## Dimensions



\* optical axis transmitter
\*\* optical axis receiver
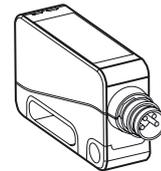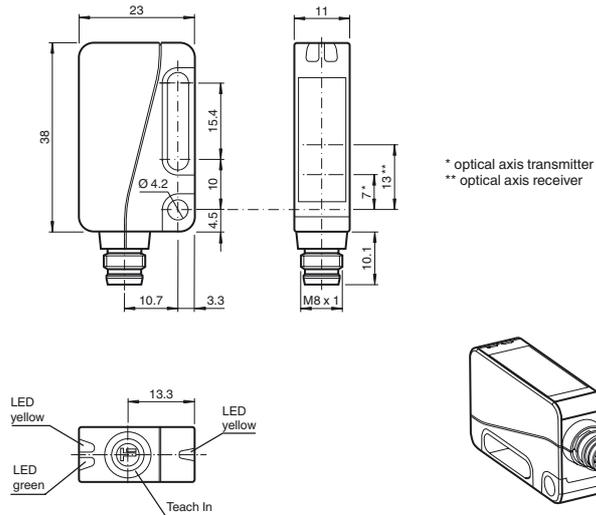
## Model Number

**ML9-54/59/82b/103/143**

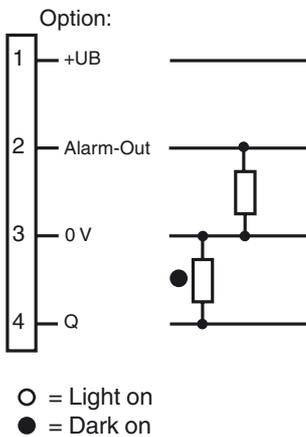Retroreflective sensor
with 4-pin, M8 x 1 connector

## Features

- Ultra bright LEDs for power on, pre fault indication and switching state
- Flashing power on LED in case of short-circuit
- TEACH-IN
- Not sensitive to ambient light, even with switched energy saving lamps
- Protected against mutual interference (no cross-talk)
- Protection class II

## Electrical connection

Option:



| 1 | +UB |
| 2 | Alarm-Out |
| 3 | 0 V |
| 4 | Q |

○ = Light on
● = Dark on

## Pinout



## Indicators/operating means
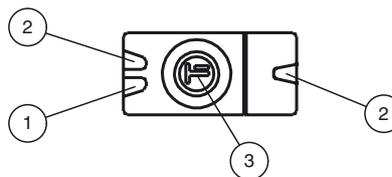


| 1 | LED green |
| 2 | LED yellow |
| 3 | Teach-In |

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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## Technical data

### General specifications

| | |
|---|---|
| Effective detection range | 0 ... 5 m |
| Threshold detection range | 6 m |
| Reference target | H85-2 reflector |
| Light source | LED |
| Light type | modulated visible red light |
| Polarization filter | yes |
| Diameter of the light spot | approx. 110 mm at a distance of 3 m |
| Angle of divergence | approx. 2.1 ° |
| Ambient light limit | 30000 Lux |

### Functional safety related parameters

| | |
|---|---|
| $MTTF_d$ | 1240 a |
| Mission Time ($T_M$) | 20 a |
| Diagnostic Coverage (DC) | 0 % |

### Indicators/operating means

| | |
|---|---|
| Operation indicator | LED green, statically lit Power on , Undervoltage indicator: Green LED, pulsing (approx. 0.8 Hz) , short-circuit : LED green flashing (approx. 4 Hz) |
| Function indicator | LED yellow, lights up when light beam is free, flashes when falling short of the stability control |
| Control elements | Teach-In key |

### Electrical specifications

| | | |
|---|---|---|
| Operating voltage | $U_B$ | 10 ... 30 V DC , class 2 |
| Ripple | | max. 10 % |
| No-load supply current | $I_0$ | < 20 mA at 24 V |

### Output

| | | |
|---|---|---|
| Pre-fault indication output | | 1 PNP, inactive when falling short of the stability control |
| Switching type | | dark 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 |
| Voltage drop | $U_d$ | ≤ 2 V DC |
| Switching frequency | f | 1000 Hz |
| Response time | | 0.5 ms |

### Ambient conditions

| | |
|---|---|
| Ambient temperature | -25 ... 60 °C (-13 ... 140 °F) |
| Storage temperature | -40 ... 75 °C (-40 ... 167 °F) |

### Mechanical specifications

| | |
|---|---|
| Degree of protection | IP67 |
| Connection | M8 x 1 connector, 4-pin |
| Material | |
| Housing | PC (glass-fiber-reinforced Makrolon) |
| Optical face | glass |
| Connector | plastic |
| Mass | approx. 15 g |

### Compliance with standards and directives

| | |
|---|---|
| Standard conformity | |
| Product standard | EN 60947-5-2:2007 IEC 60947-5-2:2007 |
| Standards | EN 50178, UL 508 |

### Approvals and certificates

| | |
|---|---|
| Protection class | II, rated voltage ≤ 50 V AC with pollution degree 1-2 according to IEC 60664-1 |
| UL approval | cULus |
| CCC approval | CCC approval / marking not required for products rated ≤36 V |

## Accessories

**OMH-ML9**
Mounting bracket

**OMH-ML9-01**
Threaded bolt M3

**V31-GM-2M-PVC**
Female cordset, M8, 4-pin, PVC cable

**V31-WM-2M-PVC**
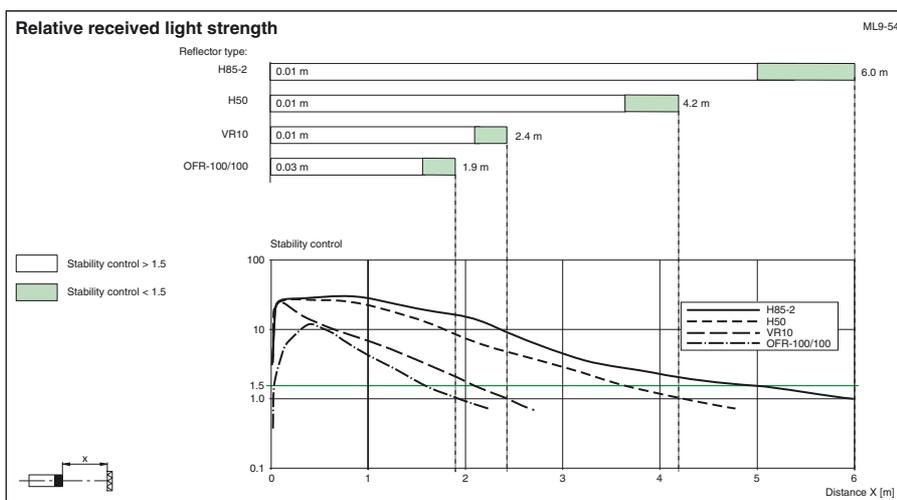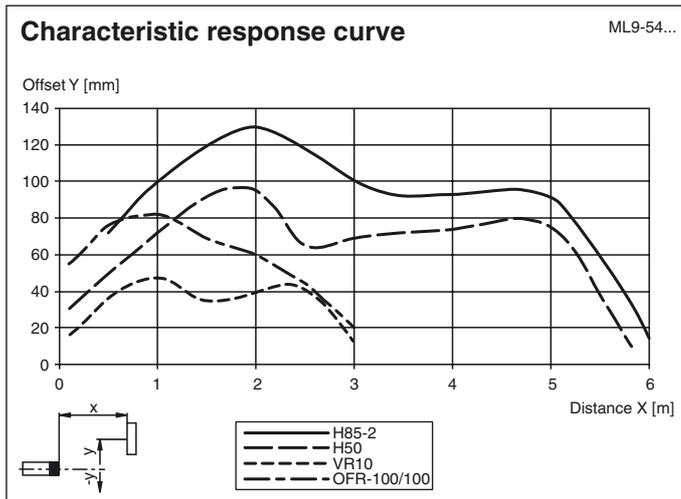Female cordset, M8, 4-pin, PVC cable

**V31-GM-5M-PUR**
Female cordset, M8, 4-pin, PUR cable

**V31-WM-5M-PUR**
Female cordset, M8, 4-pin, PUR cable

Other suitable accessories can be found at www.pepperl-fuchs.com

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## Curves/Diagrams

### Characteristic response curve
ML9-54...

Offset Y [mm]



Distance X [m]

Legend:
- H85-2
- H50
- VR10
- OFR-100/100

### Relative received light strength
ML9-54

Reflector type:

| Reflector type | | |
|---|---|---|
| H85-2 | 0.01 m | 6.0 m |
| H50 | 0.01 m | 4.2 m |
| VR10 | 0.01 m | 2.4 m |
| OFR-100/100 | 0.03 m | 1.9 m |

- Stability control > 1.5
- Stability control < 1.5

Stability control



Legend:
- H85-2
- H50
- VR10
- OFR-100/100

Distance X [m]

## Setting Instructions

### Setting Instructions for Devices with Teach-In

After the operating voltage is applied, the green LED lights up. The sensor is automatically in max. sensitivity status (state as supplied) or in the status of the most recent Teach-In setting.

Mount a suitable reflector opposite the photoelectric sensor.

### Teach-In with the Teach key
- Align the sensor to a suitable reflector.
- Press the Teach key. The green LED indicator light goes off briefly to confirm this.
- Hold down the Teach key until the yellow and green indicator LEDs flash synchronously (about 2.5 Hz). Then release the Teach key
- During internal setup of the sensor, the green and yellow indicator LEDs flash alternately (about 2.5 Hz).
- Teach-In successful: The green and yellow indicator LEDs are lit. The device is ready for operation.
- Teach-In not successful: The green and yellow indicator LEDs flash quickly and alternately (about 8 Hz) for about 5 seconds. Then the sensor switches to the status with maximum sensitivity. After that, repeat the Teach-In procedure, starting with step 1.

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