

Cylindrical photoelectric sensor with built-in power supply in M18 housing

# E3F2-240VAC

- Easy installation by compact M18 housing
- Built-in power supply, suitable for 24-240 VAC; no extra power supply needed
- Through-beam, Retro-reflective and diffuse-reflective types



## Ordering information

| Sensing method                        | Sensing distance | Connection method |   |     |   | Order code       |                  |
|---------------------------------------|------------------|-------------------|---|-----|---|------------------|------------------|
|                                       |                  |                   |   |     |   | Light-ON         | Dark-ON          |
| Through-beam<br>                      | 3 m              | -                 | - | 2 m | - | E3F2-3Z1 2M      | E3F2-3Z2 2M      |
| Retro-reflective without M.S.R**1<br> | 0.1 to 2 m*2     | -                 | - | 2 m | - | E3F2-R2Z1-E 2M   | E3F2-R2Z2-E 2M   |
| Diffuse-reflective wide beam<br>      | 0.1 m (fixed)    | -                 | - | 2 m | - | E3F2-DS10Z1-N 2M | E3F2-DS10Z2-N 2M |

\*1. Order reflector separately

\*2. Measured with E39-R1

Note: Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adapting the length of the cable (e.g. E3F2-R2Z1-E 5M). For other cable length please contact your OMRON sales representative.

## Accessories (Order Separately)

| Name             | Sensing distance (typical) | Remark       | Model    |
|------------------|----------------------------|--------------|----------|
| Reflectors       | 0.1 - 2 m                  | 60 x 40 mm   | E39-R1   |
|                  | 0.1 - 3 m                  | ∅ 84 mm      | E39-R7   |
|                  | 0.1 - 4 m                  | 100 x 100 mm | E39-R8   |
| Mounting Bracket |                            | screw mount  | Y92E-B18 |

For detailed information about Accessories, refer to the main chapter "Accessories" at the end of the document.

Specifications

Ratings / Characteristics

| Item                           | E3F2-3Z1<br>E3F2-3Z2  | E3F2-R2Z1<br>E3F2-R2Z2          | E3F2-DS10Z1<br>E3F2-DS10Z2          |
|--------------------------------|---|---------------------------------|-------------------------------------|
| Type                           | Through-beam  | Retro-reflective without M.S.R. | Diffuse-reflective (wide-beam)      |
| Power supply voltage           | 24 to 240 VAC ±10 %, 50 / 60 Hz   |                                 |                                     |
| Current consumption            | 10 mA max.  | 5 mA max.                       |                                     |
| Sensing distance <sup>*1</sup> | 3 m   | 0.1 to 2 m<br>(with E39-R1)     | 0.1 m<br>(5 x 5 cm white mat paper) |
| Detectable object              | Opaque object: 11 mm min.   | Opaque object: 56 mm min.       | Opaque objects                      |
| Directional angle              | 3° to 20°   |                                 | –                                   |
| Differential travel            | –   |                                 | 20 % max.                           |
| Response time                  | 30 ms max.  |                                 |                                     |
| Control output                 | AC solid state (SCR) 200 mA max.; residual voltage: 5 V max. at 200 mA          |                                 |                                     |
| Power reset time               | 100 ms  |                                 |                                     |
| Ambient illumination           | Incandescent lamp: 3000 lx max. Sunlight: 10000 lx max.                         |                                 |                                     |
| Ambient temperature            | Operating: -25 to 55 °C / Storage: -30 to 70 °C (with no icing or condensation) |                                 |                                     |
| Ambient humidity               | Operating: 35% to 85% / Storage: 35% to 95% (with no condensation)              |                                 |                                     |
| Insulation resistance          | 20 MΩ min. at 500 V DC between energized parts and case                         |                                 |                                     |
| Dielectric strength            | 1500 VAC, 50 / 60 Hz for 1 min between energized parts and case                 |                                 |                                     |
| Vibration resistance           | 10 to 55 Hz, 1.5 mm double amplitude for 2 hrs each direction (X, Y, Z)         |                                 |                                     |
| Shock resistance               | 500 m/sqr (approx. 50 g) for each direction (X, Y, Z)                           |                                 |                                     |
| Degree of protection           | IEC 60529: IP66   |                                 |                                     |
| Light source (wave length)     | Infrared LED (880 nm)   |                                 |                                     |
| Indicators                     | Light incident/power indicator for light source (red)                           |                                 |                                     |
| Sensitivity adjustment         | Fixed   |                                 |                                     |
| Connection method              | 2 m, 5 m pre-wired cable (PVC dia. 4 mm (14 / 0.15) <sup>*2</sup> )             |                                 |                                     |
| Operation mode                 | Light-ON or Dark-ON (fixed)   |                                 |                                     |
| Circuit protection             | None  |                                 |                                     |
| Weight (approx.)               | 110 g (pre-wired 2 m cable)   |                                 |                                     |
| Housing materials              | Plastic (case: ABS; lens: PMMA)   |                                 |                                     |

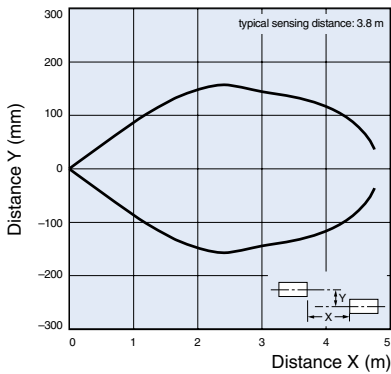
\*1. For sensing distance in detail, please refer to "Engineering Data"

\*2. For other cable materials (e.g. PUR) please contact your OMRON sales representative.

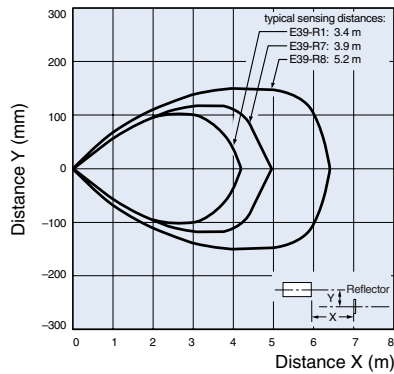
Engineering Data (Typical)

Operating Range (typical)

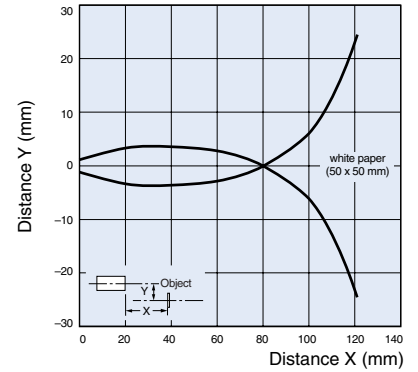
Through-beam Models  
E3F2-3Z



Retro-reflective Models  
E3F2-R2Z (non polarizing)  
and reflectors

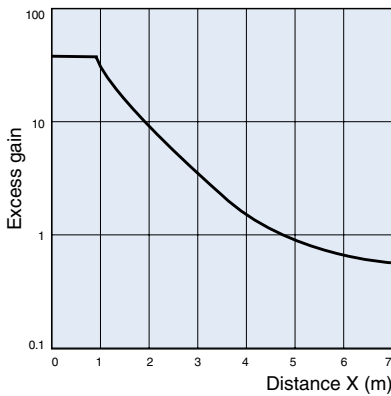


Diffuse-reflective Models  
E3F2-DS10Z (wide-beam type)

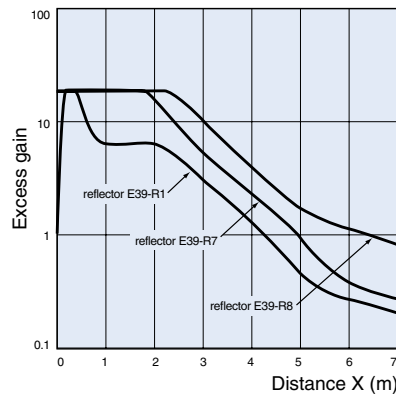


Excess Gain Ratio vs. Distance (typical)

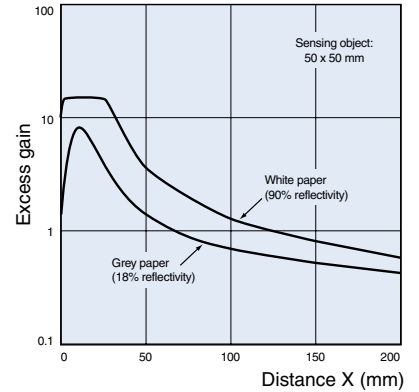
Through-beam Models  
E3F2-3Z



Retro-reflective Models  
E3F2-R2Z (non polarizing)  
and reflectors



Diffuse-reflective Models  
E3F2-DS10Z (wide-beam type)



Operation

AC Output

| Model                                  | Output transistor status                | Timing chart   | Connection method | Output circuit              |
|--|---|--|-------------------|-----------------------------|
| E3F2-3LZ                               | -                                       | -  | -                 | <p>Through-beam emitter</p> |
| E3F2-3Z1<br>E3F2-R2Z1<br>E3F2-DS10Z1-N | ON when light is incident. (Light-ON)   | <p>Incident Interrupted </p> <p>Output indicator (red) ON OFF </p> <p>Output transistor ON OFF </p> <p>Load (relay) Operate Release </p> | -                 |                             |
| E3F2-3Z2<br>E3F2-R2Z2<br>E3F2-DS10Z2-N | ON when light is interrupted. (Dark-ON) | <p>Incident Interrupted </p> <p>Output indicator (red) ON OFF </p> <p>Output transistor ON OFF </p> <p>Load (relay) Operate Release </p> | -                 |                             |

Dimensions Note: All units are in millimeters unless otherwise indicated

| Cable type                                      |  |
|---|--|
| Without potentiometer                           |  |
| <p>E3F2-3Z□<br/>E3F2-R2Z□<br/>E3F2-DS10Z□-N</p> |  |

Accessories (Order Separately)

| Reflectors   | Installation   |
|--|--|
| <p>E39-R1<br/>E39-R1S</p> <p>Material, reflective surface: acrylic<br/>Rear surface: ABS</p> | <p>Mounting Bracket<br/>Y92E-B18</p> <p><b>Note:</b><br/>Hexagon bolt: M5 x 32<br/>Material: plastic</p> |
| <p>E39-R8</p> <p>for M3</p>  |  |
| <p>E39-R7</p>  |  |

## Safety precautions

### Warning

This product is not designed or rated for directly or indirectly ensuring safety of persons. Do not use it for such a purpose.



### Caution

Do not use the product with voltage in excess of the rated voltage. Excess voltage may result in malfunction or fire.



When cleaning the product, do not apply a high-pressure spray of water to one part of the product. Otherwise, parts may become damaged and the degree of protection may be degraded.



High-temperature environments may result in burn injury.



### Precautions for Safe Use

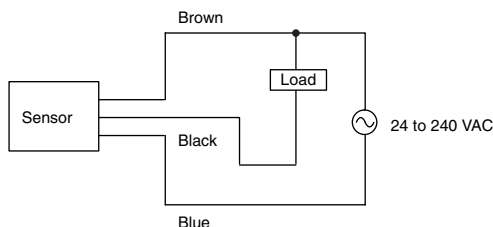
The following precautions must be observed to ensure safe operation of the Sensor.

#### Operating Environment

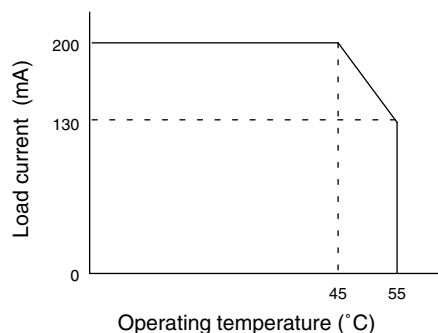
Do not use the Sensor in an environment where explosive or flammable gas is present.

#### Load

Do not use a load that exceeds the rated load. Do not connect the black wire to the brown wire without a load. Direct connection of these wires may damage the photoelectric sensor



When you use the photoelectric sensor at temperatures exceeding 45°C, the load current must be within the described values as shown in the figure below.



### Environments with Cleaners and Disinfectants (e.g., Food Processing Lines)

Do not use the Sensor in environments subject to cleaners and disinfectants. They may reduce the degree of protection.

#### Modifications

Do not attempt to disassemble, repair, or modify the Sensor.

#### Outdoor Use

Do not use the Sensor in locations subject to direct sunlight.

#### Cleaning

Do not use thinner, alcohol, or other organic solvents. Otherwise, the optical properties and degree of protection may be degraded.

#### Surface Temperature

Burn injury may occur. The Sensor surface temperature rises depending on application conditions, such as the surrounding temperature and the power supply voltage. Use caution when operating or washing the Sensor.

### Precautions for Correct Use

Do not use the Sensor in any atmosphere or environment that exceeds the ratings.

#### Do not install the Sensor in the following locations.

- (1) Locations subject to direct sunlight
- (2) Locations subject to condensation due to high humidity
- (3) Locations subject to corrosive gas
- (4) Locations where the Sensor may receive direct vibration or shock

#### Connecting and Mounting

- (1) Laying Sensor wiring in the same conduit or duct as high-voltage wires or power lines may result in malfunction or damage due to induction. As a general rule, wire the Sensor in a separate conduit or use shielded cable.
- (2) Do not pull on the cable with excessive force.
- (3) Do not subject the photoelectric sensor to excessive shock when mounting, in keeping with IP66 standards.
- (4) Mount the Sensor using a bracket (sold separately). Do not exceed a torque of 2.0 Nm when tightening mounting nuts.

#### Cleaning

Never use thinner or other solvents. Otherwise, the Sensor surface may be dissolved.

#### Water Resistance

Do not use the Sensor in water, rainfall, or outdoors.



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**WARRANTY**

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OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

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The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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**PERFORMANCE DATA**

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Performance data given in this document is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

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**CHANGE IN SPECIFICATIONS**

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Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the product may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

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**DIMENSIONS AND WEIGHTS**

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Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

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**ERRORS AND OMISSIONS**

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The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

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**PROGRAMMABLE PRODUCTS**

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OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

Cat. No. E57E-EN-01

**In the interest of product improvement, specifications are subject to change without notice.**

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