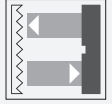




## Retroreflective sensor

ML100-54-F/25/103/115a/154



- No controls
- Miniature design
- Easy to use
- Clearly visible LEDs for Power ON, switching state and weak signal indication
- Very bright, highly visible light spot
- Full metal thread mounting
- Not sensitive to ambient light
- Optimized for small distances to any reflector
- Mounting optical reflective films down to a distance of 20 mm possible

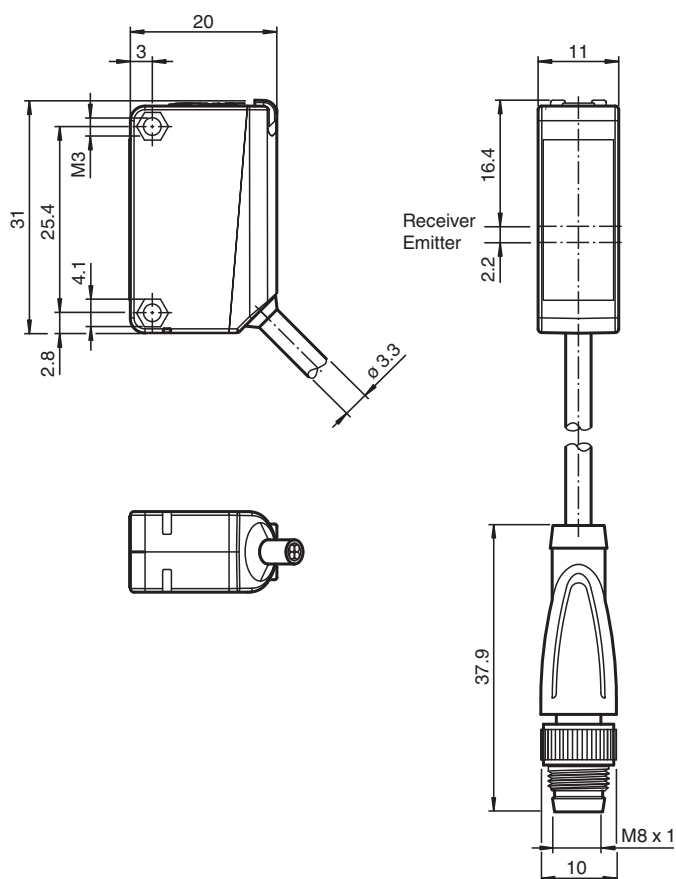
Retroreflective sensor with polarization filter, plastic housing, 3 m detection range, red light, light on, DC version, PNP output, fixed cable with M8 plug



### Function

The optical sensors of this series are suitable for both standard and demanding applications. The series features a miniature housing design, two M3 metal-threaded mounting holes and a highly visible LED status indicator. Each device is equipped with a sensitivity adjuster and a light-on/dark-on changeover switch for increased flexibility. A wide variety of versions are available in both infrared light and red light with PowerBeam for easy alignment. Special versions with BlueBeam are suitable for challenging applications like those in the solar and battery industries.

## Dimensions



## Technical Data

### General specifications

|                            |                                                                        |
|----------------------------|------------------------------------------------------------------------|
| Effective detection range  | 0 ... 2.7 m                                                            |
| Reflector distance         | 0.02 ... 2.7 m ( 0.02 ... 1 m on OFR-100/100 optical reflective film ) |
| Threshold detection range  | 3 m                                                                    |
| Reference target           | H50 reflector                                                          |
| Light source               | LED                                                                    |
| Light type                 | modulated visible red light                                            |
| Polarization filter        | yes                                                                    |
| Diameter of the light spot | approx. 200 mm at a distance of 3 m                                    |
| Opening angle              | approx. 4 °                                                            |
| Optical face               | frontal                                                                |
| Ambient light limit        | EN 60947-5-2                                                           |

### Functional safety related parameters

|                                |       |
|--------------------------------|-------|
| MTTF <sub>d</sub>              | 860 a |
| Mission Time (T <sub>M</sub> ) | 20 a  |
| Diagnostic Coverage (DC)       | 0 %   |

### Indicators/operating means

|                     |                                                                                                                                               |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Operation indicator | LED green: power on                                                                                                                           |
| Function indicator  | LED yellow: lights up when receiving the light beam ; flashes when falling short of the operating reserve; OFF when light beam is interrupted |

### Electrical specifications

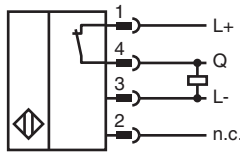
|                   |                |                |
|-------------------|----------------|----------------|
| Operating voltage | U <sub>B</sub> | 10 ... 30 V DC |
|-------------------|----------------|----------------|

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### Technical Data

|                                     |       |                                                                                                                                                                     |
|-------------------------------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ripple                              |       | max. 10 %                                                                                                                                                           |
| No-load supply current              | $I_0$ | < 20 mA                                                                                                                                                             |
| <b>Output</b>                       |       |                                                                                                                                                                     |
| Switching type                      |       | light-on                                                                                                                                                            |
| Signal output                       |       | 1 PNP output, short-circuit protected, reverse polarity protected, open collector                                                                                   |
| Switching voltage                   |       | max. 30 V DC                                                                                                                                                        |
| Switching current                   |       | max. 100 mA , resistive load                                                                                                                                        |
| Voltage drop                        | $U_d$ | ≤ 1.5 V DC                                                                                                                                                          |
| Switching frequency                 | $f$   | 1000 Hz                                                                                                                                                             |
| Response time                       |       | 0.5 ms                                                                                                                                                              |
| <b>Conformity</b>                   |       |                                                                                                                                                                     |
| Product standard                    |       | EN 60947-5-2                                                                                                                                                        |
| <b>Approvals and certificates</b>   |       |                                                                                                                                                                     |
| UL approval                         |       | cULus Listed, Class 2 Power Source or listed Power Supply with a limited voltage output with (maybe integrated) fuse (max. 3.3 A according UL248), Type 1 enclosure |
| CCC approval                        |       | CCC approval / marking not required for products rated ≤36 V                                                                                                        |
| <b>Ambient conditions</b>           |       |                                                                                                                                                                     |
| Ambient temperature                 |       | -30 ... 60 °C (-22 ... 140 °F)                                                                                                                                      |
| Storage temperature                 |       | -40 ... 70 °C (-40 ... 158 °F)                                                                                                                                      |
| <b>Mechanical specifications</b>    |       |                                                                                                                                                                     |
| Housing width                       |       | 11 mm                                                                                                                                                               |
| Housing height                      |       | 31 mm                                                                                                                                                               |
| Housing depth                       |       | 20 mm                                                                                                                                                               |
| Degree of protection                |       | IP67                                                                                                                                                                |
| Connection                          |       | 300 mm fixed cable with 4-pin, M8 x 1 connector                                                                                                                     |
| <b>Material</b>                     |       |                                                                                                                                                                     |
| Housing                             |       | PC (Polycarbonate)                                                                                                                                                  |
| Optical face                        |       | PMMA                                                                                                                                                                |
| Mass                                |       | approx. 20 g                                                                                                                                                        |
| Tightening torque, fastening screws |       | 0.6 Nm                                                                                                                                                              |
| Cable length                        |       | 0.3 m                                                                                                                                                               |

### Connection



### Connection Assignment

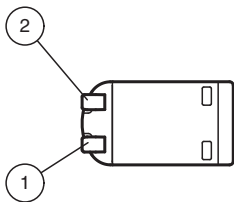


Connection Assignment

Wire colors in accordance with EN 60947-5-2

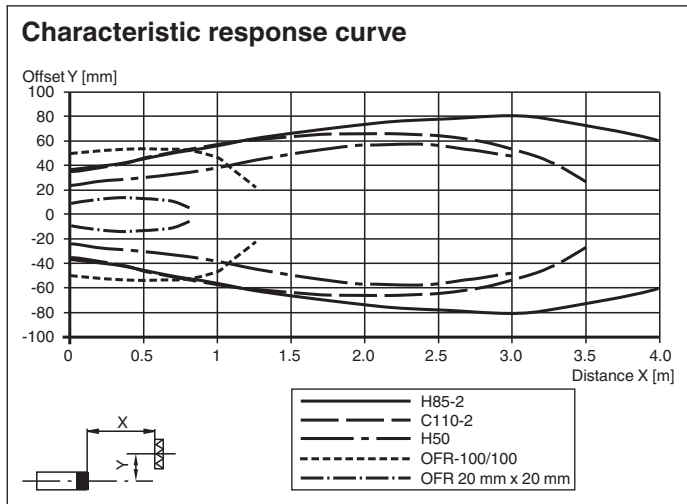
|   |    |         |
|---|----|---------|
| 1 | BN | (brown) |
| 2 | WH | (white) |
| 3 | BU | (blue)  |
| 4 | BK | (black) |

Indication

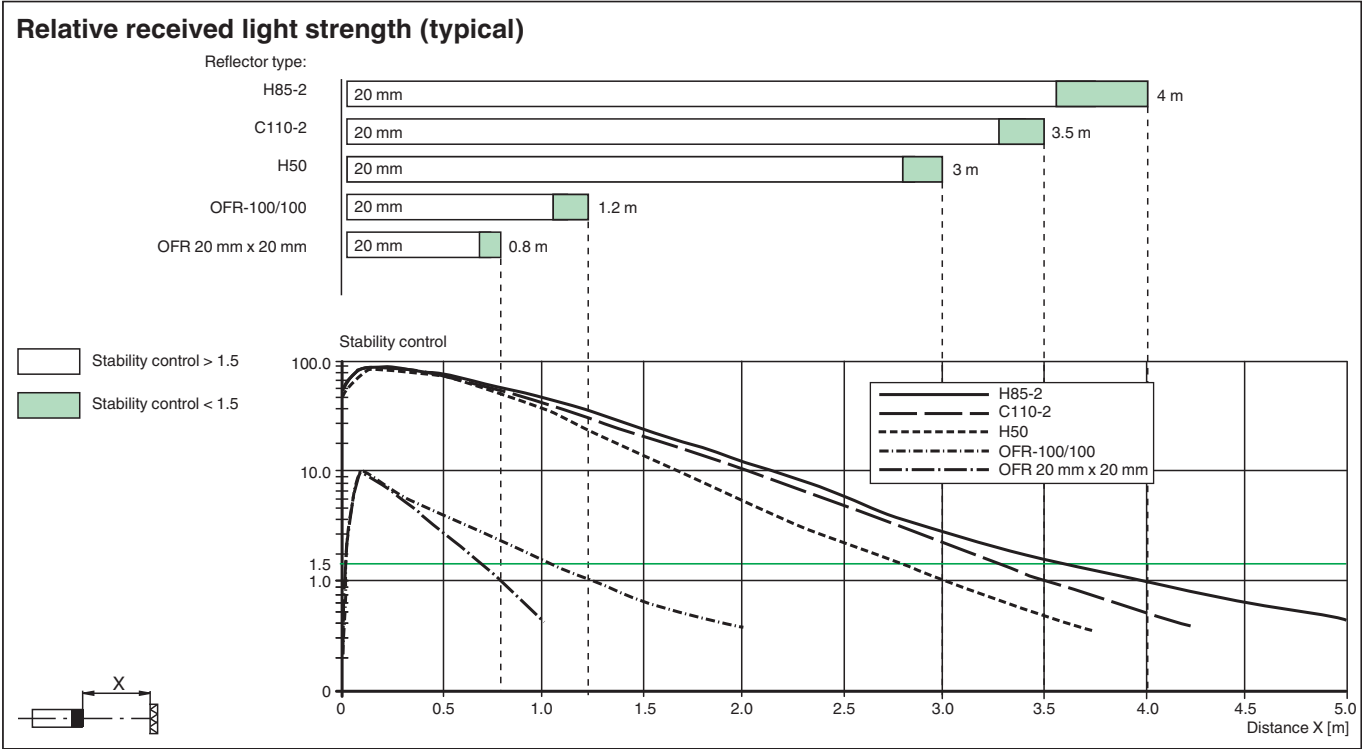


|   |                   |        |
|---|-------------------|--------|
| 1 | Signal display    | yellow |
| 2 | Operating display | green  |

Characteristic Curve



Characteristic Curve



Accessories

|                                                                                     |               |                                                               |
|-------------------------------------------------------------------------------------|---------------|---------------------------------------------------------------|
|  | OMH-ML100-09  | Mounting aid for round steel ø 12 mm or sheet 1.5 mm ... 3 mm |
|  | OMH-F10-ML100 | Mounting aid for ML100 series                                 |
|  | OMH-ML100-01  | Mounting aid for ML100 series, mounting bracket               |
|  | OMH-ML100-02  | Mounting aid for ML100 series, mounting bracket               |
|  | OMH-ML100-03  | Mounting aid for round steel ø 12 mm or sheet 1.5 mm ... 3 mm |
|  | OMH-ML100-04  | Mounting aid for ML100 series, mounting bracket               |
|  | OMH-ML100-05  | Mounting aid for ML100 series, mounting bracket               |
|  | OMH-10        | Mounting aid for ML100 series                                 |
|  | REF-C110-2    | Reflector, round ø 84 mm, central mounting hole               |
|  | REF-H60-2     | Reflector with mounting holes                                 |
|  | REF-H33       | Reflector with screw fixing                                   |

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## Accessories

|                                                                                   |                      |                                                                        |
|-----------------------------------------------------------------------------------|----------------------|------------------------------------------------------------------------|
|  | <b>OFR-70-2</b>      | Reflective tape 70 mm x 70 mm                                          |
|  | <b>OMH-ML100-08</b>  | Mounting aid for ML100 series, Snap-in                                 |
|  | <b>REF-H85-2</b>     | Reflector, rectangular 84.5 mm x 84.5 mm, mounting holes               |
|  | <b>REF-H50</b>       | Reflector, rectangular 51 mm x 61 mm, mounting holes, fixing strap     |
|  | <b>OFR-100/100</b>   | Reflective tape 100 mm x 100 mm                                        |
|  | <b>V31-GM-2M-PUR</b> | Female cordset single-ended M8 straight A-coded, 4-pin, PUR cable grey |
|  | <b>V31-WM-2M-PUR</b> | Female cordset single-ended M8 angled A-coded, 4-pin, PUR cable grey   |

## System Description

### System Description

The retro-reflective sensor contains both an emitter and a receiver in a single housing. A reflector reflects the light from emitter back to the receiver. If an object interrupts the light beam, the switching function is initiated.

## Mounting

### Mounting

The sensors can be mounted directly via through-holes or by using a mounting bracket or a clamp component. Mounting brackets and clamp components are available as accessories.

Ensure that the surface is flat to avoid housing distortion during mounting and fixing.

Secure nut and bolt with spring washers to prevent misalignment of the sensor.

**Adjusting the Sensor:** Apply the operating voltage to the sensor. The power indicator lights green.

Mount a suitable reflector opposite the retroreflective sensor. Align the sensor (without object) roughly with the reflector. Then adjust the sensor to the reflector by tilting it horizontally and vertically until the yellow signal indicator is permanently lights up. If the alignment is inaccurate, the yellow signal indicator flashes.

## Commissioning

### Commissioning

**Check Object Detection:** Check as follows if the sensor detects objects as intended.

Position the object in the beam path of the sensor.

Once the object is detected, the yellow signal indicator goes out. As soon as the object leaves the beam path of the sensor, the yellow signal indicator permanently lights up again.

## Maintenance

### Maintenance

**Cleaning:** If reception deteriorates, e. g. due to dirt, the yellow signal indicator of the receiver flashes. Clean the optical interfaces of the sensor (e. g. lenses) at regular intervals.

**Servicing:** Check the mounting screw connections and the electrical plug connections regularly.