



## Background suppression sensor

ML100-8-H-100/115/120/162



- Diffuse mode sensor with multiple light spots
- Specially designed for detecting critical objects such as PCBs
- Miniature design
- Detects objects in front of a close background through precise background suppression
- Can be adapted to the application in question thanks to the adjustable detection range
- Precision object detection, almost irrespective of the color
- Not sensitive to ambient light, even with switched energy saving lamps

Diffuse mode sensor with special light spots for detecting PCBs, background suppression, miniature design, 100 mm detection range, red light, light/dark on, PNP outputs, fixed cable



### Function

The optical sensors of this series are suitable for both standard and demanding applications. The series features a miniature housing design, two M3 metal-threaded mounting holes and a highly visible LED status indicator. Each device is equipped with a sensitivity adjuster and a light-on/dark-on changeover switch for increased flexibility. A wide variety of versions are available in both infrared light and red light with PowerBeam for easy alignment. Special versions with BlueBeam are suitable for challenging applications like those in the solar and battery industries.

### Application

#### Container handling

- Target sensor
- Control movement on conveyors
- Stack height monitoring

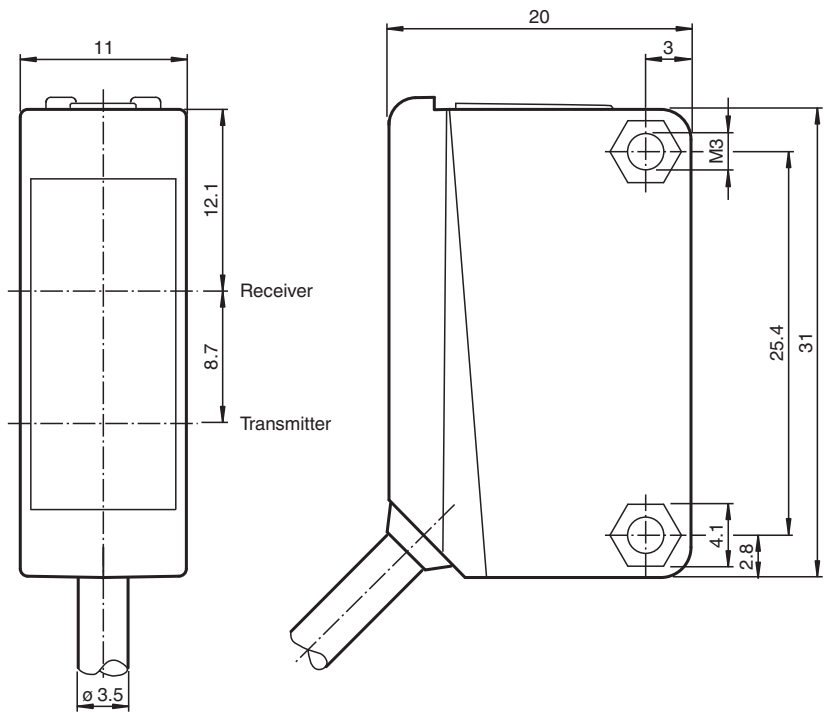
#### General assembly applications

- Presence monitoring
- Congestion monitoring
- Track loading
- Completeness check

#### Doors, gates and elevators

- Person detection for automatic doors and gates
- Protection for closing edges on sliding and revolving doors
- Threshold monitoring for elevator doors
- Activation function for restarting escalators

Dimensions



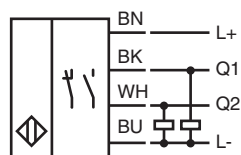
Technical Data

|                                      |                |                                                                                                                                                                                                                                   |
|--------------------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| General specifications               |                |                                                                                                                                                                                                                                   |
| Detection range                      |                | 20 ... 100 mm                                                                                                                                                                                                                     |
| Detection range min.                 |                | 10 ... 25 mm                                                                                                                                                                                                                      |
| Detection range max.                 |                | 25 ... 100 mm                                                                                                                                                                                                                     |
| Adjustment range                     |                | 25 ... 100 mm                                                                                                                                                                                                                     |
| Reference target                     |                | standard white, 100 mm x 100 mm                                                                                                                                                                                                   |
| Light source                         |                | LED                                                                                                                                                                                                                               |
| Light type                           |                | modulated visible red light                                                                                                                                                                                                       |
| Polarization filter                  |                | no                                                                                                                                                                                                                                |
| Black-white difference (6 %/90 %)    |                | < 20 %                                                                                                                                                                                                                            |
| Diameter of the light spot           |                | 3 light spots, spotsize 4 mm at a distance of 50 mm, spots are 8 mm apart; spotsize 2.5 mm at a distance of 80 mm, spots are 12 mm apart; spotsize 4 mm at a distance of 100 mm, spots are 15 mm apart (outer spot to outer spot) |
| Optical face                         |                | frontal                                                                                                                                                                                                                           |
| Ambient light limit                  |                | EN 60947-5-2:2007+A1:2012                                                                                                                                                                                                         |
| Functional safety related parameters |                |                                                                                                                                                                                                                                   |
| MTTF <sub>d</sub>                    |                | 1100 a                                                                                                                                                                                                                            |
| Mission Time (T <sub>M</sub> )       |                | 20 a                                                                                                                                                                                                                              |
| Diagnostic Coverage (DC)             |                | 0 %                                                                                                                                                                                                                               |
| Indicators/operating means           |                |                                                                                                                                                                                                                                   |
| Operation indicator                  |                | LED green: power on                                                                                                                                                                                                               |
| Function indicator                   |                | LED yellow: lights when object is detected , flashes when in adjustment mode                                                                                                                                                      |
| Control elements                     |                | Sensing range adjuster                                                                                                                                                                                                            |
| Control elements                     |                | Light-on/dark-on changeover switch                                                                                                                                                                                                |
| Electrical specifications            |                |                                                                                                                                                                                                                                   |
| Operating voltage                    | U <sub>B</sub> | 10 ... 30 V DC                                                                                                                                                                                                                    |
| Ripple                               |                | max. 10 %                                                                                                                                                                                                                         |
| No-load supply current               | I <sub>0</sub> | < 15 mA                                                                                                                                                                                                                           |
| Output                               |                |                                                                                                                                                                                                                                   |
| Switching type                       |                | The switching type of the sensor is adjustable. The default setting is: light-on                                                                                                                                                  |

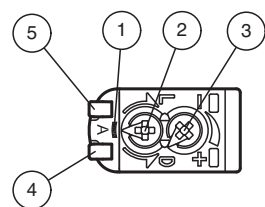
Technical Data

|                                     |                |                                                                                                                                                                     |
|-------------------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Signal output                       |                | 2 PNP outputs, independent short-circuit protected , reverse polarity protected , open collector transistor                                                         |
| Switching voltage                   |                | max. 30 V DC                                                                                                                                                        |
| Switching current                   |                | max. 100 mA , resistive load                                                                                                                                        |
| Voltage drop                        | U <sub>d</sub> | ≤ 1.5 V DC                                                                                                                                                          |
| Switching frequency                 | f              | 500 Hz                                                                                                                                                              |
| Response time                       |                | 1 ms                                                                                                                                                                |
| Conformity                          |                |                                                                                                                                                                     |
| Product standard                    |                | EN 60947-5-2                                                                                                                                                        |
| Approvals and certificates          |                |                                                                                                                                                                     |
| UL approval                         |                | cULus Listed, Class 2 Power Source or listed Power Supply with a limited voltage output with (maybe integrated) fuse (max. 3.3 A according UL248), Type 1 enclosure |
| CCC approval                        |                | CCC approval / marking not required for products rated ≤36 V                                                                                                        |
| Ambient conditions                  |                |                                                                                                                                                                     |
| Ambient temperature                 |                | -30 ... 60 °C (-22 ... 140 °F)                                                                                                                                      |
| Storage temperature                 |                | -40 ... 70 °C (-40 ... 158 °F)                                                                                                                                      |
| Mechanical specifications           |                |                                                                                                                                                                     |
| Degree of protection                |                | IP67                                                                                                                                                                |
| Connection                          |                | 2 m fixed cable                                                                                                                                                     |
| Material                            |                |                                                                                                                                                                     |
| Housing                             |                | PC (Polycarbonate)                                                                                                                                                  |
| Optical face                        |                | PMMA                                                                                                                                                                |
| Mass                                |                | approx. 50 g                                                                                                                                                        |
| Tightening torque, fastening screws |                | 0.6 Nm                                                                                                                                                              |
| Dimensions                          |                |                                                                                                                                                                     |
| Height                              |                | 31 mm                                                                                                                                                               |
| Width                               |                | 11 mm                                                                                                                                                               |
| Depth                               |                | 20 mm                                                                                                                                                               |
| Cable length                        |                | 2 m                                                                                                                                                                 |

Connection



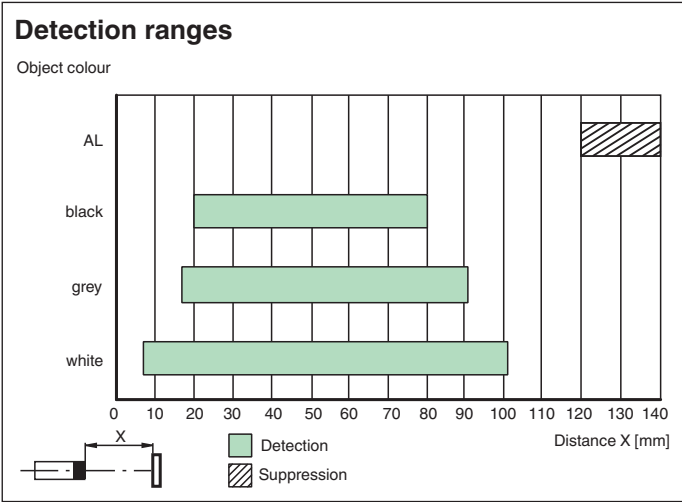
Assembly



|   |                      |        |
|---|----------------------|--------|
| 1 | Alignment Mode       |        |
| 2 | Light-Dark-switching |        |
| 3 | Sensitivity adjuster |        |
| 4 | Signal display       | yellow |
| 5 | Operating display    | green  |

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Characteristic Curve



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## Configuration

### Setting mode (A-Mode):

A-Mode is an additional switch position that is integrated into the light-on/dark-on changeover switch. A-Mode is located between position L and position D. A-Mode is a help mode which enables you to detect whether all 3 light spots are directed onto the object.

If A-Mode is selected, the yellow signal indicator LED flashes; the number of times that the LED flashes equates to the number of detected light spots.

The following scenarios exist:

- No flashing/LED off: No light spots detected
- Fast flashing (8 Hz): 1 light spot detected
- Slow flashing (4 Hz): 2 light spots detected
- Static illumination/LED on: 3 light spots detected

As soon as you exit A-Mode, the yellow LEDs light up in the standard manner again.

## Technical Features

### Switching output AND and OR

The sensor has three light spots, which the sensor evaluates individually. This permits a logical linking of the light spots. The logical linking of the light spots is available at the switching output as OR (Pin 4/BK) and AND (Pin 2/WH).

Switching outputs:

- If at least one of the three light spots provides an adequate receiving light strength from the detected object, the switching output switches to OR.
- If all the light spots provide an adequate receiving light strength from the detected object, the switching output switches to AND.

| Logical Linking | 1. Light spot | 2. Light spot | 3. Light spot | Switching output |
|-----------------|---------------|---------------|---------------|------------------|
| OR              | 0             | 0             | 0             | 0                |
|                 | 1             | 0             | 0             | 1                |
|                 | 0             | 1             | 0             | 1                |
|                 | 0             | 0             | 1             | 1                |
|                 | 1             | 1             | 0             | 1                |
|                 | 0             | 1             | 1             | 1                |
|                 | 1             | 1             | 1             | 1                |
| AND             | 0             | 0             | 0             | 0                |
|                 | 1             | 0             | 0             | 0                |
|                 | 0             | 1             | 0             | 0                |
|                 | 0             | 0             | 1             | 0                |
|                 | 1             | 1             | 0             | 0                |
|                 | 0             | 1             | 1             | 0                |
|                 | 1             | 1             | 1             | 1                |