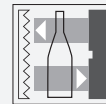




## Retroreflective sensor ML9-54-G/82b/103/115

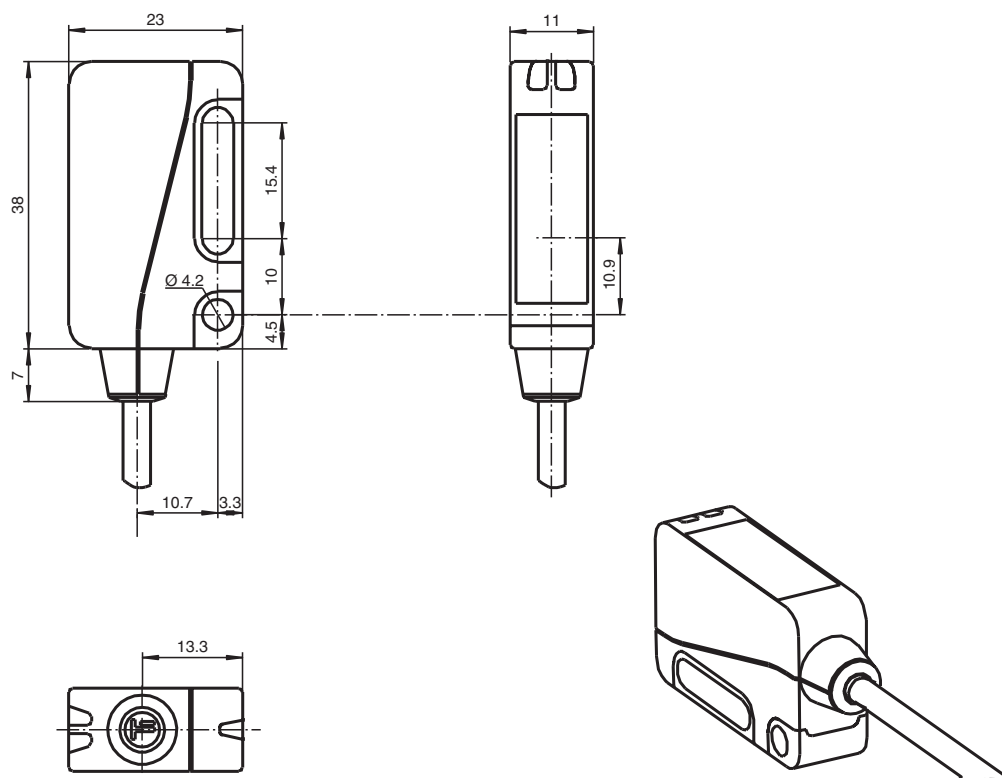


- Ultra bright LEDs for power on, weak signal indication and switching state
- Flashing power on LED in case of short-circuit
- TEACH-IN
- Automatic adjustment in case of soiling in contrast detection mode
- Not sensitive to ambient light, even with switched energy saving lamps
- Protected against mutual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

Retroreflective sensor with polarization filter for clear object detection



### Dimensions



### Technical Data

#### General specifications

|                           |                                                          |
|---------------------------|----------------------------------------------------------|
| Effective detection range | 0 ... 3.5 m in TEACH mode<br>0 ... 5.7 m in normal mode  |
| Reflector distance        | 0 ... 3.5 m in TEACH mode<br>0 ... 5.7 mm in normal mode |
| Threshold detection range | 7.6 m                                                    |

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

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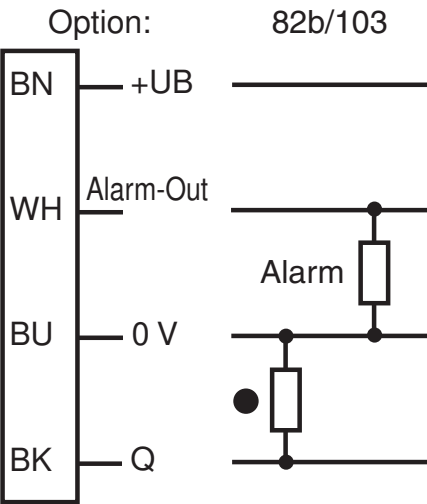
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**PEPPERL+FUCHS**

## Technical Data

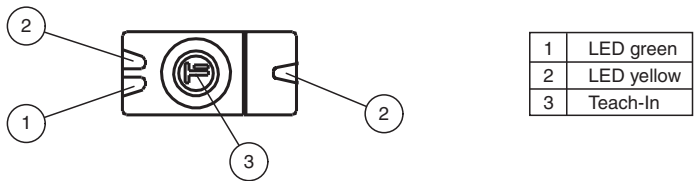
|                                             |                |                                                                                                                                                      |
|---------------------------------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reference target                            |                | H85-2 reflector                                                                                                                                      |
| Light source                                |                | LED                                                                                                                                                  |
| Light type                                  |                | modulated visible red light , 660 nm                                                                                                                 |
| Polarization filter                         |                | yes                                                                                                                                                  |
| Angle deviation                             |                | max. $\pm 1^\circ$                                                                                                                                   |
| Diameter of the light spot                  |                | approx. 40 mm at detection range 1 m                                                                                                                 |
| Opening angle                               |                | 1.7 °                                                                                                                                                |
| Ambient light limit                         |                | 40000 Lux                                                                                                                                            |
| <b>Functional safety related parameters</b> |                |                                                                                                                                                      |
| MTTF <sub>d</sub>                           |                | 1050 a                                                                                                                                               |
| Mission Time (T <sub>M</sub> )              |                | 20 a                                                                                                                                                 |
| Diagnostic Coverage (DC)                    |                | 0 %                                                                                                                                                  |
| <b>Indicators/operating means</b>           |                |                                                                                                                                                      |
| 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: switching state ; Operating reserve ; Teach-In                                                                                           |
| Control elements                            |                | Teach-In key                                                                                                                                         |
| Contrast detection levels                   |                | 10 % - clean, water filled PET bottles                                                                                                               |
| <b>Electrical specifications</b>            |                |                                                                                                                                                      |
| Operating voltage                           | U <sub>B</sub> | 10 ... 30 V DC , class 2                                                                                                                             |
| Ripple                                      |                | max. 10 %                                                                                                                                            |
| No-load supply current                      | I <sub>0</sub> | < 20 mA at 24 V DC                                                                                                                                   |
| <b>Output</b>                               |                |                                                                                                                                                      |
| Stability alarm output                      |                | 1 PNP function reserve output (alarm), short-circuit protected, protected from reverse polarity, open collector                                      |
| 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                                                                                                                                          |
| Switching frequency                         | f              | 1000 Hz                                                                                                                                              |
| Response time                               |                | 500 µs                                                                                                                                               |
| <b>Conformity</b>                           |                |                                                                                                                                                      |
| Product standard                            |                | EN 60947-5-2                                                                                                                                         |
| <b>Approvals and certificates</b>           |                |                                                                                                                                                      |
| Protection class                            |                | II, rated voltage $\leq 50$ V AC with pollution degree 1-2 according to IEC 60664-1 functional insulation acc. to DIN EN 50178                       |
| UL approval                                 |                | cULus                                                                                                                                                |
| CCC approval                                |                | CCC approval / marking not required for products rated $\leq 36$ V                                                                                   |
| <b>Ambient conditions</b>                   |                |                                                                                                                                                      |
| Ambient temperature                         |                | -20 ... 60 °C (-4 ... 140 °F)                                                                                                                        |
| Storage temperature                         |                | -40 ... 75 °C (-40 ... 167 °F)                                                                                                                       |
| <b>Mechanical specifications</b>            |                |                                                                                                                                                      |
| Housing width                               |                | 23 mm                                                                                                                                                |
| Housing height                              |                | 38 mm                                                                                                                                                |
| Housing depth                               |                | 11 mm                                                                                                                                                |
| Degree of protection                        |                | IP67                                                                                                                                                 |
| Connection                                  |                | 2 m fixed cable                                                                                                                                      |
| Material                                    |                |                                                                                                                                                      |
| Housing                                     |                | PC (glass-fiber-reinforced Makrolon)                                                                                                                 |
| Optical face                                |                | glass                                                                                                                                                |
| Mass                                        |                | approx. 25 g                                                                                                                                         |

Connection Assignment

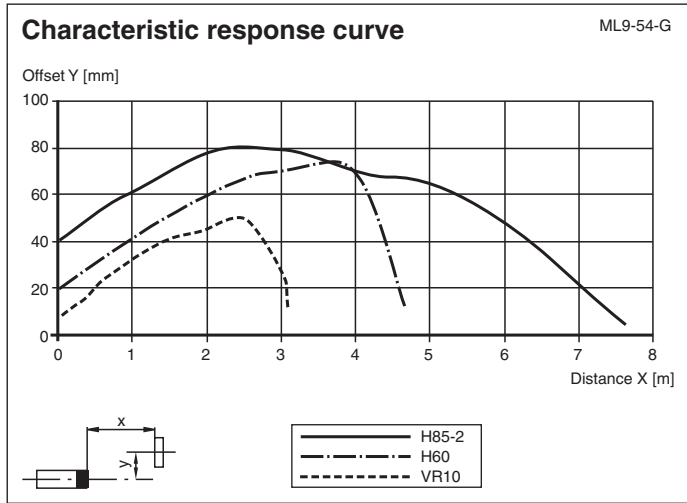


○ = Light on  
● = Dark on

Assembly



Characteristic Curve

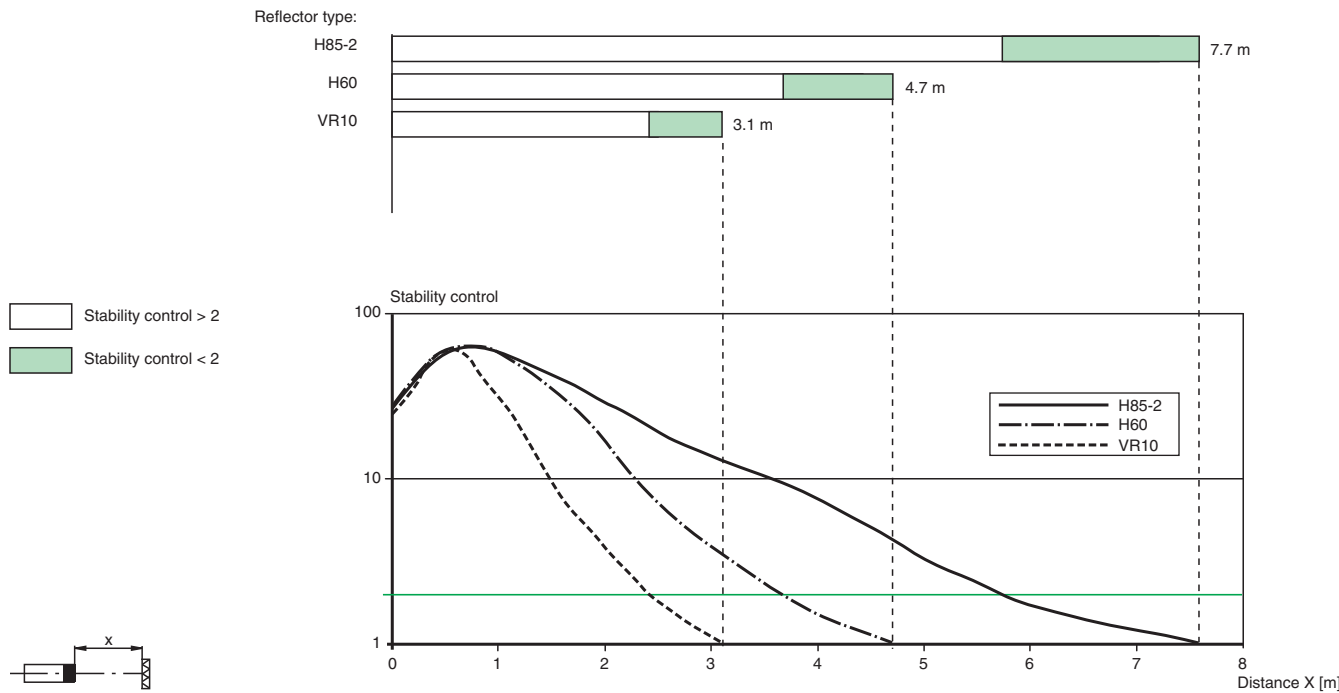


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Characteristic Curve

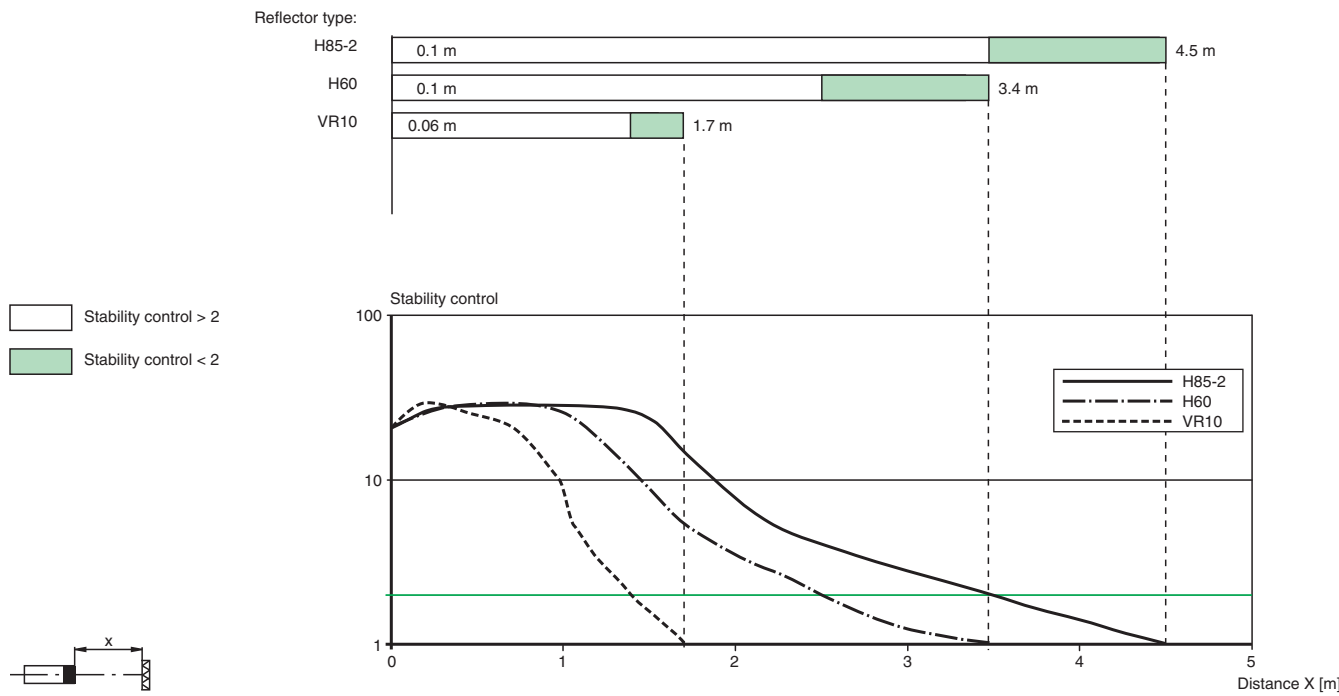
Relative received light strength in standard mode

ML9-54-G...



Relative received light strength in glass detection mode

ML9-54-G...



Accessories



OMH-ML9

Mounting aid for ML9 series, Mounting bracket



OMH-ML9-01

Mounting aid for ML9 series, Threaded bolt M3

**Adjustment instructions****Adjustment instructions for devices with Teach-In**

After the operating voltage has been applied, the LED is lit green. The sensor is automatically set to a state of maximum sensitivity (state as supplied) or the state of the most recent Teach-In setting.

Assemble the appropriate reflector opposite the light barrier.

**Teach-In using the Teach key**

- Align the sensor to an appropriate reflector.
- Press the Teach key - as confirmation, the green display LED is briefly turned off once.
- Hold the Teach key down until the yellow and green display LED is flashing at regular intervals (about 2.5 Hz). Then release the Teach key.
- During the internal set-up of the sensor, the green and yellow display LEDs flash alternately (about 2.5 Hz).
- Teach-In successful: The green and yellow display LEDs are lit. Contrast detection 10% is activated. The device is ready for operation.
- Teach-In not successful: The green and yellow display LEDs flash alternately and rapidly (about 8 Hz) for about 5 seconds. Then the sensor goes to the state with maximum sensitivity.

After this happens, repeat the Teach-In procedure, starting with step 1.