

# Transparent Object (PET Bottle) Detection Compact Photoelectric Sensor E3ZM-B

CSM\_E3ZM-B\_DS\_E\_4\_7

## Excellent PET Bottle Detection

- New detection method that is independent of bottle shape, position, and contents.
- Automatic compensation against effects of contamination and temperature (except E3ZM-B□T).
- Product lineup includes models with adjuster (E3ZM-B□T).
- Detects transparent objects made by PET, resin, and glass.



Refer to *Safety Precautions* on page 10.

For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

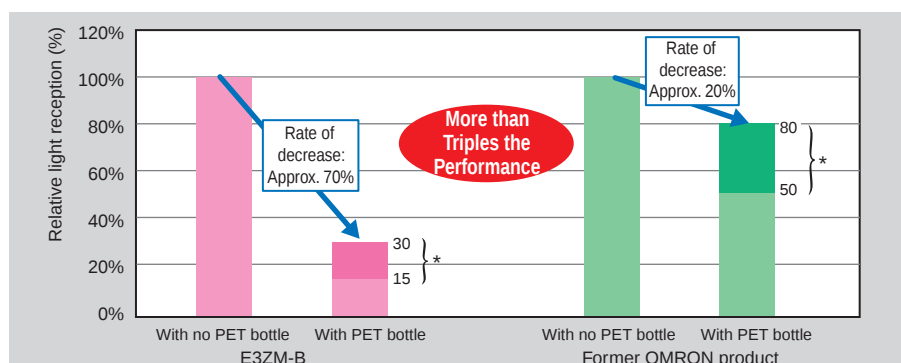
## Features

**Industry Top** P-opaquing and a Coaxial Optical System Eliminate Dependence on the Bottle's Shape, Position, Transparency, and Contents.

**P-opaquing: Polarization-opaquing**

**Patented** (Refer to page 9 for a technical description.)

The E3ZM-B more than triples conventional detection performance, with outstanding stability.



**Industry Top** AC<sup>3</sup> Function Automatically Compensates Effects of Soiling and Temperature

**AC<sup>3</sup>: Auto Compensation Control for Contamination**

**Patented** (Refer to page 9 for a technical description.)

Parameters require resetting when static electricity causes dust to adhere to the surface of the Sensor or Reflector, or when the light emission power drops due to temperature- or time-related changes. Original OMRON light emission control technology greatly reduces the resetting work involved.



Initial Condition . . . Contamination . . . Auto Compensation

## Teaching with No Workpiece Required -- Quick and Easy Setting

There is no need for delicate sensitivity adjustments. Simply adjust the optical axes of the Sensor and Reflector, then press the Teaching button twice. This high-reliability design eliminates worries about variations in the sensitivity settings of different operators.



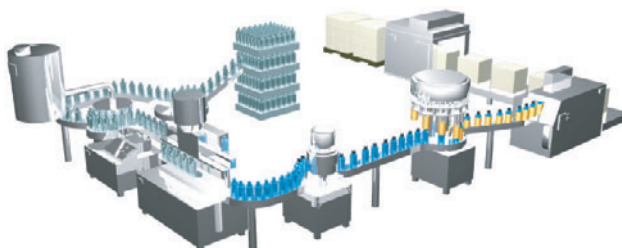
## Industry Top IP69K Degree of Protection with an SUS316L Housing

The housing is constructed of corrosion-resistant SUS316L, and the display cover is PES (polyethersulfone). Both materials are highly resistant to the effects of detergents and disinfectants. IP69K degree of protection also allows the E3ZM-B to withstand washing with high-temperature, high-pressure water. This makes the E3ZM-B well suited to use in sites requiring a high level of hygiene.



## A Wide Ambient Temperature Range of -40 to 60°C

This wide temperature range meets the needs of the many and diverse applications in the beverage industry.



## Applications



Detecting Plastic Bottles

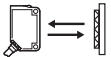
### Precautions for Correct Use

The E3ZM-B□1/-B□6 are not applicable for detecting transparent objects that exhibit no birefringence, such as glass bottles. Transparent objects made of resin also exhibit little birefringence, and cannot be detected with complete stability. Check the detection stability of objects such as these prior to actual operation.

## Ordering Information

**Sensors** [Refer to *Dimensions* on page 12.]

 Red light

| Sensing method                    | Appearance                                                                        | Sensitivity adjustment | Connection method      | Sensing distance                                                                  |                     |  |  | Model             |                |                |
|-----------------------------------|-----------------------------------------------------------------------------------|------------------------|------------------------|-----------------------------------------------------------------------------------|---------------------|--|--|-------------------|----------------|----------------|
|                                   |                                                                                   |                        |                        |                                                                                   |                     |  |  | Special reflector | NPN output     | PNP output     |
| Retroreflective with MSR function |  | Teaching type          | Pre-wired (2 m)        |  | 500 mm<br>[100 mm]* |  |  | Order separately  | E3ZM-B61 2M    | E3ZM-B81 2M    |
|                                   |                                                                                   |                        | Connector (M8, 4 pins) |                                                                                   |                     |  |  |                   | E3ZM-B66       | E3ZM-B86       |
|                                   |                                                                                   |                        | Pre-wired (2 m)        |                                                                                   |                     |  |  | Included          | E3ZM-B61-C 2M  | E3ZM-B81-C 2M  |
|                                   |                                                                                   |                        | Connector (M8, 4 pins) |                                                                                   |                     |  |  |                   | E3ZM-B66-C     | E3ZM-B86-C     |
|                                   |                                                                                   | One-turn adjuster type | Pre-wired (2 m)        |                                                                                   |                     |  |  | Order separately  | E3ZM-B61T 2M   | E3ZM-B81T 2M   |
|                                   |                                                                                   |                        | Connector (M8, 4 pins) |                                                                                   |                     |  |  |                   | E3ZM-B66T      | E3ZM-B86T      |
|                                   |                                                                                   |                        | Pre-wired (2 m)        |                                                                                   |                     |  |  | Included          | E3ZM-B61T-C 2M | E3ZM-B81T-C 2M |
|                                   |                                                                                   |                        | Connector (M8, 4 pins) |                                                                                   |                     |  |  |                   | E3ZM-B66T-C    | E3ZM-B86T-C    |

\*Values in parentheses indicate the minimum required distance between the Sensor and Reflector.

## Accessories

**Special Retroreflective Reflector** (A Retroreflector is provided depending on the model number. Check the model number in the remarks column.)

 [Refer to *Dimensions* on page 12.]

| Name                            | Model    | Sensing distance<br>(rated)                                                         |                      | Quantity | Remarks                                                                                         |
|---------------------------------|----------|-------------------------------------------------------------------------------------|----------------------|----------|-------------------------------------------------------------------------------------------------|
|                                 |          | E3ZM-B□1(T)/-B□6(T)                                                                 |                      |          |                                                                                                 |
| Special Polarizing<br>Reflector | E39-RP1  |  | 500 mm<br>[100 mm] * | 1        | A Reflector is provided with the E3ZM-B□□(T)-C.<br>A Reflector is not provided with the Sensor. |
|                                 | E39-RSP1 |  | 250 mm<br>[0 mm] *   | 1        | A Reflector is not provided with the Sensor.<br>The MSR function is enabled.                    |
|                                 | E39-RP37 |  | 250 mm<br>[0 mm] *   | 1        | A Reflector is not provided with the Sensor.<br>The MSR function is enabled.                    |

Note: Previous OMRON Retroreflective Reflectors (E39-R1/-R1S/-R2/-R3/-R9/-R10/-R1K/-RS1/-RS2/-RS3, etc.) cannot be used with the E3ZM-B.

\*Values in parentheses indicate the minimum required distance between the Sensor and Reflector.

**Mounting Brackets** A Mounting Bracket is not provided with the Sensor. Order a Mounting Bracket separately if required.

[Refer to *Dimensions* on E39-L/E39-S/E39-R, E39-L□.]

| Appearance                                                                         | Model                          | Quantity | Remarks                             | Appearance                                                                         | Model                          | Quantity | Remarks                                                                                                                            |
|------------------------------------------------------------------------------------|--------------------------------|----------|-------------------------------------|------------------------------------------------------------------------------------|--------------------------------|----------|------------------------------------------------------------------------------------------------------------------------------------|
|   | <b>E39-L153</b><br>(SUS304) *1 | 1        | Mounting Brackets                   |   | <b>E39-L98</b><br>(SUS304) *2  | 1        | Metal Protective Cover Bracket                                                                                                     |
|   | <b>E39-L104</b><br>(SUS304) *1 | 1        |                                     |   | <b>E39-L150</b><br>(SUS304)    | 1 set    | (Sensor adjuster)<br>Easily mounted to the aluminum frame rails of conveyors and easily adjusted.<br>For vertical angle adjustment |
|   | <b>E39-L43</b><br>(SUS304) *2  | 1        | Horizontal Mounting Bracket         |   | <b>E39-L151</b><br>(SUS304)    | 1 set    |                                                                                                                                    |
|   | <b>E39-L142</b><br>(SUS304) *2 | 1        | Horizontal Protective Cover Bracket |                                                                                    |                                |          |                                                                                                                                    |
|  | <b>E39-L44</b><br>(SUS304)     | 1        | Rear Mounting Bracket               |  | <b>E39-L144</b><br>(SUS304) *2 | 1        | Compact Protective Cover Bracket                                                                                                   |

Note: When using Through-beam models, order one bracket for the Receiver and one for the Emitter.

\*1. Cannot be used for Standard Connector models with mounting surface on the bottom. In that case, use Pre-wired Connector models.

\*2. Cannot be used for Standard Connector models.

### Sensor I/O Connectors (Sockets on One Cable End)

(Models for Connectors: A Connector is not provided with the Sensor. Be sure to order a Connector separately.)

[Refer to *Dimensions* on XS3.]

| Size        | Specifications | Appearance                                                                                         | Cable |        | Model                  |
|-------------|----------------|----------------------------------------------------------------------------------------------------|-------|--------|------------------------|
| M8 (4 pins) | Standard       | Straight *1     | 2 m   | 4-wire | <b>XS3F-E421-402-A</b> |
|             |                |                                                                                                    | 5 m   |        | <b>XS3F-E421-405-A</b> |
|             |                | L-shaped *1 *2  | 2 m   |        | <b>XS3F-E422-402-A</b> |
|             |                |                                                                                                    | 5 m   |        | <b>XS3F-E422-405-A</b> |

Note: The outer cover of the cable is made of PVC (polyvinyl chloride), the nut is made of SUS316L stainless steel, and the degree of protection is IP67 (IEC 60529).

When high-pressure washing will be used, select an I/O Connector that has IP69K degree of protection.

\*1. The connector will not rotate after connecting.

\*2. The cable is fixed at an angle of 180° from the sensor emitter/receiver surface.

## Ratings and Specifications

| Sensing method            |            | Retroreflective with P-opaquing (*1) and MSR functions                                                                                                      |                                                                                   |
|---------------------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Model                     | NPN output | E3ZM-B61(-C)/-B66(-C)                                                                                                                                       | E3ZM-B61T(-C)/-B66T(-C) (*2)                                                      |
| Item                      | PNP output | E3ZM-B81(-C)/-B86(-C)                                                                                                                                       | E3ZM-B81T(-C)/-B86T(-C) (*2)                                                      |
| Sensing distance          |            | 100 to 500 mm (Using E39-RP1)                                                                                                                               |                                                                                   |
| Standard sensing object   |            | 500-ml, transparent, round PET bottle (65-mm dia.)                                                                                                          |                                                                                   |
| Directional angle         |            | Sensor: 3° to 10°<br>Reflector: 30°                                                                                                                         |                                                                                   |
| Light source (wavelength) |            | Red LED (650 nm)                                                                                                                                            |                                                                                   |
| Power supply voltage      |            | 10 to 30 VDC, including 10% ripple (p-p)                                                                                                                    |                                                                                   |
| Current consumption       |            | 450 mW max. (current consumption for a 30-V power supply voltage: 15 mA max.)                                                                               | 25 mA max.                                                                        |
| Control output            |            | Load power supply voltage: 30 VDC max., Load current: 100 mA max. (Residual voltage: 2 V max.)<br>Open-collector output (NPN/PNP output depending on model) |                                                                                   |
| Operation mode            |            | Light ON/Dark ON cable switch selectable                                                                                                                    | Light ON/Dark ON switch selectable                                                |
| Protection circuits       |            | Reversed power supply polarity, Load short-circuit protection, Mutual interference prevention, and Reversed output polarity protection                      |                                                                                   |
| Response time             |            | Operate or reset: 1 ms max.                                                                                                                                 |                                                                                   |
| Sensitivity adjustment    |            | Teaching method                                                                                                                                             | One-turn adjuster                                                                 |
| Ambient illumination      |            | Incandescent lamp: 3,000 lx max., Sunlight: 10,000 lx max.                                                                                                  |                                                                                   |
| Ambient temperature range |            | Operating: -40 to 60°C (*3 *4), Storage: -40 to 70°C (with no icing or condensation)                                                                        | Operating: -25 to 55°C (*3), Storage: -40 to 70°C (with no icing or condensation) |
| Ambient humidity range    |            | Operating: 35% to 85%, Storage: 35% to 95% (with no condensation)                                                                                           |                                                                                   |
| Insulation resistance     |            | 20 MΩ min. at 500 VDC                                                                                                                                       |                                                                                   |
| Dielectric strength       |            | 1,000 VAC, 50/60 Hz for 1 min                                                                                                                               |                                                                                   |
| Vibration resistance      |            | Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions                                                                |                                                                                   |
| Shock resistance          |            | Destruction: 500 m/s <sup>2</sup> 3 times each in X, Y, and Z directions                                                                                    |                                                                                   |
| Degree of protection *5   |            | IEC IP67, DIN 40050-9: IP69K                                                                                                                                |                                                                                   |
| Connection method         |            | Pre-wired cable (standard length: 2 m) or M8 4-pin connector                                                                                                |                                                                                   |
| Indicators                |            | Operation indicator (yellow), Stability indicator (green), and Teaching indicator (red)                                                                     |                                                                                   |
| Weight (packed state)     |            | Pre-wired models: Approx. 85 g<br>Connector models: Approx. 35 g                                                                                            | Pre-wired models (2-m cable): Approx. 70 g<br>Connector models: Approx. 20 g      |
| Materials                 | Housing    | SUS316L                                                                                                                                                     |                                                                                   |
|                           | Lens       | PMMA (polymethylmethacrylate)                                                                                                                               |                                                                                   |
|                           | Indication | PES (polyethersulfone)                                                                                                                                      |                                                                                   |
|                           | Buttons    | Fluoro rubber                                                                                                                                               |                                                                                   |
|                           | Cable      | PVC (polyvinyl chloride)                                                                                                                                    |                                                                                   |
| Accessories *6            |            | Instruction sheet, Special Reflector (E3ZM-B□□-C only)                                                                                                      |                                                                                   |

\*1. For information on the P-opaquing function, refer to → pages 1 and 9.

\*2. If a sensing object such as a glass plate is being used, the light reception level may not be attenuated sufficiently.

In the following cases, be sure to test operation sufficiently under actual operating conditions.

1) If the temperature varies more than 5°C

2) If the Sensor or Reflector moves due to vibration

\*3. Do not bend the cable in temperatures of -25°C or lower.

\*4. This value applies when an E39-RP1 Reflector is used.

The ambient operating temperature range when the E39-RSP1 or E39-RP37 is used is -25 to 55°C.

\*5. IP69K Degree of Protection Specification

IP69K is a protection standard against high temperature and high-pressure water defined in the German standard DIN 40050, Part 9. The test piece is sprayed with water at 80°C at a water pressure of 80 to 100 BAR using a specified nozzle shape at a rate of 14 to 16 liters/min.

The distance between the test piece and nozzle is 10 to 15 cm, and water is sprayed horizontally for 30 seconds each at 0°, 30°, 60°, and 90° while rotating the test piece on a horizontal plane.

\*6. Mounting Brackets must be ordered separately.

