Dimensions

* optical axis transmitter
** optical axis receiver

Model Number

ML9-54/59/103/115a/123

Retroreflective sensor

200 mm fixed cable with 4-pin, M8x1 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
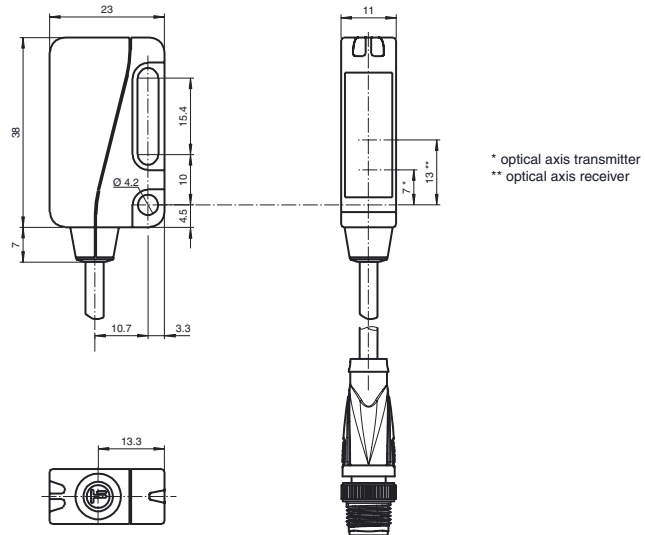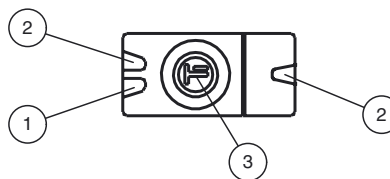
Electrical connection

Option: 59/103/115a/123

Pin	Signal
1	+UB
2	Teach-In
3	0 V
4	Q
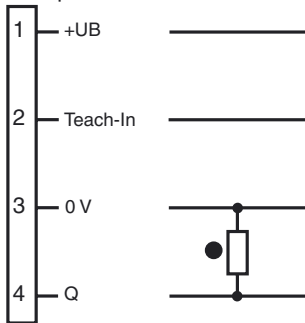
○ = Light on
● = Dark on

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

Input

Function input	Ext. Teach-In input (ET)

Output

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	200 mm fixed cable with 4-pin, M8x1 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 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
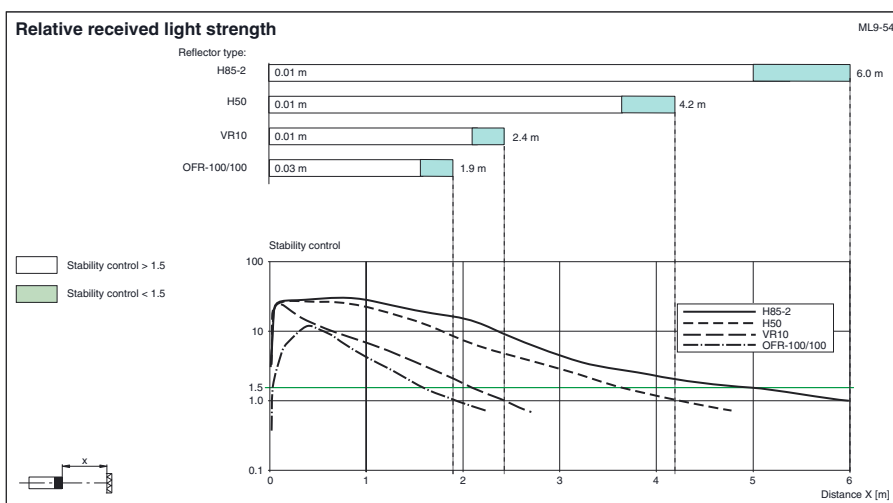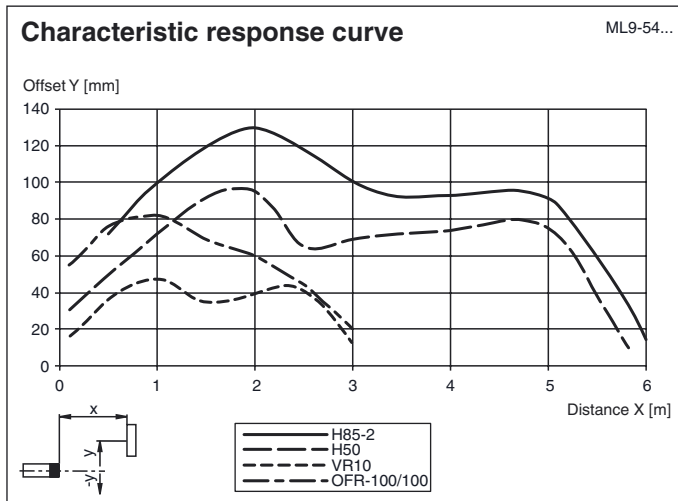
V31-GM-5M-PUR
Female cordset, M8, 4-pin, PUR cable

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

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

Curves/Diagrams

Characteristic response curve

ML9-54...

Offset Y [mm]

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

Relative received light strength

ML9-54

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

☐ Stability control > 1.5
▨ Stability control < 1.5

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.

Teach-In via external Teach-In input (ET)

Teach-In can also be initiated via the external Teach-In input (ET)

To do this, the ET must be open (or at 0 V) for at least 50 ms, after which +UB is applied for a duration of 50 to 80 ms.

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Teach-In lasts for a maximum of 11 seconds (if not successful)

Required voltage level at the external Teach-In input (ET)
to initiate a Teach-In

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