

Transparent object detection sensor in compact M18 housing

# E3FZ-B

The E3FZ-B provides enhanced detection stability for the detection of transparent objects. It allows an easy and intuitive adjustment by potentiometer to adjust to individual requirements.

- Easy adjustment to individual requirements for all transparent materials
- Easy mounting due to short M18 housing
- Coaxial optics for stable, distance-independent detection



## Ordering Information

Sensor type	Sensing distance	Connection method				Order code	
						NPN output	PNP output
Retro-reflective with M.S.R. 	0 to 700 mm <sup>*2</sup>	-	-	2 m	-	E3FZ-B61 2M	E3FZ-B81 2M
		-	■	-	-	E3FZ-B66	E3FZ-B86

\*1. For ordering pigtail versions contact your OMRON representative. Available options on request are:  
 - M3J: for M8 4-pin pigtail connector with 30 cm cable  
 - M5J: for M8 3-pin pigtail connector with 30 cm cable  
 - M1TJ: for M12 4-pin XS5 smart-click connector with 30 cm cable.  
 \*2. Sensing distance is rated on reflector E39-R1S. Reflector is sold separately.

## Mounting Brackets

Shape	Type	Material	Order code
	90° Mounting Bracket <sup>*1</sup>	Stainless Steel	E39-EL12

\*1. Bracket fitting to M18 screw mounting.

Note: for the complete range of mounting brackets refer to accessory datasheet E26E.


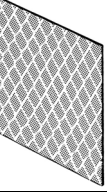
## Cable connectors

For the complete list of cable connectors refer to E26E accessory datasheet

Shape	Length	Wire	Material	Order code
Straight 	2 m	4-wire	PVC	XS2F-D421-D80-A
			PUR	Y92E-M12PUR4S2M-L
	5 m		PVC	XS2F-D421-G80-A
			PUR	Y92E-M12PUR4S5M-L
L-shaped 	2 m	PVC	XS2F-D422-D80-A	
		PUR	Y92E-M12PUR4A2M-L	
	5 m	PVC	XS2F-D422-G80-A	
		PUR	Y92E-M12PUR4A5M-L	

Reflectors

For the complete list of reflectors refer to E26E accessory datasheet.

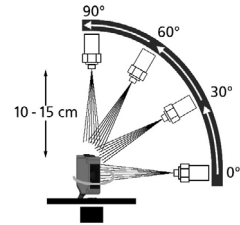
Shape	Type	Material	Features	Size in mm	Order code
	General purpose reflectors	ABS base Acrylic surface	Surface screw mounting (diagonal holes)	40x60x7.5	E39-R1S
	Reflective foil	Acrylics	self-adhesive foil	40x35	E39-RS2

Ratings and Specifications

Item		E3FZ-B_
Sensing distance		0 to 700 mm (Using E39-R1S, other reflectors see diagram operating range)
Directional angle		Sensor: 3° to 10° Reflector: 30° max.
Light source (wavelength)		Red LED (650 nm)
Power supply voltage		10 to 30 VDC, including 10% ripple (p-p)
Current consumption		25 mA max.
Control output		Load power supply voltage: 30 VDC max., Load current: 100 mA max. (Residual voltage: 2 V max.) Open-collector output (NPN/PNP output depending on model)
Operating modes		Light-ON/Dark-ON selectable by wire
Protective circuits		Reversed power supply polarity, load short-circuit protection, mutual interference prevention, reversed output polarity protection
Response time		Operation or reset: 1 ms max.
Sensitivity adjustment		one-turn adjuster
Ambient illumination		Incandescent lamp: 3,000 lx max., Sunlight: 10,000 lx max.
Ambient temperature range		Operating: -25 to 55°C, 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		IEC 60529: IP67, DIN 40050-9: IP69K <sup>*1</sup>
Connection method		Pre-wired cable (standard length: 2 m) or M12 4-pin connector
Indicator		Operating indicator (yellow), Stability indicator (green)
Weight		Pre-wired models: Approx. 60 g Connector models: Approx. 20 g
Materials	Housing	ABS
	Lens	PMMA (polymethylmethacrylate)
	Cable	PVC (polyvinyl chloride)
Accessories		Instruction sheet, 2x M18 nuts <sup>*2</sup>

\*1. 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.

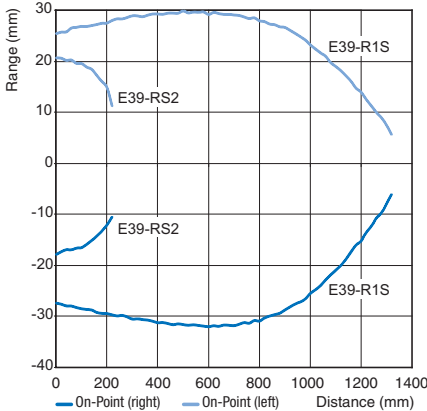
\*2. For reflectors and mounting brackets refer to Accessories.



Engineering Data (Typical)

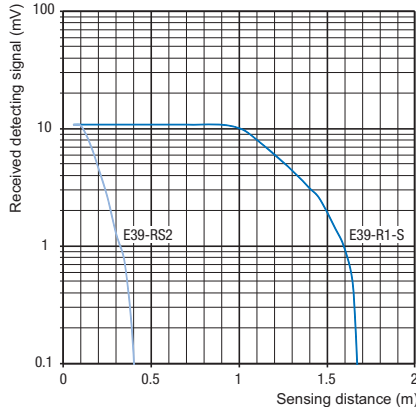
Parallel Operating Range

E3FZ-B



Excess Gain vs. Distance

E3FZ-B



## Output Circuit Diagram

### PNP Output

Model	Operation mode	Timing charts	Connection method	Output circuit
E3FZ-B8□	Light ON		Connect the pink wire (Pin(2)) to the brown wire (Pin(1)) or open the pink wire (Pin(2)).	
	Dark ON		Connect the pink wire (Pin(2)) to the blue wire (Pin(3)).	

### NPN Output

Model	Operation mode	Timing charts	Connection method	Output circuit
E3FZ-B6□	Light ON		Connect the pink wire (2) to the blue wire (3) or leave open.	
	Dark ON		Connect the pink wire (2) to the brown wire (1).	

### Connector Pin Arrangement

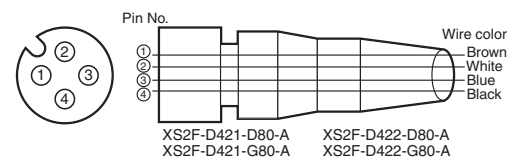
M12 Pre-wired Connector (-M1J)

M12 Connector Pin Arrangement



### Connectors (Sensor I/O connectors)


M12 4-wire Connectors





Classification	Wire color	Connector pin No.	Application
DC	Brown	①	Power supply (+V)
	White	②	Operation selection
	Blue	③	Power supply (0 V)
	Black	④	Output


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. 

Never use the product with an AC power supply. Otherwise, explosion may result. 

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.

**Connecting Connectors**

Be sure to hold the connector cover when inserting or removing the connector. Be sure to tighten the connector lock by hand; do not use pliers or other tools. If the tightening is insufficient, the degree of protection will not be maintained and the Sensor may become loose due to vibration. The appropriate tightening torque is 0.39 to 0.49 N·m for M12 connectors.

**Load**

Do not use a load that exceeds the rated load.

**Rotation Torque for Sensitivity Adjustment**

Adjust with a torque of 0.05 Nm or less.

**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) The maximum power supply voltage is 30 VDC. Before turning the power ON, make sure that the power supply voltage does not exceed the maximum voltage.
- (2) 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.
- (3) Use an extension cable with a minimum thickness of 0.3 mm<sup>2</sup> and less than 100 m long.
- (4) Do not pull on the cable with excessive force.
- (5) Pounding the Photoelectric Sensor with a hammer or other tool during mounting will impair water resistance.
- (6) Mount the Sensor either using the bracket (sold separately) or on a flat surface.
- (7) Be sure to turn OFF the power supply before inserting or removing the connector.

**Sensitivity adjustment**

Setup is completed by teaching the sensor to the reflector (without object). For transparent object detection or detection of very small objects: Turn the sensitivity adjuster slowly from minimum to maximum and stop at the position where the output LED changes state (orange LED turns from on/off to off/on) and green stability LED is on. For opaque object detection: Set the sensitivity adjuster to maximum. Confirm correct operation by testing stable detection with reference object.

**Cleaning**

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

**Power Supply**

If a commercial switching regulator is used, ground the FG (frame ground) terminal.

**Power Supply Reset Time**

The Sensor will be able to detect objects 100 ms after the power supply is tuned ON. Start using the Sensor 100 ms or more after turning ON the power supply. If the load and the Sensor are connected to separate power supplies, be sure to turn ON the Sensor first.

**Turning OFF the Power Supply**

Output pulses may be generated even when the power supply is OFF. Therefore, it is recommended to first turn OFF the power supply for the load or the load line.

**Load Short-circuit Protection**

This Sensor is equipped with load short-circuit protection, but be sure to not short circuit the load. Be sure to not use an output current flow that exceeds the rated current. If a load short circuit occurs, the output will turn OFF, so check the wiring before turning ON the power supply again. The short-circuit protection circuit will be reset. The load short-circuit protection will operate when the current flow reaches 1.8 times the rated load current. When using a capacitive load, use an inrush current of 1.8 times the rated load current or higher.

**Water Resistance**

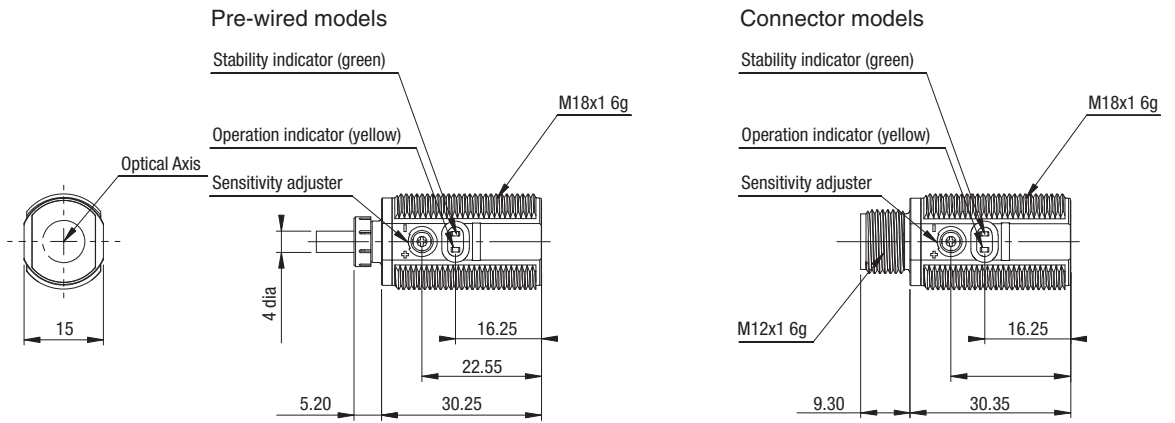
Do not use the Sensor in water, rainfall, or outdoors.

## Dimensions

Note: All units are in millimeters unless otherwise stated.

### E3FZ-Series

E3FZ-B□





---

**WARRANTY**

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.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

**LIMITATIONS OF LIABILITY**

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

**SUITABILITY FOR USE**

THE PRODUCTS CONTAINED IN THIS DOCUMENT ARE NOT SAFETY RATED. THEY ARE NOT DESIGNED OR RATED FOR ENSURING SAFETY OF PERSONS, AND SHOULD NOT BE RELIED UPON AS A SAFETY COMPONENT OR PROTECTIVE DEVICE FOR SUCH PURPOSES. Please refer to separate catalogs for OMRON's safety rated products.

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the product.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

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.

**PERFORMANCE DATA**

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.

**CHANGE IN SPECIFICATIONS**

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.

**DIMENSIONS AND WEIGHTS**

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

**ERRORS AND OMISSIONS**

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.

**PROGRAMMABLE PRODUCTS**

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

---

**OMRON EUROPE B.V.**

Wegalaan 67-69,  
 NL-2132 JD, Hoofddorp,  
 The Netherlands  
 Phone: +31 23 568 13 00  
 Fax: +31 23 568 13 88  
 www.industrial.omron.eu