# Photoelectric Sensors

## Navigation Guide

**OMRON Automation Navigation Guide**

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## Product Line

<table>
<thead>
<tr>
<th>Product Line</th>
<th>TOF/BGS Compact Rectangular</th>
<th>M18 Threaded Cylindrical</th>
<th>General Purpose Rectangular</th>
<th>IO-Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3AS-F/E3AS-L</td>
<td>E3FA/E3RA/E3FB/E3RB/E3FC</td>
<td>E3Z</td>
<td>E3Z-F</td>
<td>E3Z-L</td>
</tr>
</tbody>
</table>

## Selling Tips

<table>
<thead>
<tr>
<th>E3AS-F</th>
<th>E3AS-L</th>
<th>E3FA/E3RA/E3FB/E3RC/E3FC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of flight E3AS-F family detects parts with varying features at virtually the same distance.</td>
<td>BGS sensors use proprietary LED technology to detect thin and/or low reflectivity parts.</td>
<td>IO-Link is standard for configuration and E3AS-F distance output monitoring.</td>
</tr>
<tr>
<td>Wash down, oil, and detergent resistance reduces failure rates.</td>
<td>Compact short body allows for mounting in tight spaces.</td>
<td>E3FC designed for extreme environments.</td>
</tr>
<tr>
<td>High power visible red LED for easy setup and for blasting through dusty environments.</td>
<td>Light-ON/Dark-ON selectable by wiring.</td>
<td>Flush mounting option.</td>
</tr>
<tr>
<td>Large sensitivity adjustor for calibration with a standard size screwdriver.</td>
<td>Product Inspection.</td>
<td>Advanced high power LED allows use in brightly lit manufacturing applications.</td>
</tr>
</tbody>
</table>

## Applications

<table>
<thead>
<tr>
<th>General Purpose Sensing</th>
<th>Conveyors and Distribution Facilities</th>
<th>Filling and Packaging Machines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials handling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food packaging plants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packaging applications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automotive part assembly lines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dark or matte part detection</td>
<td></td>
<td></td>
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<tr>
<td>Perforated part detection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General purpose long distance sensing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packaging: Limited distance sensors to detect transparent or shiny film</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food &amp; Beverage: Ecolab and Diversey tested E3FC designed for harsh F&amp;B environments with daily cleaning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conveyors and distribution facilities</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Housing Material

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SUS 316L or PBT</td>
<td></td>
<td>PBT (polybutylene terephthalate)</td>
</tr>
</tbody>
</table>

## Through-Beam Sensing Range

<table>
<thead>
<tr>
<th>NA</th>
<th>20 m</th>
<th>10 m, 15 m, 30 m</th>
<th>15 m</th>
</tr>
</thead>
</table>

## Retro-Reflective Sensing Range

<table>
<thead>
<tr>
<th>NA</th>
<th>4 m</th>
<th>5 m</th>
<th>4 m, 3 m</th>
</tr>
</thead>
</table>

## Diffuse-Reflective Sensing Range

<table>
<thead>
<tr>
<th>80mm, 200mm, 1m, 1.5m</th>
<th>1 m</th>
<th>1 m</th>
<th>1 m</th>
</tr>
</thead>
</table>

## Power Supply Voltage

<table>
<thead>
<tr>
<th>10 to 30 VDC</th>
<th>10 - 30 VDC</th>
<th>12 - 24 VDC</th>
<th>10 to 30 VDC</th>
</tr>
</thead>
</table>

## Light Source

<table>
<thead>
<tr>
<th>Infrared Laser (E3AS-F), Red LED (E3AS-L)</th>
<th>Red LED (624 nm), Infrared LED</th>
<th>Infrared LED, RED LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3FA/E3RA/E3RC/E3FC</td>
<td>E3FB/E3RC</td>
<td>E3FA/E3RC/E3Z</td>
</tr>
</tbody>
</table>

## Environment Protection

<table>
<thead>
<tr>
<th>IP67, IP67G, Ecolab</th>
<th>IP67 and IP69K (E3FC is also IP68)</th>
<th>IP67</th>
</tr>
</thead>
</table>

## Response Time

<table>
<thead>
<tr>
<th>Operate or reset: 150ms max (1500mm); 90ms max (1000mm)</th>
<th>Operation or Reset 0.5ms max</th>
<th>Operation or Reset 1ms max</th>
<th>Operate or reset: 1 ms max.</th>
</tr>
</thead>
</table>

## Popular Part Numbers

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

## Accessories

<table>
<thead>
<tr>
<th>Cable connector, mounting brackets</th>
<th>Mounting brackets, Mounting Nuts, Cable Connector, Reflectors</th>
<th>Mounting Bracket, Adjustable Arm, Cable Connectors</th>
<th>Slit, Reflector, Mounting Brackets, Sensor I/O Connectors</th>
</tr>
</thead>
</table>

## Price Level

<table>
<thead>
<tr>
<th>$5</th>
<th>$5</th>
<th>$5</th>
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</thead>
</table>

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E33I-E-07
## Photoelectric Sensors

### Product Line
- **ESC-DC**
- **E3Z-F**
- **E3ZM**
- **E3ZR-C**

### General Purpose Rectangular

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>- Able to handle glossy material</td>
<td>- Food and Beverage Packaging</td>
<td>Diecast zinc (nickel-plated brass)</td>
<td>20m</td>
<td>4 m</td>
<td>10 to 30 VDC</td>
<td>Red LED (635 nm) + Green LED (525 nm) + Blue LED (465 nm)</td>
<td>M12 Connector</td>
<td>IP67</td>
<td>Operate or reset: 50 μs - 150 μs max.</td>
<td>E3S-DCP21-IL2, E3S-DCP21-IL3, E3S-DCN21</td>
<td>Sensor I/O Connectors</td>
<td>$5</td>
</tr>
<tr>
<td>- Detect subtle color differences</td>
<td>- Registration mark detection on labeling</td>
<td>A5S (acrylonitrile butadiene styrene)</td>
<td>15 m</td>
<td>4 m</td>
<td>10 - 30 VDC</td>
<td>Infrared LED, Red LED</td>
<td>Pre-wired or M12 connector</td>
<td>IP67, IP69K</td>
<td>Operate or reset: 0.5 ms max.</td>
<td>E3ZT-F11, E3Z-F12, E3Z-FRN11, E3Z-TRP11</td>
<td>Mounting Bracket, Cable Connector, Reflector</td>
<td>$55</td>
</tr>
<tr>
<td>- Stable even when lots change</td>
<td>- Molding machines: detect falling molded objects</td>
<td>SUS316L (Stainless Steel 316)</td>
<td>30 m</td>
<td>2.5 m</td>
<td>12 - 24 VDC</td>
<td>Infrared LED, RED LED</td>
<td>Pre-Wired, Cable Connector style</td>
<td>IP69K</td>
<td>Operation or Reset 1 ms max.</td>
<td>E3ZM-T66, E3ZM-T86, E3ZM-R66, E3ZM-R86, E3ZM-D67, E3ZM-D87</td>
<td>Reflecting Bracket, Cable Connector, Reflectors, Mounting Brackets, Sensor I/O Connectors</td>
<td>$55</td>
</tr>
<tr>
<td>- Easy to understand two push teach button</td>
<td>- Automated warehouses: detect out-of-place items</td>
<td>SUS316L (Stainless Steel 316)</td>
<td>1 m</td>
<td>0.5 m</td>
<td>12 to 24 VDC</td>
<td>Red LED</td>
<td>Pre-wired, M12 Pigtailed Pre-wired connector</td>
<td>IP69K</td>
<td>Operate or reset: 1 ms max.</td>
<td>E3Z-CT81L 2M, E3Z-CT71L 2M, E3Z-CR81L 2M, E3Z-CR81L 2M</td>
<td></td>
<td>$55</td>
</tr>
<tr>
<td>- One time teaching</td>
<td>- Machine tools: detect passing object</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>$55</td>
</tr>
<tr>
<td>- IO-Link capable models available</td>
<td>- Packaging machines: detect passing products</td>
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<td>$55</td>
</tr>
</tbody>
</table>

### Stainless Steel Housing
- **E3ZM**

### Oil Resistant
- **E3ZR-C**

- Rugged, detergent-resistant stainless steel housing for harsh environments
- Compact housing size and high power LED for excellent long life performance
- ECOLAB tested and certified for applications that require a wash down and scrub down cleaning
- Designed for high temperature and high pressure jet water spray cleaning
- Fluororesin cables that strongly resist cutting oil
- Sealing methods that prevent gaps at joints block the ingress of cutting oil

### Applications
- **Food and Beverage Packaging**
- **Registration mark detection on labeling**
- **Packaging**: Shiny or glossy film
- **Materials handling**: detect passing cardboard boxes
- **Molding machines**: detect falling molded objects
- **Automated warehouses**: detect out-of-place items
- **Machine tools**: detect passing object
- **Packaging machines**: detect passing products
- **Spinning machines**: detect discharging cloth
- **Automotive**: detect vehicles
- **Escalators**: detect person
- **Meat, poultry and fish processing**
- **Food packing plants**
- **Packaging applications**
- **General purpose sensing where rugged product can damage equipment**
- **Machining and tool making**
- **Automotive assembly lines**
- **Cleaning parts with chemicals**
- **Applying grease to manufactured parts**

### Housing Material
- Diecast zinc (nickel-plated brass)
- A5S (acrylonitrile butadiene styrene)
- SUS316L (Stainless Steel 316)

### Through-Beam Sensing Range
- 20 m

### Retro-Reflective Sensing Range
- 15 m

### Diffuse-Reflective Sensing Range
- 30 m

### Power Supply Voltage
- 10 to 30 VDC
- 12 - 24 VDC

### Light Source
- Red LED (635 nm) + Green LED (525 nm) + Blue LED (465 nm)

### Connection Method
- M12 Connector
- Pre-wired or M12 connector
- Pre-Wired, Cable Connector style

### Environment Protection
- IP67
- IP67, IP69K
- IP69K

### Response Time
- Operate or reset: 50 μs - 150 μs max.
- Operate or reset: 0.5 ms max.
- Operation or Reset 1 ms max.
- Operate or reset: 1 ms max.

### Popular Part Numbers
- E3S-DCP21-IL2
- E3S-DCP21-IL3
- E3S-DCN21
- E3ZT-F11
- E3Z-F12
- E3Z-FRN11
- E3Z-TRP11
- E3ZM-T66
- E3ZM-T86
- E3ZM-R66
- E3ZM-R86
- E3ZM-D67
- E3ZM-D87
- E3ZR-CT81L 2M
- E3ZR-CT71L 2M
- E3Z-CR81L 2M
- E3Z-CR81L 2M
- E3ZR-C881L 2M

### Accessories
- Sensor I/O Connectors
- Mounting Bracket, Cable Connector, Reflector
- Reflecting Bracket, Cable Connector, Reflectors, Mounting Brackets, Sensor I/O Connectors

### Price Level
- $5
- $55
- $55
- $55

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## Photoelectric Sensors

### Product Line

<table>
<thead>
<tr>
<th>Oil Resistant</th>
<th>Transparent Object Detection</th>
<th>Transparent Object Detection</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3S-DB</td>
<td>E3ZM-B</td>
<td>E3Z-B</td>
</tr>
</tbody>
</table>

#### Selling Tips
- Double slits prevent incorrect operation
- P-opaquing function improves detection
- Smart teaching for optimum settings
- IP69K protection recommended for food and beverage industry; third party certification from Ecolab in Europe
- Variable connector and cable directions and 360 degree indicators for greater usability
- General transparent material detection
- Models provide highest detection of PET bottles
- Stainless steel housing for detergent resistant wash down applications
- Easy installation with "quick-teach" function for delicate sensitivity adjustment
- Utilizes OMRON’S unique optical system ("Inner View") to detect various shapes of PET bottles and transparent objects
- Detects a wide range of bottles from single bottles to sets of stacked bottles
- Easy adjustment for detailed setup by potentiometer

#### Applications
- Plastic bottle conveying
- Conveying and packaging PET plastic bottles
- Food and beverage packaging
- Transparent film processing
- Processing machinery exposed to regular cleaning with detergent or disinfectant
- Plastic bottle conveying
- Food and beverage packaging
- Transparent film processing
- Plastic bottle conveying
- Conveying and packaging PET plastic bottle
- Food and beverage packaging

#### Housing Material
- PBT/ABS (Polybutylene terephthalate/acylonitrile butadiene styrene)
- SUS316L (Stainless Steel 316)
- PBT (polybutylene terephthalate)

#### Through-Beam Sensing Range
- -

#### Retro-Reflective Sensing Range
- 0.5m, 3.5m
- 500 mm
- 500 mm, 2 m

#### Diffuse-Reflective Sensing Range
- -

#### Power Supply Voltage
- 10 - 30 VDC
- 12 - 24 VDC
- 12 - 24 VDC

#### Light Source
- Red LED
- Red LED
- Red LED

#### Connection Method
- Pre-wired, M12 connector, M12 Smartclick connector
- Pre-Wired, Connector Cord set style MB 4-pin
- Pre-Wired, Cable Connector style MB 4-pin

#### Environment Protection
- IP67, IP69K
- IP69
- IP67, IP69

#### Response Time
- Operate or reset: 0.5ms max
- Operation or Reset 1ms max
- Shorter than 2.5ms

#### Popular Part Numbers
- E3S-DBN11  E3S-DBP11  E3S-DBN12  E3S-DBP12
- E3ZM-B66-C  E3ZM-B86-C
- E3Z-B86  E3Z-B86  E3Z-B67  E3Z-B87

#### Accessories
- Mounting Bracket, Cable Connector, Reflector
- Mounting Bracket, Adjustable Arm, Cable Connector
- Mounting Bracket, Adjustable Arm, Cable Connector

#### Price Level
- $$$
- $$$
- $$
# Photoelectric Sensors

**Product Line**
- Reflective Laser Sensor
  - E3NC
- Laser Sensor
  - E3Z-LASER
- Miniature Sensor
  - E3T
- Fork Shaped Housing
  - E3Z-G

## Selling Tips
- High detection stability independent from color or surface
- Lens attachments for line beam applications
- Adjustable focus and smart tune functions
- Sensor heads with up to 1.2m sensing distance
- High speed network connectivity to EtherCat fieldbus
- Comprehensive range of sensing heads with variable spot and advanced CMOS sensing
- Compact plastic housing fits in most applications
- Class 2 LASER (FDA)
- Visible LASER light for easy installation, accurate positioning, small object detection and long range precision
- Precise background suppression and low black/white error for accurate detection
- Small size with precision pinpoint LED where space is crucial
- 3.5 mm thick flat model with reliable background suppression and small black/white error
- Unique optical alignment technology ensuring minimal deviation of sensing angle
- High ambient light immunity for bright factory floor applications
- Fork shaped through-beam sensors have a 25 mm sensing distance
- Slotted head eliminates the need for optical axis adjustment
- One or two axes models

## Applications
- Detecting the height of shrink packaging film, two sheets of transparent film and holes made in metal parts
- Thread presence and glass substrate mark detection
- Workpiece presence detection through narrow gaps
- Detecting the presence of needle caps and exterior wall material
- Presence detection of powders or liquids
- Detection of faulty cap assembly and cut position on rubber hose
- Jam prevention conveying at high speeds
- Precise positioning of product
- Detection of damage or warn equipment like drill bits or saw blades
- Textile mills and sheet good sensing (Start, end of roll and mark detection along the way)
- Sorting machines
- Applications where machine size is an issue
- Slotted edge control
- Mark sensing
- Ideal for slowdown, then stop applications like garment hangers

## Housing Material
- PBT (polybutylene terephthalate)
- Stainless Steel 303

## Through-Beam Sensing Range
- E3NC: 60 m, 1 m, 25 mm
- E3Z-LASER: 0.5m, 2m, 3.5m, 6m, 8m (Coaxial)
- E3T: 15 m, 200 mm

## Retro-Reflective Sensing Range
- E3NC-LH03: 1m, 1.2m
- E3Z-LT66, E3Z-LT86, E3Z-LR66, E3Z-LR86, E3Z-LR86, E3Z-LL86
- E3Z-G61, E3Z-G81, E3Z-G61M3J, E3Z-G81M3J

## Diffuse-Reflective Sensing Range
- E3NC: 150mm, 200mm, 250mm, 600mm, 750mm
- E3Z-LR66: 150mm, 200mm, 250mm, 600mm, 750mm, 1m, 1.2m
- E3Z-G61: 150mm, 200mm, 250mm, 600mm, 750mm, 1m, 1.2m
- E3Z-G81: 150mm, 200mm, 250mm, 600mm, 750mm, 1m, 1.2m
- E3Z-G61M3J: 150mm, 200mm, 250mm, 600mm, 750mm, 1m, 1.2m
- E3Z-G81M3J: 150mm, 200mm, 250mm, 600mm, 750mm, 1m, 1.2m

## Power Supply Voltage
- E3NC: 10 - 30 VDC
- E3Z-LASER: 12 - 24 VDC
- E3T: 12 - 24 VDC

## Light Source
- E3NC: Red Laser FDA Class I
- E3Z-LASER: Red LED FDA Class II
- E3T: Red LED
- E3Z-G: Infrared LED

## Connection Method
- Pre-wired, Wire-saving connector, M8 connector, Connector for sensor communications unit
- Pre-Wired, Cable Connector style
- Pre-Wired
- Pre-Wired

## Environment Protection
- E3NC: IP67 (Coaxial), IP65 (Diffuse- and Limited-reflective)
- E3Z-LASER: IP67
- E3T: IP67

## Response Time
- E3NC: Operate or reset: GIGA=16ms, Std=1ms, HS=250 µs, HS=80µs
- E3Z-LASER: Operation or Reset 1ms max
- E3T: Operation or Reset 1ms max
- E3Z-G: Operation or Reset 1ms max

## Popular Part Numbers
- E3NC-LH03, E3NC-LH02, E3NC-LH01, E3NC-SH250H, E3NC-SH250
- E3Z-LT66, E3Z-LT86, E3Z-LR66, E3Z-LR86, E3Z-LR86, E3Z-LL86
- E3T-ST11, E3T-ST12, E3T-FT13, E3T-SL11, E3T-SL21, E3T-SR21
- E3Z-G61, E3Z-G81, E3Z-G61M3J, E3Z-G81M3J

## Accessories
- Reflector, Lens attachment, Mounting bracket, Wire-saving connectors, Cable connector, Communication unit, DIN track, End plate
- Mounting Bracket, Adjustable Arm, Cable connector
- Mounting Brackets

## Price Level
- E3NC: $$$
- E3Z-LASER: $$$
- E3T: $$