



**Model Number**

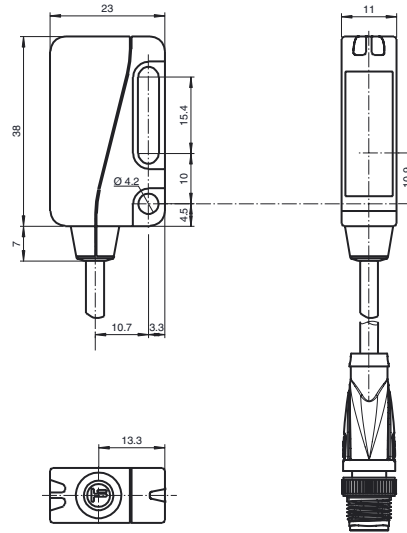
**ML9-54-G/59/136/115b**

Retroreflective sensor  
with fixed cable and M12 connector, 4-pin

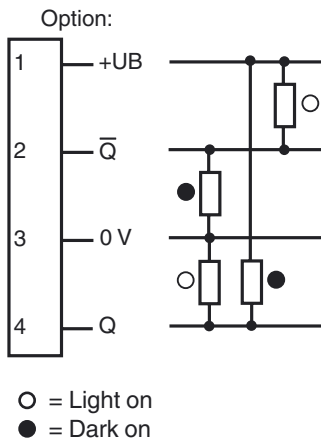
**Features**

- Ultra bright LEDs for power on, pre fault 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

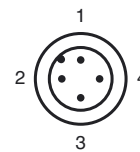
**Dimensions**



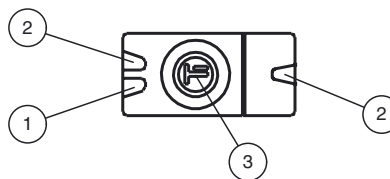
**Electrical connection**



**Pinout**



**Indicators/operating means**



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

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**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                                                    |
| 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                     |
| Angle of divergence        | 1.7 °                                                    |
| Ambient light limit        | 40000 Lux                                                |

**Functional safety related parameters**

|                                |        |
|--------------------------------|--------|
| MTTF <sub>d</sub>              | 1050 a |
| Mission Time (T <sub>M</sub> ) | 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: switching state ; Stability control ; Teach-In                                                                                           |
| Control elements          | Teach-In key                                                                                                                                         |
| Contrast detection levels | 10 % - clean, water filled PET bottles                                                                                                               |

**Electrical specifications**

|                        |                |                          |
|------------------------|----------------|--------------------------|
| 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       |

**Output**

|                     |   |                                                                                              |
|---------------------|---|----------------------------------------------------------------------------------------------|
| Signal output       |   | 2 push-pull (4 in 1) outputs, complementary, short-circuit proof, reverse polarity protected |
| Switching voltage   |   | max. 30 V DC                                                                                 |
| Switching current   |   | max. 100 mA                                                                                  |
| Switching frequency | f | 1000 Hz                                                                                      |
| Response time       |   | 500 $\mu$ s                                                                                  |

**Ambient conditions**

|                     |                                |
|---------------------|--------------------------------|
| Ambient temperature | -20 ... 60 °C (-4 ... 140 °F)  |
| Storage temperature | -40 ... 75 °C (-40 ... 167 °F) |

**Mechanical specifications**

|                      |                                                     |
|----------------------|-----------------------------------------------------|
| Degree of protection | IP67                                                |
| Connection           | 200 mm connecting cable with 4-pin, M12x1 connector |
| Material             |                                                     |
| Housing              | PC (glass-fiber-reinforced Makrolon)                |
| Optical face         | glass                                               |
| Mass                 | approx. 25 g                                        |

**Compliance with standards and directives**

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

**Approvals and certificates**

|                  |                                                                                                                                |
|------------------|--------------------------------------------------------------------------------------------------------------------------------|
| 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                                                             |

**Accessories****OMH-ML9**

Mounting bracket

**OMH-ML9-01**

Threaded bolt M3

**V1-G-2M-PUR**

Female cordset, M12, 4-pin, PUR cable

**V1-W-2M-PUR**

Female cordset, M12, 4-pin, PUR cable

**V1-G-5M-PUR**

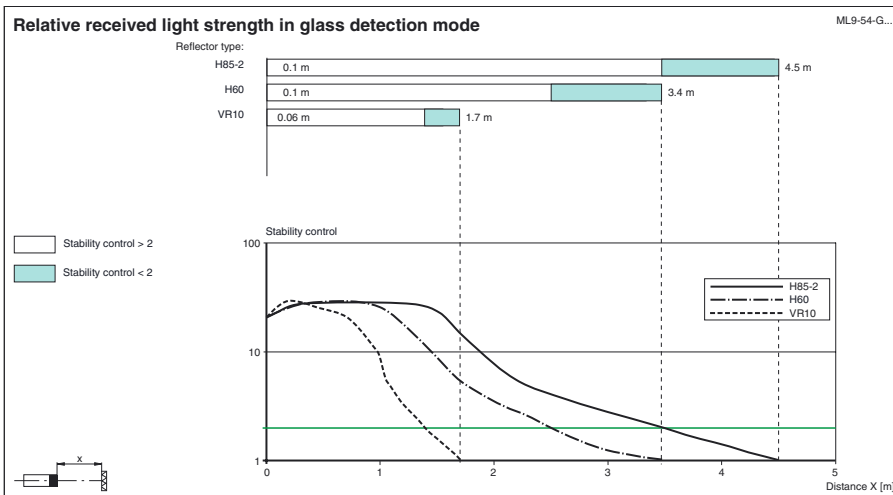
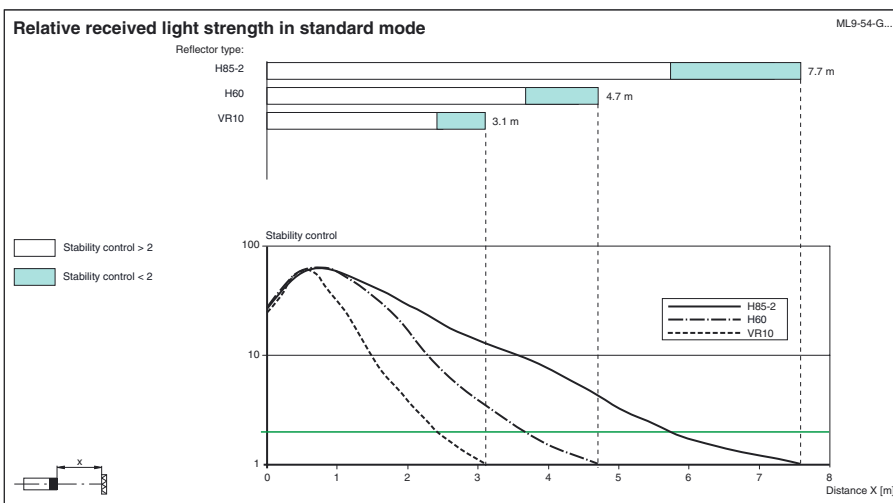
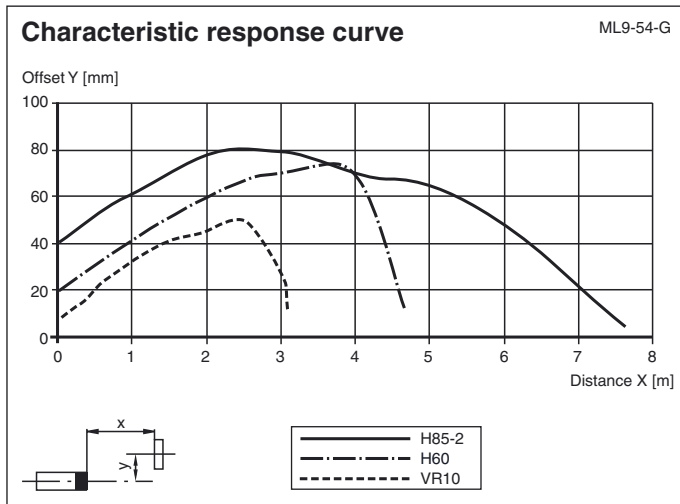
Female cordset, M12, 4-pin, PUR cable

**V1-W-5M-PUR**

Female cordset, M12, 4-pin, PUR cable

Other suitable accessories can be found at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com)

**Curves/Diagrams**



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**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.

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

- 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.