, housing               | ABS                         |
| Protective circuits                | Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q) | Material, front screen          | PMMA                        |
| Protection Class                   | 2  | Type of connection              | See Selection Table         |
| Power On Delay                     | < 300ms  | Ambient temperature: operation  | -20 ... +60 °C <sup>5</sup> |
| Switching output, Q                | PNP/NPN (see Selection Table)  | Ambient temperature: storage    | -20 ... +80 °C              |
| Output function                    | N.O./N.C.  | Weight (plug device)            | 10 g                        |
| Switching frequency, f (ti/tp 1:1) | ≤ 1000 Hz  | Weight (cable device)           | 40 g                        |
| Response time                      | 500 μs   | Vibration and impact resistance | EN 60947-5-2                |
| Control input, IN                  | +U <sub>B</sub> = N.C.<br>-U <sub>B</sub> / Open = N.O.                    |                                 |                             |

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

<sup>5</sup> UL: -20 ... +50 °C

| Scanning distance | Switching output | Type of connection | Part number     | Article number |
|-------------------|------------------|--------------------|-----------------|----------------|
| 0 ... 80 mm       | PNP              | Plug, M18x1, 4-pin | FT 25-BF2-PS-M4 | 608-11038      |
| 0 ... 80 mm       | NPN              | Plug, M18x1, 4-pin | FT 25-BF2-NS-M4 | 608-11039      |
| 0 ... 80 mm       | PNP              | Cable, 2 m, 4-wire | FT 25-BF2-PS-K4 | 608-11040      |
| 0 ... 80 mm       | NPN              | Cable, 2 m, 4-wire | FT 25-BF2-NS-K4 | 608-11041      |



| Reference material | Detection range |
|--------------------|-----------------|
| White (90 %)       | 0 ... 80 mm     |
| Grey (18 %)        | 0 ... 80 mm     |
| Black (6 %)        | 1 ... 80 mm     |

**Accessories**

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

# FT 25-RV

## Photoelectric proximity sensor with foreground suppression



### PRODUCT HIGHLIGHTS

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

| Optical data                       |  | Functions                                |  |
|------------------------------------|--|--|--|
| Scanning distance                  | 30 ... 200 mm <sup>1</sup>   | Indicator LED, green                     | Operating voltage indicator  |
| Type of light                      | LED, red, 632 nm   | Indicator LED, yellow                    | Switching output indicator   |
| Light spot size                    | See diagram  | Scanning distance adjustment             | Via Teach-in button and control input  |
|                                    |  | Teach-in modes                           | Mode 1: during running process<br>Mode 2: during standing process<br>Mode 3: switching window  |
|                                    |  | Adjustment possibilities                 | N.O./N.C. via Teach-in button and control input<br>Button lock via control input<br>Auto-detect / NPN/ PNP via Teach-in button and control input (only Auto-detect-variants) |
|                                    |  | Default settings                         | Max. scanning distance and N.O.  |
| Electrical data                    |  | Mechanical data                          |  |
| Operating voltage, +U <sub>B</sub> | 10 ... 30V DC <sup>2</sup>   | Dimensions                               | 34 x 20 x 12 mm  |
| No-load current, I <sub>0</sub>    | ≤ 30 mA  | Enclosure rating                         | IP 69K & IP 67 <sup>3</sup>  |
| Output current, I <sub>e</sub>     | ≤ 100 mA   | Material, housing                        | ABS  |
| Protective circuits                | Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)             | Material, front screen                   | PMMA   |
| Protection Class                   | 2  | Type of connection                       | See Selection Table  |
| Power On Delay                     | < 300 ms   | Ambient temperature: operation           | -20 ... +60 °C <sup>4</sup>  |
| Switching output, Q                | PNP/NPN / Auto-Detect (see Selection Table)  | Ambient temperature: storage             | -20 ... +80 °C   |
| Output function                    | N.O./N.C.  | Weight (plug device)                     | 10 g   |
| Switching frequency, f (ti/tp 1:1) | ≤ 1000 Hz  | Weight (metal plug device <sup>5</sup> ) | 10 g   |
| Response time                      | 500 μs   | Vibration and impact resistance          | EN 60947-5-2   |
| Control input, IN                  | +U <sub>B</sub> = teach-in, -U <sub>B</sub> = button locked<br>Open = normal operation |  |  |

<sup>1</sup> Reference material: white, 90 % reflectivity

<sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz

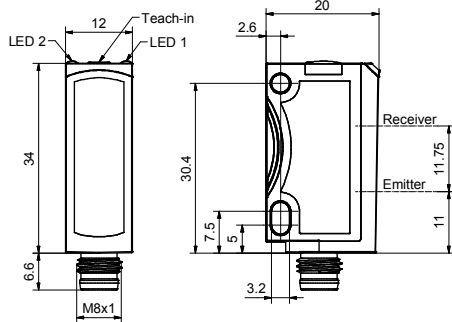
<sup>3</sup> With connected IP 67 / IP 69K plug

<sup>4</sup> UL: -20 ... +50 °C

<sup>5</sup> No Ecolab

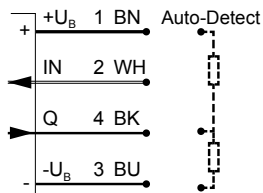
| Scanning distance | Switching output | Type of connection      | Part number      | Article number |
|-------------------|------------------|-------------------------|------------------|----------------|
| 30 ... 200 mm     | PNP              | Plug, M8x1, 4-pin       | FT 25-RV-PS-M4   | 604-41006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

Plug connection



153-00837

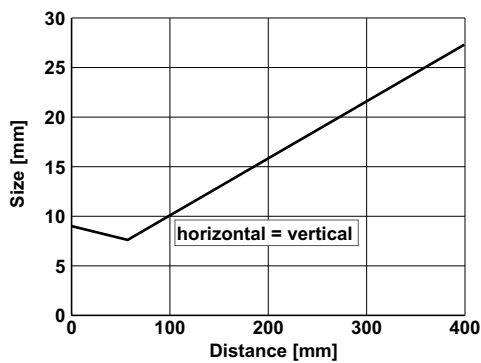
Connection, 4-pin, Auto-Detect



154-00313

8

Light spot size



155-01381

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

Accessories

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

# FT 25-RL

## Diffuse laser photoelectric proximity switch



### PRODUCT HIGHLIGHTS

- Differentiates between even the slightest of grey value differences
- Sensor settings via teach-in and control input
- Durable laser printing
- Very small, easily visible laser light spot
- Wide range of variants

| Optical data                       |  | Functions                                |   |
|------------------------------------|--|--|---|
| Scanning distance                  | 1 ... 250 mm <sup>1</sup>  | Indicator LED, green                     | Operating voltage indicator                     |
| Adjustment range                   | 25 ... 250 mm <sup>1</sup>   | Indicator LED, yellow                    | Switching output indicator                      |
| Type of light                      | Laser, red, 650 nm   | Sensitivity adjustment                   | Via Teach-in button and control input           |
| Light spot size                    | See diagram  | Teach-in modes                           | Mode 1: during running process                  |
| Laser Class (IEC 60825-1)          | 1  | Adjustment possibilities                 | Mode 2: during standing process                 |
| Hysteresis                         | ≤ 10% <sup>2</sup>   | Default settings                         | N.O./N.C. via Teach-in button and control input |
|                                    |  |  | Button lock via control input                   |
|                                    |  |  | Max. scanning distance and N.O.                 |
| Electrical data                    |  | Mechanical data                          |   |
| Operating voltage, +U <sub>B</sub> | 10 ... 30V DC <sup>3</sup>   | Dimensions                               | 34 × 20 × 12 mm                                 |
| No-load current, I <sub>0</sub>    | ≤ 30 mA  | Enclosure rating                         | IP 69K & IP 67 <sup>4</sup>                     |
| Output current, I <sub>e</sub>     | ≤ 100 mA   | Material, housing                        | ABS   |
| Protective circuits                | Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)               | Material, front screen                   | PMMA  |
| Protection Class                   | 2  | Type of connection                       | See Selection Table                             |
| Power On Delay                     | < 300 ms   | Ambient temperature: operation           | -20 ... +60 °C <sup>5</sup>                     |
| Switching output, Q                | PNP/NPN (see Selection Table)  | Ambient temperature: storage             | -20 ... +80 °C                                  |
| Output function                    | N.O./N.C.  | Weight (metal plug device <sup>6</sup> ) | 10 g  |
| Switching frequency, f (ti/tp 1:1) | ≤ 4000 Hz  | Weight (cable device)                    | 40 g  |
| Response time                      | 125 μs   | Weight (pigtail)                         | 20 g  |
| Control input, IN                  | +U <sub>B</sub> = teach-in<br>-U <sub>B</sub> = button locked<br>Open = normal operation | Vibration and impact resistance          | EN 60947-5-2                                    |

<sup>1</sup> Reference material: white, 90 % reflectivity

<sup>2</sup> Up to scanning distance of 150 mm

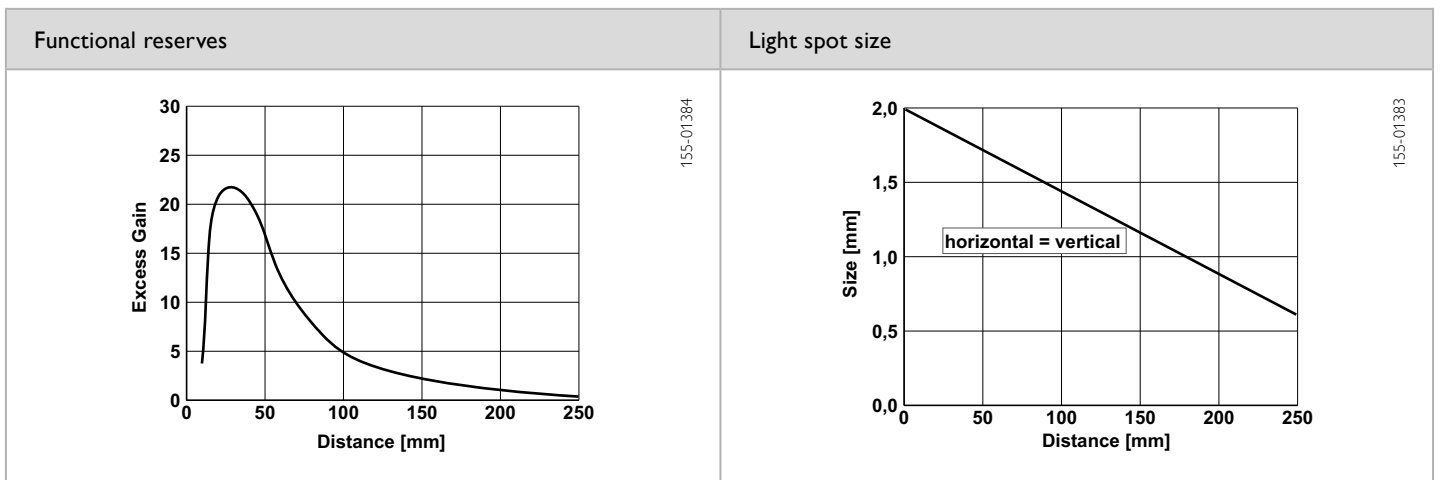
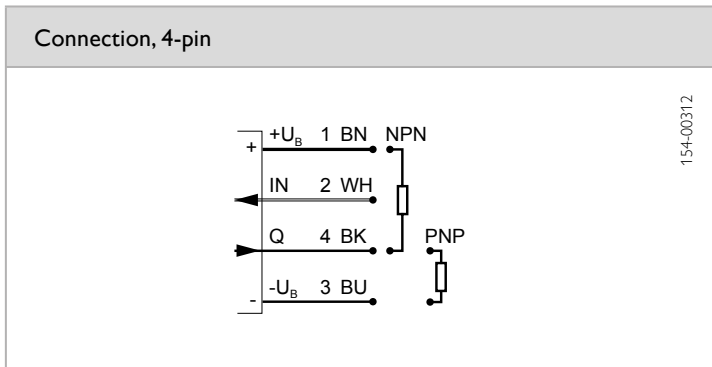
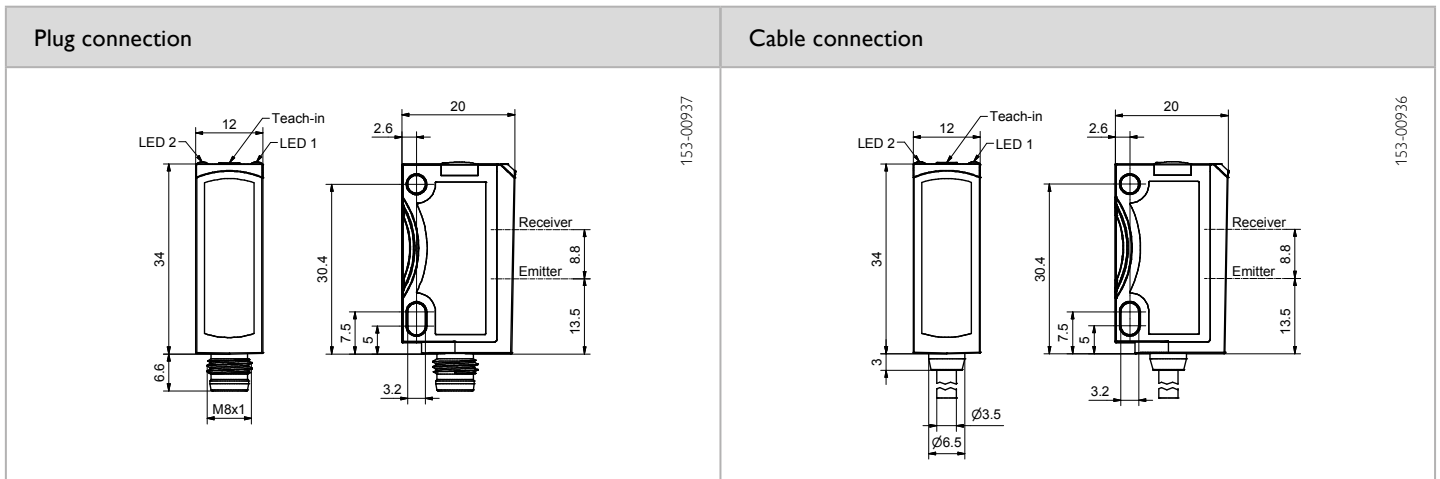
<sup>3</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz

<sup>4</sup> With connected IP 67 / IP 69K plug

<sup>5</sup> UL: -20 ... +50 °C

<sup>6</sup> No Ecolab

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



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

**Accessories**

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



# FT 25-R

## Diffuse photoelectric proximity sensor



### PRODUCT HIGHLIGHTS

- Differentiates between even the slightest of grey value differences
- Sensor settings via teach-in and control input
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings
- Durable laser printing

| Optical data                       |  | Functions                                |  |
|------------------------------------|--|--|--|
| Scanning distance                  | 0 ... 800 mm <sup>1</sup>  | Indicator LED, green                     | Operating voltage indicator  |
| Adjustment range                   | 20 ... 800 mm <sup>1</sup>   | Indicator LED, yellow                    | Switching output indicator   |
| Type of light                      | LED, red, 632 nm   | Sensitivity adjustment                   | Via Teach-in button and control input  |
| Light spot size                    | See diagram  | Teach-in modes                           | Mode 1: during running process<br>Mode 2: during standing process                |
|                                    |  | Adjustment possibilities                 | N.O./N.C. via Teach-in button and control input<br>Button lock via control input |
|                                    |  | Default settings                         | Max. scanning distance and N.O.  |
| Electrical data                    |  | Mechanical data                          |  |
| Operating voltage, +U <sub>B</sub> | 10 ... 30V DC <sup>2</sup>   | Dimensions                               | 34 × 20 × 12 mm  |
| No-load current, I <sub>0</sub>    | ≤ 30 mA  | Enclosure rating                         | IP 69K & IP 67 <sup>3</sup>  |
| Output current, I <sub>e</sub>     | ≤ 100 mA   | Material, housing                        | ABS  |
| Protective circuits                | Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)                 | Material, front screen                   | PMMA   |
| Protection Class                   | 2  | Type of connection                       | See Selection Table  |
| Power On Delay                     | < 300 ms   | Ambient temperature: operation           | -20 ... +60 °C <sup>4</sup>  |
| Switching output, Q                | PNP/NPN (see Selection Table)  | Ambient temperature: storage             | -20 ... +80 °C   |
| Output function                    | N.O./N.C.  | Weight (plug device)                     | 10 g   |
| Switching frequency, f (ti/tp 1:1) | ≤ 1000 Hz  | Weight (metal plug device <sup>5</sup> ) | 10 g   |
| Response time                      | 500 μs   | Weight (cable device)                    | 40 g   |
| Control input, IN                  | + U <sub>B</sub> = teach-in<br>- U <sub>B</sub> = button locked<br>Open = normal operation | Weight (pigtail)                         | 20 g   |
|                                    |  | Vibration and impact resistance          | EN 60947-5-2   |

<sup>1</sup> Reference material: white, 90 % reflectivity

<sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz

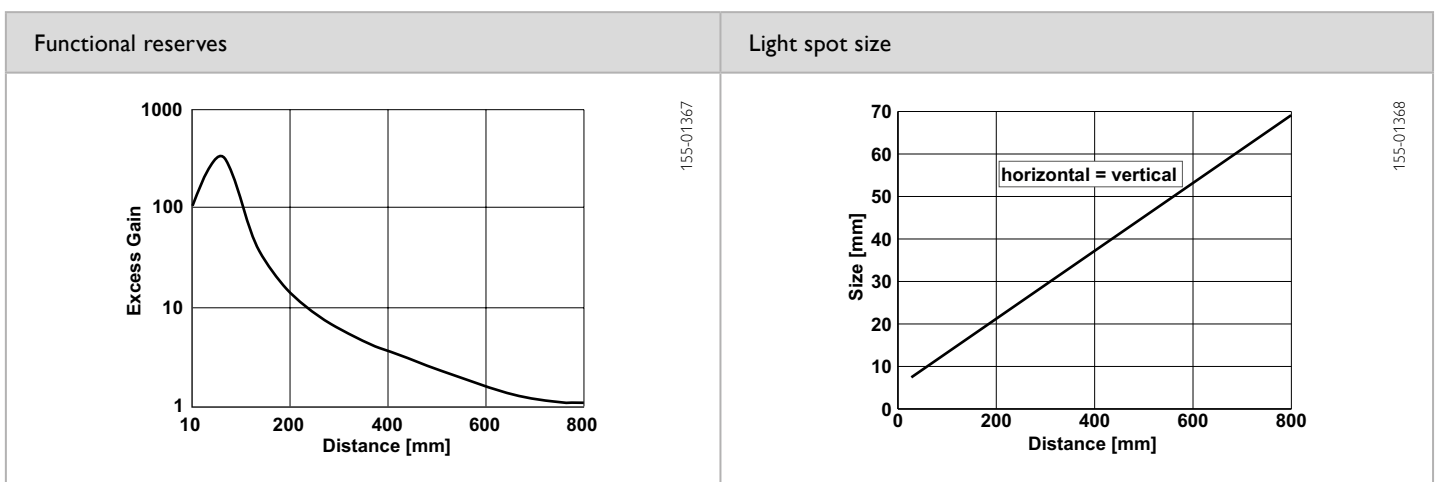
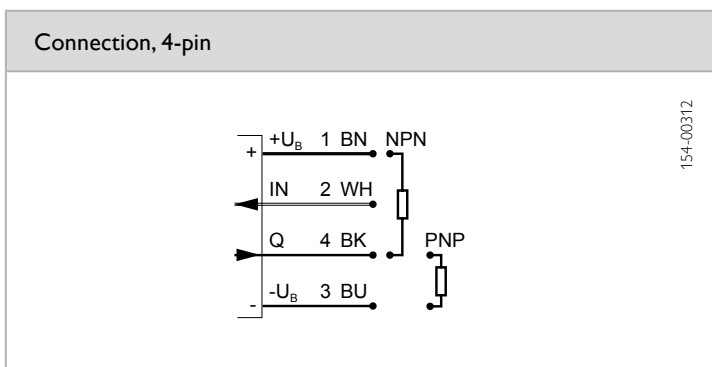
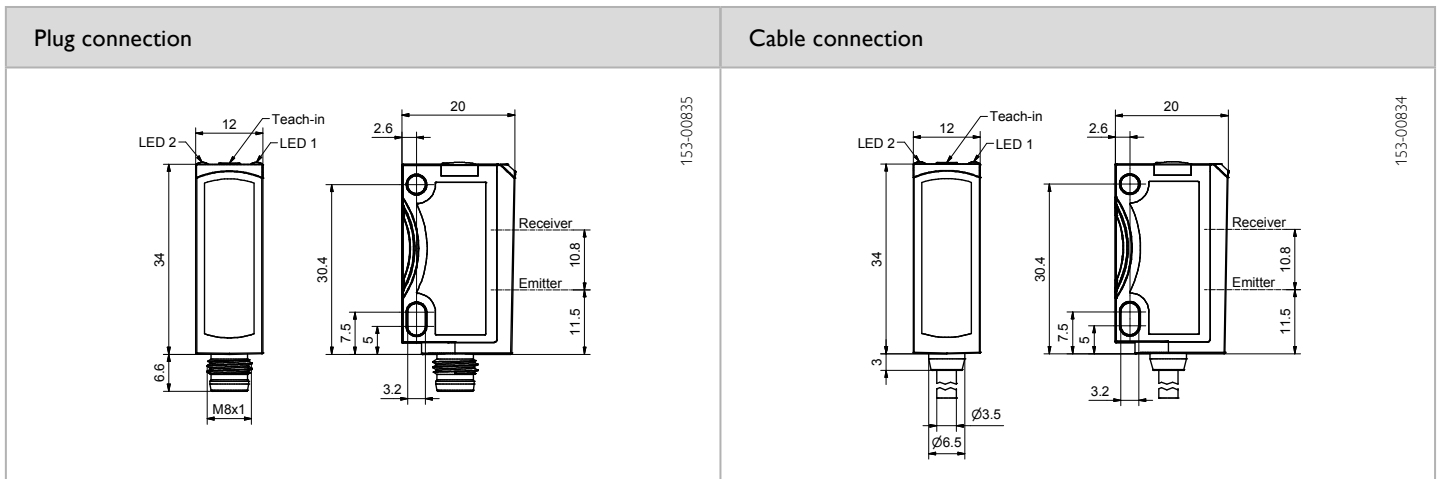
<sup>3</sup> With connected IP 67 / IP 69K plug

<sup>4</sup> UL: -20 ... +50 °C

<sup>5</sup> No Ecolab

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

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



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

# FR 25-RGO

Retroreflective photoelectric sensor for detection of transparent objects



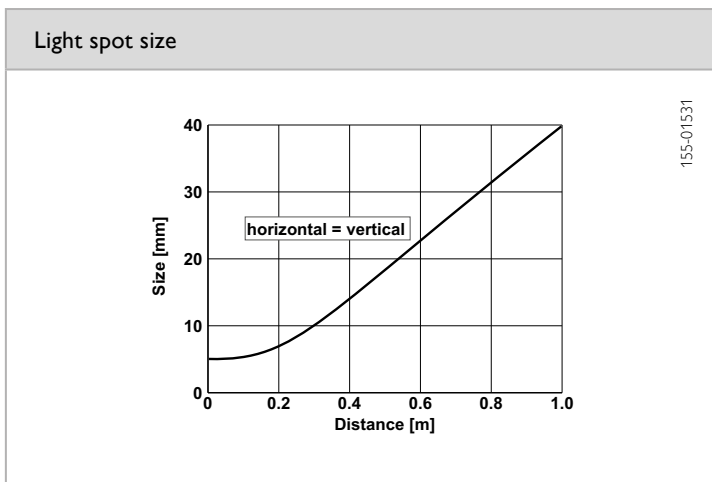
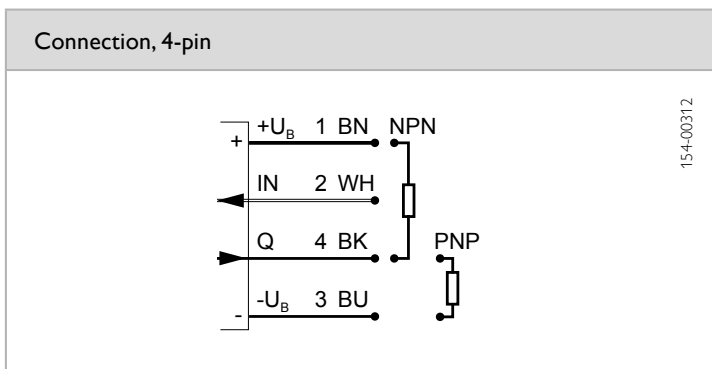
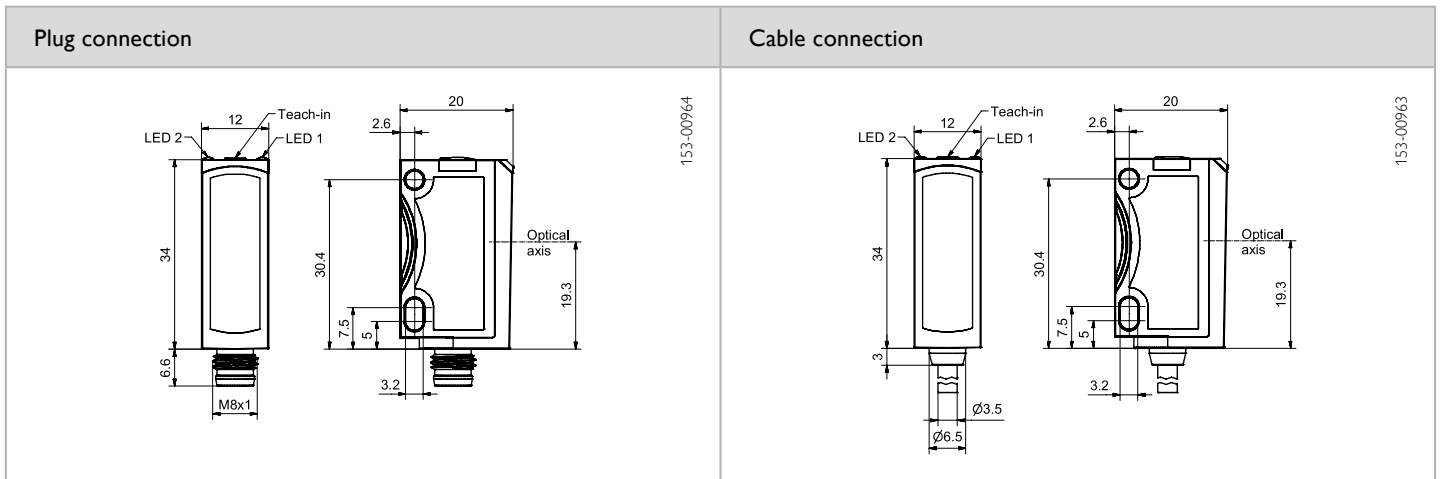
## PRODUCT HIGHLIGHTS

- Reliable detection of transparent objects regardless of shape
- Autocollimation principle: reliable and precise detection from a range of 0 mm
- DELTA function (Dynamic Evaluation of Light for Threshold Adaption): dynamic sensor adaptation to changing environmental conditions – dust and dirt have no effect
- Precise and easily visible light spot with sharp contour for easy alignment of the sensor

| Optical data                       |  | Functions                                |  |
|------------------------------------|--|--|--|
| Operating range                    | 0 ... 2 m <sup>1</sup>   | Indicator LED, green                     | Operating voltage indicator  |
| Type of light                      | LED, red, 632 nm   | Indicator LED, yellow                    | Switching output indicator   |
| Polarising filter                  | Yes  | Sensitivity adjustment                   | Via Teach-in button and control input  |
|                                    |  | Teach-in modes                           | Mode 1: during running process<br>Mode 2: during standing process                |
|                                    |  | Adjustment possibilities                 | N.O./N.C. via Teach-in button and control input<br>Button lock via control input |
|                                    |  | Default settings                         | Max. range and N.O.  |
| Electrical data                    |  | Mechanical data                          |  |
| Operating voltage, +U <sub>B</sub> | 10 ... 30V DC <sup>2</sup>   | Dimensions                               | 34 x 20 x 12 mm  |
| No-load current, I <sub>0</sub>    | ≤ 30 mA  | Enclosure rating                         | IP 69K & IP 67 <sup>3</sup>  |
| Output current, I <sub>e</sub>     | ≤ 100 mA   | Material, housing                        | ABS  |
| Protective circuits                | Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)                 | Material, front screen                   | PMMA   |
| Protection Class                   | 2  | Type of connection                       | See Selection Table  |
| Power On Delay                     | < 300 ms   | Ambient temperature: operation           | -20 ... +60 °C <sup>4</sup>  |
| Switching output, Q                | PNP/NPN (see Selection Table)  | Ambient temperature: storage             | -20 ... +80 °C   |
| Output function                    | N.O./N.C.  | Weight (plug device)                     | 10 g   |
| Switching frequency, f (ti/tp 1:1) | ≤ 1000 Hz  | Weight (metal plug device <sup>5</sup> ) | 10 g   |
| Response time                      | 500 μs   | Weight (cable device)                    | 40 g   |
| Control input, IN                  | + U <sub>B</sub> = teach-in<br>- U <sub>B</sub> = button locked<br>Open = normal operation | Vibration and impact resistance          | EN 60947-5-2   |

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

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



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

**Accessories**

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

# FR 25-RGO2

Autocollimation retroreflective photoelectric sensor



## PRODUCT HIGHLIGHTS

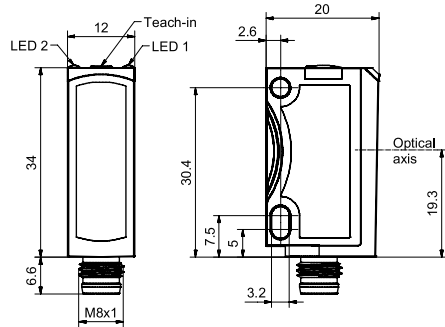
- Autocollimation principle: reliable and precise detection from a range of 0 mm
- Precise detection, even through narrow openings and drilled holes
- Compact miniature housings for installation in the smallest of spaces
- Simple operation via electronic Teach-in button or control input
- Robust glass-fibre-reinforced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

| Optical data                       |  | Functions                       |  |
|------------------------------------|--|---------------------------------|--|
| Operating range                    | 0 ... 2 m <sup>1</sup>   | Indicator LED, green            | Operating voltage indicator  |
| Type of light                      | LED, red, 632 nm   | Indicator LED, yellow           | Switching output indicator   |
| Polarising filter                  | Yes  | Sensitivity adjustment          | Via Teach-in button and control input  |
|                                    |  | Teach-in modes                  | Mode 1: during running process<br>Mode 2: during standing process                |
|                                    |  | Adjustment possibilities        | N.O./N.C. via Teach-in button and control input<br>Button lock via control input |
|                                    |  | Default settings                | Max. range and N.O.  |
| Electrical data                    |  | Mechanical data                 |  |
| Operating voltage, +U <sub>B</sub> | 10 ... 30V DC <sup>2</sup>   | Dimensions                      | 34 x 20 x 12 mm  |
| No-load current, I <sub>0</sub>    | ≤ 30 mA  | Enclosure rating                | IP 69K & IP 67 <sup>3</sup>  |
| Output current, I <sub>e</sub>     | ≤ 100 mA   | Material, housing               | ABS  |
| Protective circuits                | Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)               | Material, front screen          | PMMA   |
| Protection Class                   | 2  | Type of connection              | See Selection Table  |
| Power On Delay                     | < 300 ms   | Ambient temperature: operation  | -20 ... +60 °C <sup>4</sup>  |
| Switching output, Q                | PNP/NPN (see Selection Table)  | Ambient temperature: storage    | -20 ... +80 °C   |
| Output function                    | N.O./N.C.  | Weight                          | 10 g   |
| Switching frequency, f (ti/tp 1:1) | ≤ 1000 Hz  | Vibration and impact resistance | EN 60947-5-2   |
| Response time                      | 500 μs   |                                 |  |
| Control input, IN                  | +U <sub>B</sub> = teach-in<br>-U <sub>B</sub> = button locked<br>Open = normal operation |                                 |  |

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

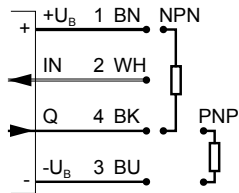
| Operating range | Switching output | Type of connection | Part number      | Article number |
|-----------------|------------------|--------------------|------------------|----------------|
| 0 ... 2 m       | PNP              | Plug, M8x1, 4-pin  | FR 25-RGO2-PS-M4 | 606-11022      |
| 0 ... 2 m 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

Plug connection



153-00964

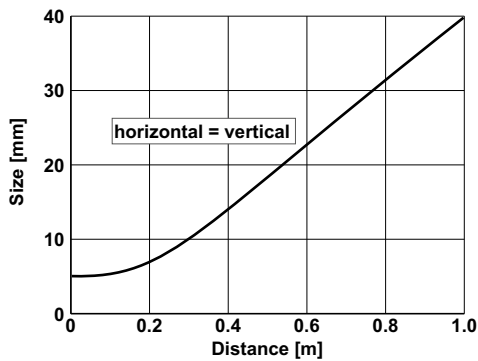
Connection, 4-pin



154-00312

8

Light spot size



155-01531

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

Accessories

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

# FR 25-RLO

Autocollimation laser retroreflective photoelectric sensor



## PRODUCT HIGHLIGHTS

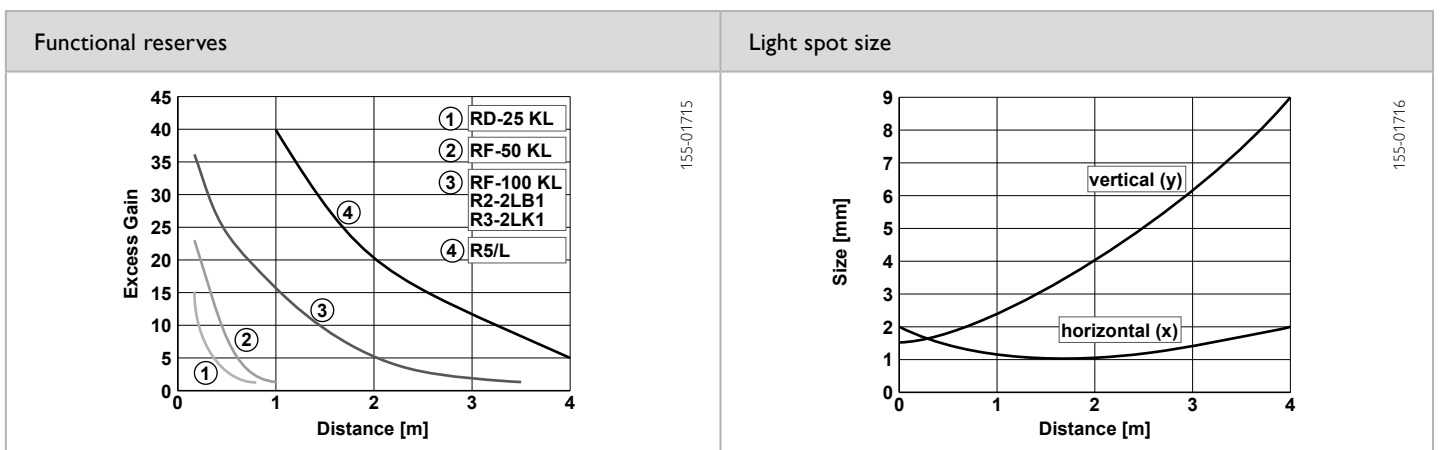
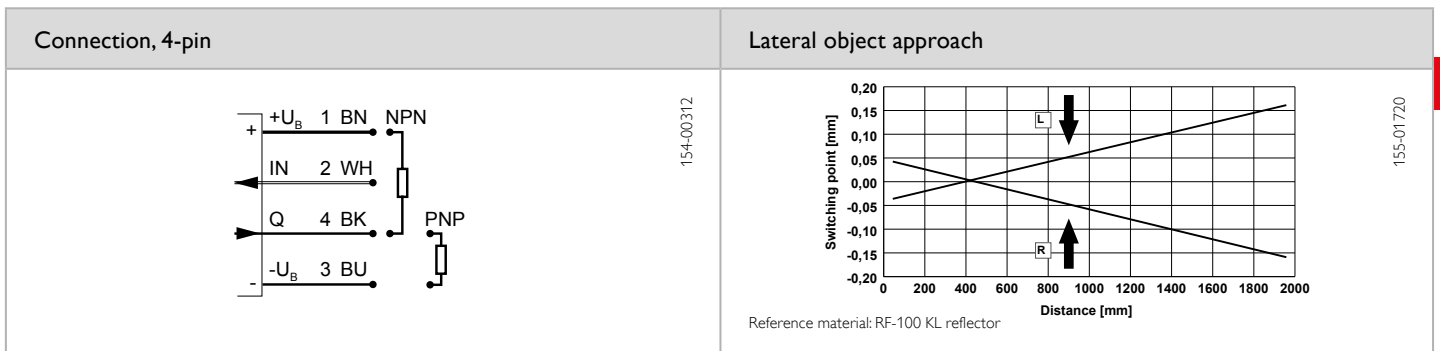
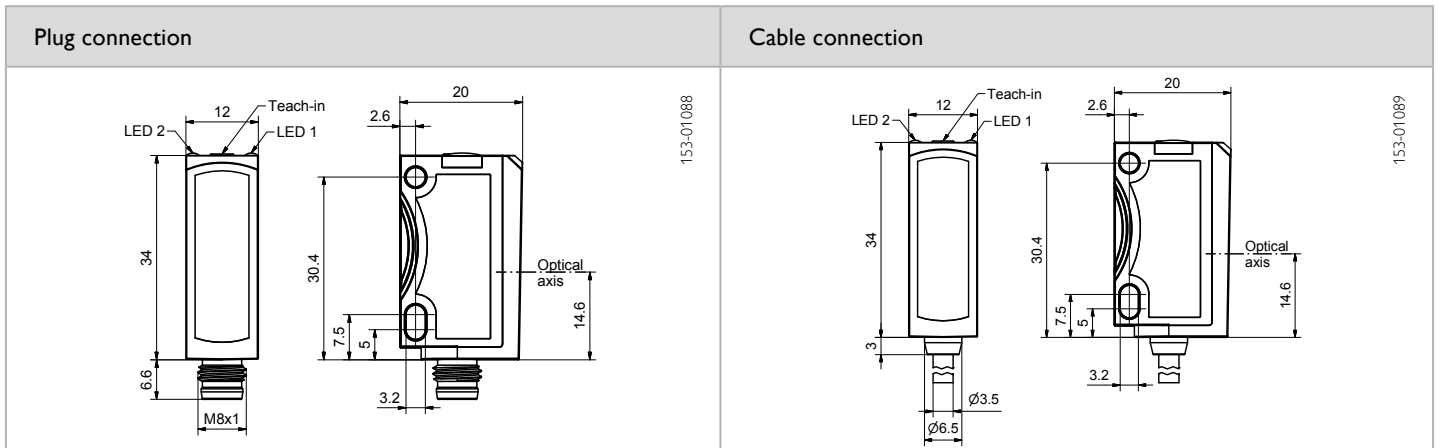
- Reliable small-part detection over the entire operating range from a size of 0.2 mm
- Precise front-edge detection even in fastest automation processes thanks to a high switching frequency of 10 kHz
- Constant detection position with lateral object approach over the entire operating range for maximum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

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

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

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

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



| Small part detection         |                    |                   |                          | Reflector / Reflective foil* | Operating range (min./max. reflector distance) |
|------------------------------|--------------------|-------------------|--------------------------|------------------------------|--|
| Reflector / Reflective foil* | Reflector distance | Scanning distance | Smallest detectable part |                              |  |
| R5L                          | 1000 ... 4000 mm   | 0 ... 4000 mm     | ≥ 1 mm                   | R5L                          | 0 ... 4000 mm                                  |
| RD-25 KL                     | 50 ... 500 mm      | 50 ... 500 mm     | ≥ 0.2 mm                 | RD-25 KL                     | 50 ... 600 mm                                  |
| RF-100 KL*                   | 500 ... 2500 mm    | 0 ... 500 mm      | ≥ 0.2 mm                 | RF-100 KL*                   | 0 ... 2500 mm                                  |
| R2-2LB1                      | 500 ... 2500 mm    | 0 ... 500 mm      | ≥ 0.2 mm                 | R2-2LB1                      | 0 ... 2500 mm                                  |
| R3-2LK1                      | 500 ... 2500 mm    | 0 ... 500 mm      | ≥ 0.2 mm                 | R3-2LK1                      | 0 ... 2500 mm                                  |
| RF-50 KL*                    | 100 ... 500 mm     | 100 ... 500 mm    | ≥ 0.2 mm                 | RF-50 KL*                    | 0 ... 800 mm                                   |



# FR 25-RL

## Laser retroreflective photoelectric sensor



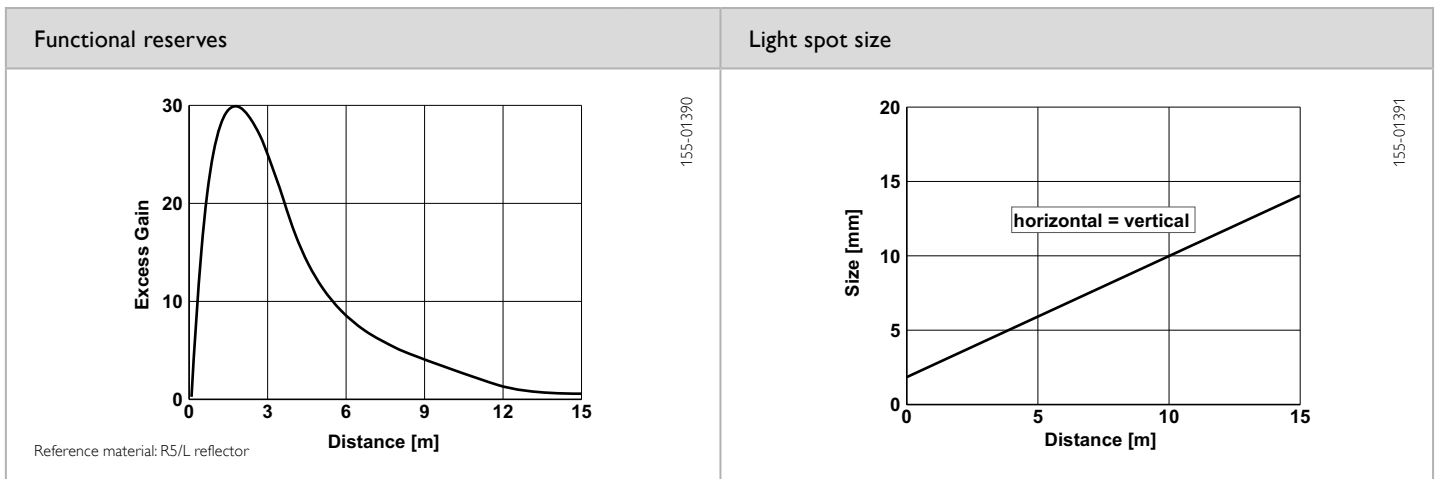
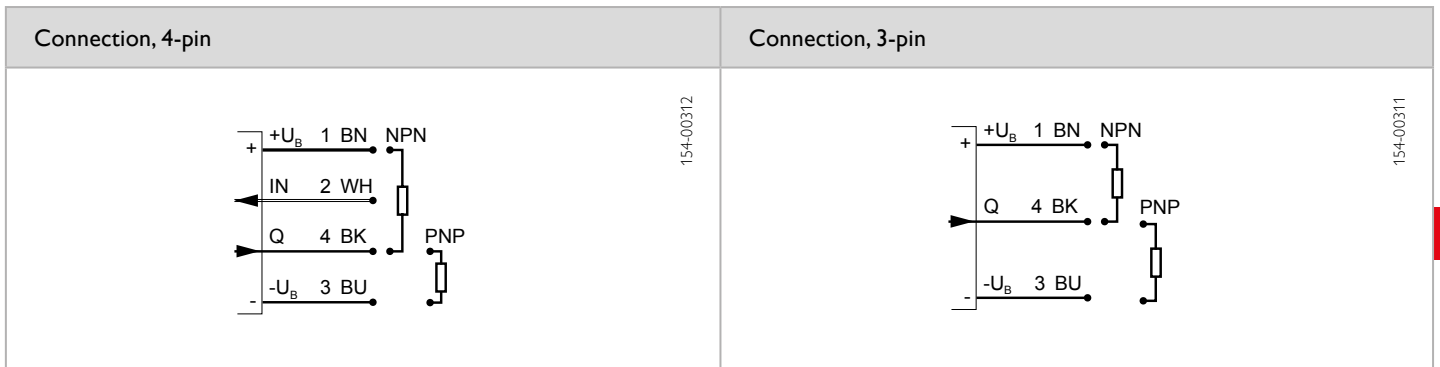
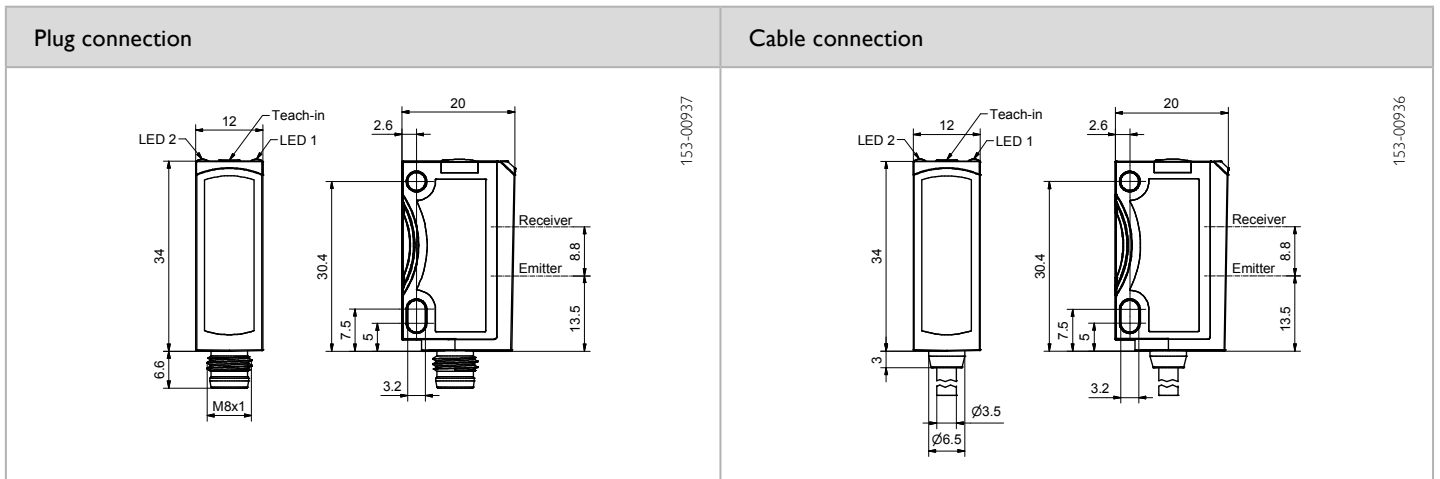
### PRODUCT HIGHLIGHTS

- Particularly suitable for short-range applications
- Suitable for a wide variety of different reflectors
- Very small, easily visible laser light spot
- Sensor settings via teach-in and control input
- Robust glass-fibre-reinforced plastic housings

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

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

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



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

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

# FR 25-R

## Retroreflective photoelectric sensor



### PRODUCT HIGHLIGHTS

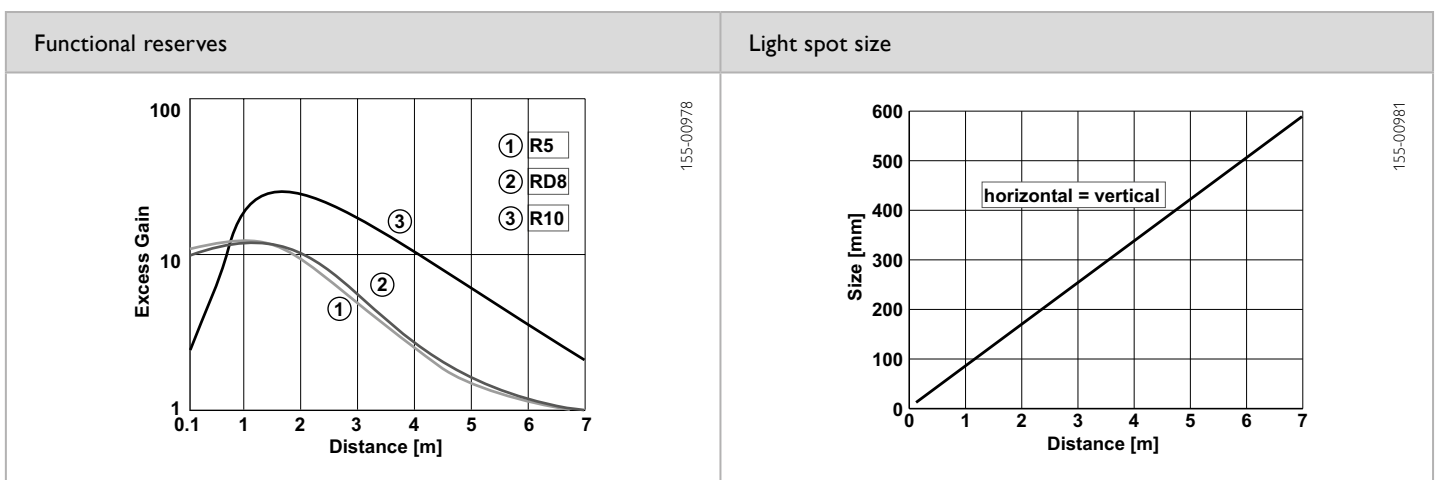
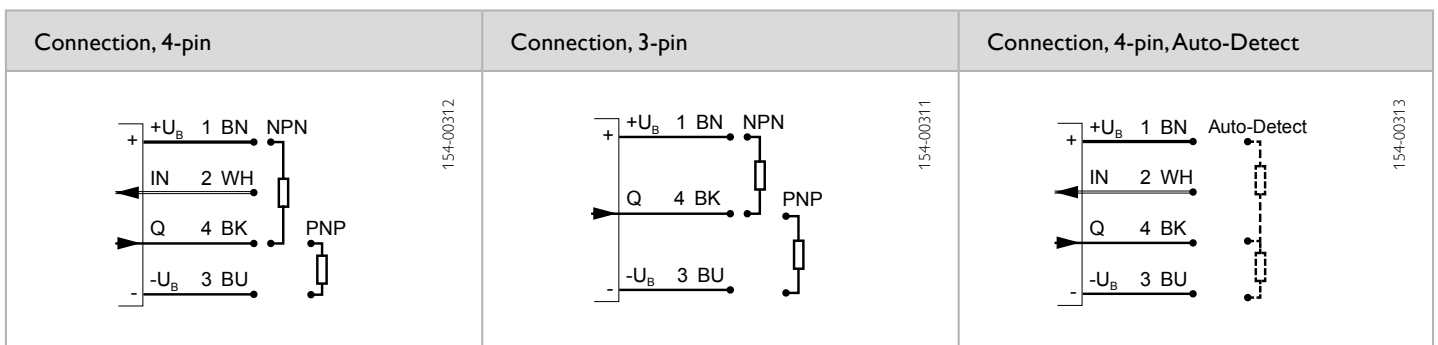
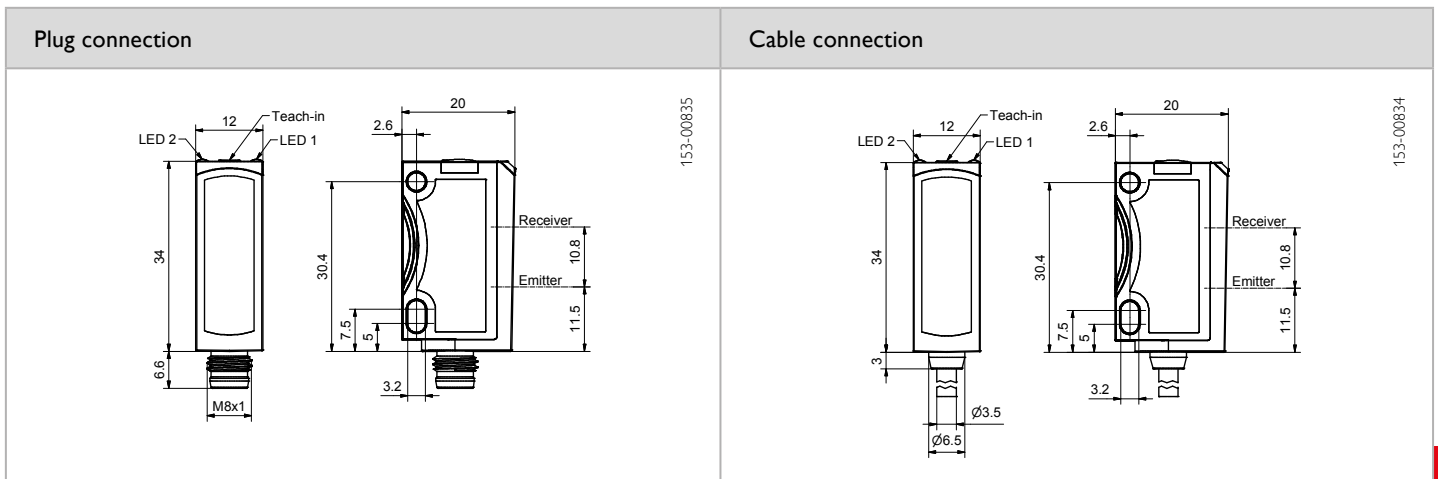
- Auto-detect retroreflective photoelectric sensor with real PNP and real NPN functions
- Particularly suitable for short-range applications
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings
- Durable laser printing
- Wide range of variants

| Optical data                       |  | Functions                                |   |
|------------------------------------|--|--|---|
| Limit range                        | 0.1 ... 7 m <sup>1</sup>   | Indicator LED, green                     | Operating voltage indicator   |
| Operating range                    | 0.1 ... 6 m <sup>1</sup>   | Indicator LED, yellow                    | Switching output indicator  |
| Type of light                      | LED, red, 632 nm   | Sensitivity adjustment                   | Via Teach-in button and control input   |
| Light spot size                    | See diagram  | Teach-in modes                           | Mode 1: during running process  |
| Polarising filter                  | Yes  | Adjustment possibilities                 | Mode 2: during standing process   |
|                                    |  |  | N.O./N.C. via Teach-in button and control input   |
|                                    |  |  | Button lock via control input   |
|                                    |  |  | Auto-detect / NPN / PNP via Teach-in button and control input (only Auto-detect variants) |
|                                    |  | Default settings                         | Max. range and N.O.   |
| Electrical data                    |  | Mechanical data                          |   |
| Operating voltage, +U <sub>B</sub> | 10 ... 30V DC <sup>2</sup>   | Dimensions                               | 34 × 20 × 12 mm   |
| No-load current, I <sub>0</sub>    | ≤ 30 mA  | Enclosure rating                         | IP 69K & IP 67 <sup>4</sup>   |
| Output current, I <sub>e</sub>     | ≤ 100 mA   | Material, housing                        | ABS   |
| Protective circuits                | Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)               | Material, front screen                   | PMMA  |
| Protection Class                   | 2  | Type of connection                       | See Selection Table   |
| Power On Delay                     | < 300 ms   | Ambient temperature: operation           | -20 ... +60 °C <sup>5</sup>   |
| Switching output, Q                | PNP/NPN/Auto-detect (see Selection Table)  | Ambient temperature: storage             | -20 ... +80 °C  |
| Output function                    | N.O./N.C.  | Weight (plug device)                     | 10 g  |
| Switching frequency, f (ti/tp 1:1) | ≤ 1000 Hz  | Weight (metal plug device <sup>6</sup> ) | 10 g  |
| Response time                      | 500 μs   | Weight (cable device)                    | 40 g  |
| Control input, IN <sup>3</sup>     | +U <sub>B</sub> = teach-in<br>-U <sub>B</sub> = button locked<br>Open = normal operation | Weight (pigtail)                         | 20 g  |
|                                    |  | Vibration and impact resistance          | EN 60947-5-2  |

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

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

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



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

# FR 25-RF

Retroreflective photoelectric sensor, fixed setting



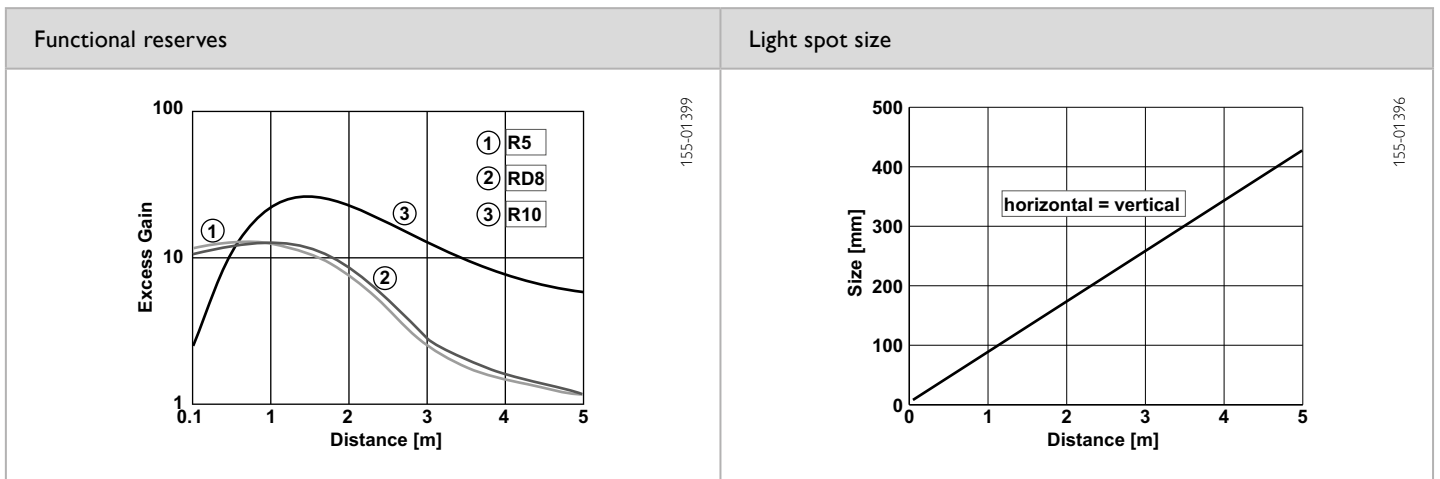
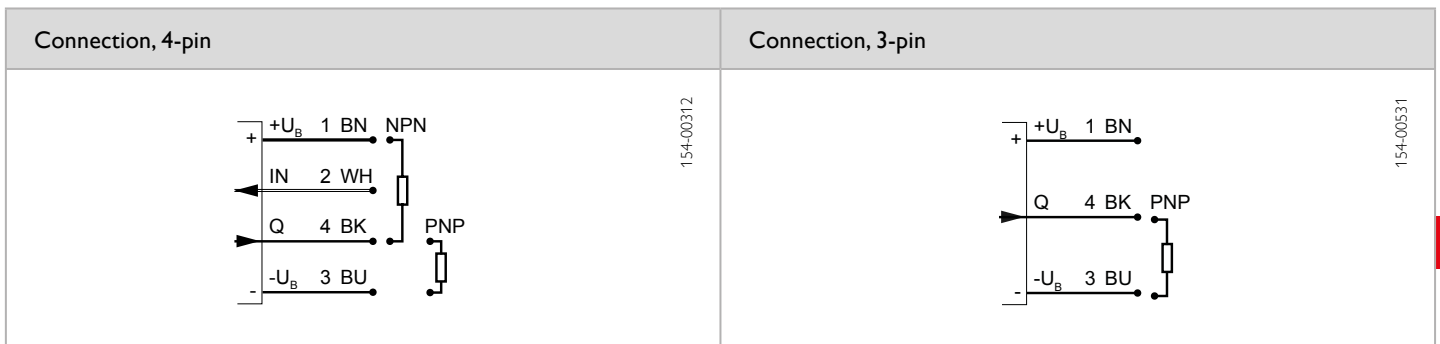
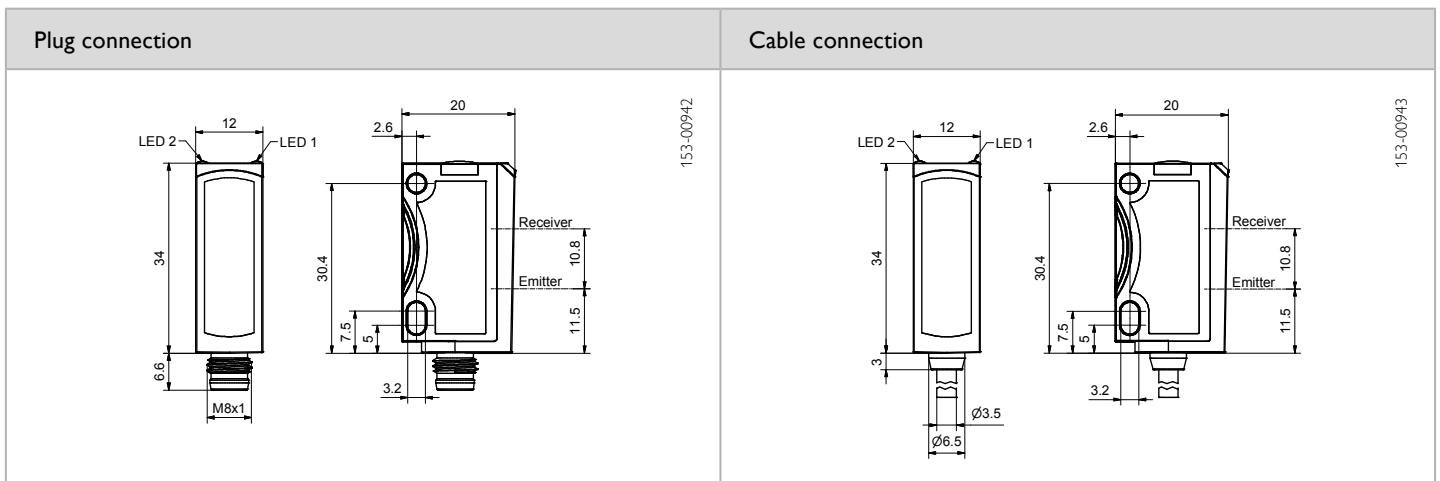
## PRODUCT HIGHLIGHTS

- Economical solution for numerous applications
- Tamper-proof sensor design – no misalignment possible
- Suitable for a wide variety of different reflectors
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings

| Optical data                       |  | Functions                       |                             |
|------------------------------------|--|---------------------------------|-----------------------------|
| Limit range                        | 0.1 ... 5 m <sup>1</sup>   | Indicator LED, green            | Operating voltage indicator |
| Operating range                    | 0.1 ... 3 m <sup>1</sup>   | Indicator LED, yellow           | Switching output indicator  |
| Type of light                      | LED, red, 632 nm   | Adjustment possibilities        | N.O./N.C. via control input |
| Light spot size                    | See diagram  |                                 |                             |
| Polarising filter                  | Yes  |                                 |                             |
| Electrical data                    |  | Mechanical data                 |                             |
| Operating voltage, +U <sub>B</sub> | 10 ... 30V DC <sup>2</sup>   | Dimensions                      | 34 x 20 x 12 mm             |
| No-load current, I <sub>0</sub>    | ≤ 30 mA  | Enclosure rating                | IP 69K & IP 67 <sup>3</sup> |
| Output current, I <sub>e</sub>     | ≤ 100 mA   | Material, housing               | ABS                         |
| Protective circuits                | Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q) | Material, front screen          | PMMA                        |
| Protection Class                   | 2  | Type of connection              | See Selection Table         |
| Power On Delay                     | < 300 ms   | Ambient temperature: operation  | -20 ... +60 °C <sup>4</sup> |
| Switching output, Q                | PNP/NPN (see Selection Table)  | Ambient temperature: storage    | -20 ... +80 °C              |
| Output function                    | N.O./N.C.  | Weight (plug device)            | 10 g                        |
| Switching frequency, f (ti/tp 1:1) | ≤ 1000 Hz  | Weight (cable device)           | 40 g                        |
| Response time                      | 500 μs   | Vibration and impact resistance | EN 60947-5-2                |
| Control input, IN                  | +U <sub>B</sub> = N.C.<br>-U <sub>B</sub> / Open = N.O.                    |                                 |                             |

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

| Operating range | Switching output | Type of connection | Part number    | Article number |
|-----------------|------------------|--------------------|----------------|----------------|
| 0.1 ... 3 m     | PNP              | Plug, M8x1, 3-pin  | FR 25-RF-PS-M3 | 606-11038      |
| 0.1 ... 3 m     | PNP              | Plug, M8x1, 4-pin  | FR 25-RF-PS-M4 | 606-11012      |
| 0.1 ... 3 m     | NPN              | Plug, M8x1, 4-pin  | FR 25-RF-NS-M4 | 606-11013      |
| 0.1 ... 3 m     | PNP              | Cable, 2 m, 4-wire | FR 25-RF-PS-K4 | 606-11014      |
| 0.1 ... 3 m     | NPN              | Cable, 2 m, 4-wire | FR 25-RF-NS-K4 | 606-11015      |



| Reflector | Operating range |
|-----------|-----------------|
| R10       | 0.1 ... 3 m     |
| RD8       | 0.1 ... 3 m     |
| R5        | 0.1 ... 3 m     |

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

# FS/FE 25-RL

Laser through-beam photoelectric sensor



## PRODUCT HIGHLIGHTS

- Long range with small and compact housings
- Test input for checking sensor pair function
- Very small, easily visible laser light spot
- Sensor settings via teach-in and control input
- Robust glass-fibre-reinforced plastic housings

| Optical data                       |  | Functions                                |  |
|------------------------------------|--|--|--|
| Limit range                        | 0 ... 20 m   | Indicator LED, green                     | Operating voltage indicator  |
| Operating range                    | 0 ... 18 m   | Indicator LED, yellow                    | Switching output indicator   |
| Type of light                      | Laser, red, 650 nm   | Sensitivity adjustment (receiver)        | Via Teach-in button and control input  |
| Light spot size                    | See diagram  | Teach-in modes                           | Mode 1: during running process<br>Mode 2: during standing process                |
| Laser Class (IEC 60825-1)          | 1  | Adjustment possibilities (receiver)      | N.O./N.C. via Teach-in button and control input<br>Button lock via control input |
|                                    |  | Default settings                         | Max. range and N.O.  |
| Electrical data                    |  | Mechanical data                          |  |
| Operating voltage, +U <sub>B</sub> | 10 ... 30V DC <sup>1</sup>   | Dimensions                               | 34 x 20 x 12 mm  |
| No-load current, I <sub>0</sub>    | ≤ 30 mA  | Enclosure rating                         | IP 69K & IP 67 <sup>2</sup>  |
| Output current, I <sub>e</sub>     | ≤ 100 mA   | Material, housing                        | ABS  |
| Protective circuits                | Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)               | Material, front screen                   | PMMA   |
| Protection Class                   | 2  | Type of connection                       | See Selection Table  |
| Power On Delay                     | < 300 ms   | Ambient temperature: operation           | -20 ... +60 °C <sup>3</sup>  |
| Switching output, Q                | PNP/NPN (see Selection Table)  | Ambient temperature: storage             | -20 ... +80 °C   |
| Output function                    | N.O./N.C.  | Weight (plug device)                     | 10 g   |
| Switching frequency, f (ti/tp 1:1) | ≤ 2000 Hz  | Weight (metal plug device <sup>4</sup> ) | 10 g   |
| Response time                      | 250 μs   | Weight (cable device)                    | 40 g   |
| Control input, IN (receiver)       | +U <sub>B</sub> = teach-in<br>-U <sub>B</sub> = button locked<br>Open = normal operation | Vibration and impact resistance          | EN 60947-5-2   |
| Control input, Test (transmitter)  | +U <sub>B</sub> = Test (transmitter off)<br>-U <sub>B</sub> / Open = normal operation    |  |  |

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

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

|   |  |
|---|--|
| <p><b>Plug connection (transmitter)</b></p> | <p><b>Cable connection (transmitter)</b></p> |
| <p><b>Plug connection (receiver)</b></p>    | <p><b>Cable connection (receiver)</b></p>    |

|  |   |
|--|---|
| <p><b>Connection, transmitter, 4-pin</b></p> | <p><b>Connection, receiver, 4-pin</b></p> |
|--|---|

|                                   |                               |
|-----------------------------------|-------------------------------|
| <p><b>Functional reserves</b></p> | <p><b>Light spot size</b></p> |
|-----------------------------------|-------------------------------|

|                           |                       |                 |                      |
|---------------------------|-----------------------|-----------------|----------------------|
| <p><b>Accessories</b></p> |                       |                 |                      |
| <p>Connection cables</p>  | <p>From Page A-38</p> | <p>Brackets</p> | <p>From Page A-4</p> |



# FS/FE 25-R

## Through-beam photoelectric sensor



### PRODUCT HIGHLIGHTS

- Test input for checking sensor pair function
- Sensor settings via teach-in and control input
- Simple alignment thanks to easily visible light spot
- Robust glass-fibre-reinforced plastic housings
- Durable laser printing

| Optical data                       |  | Functions                                |  |
|------------------------------------|--|--|--|
| Limit range                        | 0 ... 15 m   | Indicator LED, green                     | Operating voltage indicator  |
| Operating range                    | 0 ... 13 m   | Indicator LED, yellow                    | Switching output indicator   |
| Type of light                      | LED, red, 632 nm   | Sensitivity adjustment (receiver)        | Via Teach-in button and control input  |
| Light spot size                    | See diagram  | Teach-in modes                           | Mode 1: during running process<br>Mode 2: during standing process                |
|                                    |  | Adjustment possibilities (receiver)      | N.O./N.C. via Teach-in button and control input<br>Button lock via control input |
|                                    |  | Default settings                         | Max. range and N.O.  |
| Electrical data                    |  | Mechanical data                          |  |
| Operating voltage, +U <sub>B</sub> | 10 ... 30V DC <sup>1</sup>   | Dimensions                               | 34 x 20 x 12 mm  |
| No-load current, I <sub>0</sub>    | ≤ 30 mA  | Enclosure rating                         | IP 69K & IP 67 <sup>2</sup>  |
| Output current, I <sub>e</sub>     | ≤ 100 mA   | Material, housing                        | ABS  |
| Protective circuits                | Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)               | Material, front screen                   | PMMA   |
| Protection Class                   | 2  | Type of connection                       | See Selection Table  |
| Power On Delay                     | < 300 ms   | Ambient temperature: operation           | -20 ... +60 °C <sup>3</sup>  |
| Switching output, Q                | PNP/NPN (see Selection Table)  | Ambient temperature: storage             | -20 ... +80 °C   |
| Output function                    | N.O./N.C.  | Weight (plug device)                     | 10 g   |
| Switching frequency, f (ti/tp 1:1) | ≤ 1000 Hz  | Weight (metal plug device <sup>4</sup> ) | 10 g   |
| Response time                      | 500 μs   | Weight (cable device)                    | 40 g   |
| Control input, IN (receiver)       | +U <sub>B</sub> = teach-in<br>-U <sub>B</sub> = button locked<br>Open = normal operation | Vibration and impact resistance          | EN 60947-5-2   |
| Control input, Test (transmitter)  | +U <sub>B</sub> = Test (transmitter off)<br>-U <sub>B</sub> / Open = normal operation    |  |  |

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

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

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

|   |  |
|---|--|
| <p><b>Connection, transmitter, 4-pin</b></p> <p>154-00315</p> | <p><b>Connection, receiver, 4-pin</b></p> <p>154-00312</p> |
|---|--|

|  |  |
|--|--|
| <p><b>Functional reserves</b></p> <p>155-01370</p> | <p><b>Light spot size</b></p> <p>155-01371</p> |
|--|--|

|                    |                |          |               |
|--------------------|----------------|----------|---------------|
| <b>Accessories</b> |                |          |               |
| Connection cables  | From Page A-38 | Brackets | From Page A-4 |

# FS/FE 25-RF

Through-beam photoelectric sensor, fixed setting



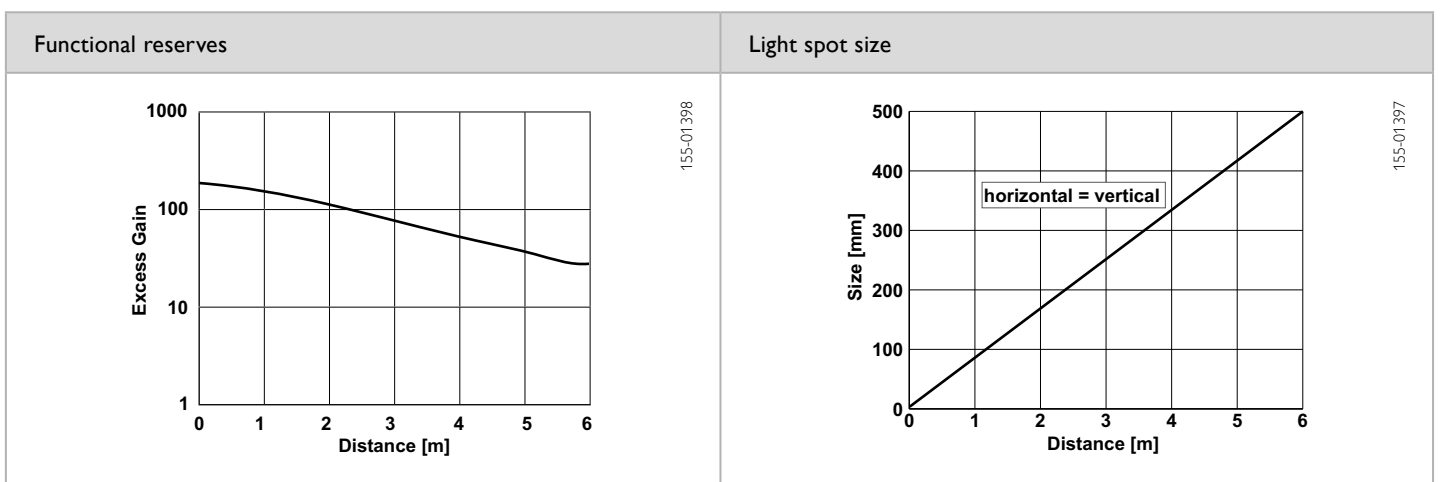
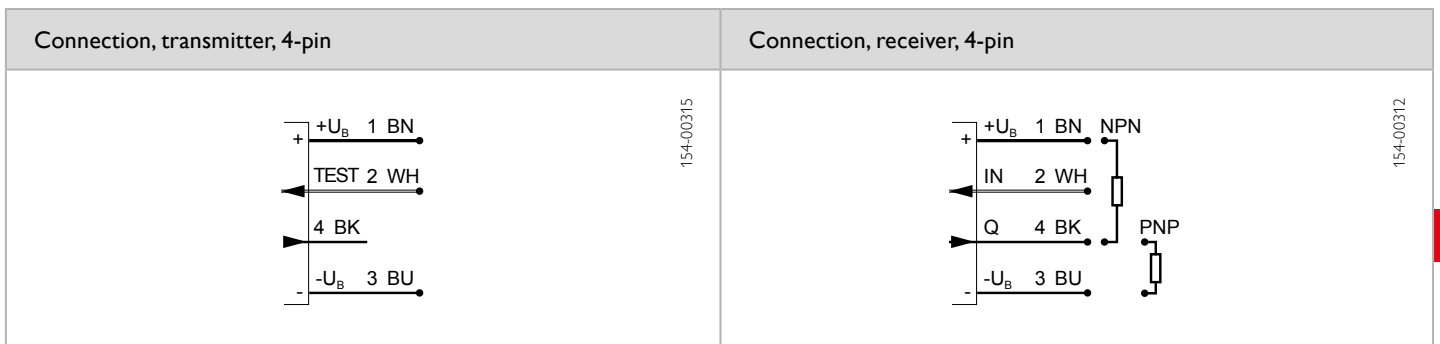
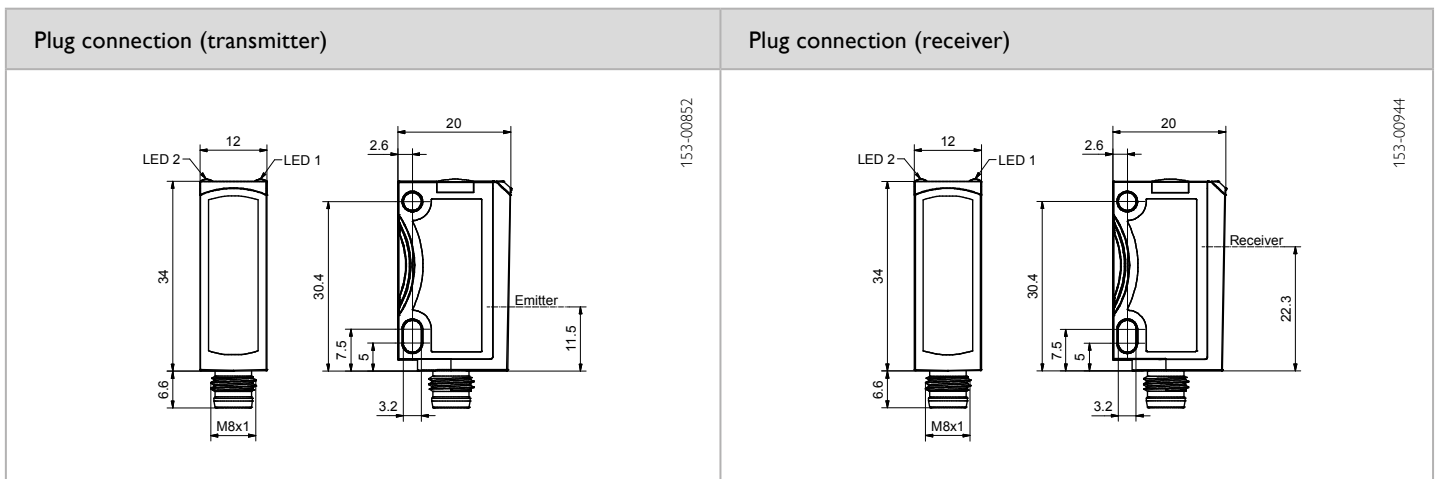
## PRODUCT HIGHLIGHTS

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

| Optical data                       |   | Functions                           |                             |
|------------------------------------|---|-------------------------------------|-----------------------------|
| Limit range                        | 0 ... 6 m   | Indicator LED, green                | Operating voltage indicator |
| Operating range                    | 0 ... 4 m   | Indicator LED, yellow               | Switching output indicator  |
| Type of light                      | LED, red, 632 nm  | Adjustment possibilities (receiver) | N.O./N.C. via control input |
| Light spot size                    | See diagram   |                                     |                             |
| Electrical data                    |   | Mechanical data                     |                             |
| Operating voltage, +U <sub>B</sub> | 10 ... 30V DC <sup>1</sup>  | Dimensions                          | 34 × 20 × 12 mm             |
| No-load current, I <sub>0</sub>    | ≤ 30 mA   | Enclosure rating                    | IP 69K & IP 67 <sup>2</sup> |
| Output current, I <sub>e</sub>     | ≤ 100 mA  | Material, housing                   | ABS                         |
| Protective circuits                | Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)            | Material, front screen              | PMMA                        |
| Protection Class                   | 2   | Type of connection                  | See Selection Table         |
| Power On Delay                     | < 300 ms  | Ambient temperature: operation      | -20 ... +60 °C <sup>3</sup> |
| Switching output, Q                | PNP/NPN (see Selection Table)   | Ambient temperature: storage        | -20 ... +80 °C              |
| Output function                    | N.O./N.C.   | Weight (plug device)                | 10 g                        |
| Switching frequency, f (ti/tp 1:1) | ≤ 1000 Hz   | Vibration and impact resistance     | EN 60947-5-2                |
| Response time                      | 500 μs  |                                     |                             |
| Control input, IN (receiver)       | +U <sub>B</sub> = N.C.<br>-U <sub>B</sub> / Open = N.O.                               |                                     |                             |
| Control input, Test (transmitter)  | +U <sub>B</sub> = Test (transmitter off)<br>-U <sub>B</sub> / Open = normal operation |                                     |                             |

<sup>1</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>2</sup> With connected IP 67 / IP 69K plug    <sup>3</sup> UL: -20 ... +50 °C

| Operating range | Switching output | Type of connection | Part number    | Article number |
|-----------------|------------------|--------------------|----------------|----------------|
| 0 ... 4 m       | PNP              | Plug, M8x1, 4-pin  | FE 25-RF-PS-M4 | 605-21016      |
| 0 ... 4 m       | NPN              | Plug, M8x1, 4-pin  | FE 25-RF-NS-M4 | 605-21017      |
| 0 ... 4 m       | –                | Plug, M8x1, 4-pin  | FS 25-RF-M4    | 605-11008      |



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