

# Photoelectric Sensor E3F3

**Threaded Cylindrical Photoelectric Sensor with Built-in Amplifier for Use as an Optical Proximity Sensor**

**High Noise-immunity with Photo-IC Technology**

- Up-to-date photo-IC to increase noise immunity.
- M18 DIN-sized cylindrical housing, ABS resin case.
- Compact and space-saving.
- Long sensing distance (30 cm) with sensitivity adjuster for diffuse type.
- Short-circuit and reverse connection protection.



**<READ AND UNDERSTAND THIS CATALOG>**

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

## Ordering Information

Infrared light  Red light

Sensing method	Appearance	Connection method	Sensing distance	Operating modes	Model	
					NPN output	PNP output
Through-beam		Pre-wired	5 m	Dark-ON	E3F3-T61	E3F3-T81
				Light-ON	E3F3-T11	E3F3-T31
Retroreflective		Pre-wired	2 m	Dark-ON	E3F3-R61	E3F3-R81
Diffuse reflective			100 mm	Light-ON	E3F3-D11	E3F3-D31
		300 mm	E3F3-D12		E3F3-D32	

**Note:** Light-ON retroreflective models and Dark-ON diffuse reflective models are also available.

### ? Accessories (Order Separately)

Name	Model
Reflector	E39-R1, E39-R3
Reflector (tape type)	E39-RS1, E39-RS2, E39-RS3
Lens Cap	E39-F31
Mounting Bracket	Y92E-B18

**Note:** E39-R1 is included in E3F3-R61 and E3F3-R81.

# Specifications

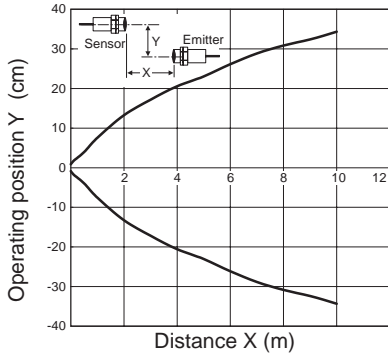
## ■ Ratings/Characteristics

Item	Sensing method	Through-beam	Retroreflective	Diffuse reflective	
	NPN output	E3F3-T61 E3F3-T11	E3F3-R61	E3F3-D11	E3F3-D12
	PNP output	E3F3-T81 E3F3-T31	E3F3-R81	E3F3-D31	E3F3-D32
<b>Sensing distance</b>	5 m		2 m (when using E39-R1)	100 mm	300 mm
<b>Standard sensing object</b>	Opaque object: 11 mm min.		Opaque object: 56 mm min.	100 × 100 mm white mat paper	100 × 100 mm white mat paper
<b>Hysteresis</b>	---			20% max. of sensing distance	
<b>Light source (wavelength)</b>	Infrared LED (860 nm)		Red LED (680 nm)	Infrared LED (860 nm)	
<b>Power supply voltage</b>	12 to 24 VDC±10%, ripple (p-p): 10% max.				
<b>Current consumption</b>	45 mA max. (light source and receiver)		25 mA max.		
<b>Control output</b>	Open collector transistor output, 100 mA max., residual voltage: 1 V max. at 100 mA				
<b>Protective circuit</b>	Output short-circuit protection, DC power supply reverse polarity protection				
<b>Response time</b>	2.5 ms max.				
<b>Sensitivity adjustment</b>	---				Single-turn adjuster
<b>Ambient illumination</b>	Incandescent lamp: 3,000 lx max., Sunlight: 10,000 lx max.				
<b>Ambient temperature</b>	Operating: -25 to 55 °C (with no icing or condensation) Storage: -30 to 70 °C (with no icing or condensation)				
<b>Ambient humidity</b>	Operating: 35% to 85% (with no condensation) Storage: 35% to 95% (with no condensation)				
<b>Insulation resistance</b>	20 MΩ min. (at 500 VDC) between current carry parts and case				
<b>Dielectric strength</b>	1,000 VAC at 50/60 Hz for 1 min between current carry parts and case				
<b>Vibration resistance (destruction)</b>	10 to 55 Hz, 1.5-mm double amplitude for 1 hour each in X, Y, and Z directions				
<b>Shock resistance (destruction)</b>	500 m/s <sup>2</sup> for 3 times each in X, Y, and Z directions				
<b>Degree of protection</b>	IEC60529 IP66				
<b>Connecting method</b>	Pre-wired (standard length: 2 m)				
<b>Indicators</b>	Light source: Power indicator (orange) Receiver: Operation indicator (orange)		Operation indicator (orange)		
<b>Weight (packed state)</b>	170 g max.		85 g max.		
<b>Material</b>	<b>Case</b>	ABS			
	<b>Lens</b>	PMMA			
<b>Accessories</b>	Instruction sheet, screw nuts (2), E39-R1 reflector (E3F3-R only), Adjusting Driver (E3F3-D12/D32)				

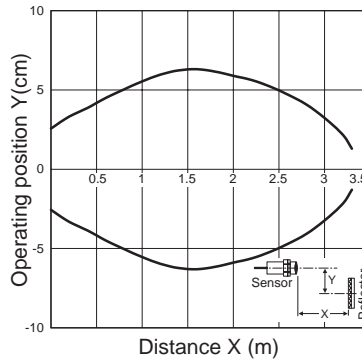
# Engineering Data

## Parallel Operating Range (Typical)

**Through-beam Models**  
E3F3-T61/T11/T81/T31

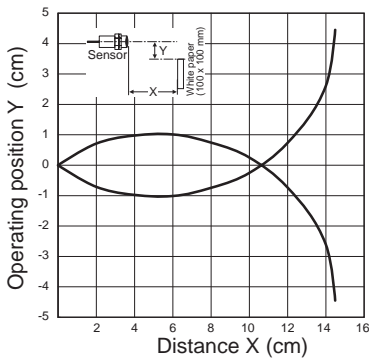


**Retroreflective Models**  
E3F3-R61/R81+E39-R1

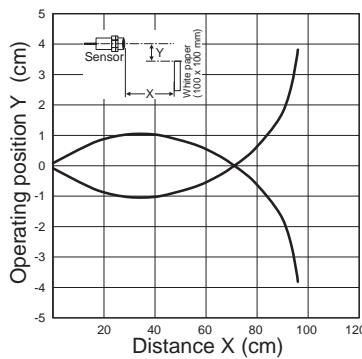


## Operating Range (Typical)

**Diffuse-reflective Models**  
E3F3-D11/D31

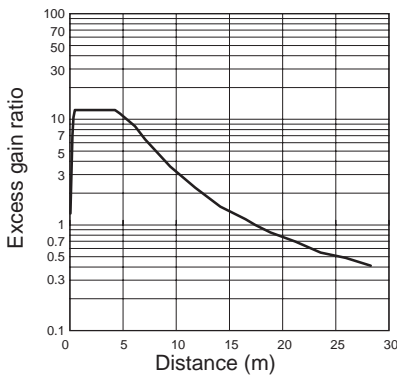


**Diffuse-reflective Models**  
E3F3-D12/D32

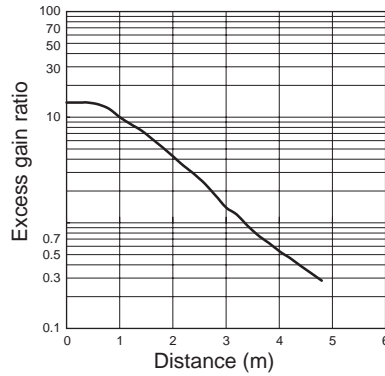


## Excess Gain Ratio vs. Set Distance (Typical)

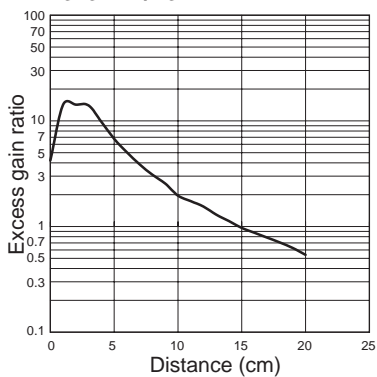
**Through-beam Models**  
E3F3-T61/T11/T81/T31



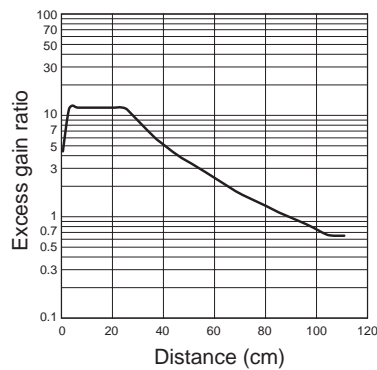
**Retroreflective Models**  
E3F3-R61/R81+E39-R1



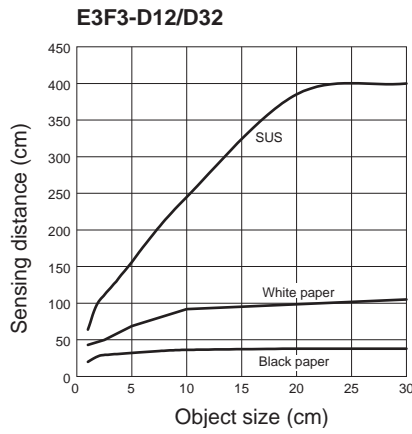
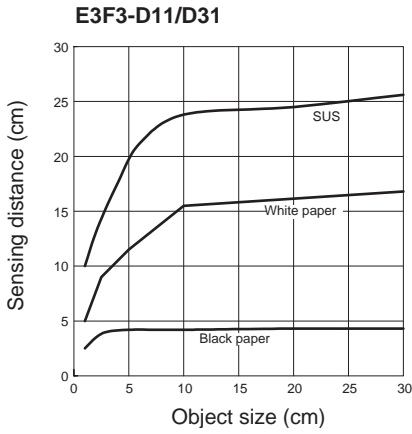
**Diffuse-reflective Models**  
E3F3-D11/D31



**Diffuse-reflective Models**  
E3F3-D12/D32



Sensing Distance vs. Object Size (Typical)



Operation

■ NPN Output

Model	Output transistor status	Timing chart	Output circuit
E3F3-T11 E3F3-D11 E3F3-D12	Light-ON	<p>Incident light No incident light</p> <p>Operation indicator (orange) ON OFF</p> <p>Control output ON OFF</p> <p>Load (relay) Operate Release (Between brown and black)</p>	
E3F3-T61 E3F3-R61	Dark-ON	<p>Incident light No incident light</p> <p>Operation indicator (orange) ON OFF</p> <p>Control output ON OFF</p> <p>Load (relay) Operate Release (Between brown and black)</p>	

■ PNP Output

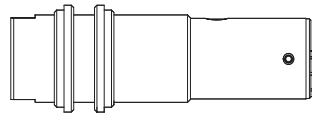
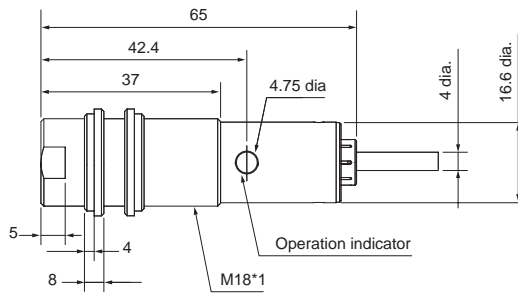
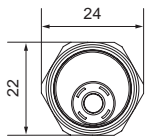
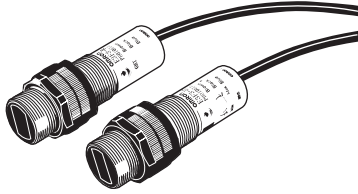
Model	Output transistor status	Timing chart	Output circuit
E3F3-T31 E3F3-D31 E3F3-D32	Light-ON	<p>Incident light No incident light</p> <p>Operation indicator (orange) ON OFF</p> <p>Control output ON OFF</p> <p>Load (relay) Operate Release (Between blue and black)</p>	
E3F3-T81 E3F3-R81	Dark-ON	<p>Incident light No incident light</p> <p>Operation indicator (orange) ON OFF</p> <p>Control output ON OFF</p> <p>Load (relay) Operate Release (Between blue and black)</p>	

# Dimensions

Note: All units are in millimeters unless otherwise indicated.

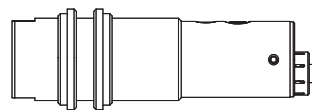
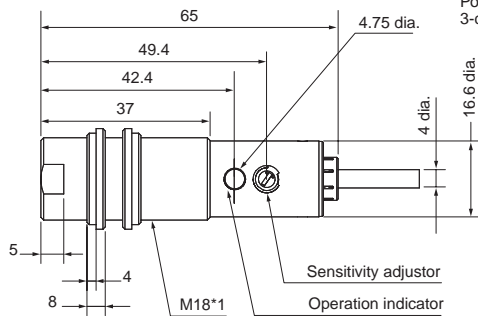
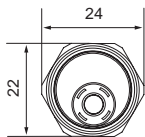
## Sensors

E3F3-T61/T11/T81/T31  
 E3F2-R61/R81  
 E3F2-D11/D31



**E3F3-T61/T11/T81/T31**  
 Emitter: Polyvinyl chloride-covered cord, 4 mm dia. (18/0.12)  
 2-conductor (brown and blue) standard length: 2 m  
 Receiver: Polyvinyl chloride-covered cord, 4 mm dia. (18/0.12)  
 3-conductor (brown, blue and black) standard length: 2 m

E3F3-D12/D32

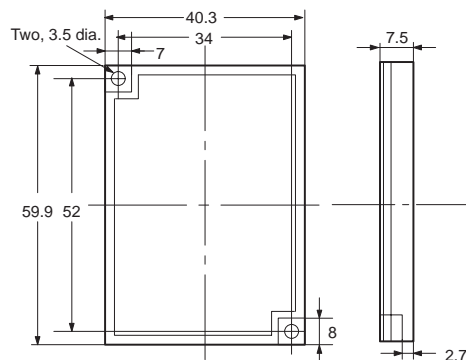
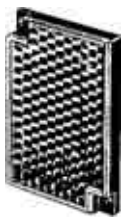


**E3F2-R61/R81**  
**E3F2-D11/D31**  
 Polyvinyl chloride-covered cord, 4 mm dia. (18/0.12)  
 3-conductor (brown, blue, and black) standard length: 2 m

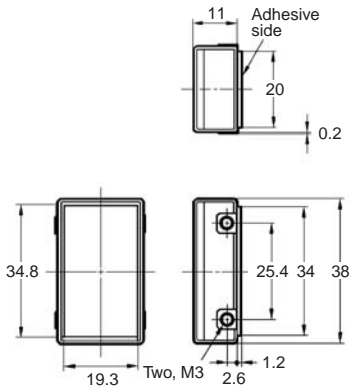
Polyvinyl chloride-covered cord, 4 mm dia. (18/0.12)  
 3-conductor (brown, blue, and black) standard length: 2 m

## Accessories (Order Separately)

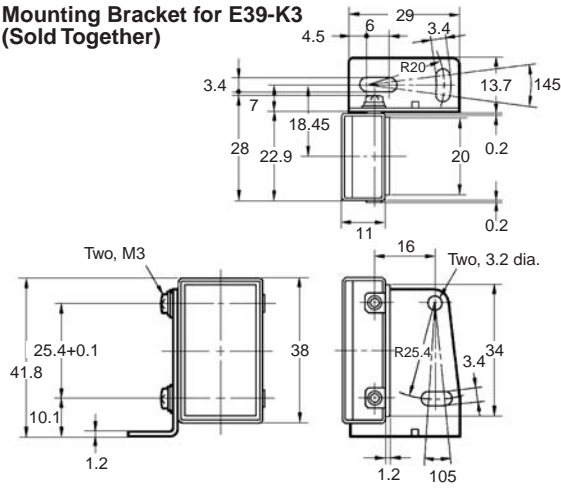
E39-R1 Reflector



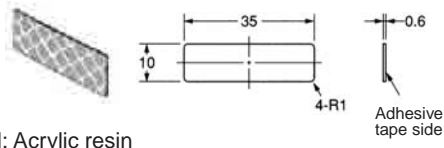
**E39-R3 Reflector**



**Mounting Bracket for E39-K3 (Sold Together)**

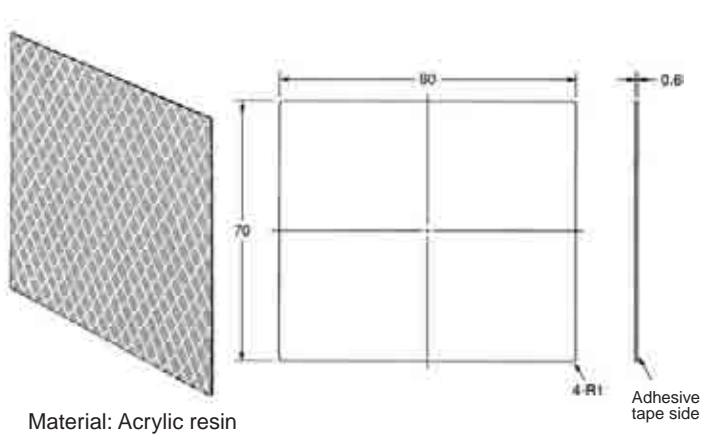


**E39-RS1 Reflector**



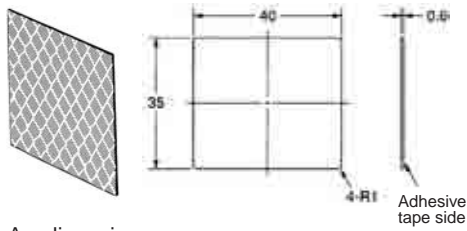
Material: Acrylic resin

**E39-RS3 Reflector**



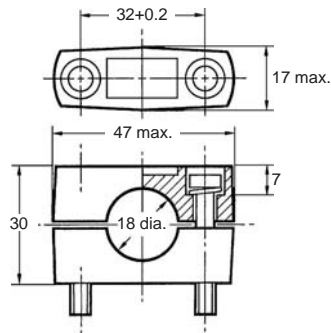
Material: Acrylic resin

**E39-RS2 Reflector**



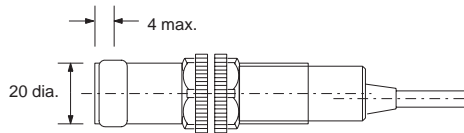
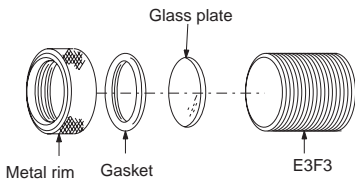
Material: Acrylic resin

**Y92E-B18 Mounting Bracket**



Note: Hexagonal bolt: M5 x 32  
Material: plastic

**E39-F31 Lens Cap**



## Precautions

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If the input/output lines of the photoelectric sensor are placed in the same conduit or duct as power lines or high-voltage lines, the photoelectric sensor could be induced to malfunction, or even be damaged, by electrical noise. Separate the wiring, or use shielded lines as input/output lines to the photoelectric sensor.

Do not subject the photoelectric sensor to excessive shock when mounting, in keeping with IP66 standards.

When you use the photoelectric sensor in the vicinity of an inverter motor, be sure to connect the protective ground wire of the motor to ground. Failure to ground the motor may result in malfunction of the sensor.

## Mounting

Do not exceed a torque of 20 kgf·cm (2.0 N·m) when tightening mounting nuts.



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**⚠ WARNING**

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The E3F3 Photoelectric sensor is not a safety component for ensuring the safety of people as defined by EC Directives (91/386 EEC) and covered by separate European standards or by any other regulations or standards.

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## ■ 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

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

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## Application Considerations

### ■ SUITABILITY FOR USE

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 products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

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 PRODUCTS IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

## Disclaimers

### ■ CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

### ■ DIMENSIONS AND WEIGHTS

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

**ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.**

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E333-E1-01

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

**OMRON Corporation**

Industrial Automation Company

Industrial Sensors Division

Sensing Devices and Components Division H.Q.

3-2, Narutani, Nakayama-cho, Ayabe-shi,

Kyoto, 623-0105 Japan

Tel: (81)773-43-4078/Fax: (81)773-43-4030

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**ASH & ALAIN**

**Authorised Distributors:-**

**ASH & ALAIN INDIA PVT LTD**

S-100, F.I.E.E., Okhla Industrial Area, Phase-ii, New Delhi-110020(India)

Tel : 011-43797575 Fax : 011-43797574 E-mail : sales@ashalain.com