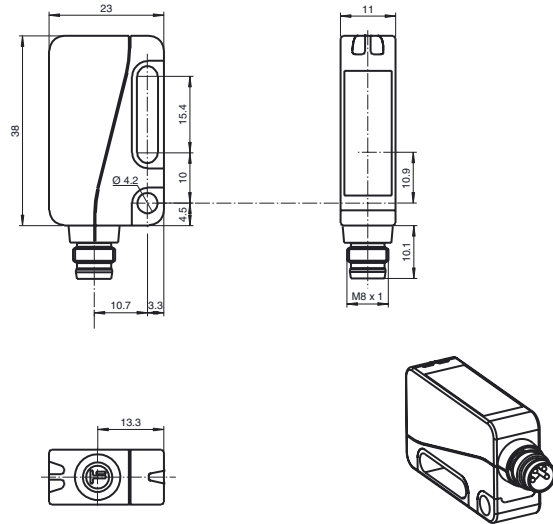## Model Number

ML9-54-G/25/110/123/143

Retroreflective sensor
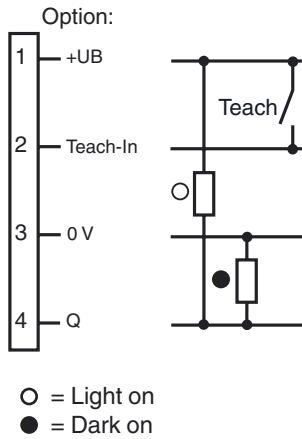with 4-pin, M8 x 1 connector

Features

- Ultra bright LEDs for power on, pre fault indication and switching state
- Flashing power on LED in case of short-circuit
- TEACH-IN
- 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)
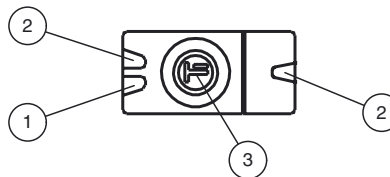- Protection class II

Dimensions

Electrical connection

Option:

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".

Pepperl+Fuchs Group
www.pepperl-fuchs.com

USA: +1 330 486 0001
fa-info@us.pepperl-fuchs.com

Germany: +49 621 776 4411
fa-info@de.pepperl-fuchs.com

Singapore: +65 6779 9091
fa-info@sg.pepperl-fuchs.com

PEPPERL+FUCHS
SENSING YOUR NEEDS

1

Technical data

General specifications

Effective detection range	0 ... 3.5 m in TEACH mode 0 ... 5.7 m in normal mode
Reflector distance	0 ... 3.5 m in TEACH mode 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. ± 1°
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

$MTTF_d$		1050 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: 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_B	10 ... 30 V DC , class 2
Ripple		max. 10 %
No-load supply current	I_0	< 20 mA at 24 V DC

Input

Function input	Ext. Teach-In input (ET)

Output

Switching type		light on
Signal output		1 push-pull (4 in 1) output, short-circuit protected, reverse polarity protected
Switching voltage		max. 30 V DC
Switching current		max. 100 mA
Switching frequency	f	1000 Hz
Response time		500 μs

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	M8 x 1 connector, 4-pin
Material	
Housing	PC (glass-fiber-reinforced Makrolon)
Optical face	glass
Connector	plastic
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 functional insulation acc. to DIN EN 50178
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
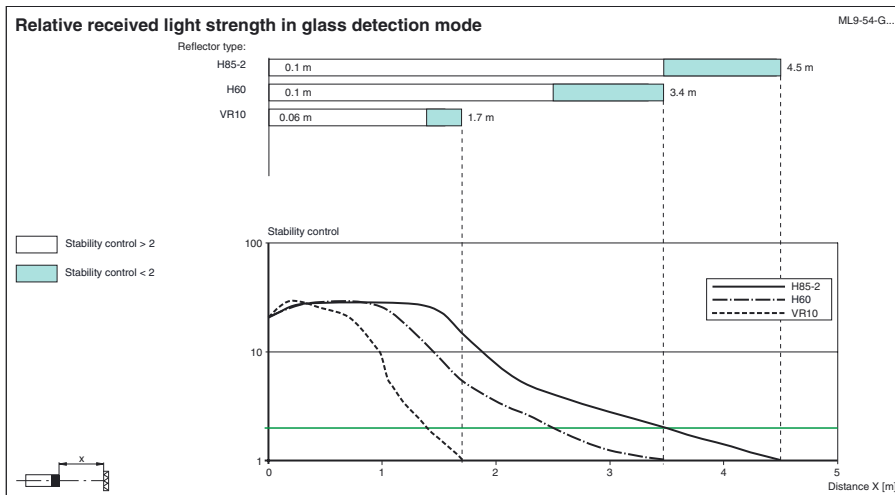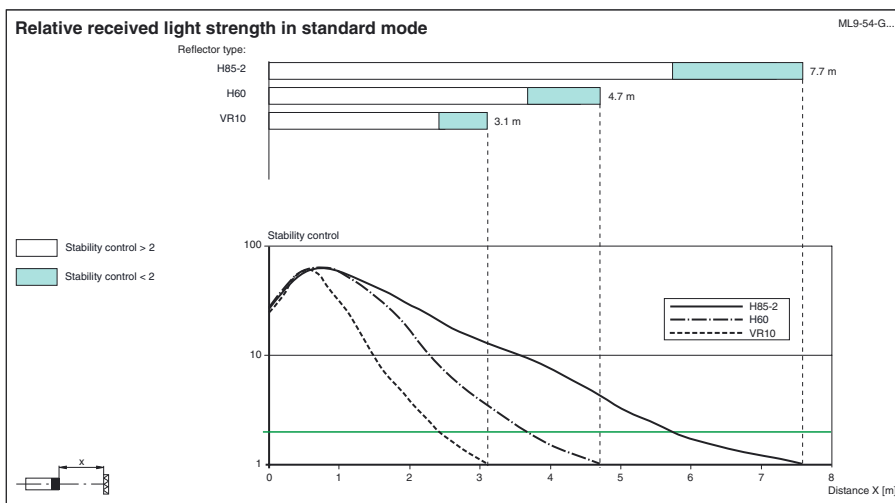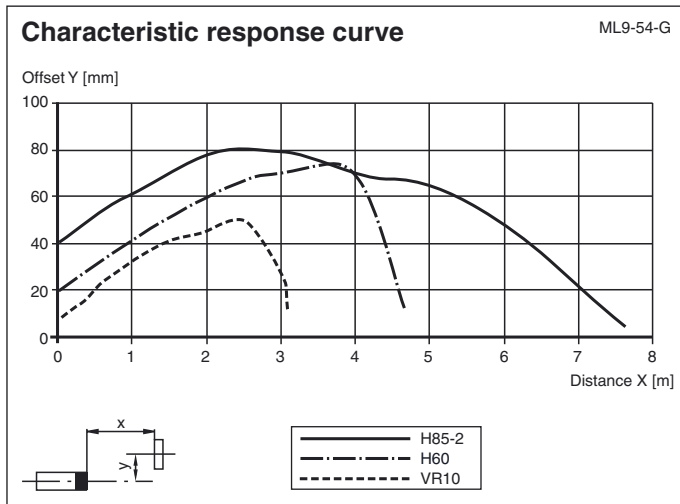Female cordset, M8, 4-pin, PVC cable

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

PEPPERL+FUCHS
SENSING YOUR NEEDS

Curves/Diagrams

Characteristic response curve ML9-54-G

Offset Y [mm] vs Distance X [m]

Legend:
— H85-2
—·— H60
---- VR10

Relative received light strength in standard mode ML9-54-G...

Reflector type:

Reflector	Range
H85-2	7.7 m
H60	4.7 m
VR10	3.1 m

☐ Stability control > 2
▨ Stability control < 2

Stability control vs Distance X [m]

Legend:
— H85-2
—·— H60
---- VR10

Relative received light strength in glass detection mode ML9-54-G...

Reflector type:

Reflector	Min	Max
H85-2	0.1 m	4.5 m
H60	0.1 m	3.4 m
VR10	0.06 m	1.7 m

☐ Stability control > 2
▨ Stability control < 2

Stability control vs Distance X [m]

Legend:
— H85-2
—·— H60
---- VR10

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".

Pepperl+Fuchs Group   USA: +1 330 486 0001   Germany: +49 621 776 4411   Singapore: +65 6779 9091
www.pepperl-fuchs.com   fa-info@us.pepperl-fuchs.com fa-info@de.pepperl-fuchs.com   fa-info@sg.pepperl-fuchs.com

PEPPERL+FUCHS
SENSING YOUR NEEDS   3

- 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.

Teach-In using the External Teach-In process (ET)

Teach-In can also be triggered by the External Teach-In input (ET).

To do this, the ET must remain open (at 0 V) for at least 50 ms and must then be applied to +UB for a duration of from 50 to 80 ms.

The Teach process 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

PEPPERL+FUCHS
SENSING YOUR NEEDS