OMRON
AUTOMATION & SAFETY

E3FA/E3RA PHOTOELECTRIC SENSORS

The next generation in sensing performance

M18 Plastic Housing

» Simplicity in setup & installation

» Standard & special applications

» Robust waterproof housing

The next generation in sensing performance!

Producing more than a million per year, Omron is a world leader in photoelectric sensors. Backed by more than 40 years of experience, Omron is constantly enhancing its portfolio and has now completely redesigned and expanded its popular M18 cylindrical range. Renowned for its high quality and product reliability, Omron's new generation of photoelectric sensors represents one of the largest varieties of dependable and easy-to-use photoelectric sensors on the market. Regardless of your industry or application, the E3FA/E3RA series has the right sensor for the job.

Simplicity

- Simple selection
- Easy installation

One family for all applications

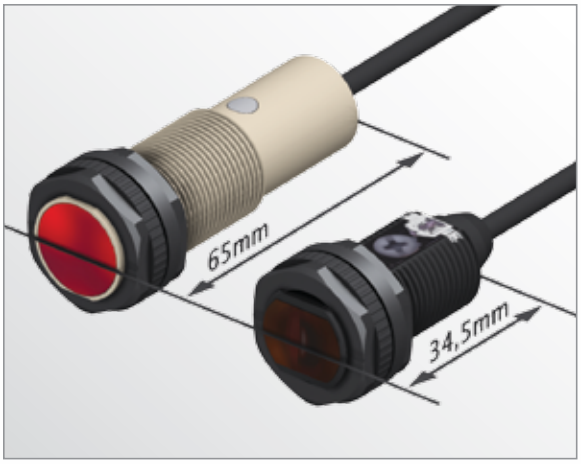
- All standard sensor types available
- Several models designed for special applications

Unrivaled detection

- High quality and reliability
- Increased EMC protection
- High light immunity
- Robust waterproof housing

Simplicity

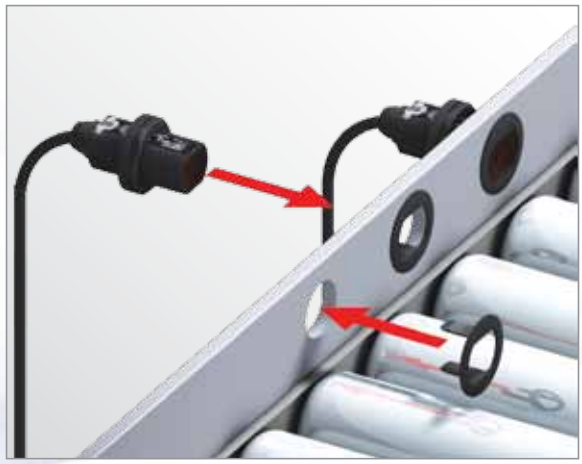
Omron's compact E3FA/E3RA series of photoelectric sensors is simple and quick to mount, as well as easy and intuitive to set-up. The large, robust adjuster makes life much easier for installers to adjust the sensor, as does the bright, high-power red LED, which is clearly visible for easy alignment over longer distances. Similarly, the sensor's LED status indicator can be viewed from long distances and wide angles.



Compact size and shape for increased installation options over the conventional sensor.

Visible red LED light for easy alignment.

Bright LED indicators for status visibility and large sensor adjustor for use with a standard size screwdriver.



Flush mounting option for quick and easy installation.

One family for all applications

Typically installed in industrial plants ranging from food and beverage, textiles, ceramics, through to packaging, there's always an E3FA/E3RA model to fit your application. This extensive photoelectric sensor series with high reliability and enhanced performance includes through-beam, retro-reflective and diffuse reflective types in straight and radial versions. Straight versions are also available with background-suppression, limited-reflective detection, and transparent object detection types for special applications.

E3FA Standard Series

Omron's well-known quality far exceeds market standards in terms of reliability and solves a wide range of applications in various industries.

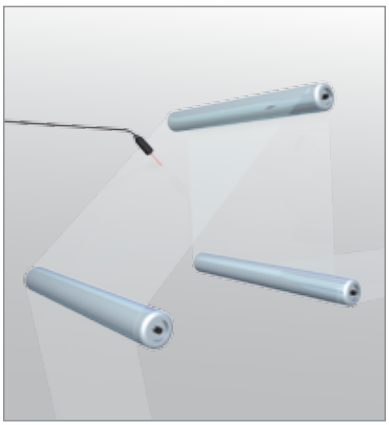
Through-beam	20 m
Retro-reflective	0.1 to 4 m with E39-R1S
Coaxial Retro-reflective	0 to 500 mm with E39-R1S
Diffuse-reflective	100 mm
	300 mm
	1 m

E3RA Standard Series

E3RA provides a full line-up of radial type sensors that increase mounting flexibility to meet specific requirements.

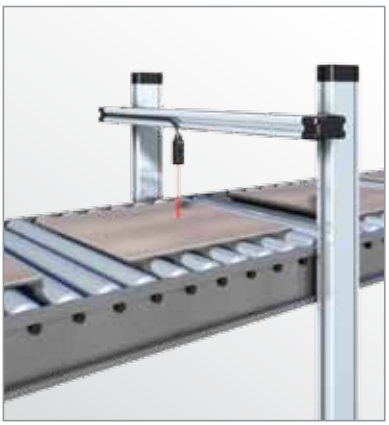
Through-beam	15 m
Retro-reflective	0.1 to 3 m with E39-R1S
Diffuse-reflective	100 mm
	300 mm
	700 mm

Application-specific models



Limited-reflective type sensors suitable for detecting transparent, shiny and mirrored film.

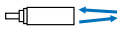
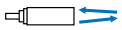
Transparent object detection sensors utilize Omron's unique technology for detecting objects with birefringent (double refraction) properties.



Background suppression type sensors for stable detection independent of color or background.

E3FA Special Models

The E3FA series includes special models for solving more challenging applications.

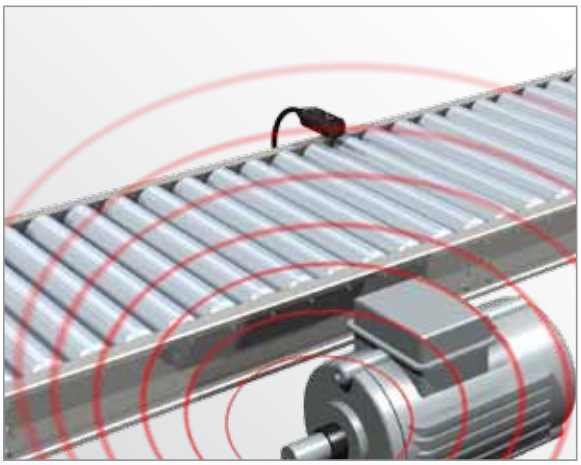
BGS (background suppression) 	100 mm
	200 mm
Limited distance reflective 	10 to 50 mm
Transparent detection with P-opaquing function 	100 to 500 mm with E39-RP1
Transparent detection with P-opaquing function 	0.1 to 2 m with E39-RP1

Unrivaled detection

Especially designed for machines that never stop, the rugged E3FA/E3RA series offers completely reliable sensing in a robust, waterproof housing that can withstand high-pressure cleaning. Exceeding market standards, this series also has high EMC protection and light immunity. In addition, the high-power LED allows for increased sensing stability in environments with dust or vibrations.

High power LED to compensate for dirt and misalignment.

Pulse synchronization for increased ambient light immunity.



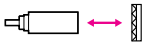
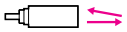
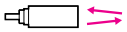
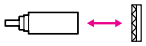
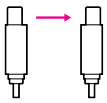
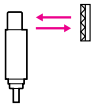
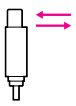
Intensive shielding for high electromagnetic noise immunity.

Tight housing construction for wash down protection.

Ordering Information

Sensors [Refer to *Dimensions on page 18.*]

Red light

Sensor type	Sensing distance	Connection method	Model	
			NPN output	PNP output
Through-beam *1. 	20 m	pre-wired	**set E3FA-TN11 2M** Emitter E3FA-TN11-L 2M Receiver E3FA-TN11-D 2M	**set E3FA-TP11 2M** Emitter E3FA-TP11-L 2M Receiver E3FA-TP11-D 2M
		M12 connector	**set E3FA-TN21** Emitter E3FA-TN21-L Receiver E3FA-TN21-D	**set E3FA-TP21** Emitter E3FA-TP21-L Receiver E3FA-TP21-D
Retro-reflective *2. 	0.1 to 4 m with E39-R1S	pre-wired	**E3FA-RN11 2M**	**E3FA-RP11 2M**
		M12 connector	**E3FA-RN21**	**E3FA-RP21**
Coaxial Retro-reflective *2. 	0 to 500 mm with E39-R1S	pre-wired	**E3FA-RN12 2M**	**E3FA-RP12 2M**
		M12 connector	**E3FA-RN22**	**E3FA-RP22**
Diffuse-reflective 	100 mm	pre-wired	**E3FA-DN11 2M**	**E3FA-DP11 2M**
		M12 connector	**E3FA-DN21**	**E3FA-DP21**
	300 mm	pre-wired	**E3FA-DN12 2M**	**E3FA-DP12 2M**
		M12 connector	**E3FA-DN22**	**E3FA-DP22**
	1 m	pre-wired	**E3FA-DN13 2M**	**E3FA-DP13 2M**
		M12 connector	**E3FA-DN23**	**E3FA-DP23**
BGS (background suppression) 	100 mm	pre-wired	**E3FA-LN11 2M**	**E3FA-LP11 2M**
		M12 connector	**E3FA-LN21**	**E3FA-LP21**
	200 mm	pre-wired	**E3FA-LN12 2M**	**E3FA-LP12 2M**
		M12 connector	**E3FA-LN22**	**E3FA-LP22**
Limited distance reflective 	10 to 50 mm	pre-wired	**E3FA-VN11 2M**	**E3FA-VP11 2M**
		M12 connector	**E3FA-VN21**	**E3FA-VP21**
Transparent detection with P-opaquing function *2. 	100 to 500 mm with E39-RP1	pre-wired	**E3FA-BN11 2M**	**E3FA-BP11 2M**
		M12 connector	**E3FA-BN21**	**E3FA-BP21**
Transparent detection with P-opaquing function *2. 	0.1 to 2 m with E39-RP1	pre-wired	**E3FA-BN12 2M**	**E3FA-BP12 2M**
		M12 connector	**E3FA-BN22**	**E3FA-BP22**
Through-beam *1. 	15 m	pre-wired	**set E3RA-TN11 2M** Emitter E3RA-TN11-L 2M Receiver E3RA-TN11-D 2M	**set E3RA-TP11 2M** Emitter E3RA-TP11-L 2M Receiver E3RA-TP11-D 2M
		M12 connector	**set E3RA-TN21** Emitter E3RA-TN21-L Receiver E3RA-TN21-D	**set E3RA-TP21** Emitter E3RA-TP21-L Receiver E3RA-TP21-D
Retro-reflective *2. 	0.1 to 3 m with E39-R1S	pre-wired	**E3RA-RN11 2M**	**E3RA-RP11 2M**
		M12 connector	**E3RA-RN21**	**E3RA-RP21**
Diffuse reflective 	100 mm	pre-wired	**E3RA-DN11 2M**	**E3RA-DP11 2M**
		M12 connector	**E3RA-DN21**	**E3RA-DP21**
	300 mm	pre-wired	**E3RA-DN12 2M**	**E3RA-DP12 2M**
		M12 connector	**E3RA-DN22**	**E3RA-DP22**
	700 mm	pre-wired	**E3RA-DN13 2M**	**E3RA-DP13 2M**
		M12 connector	**E3RA-DN23**	**E3RA-DP23**

*1. The set type includes the emitter and receiver.
*2. The Reflector is sold separately. Select the Reflector model most suited to the application.

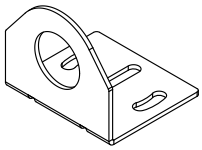
Reflectors [Refer to *Dimensions on page 19.*]

Reflectors required for Retro-reflective Sensors: A Reflector is not provided with the Sensor. Be sure to order a Reflector separately.

Sensor	Sensing distance	Appearance	Model	Quantity	Remarks
E3FA-R□1	0.1 to 4 m		**E39-R1S**	1	for E3FA-R□ and E3RA-R□
E3FA-R□2	0 to 500 mm				
E3FA-B□1	100 to 500 mm		**E39-RP1**	1	for E3FA-B□
E3FA-B□2	0.1 to 2 m				

Mounting brackets [Refer to *Dimensions on page 19.*]

A Mounting Bracket is not included with the Sensor. Order a Mounting Bracket separately if required.

Sensor	Appearance	Model (Material)	Quantity	Remarks
all types		**E39-L183** (SUS304)	1	Mounting bracket
		**E39-L182** (POM)	1	Flush mounting bracket

Sensor I/O connectors

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

Sensor	Size	Cable	Appearance	Cable type		Model
M12 connector types	M12	Standard	Straight 	2 m	4-wire	**XS2F-M12PVC4S2M**
				5 m		**XS2F-M12PVC4S5M**
			Angle 	2 m		**XS2F-M12PVC4A2M**
				5 m		**XS2F-M12PVC4A5M**

Model Number Legend

E3□-□□□□-(□)□

1 2 3 4 5 6 7

1. Series name
FA: Cylindrical, Straight type, Plastic body
RA: Cylindrical, Radial type, Plastic body

2. Sensing method
T: Through-beam
R: Retro-reflective
D: Diffuse-reflective
L: Background suppression
V: Limited distance reflective
B: Transparent detection with P-opaquing function

3. Output
P: PNP
N: NPN

4. Connection
1: Cable
2: Connector, M12, 4-pin

5. Sensing distance
Sequential number

6. Emitter/Receiver
D: Receiver
L: Emitter

7. Cable length
Blank: Connector type

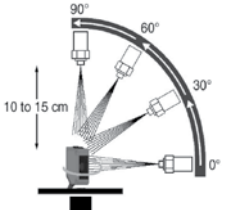
e.g., E3FA-TP11 2M;
Cylindrical, Straight type, Plastic body/ Through-beam/ PNP/ Cable/ Sensing distance/ Cable length of 2M
E3RA-TN12-D;
Cylindrical, Radial type, Plastic body/ Through-beam/ NPN/ Connector, M12, 4-pin/ Sensing distance/ Receiver/ Connector type
E3FA-VP12;
Cylindrical, Straight type, Plastic body/ Limited distance reflective/ PNP/ Connector, M12, 4-pin/ Sensing distance/ Connector type

Specifications

Straight type

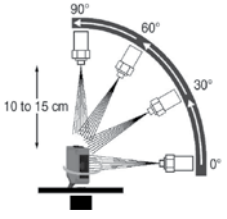
Item								
Model	Sensing method		Through-beam	Retro-reflective	Coaxial Retro-reflective	Diffuse-reflective		
	NPN output	Pre-wired	E3FA-TN11 2M	E3FA-RN11 2M	E3FA-RN12 2M	E3FA-DN11 2M	E3FA-DN12 2M	E3FA-DN13 2M
		M12 Connector	E3FA-TN21	E3FA-RN21	E3FA-RN22	E3FA-DN21	E3FA-DN22	E3FA-DN23
	PNP output	Pre-wired	E3FA-TP11 2M	E3FA-RP11 2M	E3FA-RP12 2M	E3FA-DP11 2M	E3FA-DP12 2M	E3FA-DP13 2M
		M12 Connector	E3FA-TP21	E3FA-RP21	E3FA-RP22	E3FA-DP21	E3FA-DP22	E3FA-DP23
Sensing distance			20 m	0.1 to 4 m (with E39-R1S)	0 to 500 mm (with E39-R1S)	100 mm (white paper: 300 × 300 mm)	300 mm (white paper: 300 × 300 mm)	1 m (white paper: 300 × 300 mm)
Spot diameter (typical)			—	—	—	40 × 45 mm Sensing distance of 100 mm	40 × 50 mm Sensing distance of 300 mm	120 × 150 mm Sensing distance of 1 m
Standard sensing object			Opaque: 7 mm dia.min.	Opaque: 75 mm dia.min.	Opaque: 75 mm dia.min.	—	—	—
Differential travel			—	—	—	20% max.	—	—
Directional angle			2° min.	2° min.	2° min.	—	—	—
Light source (wavelength)			Red LED (624 nm)					
Power supply voltage			10 to 30 VDC (include voltage ripple of 10%(p-p) max.)					
Current consumption			40 mA max. (Emitter 25 mA max. Receiver 15 mA max.)	25 mA max.				
Control output			NPN/PNP (open collector) Load current: 100 mA max. (Residual voltage: 3 V max.), Load power supply voltage: 30 VDC max.					
Operation mode			Light-ON/Dark-ON selectable by wiring					
Indicator			Operation indicator (orange) Stability indicator (green) Power indicator (green): only Emitter of Through-beam					
Protection circuits			Reversed power supply polarity protection, Output short-circuit protection and Reversed output polarity protection					
Response time			0.5 ms					
Sensitivity adjustment			One-turn adjuster					
Ambient illumination (Receiver side)			Incandescent lamp: 3,000 lx max./ Sunlight: 10,000 lx max.					
Ambient temperature range			Operating: -25 to 55°C/ Storage: -30 to 70°C (with no ice or condensation)					
Ambient humidity range			Operating: 35 to 85%RH/ Storage: 35 to 95%RH (with no condensation)					
Insulation resistance			20 MΩ min. at 500 VDC					
Dielectric strength			1,000 VAC at 50/60 Hz for 1 min. between current-carrying parts and case					
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^2 3 times each in X, Y and Z directions					
Degree of protection			IEC: IP67, DIN 40050-9: IP69K *					
Weight (packed state/only sensor)	Pre-wired cable (2M)		Approx. 110 g/ Approx. 50 g, respectively	Approx. 60 g/ Approx. 50 g				
	Connector		Approx. 30 g/ Approx. 10 g, respectively	Approx. 20 g/ Approx. 10 g				
Material	Case		ABS					
	Lens and Display		PMMA					
	Adjuster		POM					
	Nut		ABS					
Accessories			Instruction sheet M18 nuts (4 pcs)	Instruction sheet M18 nuts (2 pcs)				

* IP69K Degree of Protection Specifications
IP69K is a protection specification stipulated by DIN 40050 Part 9 of the German standards.
The test item is sprayed with 80°C water from a nozzle of a specified shape at a water pressure of 80 to 100 bar. The amount of water is 14 to 16 liters per minute.
The distance between the test item and the nozzle is 10 to 15 cm. The water is discharged at angles of 0°, 30°, 60°, and 90° from the horizontal plane for 30 seconds at each angle while the test item is rotated horizontally.



Item							
Model	**Sensing method**		**BGS (Background suppression)**		**Limited distance reflective**	**Transparent detection with P-opaquing function**	
	NPN output	**Pre-wired**	**E3FA-LN11 2M**	**E3FA-LN12 2M**	**E3FA-VN11 2M**	**E3FA-BN11 2M**	**E3FA-BN12 2M**
		M12 Connector	**E3FA-LN21**	**E3FA-LN22**	**E3FA-VN21**	**E3FA-BN21**	**E3FA-BN22**
	PNP output	**Pre-wired**	**E3FA-LP11 2M**	**E3FA-LP12 2M**	**E3FA-VP11 2M**	**E3FA-BP11 2M**	**E3FA-BP12 2M**
		M12 Connector	**E3FA-LP21**	**E3FA-LP22**	**E3FA-VP21**	**E3FA-BP21**	**E3FA-BP22**
Sensing distance			100 mm (white paper: 300 × 300 mm)	200 mm (white paper: 300 × 300 mm)	10 to 50 mm (glass(t = 1.0 mm): 150 × 150 mm)	100 to 500 mm (with E39-RP1)	0.1 to 2 m (with E39-RP1)
Spot diameter (typical)			10 × 10 mm Sensing distance of 100 mm	10 × 15 mm Sensing distance of 200 mm	10 × 10 mm Sensing distance of 50 mm	—	—
Standard sensing object			—	—	—	glass(t = 1.0 mm): 150 × 150 mm	glass(t = 1.0 mm): 150 × 150 mm
Differential travel			20% max.		—	—	—
Directional angle			—	—	—	—	—
Light source (wavelength)			Red LED (624 nm)				
Power supply voltage			10 to 30 VDC (include voltage ripple of 10%(p-p) max.)				
Current consumption			25 mA max.				
Control output			NPN/PNP (open collector) Load current: 100 mA max. (Residual voltage: 3 V max.), Load power supply voltage: 30 VDC max.				
Operation mode			Light-ON/Dark-ON selectable by wiring				
Indicator			Operation indicator (orange) Stability indicator (green) Power indicator (green): only Emitter of Through-beam				
Protection circuits			Reversed power supply polarity protection, Output short-circuit protection and Reversed output polarity protection				
Response time			0.5 ms				
Sensitivity adjustment			Fixed		One-turn adjuster		
Ambient illumination (Receiver side)			Incandescent lamp: 3,000 lx max./ Sunlight: 10,000 lx max.				
Ambient temperature range			Operating: -25 to 55°C/ Storage: -30 to 70°C (with no ice or condensation)				
Ambient humidity range			Operating: 35 to 85%RH/ Storage: 35 to 95%RH (with no condensation)				
Insulation resistance			20 MΩ min. at 500 VDC				
Dielectric strength			1,000 VAC at 50/60 Hz for 1 min. between current-carrying parts and case				
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^2 3 times each in X, Y and Z directions				
Degree of protection			IEC: IP67, DIN 40050-9: IP69K *				
Weight (packed state/only sensor)	**Pre-wired cable (2M)**		Approx. 60 g/ Approx. 50 g				
	Connector		Approx. 20 g/ Approx. 10 g				
Material	**Case**		ABS				
	Lens and Display		PMMA				
	Adjuster		POM				
	Nut		ABS				
Accessories			Instruction sheet M18 nuts (2 pcs)				

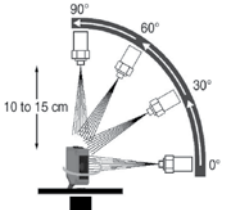
* IP69K Degree of Protection Specifications
IP69K is a protection specification stipulated by DIN 40050 Part 9 of the German standards.
The test item is sprayed with 80°C water from a nozzle of a specified shape at a water pressure of 80 to 100 bar. The amount of water is 14 to 16 liters per minute.
The distance between the test item and the nozzle is 10 to 15 cm. The water is discharged at angles of 0°, 30°, 60°, and 90° from the horizontal plane for 30 seconds at each angle while the test item is rotated horizontally.



Radial type

Item	Sensing method		Through-beam	Retro-reflective	Diffuse-reflective		
Model	NPN output	Pre-wired	E3RA-TN11 2M	E3RA-RN11 2M	E3RA-DN11 2M	E3RA-DN12 2M	E3RA-DN13 2M
		M12 Connector	E3RA-TN21	E3RA-RN21	E3RA-DN21	E3RA-DN22	E3RA-DN23
	PNP output	Pre-wired	E3RA-TP11 2M	E3RA-RP11 2M	E3RA-DP11 2M	E3RA-DP12 2M	E3RA-DP13 2M
		M12 Connector	E3RA-TP21	E3RA-RP21	E3RA-DP21	E3RA-DP22	E3RA-DP23
Sensing distance			15 m	0.1 to 3 m (with E39-R1S)	100 mm (white paper: 300 × 300 mm)	300 mm (white paper: 300 × 300 mm)	700 mm (white paper: 300 × 300 mm)
Spot diameter (typical)			—	—	35 × 40 mm Sensing distance of 100 mm	40 × 45 mm Sensing distance of 300 mm	90 × 120 mm Sensing distance of 700 mm
Standard sensing object			Opaque: 7 mm dia.min.	Opaque: 75 mm dia.min.	—	—	—
Differential travel			—	—	20% max.		
Directional angle			2° min.	2° min.	—	—	—
Light source (wavelength)			Red LED (624 nm)				
Power supply voltage			10 to 30 VDC (include voltage ripple of 10%(p-p) max.)				
Current consumption			40mA max. (Emitter 25 mA max. Receiver 15 mA max.)	25 mA max.			
Control output			NPN/PNP (open collector) Load current: 100 mA max. (Residual voltage: 2 V max.), Load power supply voltage: 30 VDC max.				
Operation mode			Light-ON/Dark-ON selectable by wiring				
Indicator			Operation indicator (orange) Stability indicator (green) Power indicator (green): only Emitter of Through-beam				
Protection circuits			Reversed power supply polarity protection, Output short-circuit protection and Reversed output polarity protection				
Response time			0.5 ms				
Sensitivity adjustment			One-turn adjuster				
Ambient illumination (Receiver side)			Incandescent lamp: 3,000 lx max./ Sunlight: 10,000 lx max.				
Ambient temperature range			Operating: -25 to 55°C/ Storage: -30 to 70°C (with no ice or condensation)				
Ambient humidity range			Operating: 35 to 85%RH/ Storage: 35 to 95%RH (with no condensation)				
Insulation resistance			20 MΩ min. at 500 VDC				
Dielectric strength			1,000 VAC at 50/60 Hz for 1 min. between current-carrying parts and case				
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^2 3 times each in X, Y and Z directions				
Degree of protection			IEC: IP67, DIN 40050-9: IP69K *				
Weight (packed state/only sensor)	Pre-wired cable (2M)		Approx. 110 g/ Approx. 50 g, respectively	Approx. 60 g/ Approx. 50 g			
	Connector		Approx. 30 g/ Approx. 10 g, respectively	Approx. 20 g/ Approx. 10 g			
Material	Case		ABS				
	Lens and Display		PMMA				
	Adjuster		POM				
	Nut		ABS				
Accessories			Instruction sheet M18 nuts (4 pcs)	Instruction sheet M18 nuts (2 pcs)			

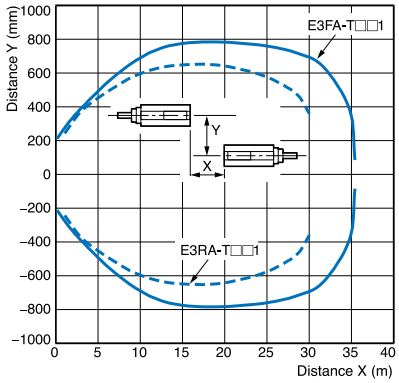
* IP69K Degree of Protection Specifications
IP69K is a protection specification stipulated by DIN 40050 Part 9 of the German standards.
The test item is sprayed with 80°C water from a nozzle of a specified shape at a water pressure of 80 to 100 bar. The amount of water is 14 to 16 liters per minute.
The distance between the test item and the nozzle is 10 to 15 cm. The water is discharged at angles of 0°, 30°, 60°, and 90° from the horizontal plane for 30 seconds at each angle while the test item is rotated horizontally.



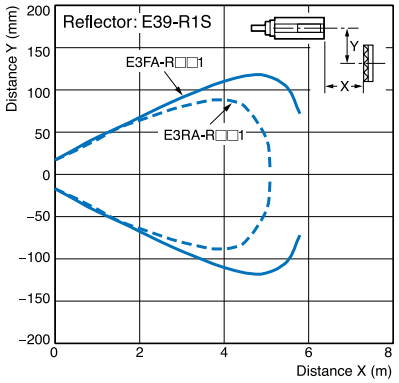
Engineering Data (Typical)

Parallel Operating Range

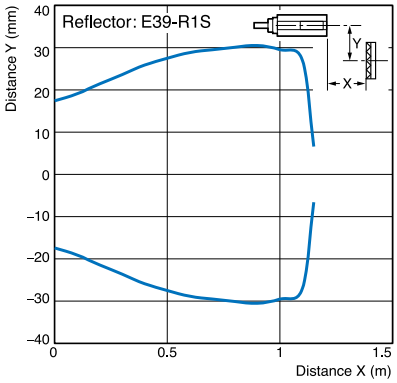
Through-beam Models
E3FA-T□, E3RA-T□



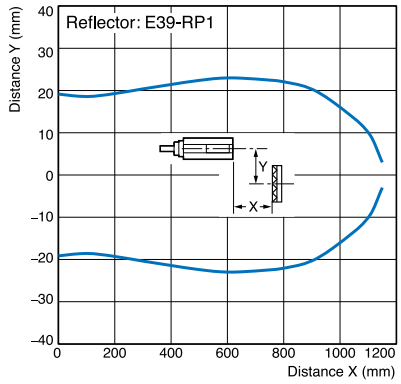
Retro-reflective Models
E3FA-R□1, E3RA-R□1



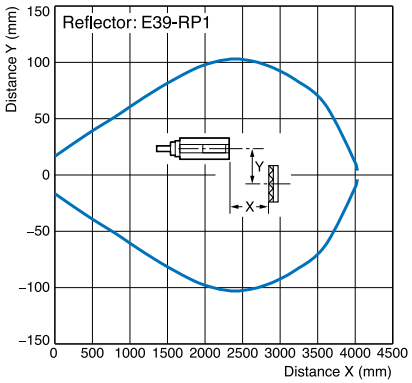
E3FA-R□2



Transparent detection wth P-opaquing function
E3FA-B□1

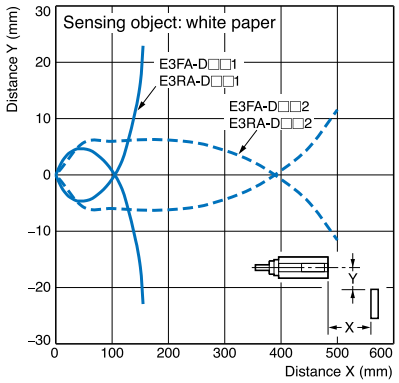


E3FA-B□2

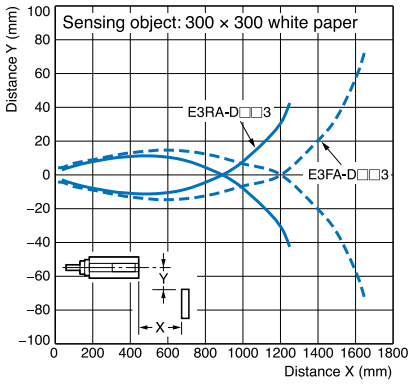


Operating Range

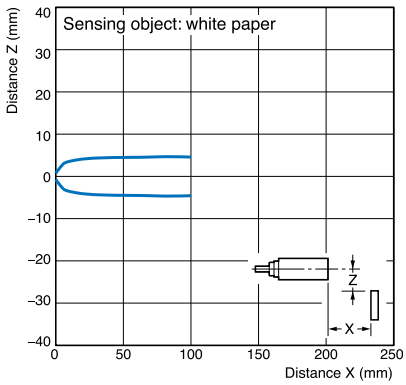
Diffuse-reflective Models
E3FA-D□1, E3FA-D□2
E3RA-D□1, E3RA-D□2



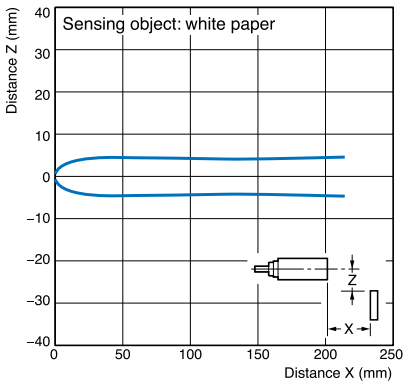
E3FA-D□3, E3RA-D□3



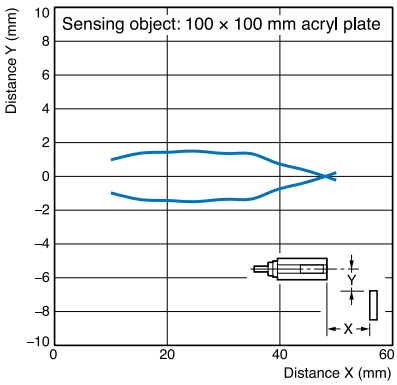
BGS Models
E3FA-L□1



E3FA-L□2

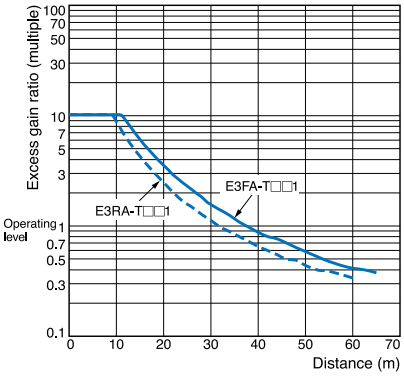


Limited distance reflective
E3FA-V□

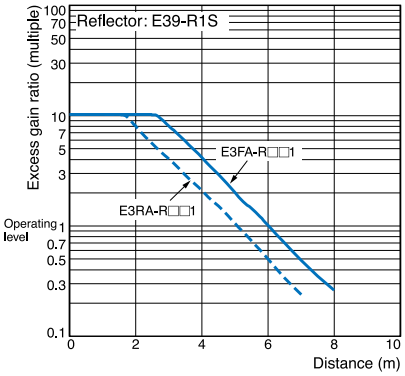


Excess Gain vs. Distance

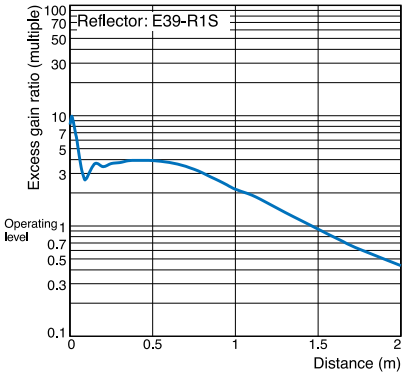
Through-beam Models
E3FA-T□, E3RA-T□



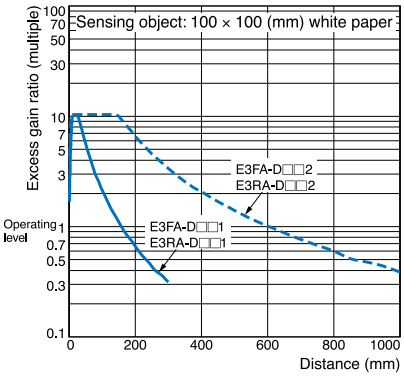
Retro-reflective Models
E3FA-R□1, E3RA-R□1



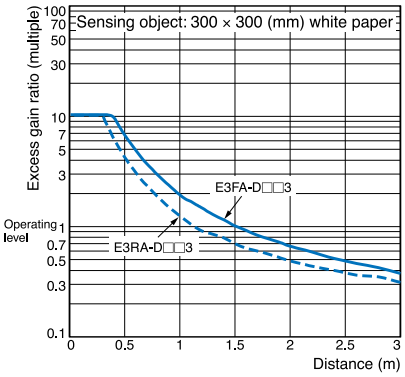
E3FA-R□2



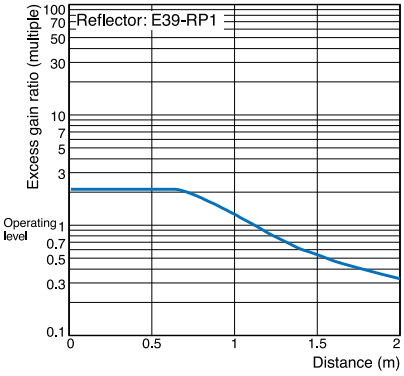
Diffuse reflective Models
E3FA-D□1, E3FA-D□2
E3RA-D□1, E3RA-D□2



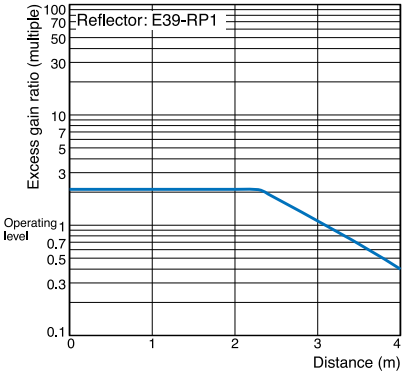
E3FA-D□3, E3RA-D□3



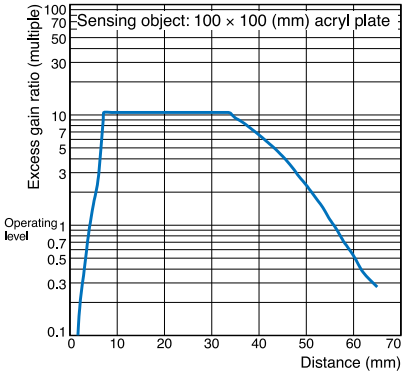
Transparent detection with P-opaquing function
E3FA-B□1



E3FA-B□2

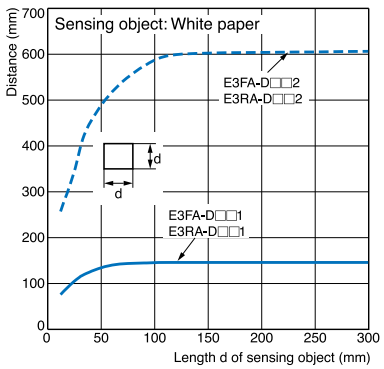


Limited distance reflective
E3FA-V□

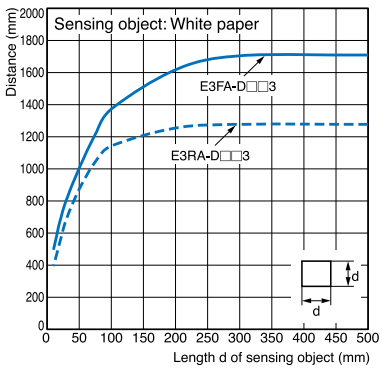


Sensing Object Size vs. Distance

Diffuse reflective Models
E3FA-D□1, E3FA-D□2
E3RA-D□1, E3RA-D□2



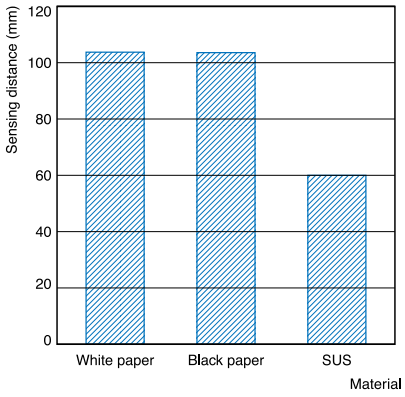
E3FA-D□3, E3RA-D□3



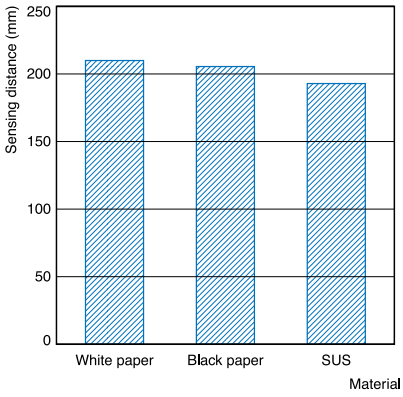
Sensing Distance vs. Sensing Object Material

BGS Models

E3FA-L□1



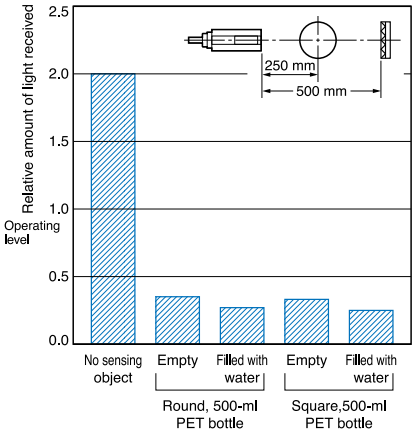
E3FA-L□2



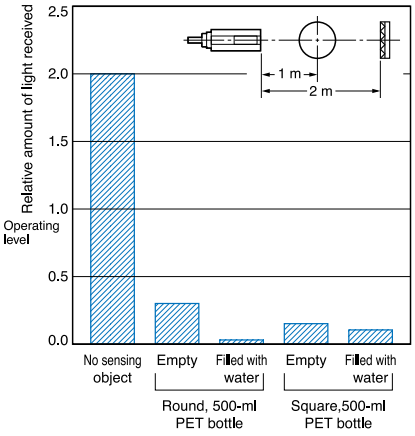
Dark Excess Gain vs. Sensing Object Characteristics

Transparent detection with P-opaquing function

E3FA-B□1

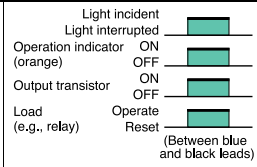
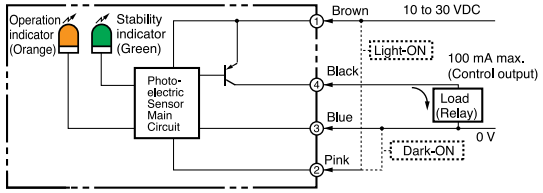
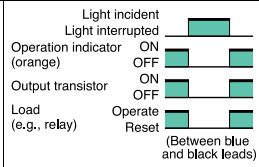
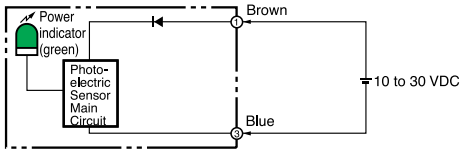
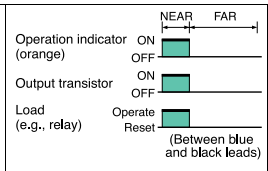
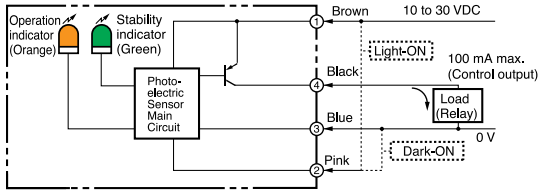


E3FA-B□2



Output circuit diagram

PNP Output

<table>
<tr><th>Model</th><th>Operation mode</th><th>Timing charts</th><th>Operation selector</th><th>Output circuit</th></tr>
<tr><td rowspan="3">E3FA-TP□
E3FA-RP□
E3FA-DP□
E3FA-VP□
E3FA-BP□
E3RA-TP□
E3RA-RP□
E3RA-DP□</td><td>Light-ON</td><td> 
</td><td>Connect the pink wire (Pin(2)) to the brown (Pin(1))</td><td rowspan="2">Through-beam Receivers, Retro-reflective Models, Diffuse-reflective Models, Limited reflective Models. Transparent detection with P-opaquing function.
 
</td></tr>
<tr><td>Dark-ON</td><td> 
</td><td>Connect the pink wire (Pin(2)) to the blue (Pin(3)) or open the pink wire (Pin(2))</td></tr>
<tr><td colspan="4">Through-beam Emitter
 
</td></tr>
<tr><td rowspan="2">E3FA-LP□</td><td>Light-ON</td><td> 
</td><td>Connect the pink wire (Pin(2)) to the brown (Pin(1))</td><td rowspan="2">Background suppression.
 
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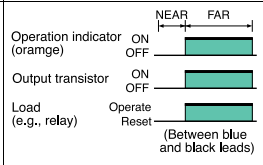
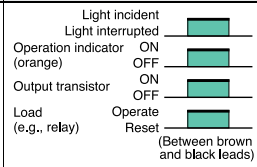
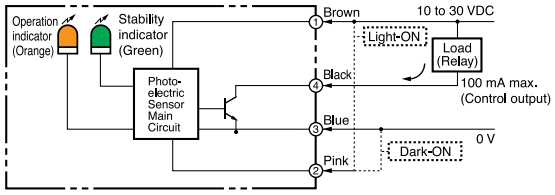
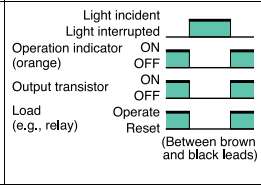
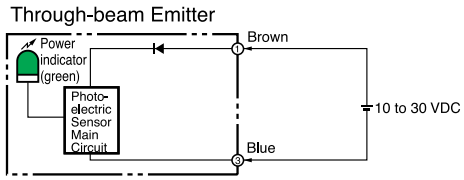
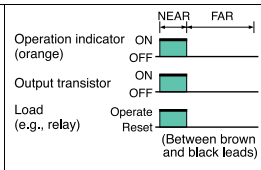
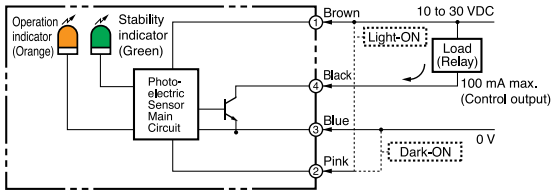
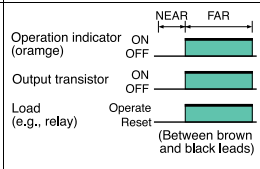
<tr><td>Dark-ON</td><td> 
</td><td>Connect the pink wire (Pin(2)) to the blue (Pin(3)) or open the pink wire (Pin(2))</td></tr>
</table>

NPN Output

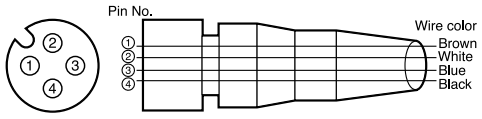
Model	Operation mode	Timing charts	Operation selector	Output circuit
E3FA-TN□ E3FA-RN□ E3FA-DN□ E3FA-VN□ E3FA-BN□ E3RA-TN□ E3RA-RN□ E3RA-DN□	Light-ON		Connect the pink wire (Pin(2)) to the brown (Pin(1)) or open the pink wire (Pin(2))	Through-beam Receivers, Retro-reflective Models, Diffuse-reflective Models, Limited reflective Models. Transparent detection with P-opaquing function. 
	Dark-ON		Connect the pink wire (Pin(2)) to the blue (Pin(3))	
		Through-beam Emitter 		
E3FA-LN□	Light-ON		Connect the pink wire (Pin(2)) to the brown (Pin(1)) or open the pink wire (Pin(2))	Background suppression. 
	Dark-ON		Connect the pink wire (Pin(2)) to the blue (Pin(3))	

Connector Pin Arrangement

M12 Connector Pin Arrangement

Connectors (Sensor I/O connectors)

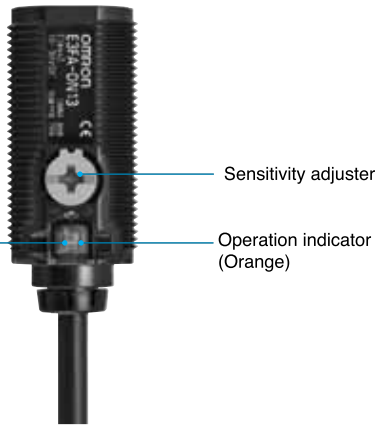
M12 4-wire Connectors



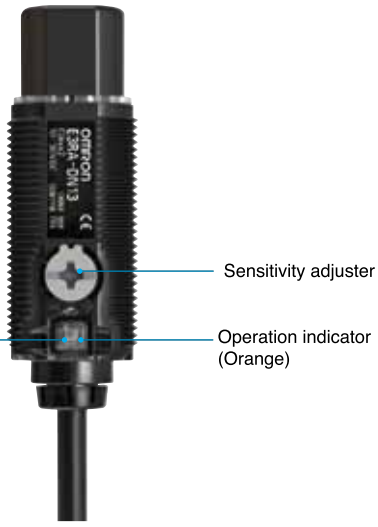
Classification	Wire color	Connector pin No.	Application
DC	Brown	①	Power supply (+V)
	White	②	L/on · D/on selectable
	Blue	③	Power supply (0 V)
	Black	④	Output

Nomenclature

Straight
with an adjuster:
E3FA-T□-D
E3FA-R□
E3FA-D□
E3FA-V□
E3FA-B□
without an adjuster:
E3FA-T□-L *
E3FA-L□



Radial
with an adjuster:
E3RA-T□-D
E3RA-R□
E3RA-D□
without an adjuster:
E3RA-T□-L *



* The Emitter has two Power indicators (Green) instead of the Stability indicator (Green) and the Operation indicator (Orange).

Safety Precautions

Refer to *Warranty and Limitations of Liability*.

⚠ 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

Never use the product with an AC power supply.
Do not use the product with voltage in excess of the rated voltage.

Do not use the product with incorrect wiring.
Otherwise, explosion, fire, malfunction may result.

Precautions for Safe Use

Be sure to follow the safety precautions below for added safety.

1. Do not use the sensor in an environment with explosive, flammable or corrosive gas.
2. Do not use the sensor in an oil or chemical environment.
3. Do not use the sensor outdoors.
4. Do not use the sensor in an environment where humidity is high and condensation may occur.
5. Do not use the sensor in an environment where conditions are in excess of the listed specifications.
6. Do not use the sensor in a location that is exposed to direct sunlight.
7. Do not use the sensor in a location where the sensor may receive direct vibration or shock excessive of listed specifications.
8. Do not use thinner, alcohol, or other organic solvents.
9. Never disassemble, repair or tamper with the sensor.
10. Please process it as industrial waste.

Precautions for Correct Use

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 conduit or use shielded cable.
2. Do not pull on the cable with excessive force.
3. If a commercial switching regulator is used, ground the FG (frame ground) terminal.
4. The sensor will be available 100 ms after the power supply is turned ON. Start to use 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.
5. 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.
6. The sensor must be mounted using the provided nuts. The proper tightening torque range is between 0.4 and 0.5 N·m.

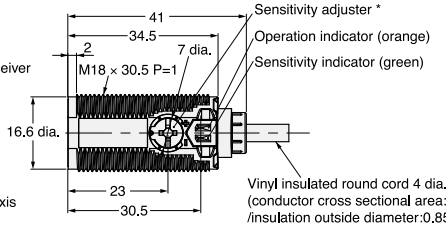
Dimensions (Unit: mm)

Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

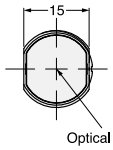
Sensors

E3FA series
Pre-wired Models
E3FA-T□11
E3FA-R□1□
E3FA-D□1□
E3FA-L□1□
E3FA-V□11
E3FA-B□1□

Front view

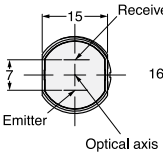


Left side view



Suitable models
E3FA-T□11
E3FA-R□12
E3FA-B□11

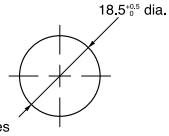
Left side view



Suitable models
E3FA-R□11
E3FA-D□1□
E3FA-L□1□
E3FA-V□11
E3FA-B□12

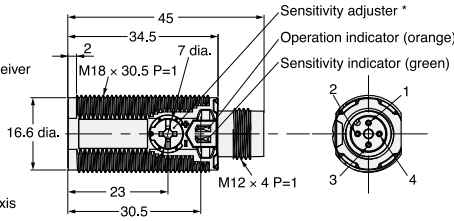
* Suitable models
E3FA-T□11-D
E3FA-R□12
E3FA-D□1□
E3FA-V□11
E3FA-B□12

Mounting Holes

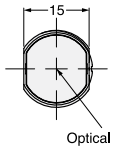


E3FA series
M12 Connector Models
E3FA-T□21
E3FA-R□2□
E3FA-D□2□
E3FA-L□2□
E3FA-V□21
E3FA-B□2□

Front view / Right side view

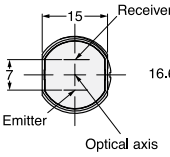


Left side view



Suitable models
E3FA-T□21
E3FA-R□22
E3FA-B□21

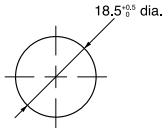
Left side view



Suitable models
E3FA-R□21
E3FA-D□2□
E3FA-L□2□
E3FA-V□21
E3FA-B□22

* Suitable models
E3FA-T□21-D
E3FA-R□22
E3FA-D□2□
E3FA-V□21
E3FA-B□22

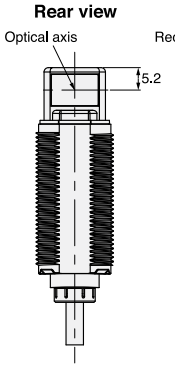
Mounting Holes



Terminal No.	Specification
1	+V
2	L/on · D/on selectable
3	0V
4	Output

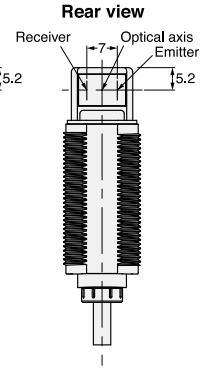
E3RA series
Pre-wired Models
E3RA-T□11
E3RA-R□11
E3RA-D□1□

Rear view



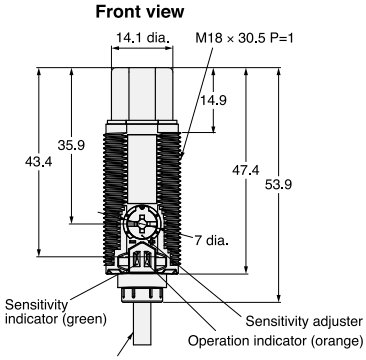
Suitable models
E3RA-T□11

Rear view

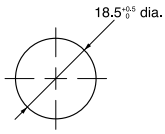


Suitable models
E3RA-R□11
E3RA-D□1□

Front view

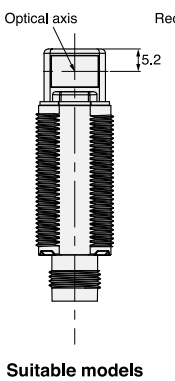


Mounting Holes



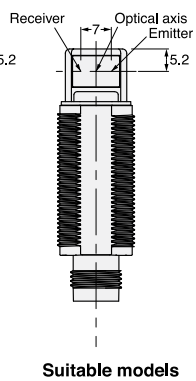
E3RA series
M12 Connector Models
E3RA-T□21
E3RA-R□21
E3RA-D□2□

Rear view



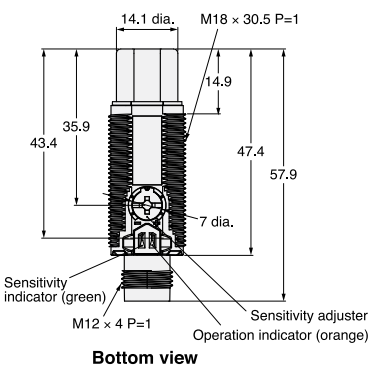
Suitable models
E3RA-T□21

Rear view

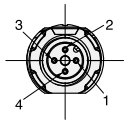


Suitable models
E3RA-R□21
E3RA-D□2□

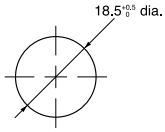
Front view



Bottom view

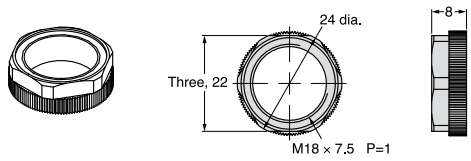


Mounting Holes



Terminal No.	Specification
1	+V
2	L/on · D/on selectable
3	0V
4	Output

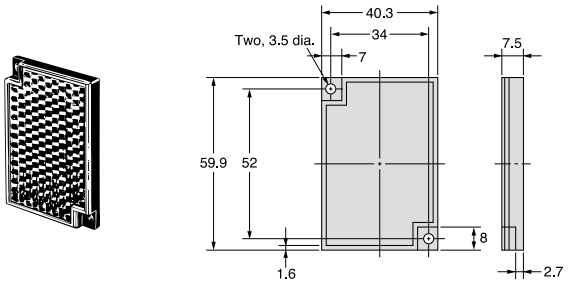
Attached nut



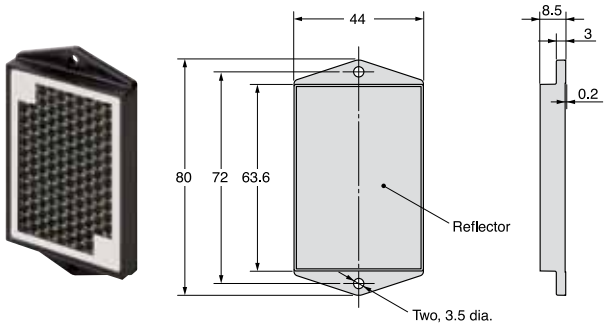
Accessories (Order Separately)

Reflectors

E39-R1S

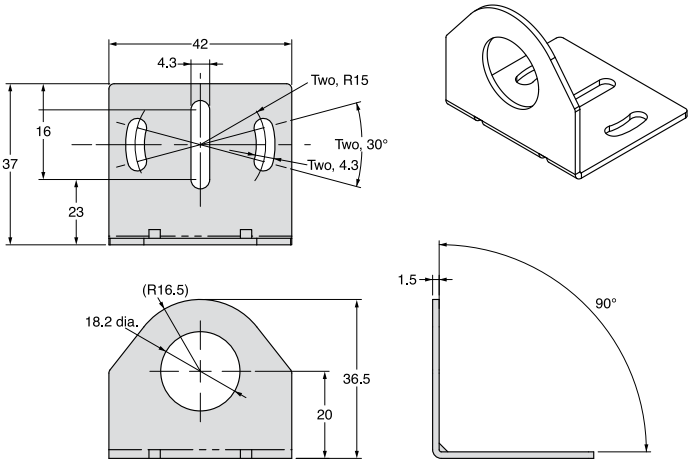


E39-RP1



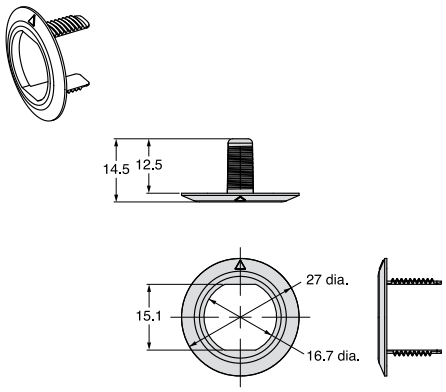
Mounting brackets

E39-L183



Mounting brackets

E39-L182



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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E423-E1-01
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