

Photoelectric Sensor with Built-in Amplifier Contributes to Equipment Downsizing

- Ultracompact and Thin Photoelectric Sensor with Built-in Amplifier
- Easy optical axis adjustment with emitter fluctuation of $\pm 2\%$ max. for Through-beam Models.
- Product lineup includes Coaxial Retro-reflective Models that support positioning applications.
- Product lineup includes BGS* Reflective Models unaffected by background (E3T-FL1□/-FL2□).
- Product lineup of models with a variety of connection specifications. (e.g., robot cable and Smartclick pre-wired connectors)

* BGS (Background Suppression) technology prevents detecting background objects.



Be sure to read *Safety Precautions* on page 14.

Features

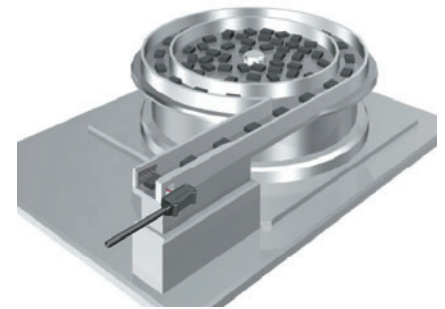
E3T-SR4□ **NEW**: Retro-reflective Sensor with Enhanced Compactness and High Performance

- Perform detection from a small hole.

With a coaxial optical system, the lens diameter is only 2 mm.

Sufficient incident light is obtained even through a small hole.

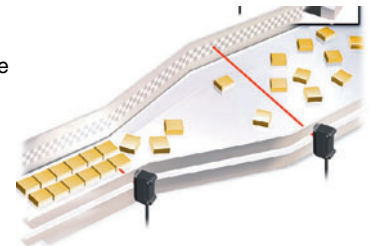
The Coaxial Retro-reflective Sensor can be used for reliable application with positioning.



- Improved Stability of Short-distance Detection

A detection distance as short as 10 mm can be used with a Tape Reflector.

Detection is stable through a hole whether the distance is 10 mm or 100 mm (except in combination with the E39-R4).

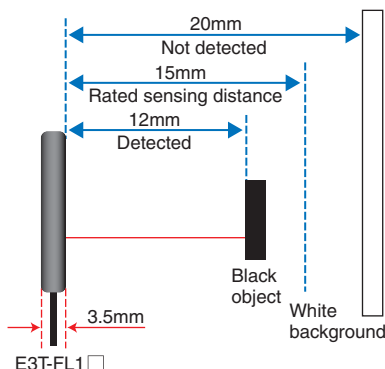


E3T-FL1□/-FL2□: The Slimmest BGS (Background Suppression) Reflective Photoelectric Sensors in the World

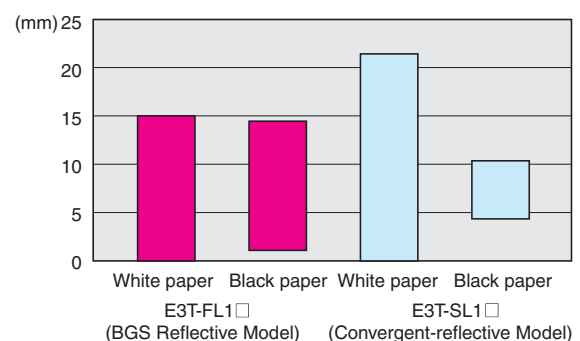
Ultra slim at 3.5 mm and black/white error of only 15%.

For example, the E3T-FL1□ can stably detect a black object at 12 mm without being affected by a white background at 20 mm.

OMRON provides BGS performance sharper than the previous Convergent-reflective Sensors.



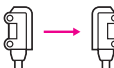
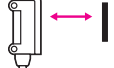
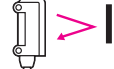
Dramatic Improvement in Black/White Error



Ordering Information

Sensors (Refer to Dimensions on page 15.)

 Red light

Sensing method	Appearance		Connection method	Sensing distance	Operation mode	Model	
						NPN output	PNP output
Through-beam (Emitter + Receiver) *1			Pre-wired (2 m)	 1 m (Sensitivity Adjustment Unit can be used.)	Light-ON	E3T-ST11 2M *2 Emitter E3T-ST11-L 2M Receiver E3T-ST11-D 2M	E3T-ST13 2M *2 Emitter E3T-ST13-L 2M Receiver E3T-ST13-D 2M
					Dark-ON	E3T-ST12 2M *2 Emitter E3T-ST12-L 2M Receiver E3T-ST12-D 2M	E3T-ST14 2M *2 Emitter E3T-ST14-L 2M Receiver E3T-ST14-D 2M
				 300 mm	Light-ON	E3T-ST21 2M *2 Emitter E3T-ST21-L 2M Receiver E3T-ST21-D 2M	E3T-ST23 2M *2 Emitter E3T-ST23-L 2M Receiver E3T-ST23-D 2M
					Dark-ON	E3T-ST22 2M *2 Emitter E3T-ST22-L 2M Receiver E3T-ST22-D 2M	E3T-ST24 2M *2 Emitter E3T-ST24-L 2M Receiver E3T-ST24-D 2M
				 500 mm	Light-ON	E3T-FT11 2M Emitter E3T-FT11-L 2M Receiver E3T-FT11-D 2M	E3T-FT13 2M Emitter E3T-FT13-L 2M Receiver E3T-FT13-D 2M
					Dark-ON	E3T-FT12 2M Emitter E3T-FT12-L 2M Receiver E3T-FT12-D 2M	E3T-FT14 2M Emitter E3T-FT14-L 2M Receiver E3T-FT14-D 2M
				 300 mm	Light-ON	E3T-FT21 2M Emitter E3T-FT21-L 2M Receiver E3T-FT21-D 2M	E3T-FT23 2M Emitter E3T-FT23-L 2M Receiver E3T-FT23-D 2M
					Dark-ON	E3T-FT22 2M Emitter E3T-FT22-L 2M Receiver E3T-FT22-D 2M	E3T-FT24 2M Emitter E3T-FT24-L 2M Receiver E3T-FT24-D 2M
Retro-reflective *3				 200 mm [30 mm] *4  100 mm [10 mm] *4	Light-ON	E3T-SR41 2M *5	E3T-SR43 2M *5
					Dark-ON	E3T-SR42 2M *5	E3T-SR44 2M *5
Diffuse-reflective				 5 to 30 mm	Light-ON	E3T-FD11 2M *2	E3T-FD13 2M *2
					Dark-ON	E3T-FD12 2M *2	E3T-FD14 2M *2
Convergent-reflective				 5 to 15 mm	Light-ON	E3T-SL11 2M *2	E3T-SL13 2M *2
					Dark-ON	E3T-SL12 2M *2	E3T-SL14 2M *2
				 5 to 30 mm	Light-ON	E3T-SL21 2M *2	E3T-SL23 2M *2
					Dark-ON	E3T-SL22 2M *2	E3T-SL24 2M *2
BGS reflective				 1 to 15 mm	Light-ON	E3T-FL11 2M	E3T-FL13 2M
					Dark-ON	E3T-FL12 2M	E3T-FL14 2M
				 1 to 30 mm	Light-ON	E3T-FL21 2M	E3T-FL23 2M
					Dark-ON	E3T-FL22 2M	E3T-FL24 2M

*1. Through-beam Sensors are normally sold in sets that include both the Emitter and Receiver.

Orders for individual Emitters and Receivers are accepted. (Modifications are required for some models. Ask your OMRON representative for details.)

*2. M3 mounting models are also available. These models have the M-suffix. Example: E3T-ST11M 2M

Contact your OMRON representative for detail.

*3. Ask your OMRON representative about the previous Retro-reflective Sensors: E3T-SR2□ and E3T-SR3□.

*4. Values in parentheses indicate the minimum required distance between the Sensor and Reflector.

*5. Models are available either with or without the E39-R37-CA Reflector included.

Model with E39-R37-CA Reflector: E3T-SR4□-S

Model without Reflector: E3T-SR4□-C

Variety of Connection Specifications

The models with the connection specifications marked with a black circle in the table are available. The model number indication is a combination of the basic model and the connection specification.

Example: E3T-ST11-M1TJ 0.3M

Basic model
number Connection
specification

NPN Output

Model			Model number example	E3T-ST11-M1TJ 0.3M	E3T-ST11 5M	E3T-ST11R 2M	E3T-ST11-ECON 0.3M	E3T-ST11-ECON 2M
Sensing method	Sensing distance	Operation mode	Conne- tion speci- fication	M12 pre-wired Smartclick Con- nector (cable length: 0.3 m)	Pre-wired (cable length: 5 m)	Pre-wired robot (cable length: 2 m)	e-CON pre-wired connector (cable length: 0.3 m)	e-CON pre-wired connector (cable length: 2 m)
			Basic model number	-M1TJ 0.3M	5M	R 2M	-ECON 0.3M	-ECON 2M
Through- beam (side- view)	1 m	Light-ON	E3T-ST11	●	●	●	●	●
		Dark-ON	E3T-ST12	●	●	●	●	●
	300 mm	Light-ON	E3T-ST21	●	●	---	●	●
		Dark-ON	E3T-ST22	●	●	---	●	●
Through- beam (flat)	500 mm	Light-ON	E3T-FT11	●	●	●	●	●
		Dark-ON	E3T-FT12	●	●	●	●	●
	300 mm	Light-ON	E3T-FT21	●	---	---	●	●
		Dark-ON	E3T-FT22	●	---	---	●	●
Retro- reflective	200 mm (100 mm)	Light-ON	E3T-SR41	●	●	●	●	●
		Dark-ON	E3T-SR42	●	●	●	●	●
Diffuse- reflective	5 to 30 mm	Light-ON	E3T-FD11	●	●	●	●	●
		Dark-ON	E3T-FD12	●	●	●	●	●
Convergent- reflective	5 to 15 mm	Light-ON	E3T-SL11	●	●	●	●	●
		Dark-ON	E3T-SL12	●	●	●	●	●
	5 to 30 mm	Light-ON	E3T-SL21	●	●	●	●	●
		Dark-ON	E3T-SL22	●	●	●	●	●
BGS reflec- tive	1 to 15 mm	Light-ON	E3T-FL11	●	---	●	---	---
		Dark-ON	E3T-FL12	●	---	●	---	---
	1 to 30 mm	Light-ON	E3T-FL21	●	---	●	●	---
		Dark-ON	E3T-FL22	●	---	●	---	---

* The sensing distance depends on the Reflector that is used. The sensing distance is 200 mm if an E39-R4 is used and 100 mm if an E39-R37-CA is used.

PNP Output

Model			Model number example	E3T-ST13-M1TJ 0.3M	E3T-ST13 5M	E3T-ST13R 2M
Sensing method	Sensing distance	Operation mode	Conne- tion speci- fication	M12 pre-wired Smartclick Con- nector (cable length: 0.3 m)	Pre-wired (cable length: 5 m)	Pre-wired robot (cable length: 2 m)
			Basic model number	-M1TJ 0.3M	5M	R 2M
Through- beam (side- view)	1 m	Light-ON	E3T-ST13	●	●	●
		Dark-ON	E3T-ST14	●	●	●
	300 mm	Light-ON	E3T-ST23	●	---	---
		Dark-ON	E3T-ST24	●	---	---
Through- beam (flat)	500 mm	Light-ON	E3T-FT13	●	●	●
		Dark-ON	E3T-FT14	●	●	●
	300 mm	Light-ON	E3T-FT23	●	---	---
		Dark-ON	E3T-FT24	●	●	---

Model			Model number example	E3T-ST13-M1TJ 0.3M	E3T-ST13 5M	E3T-ST13R 2M
Sensing method	Sensing distance	Operation mode	Connection specification	M12 pre-wired Smartclick Connector (cable length: 0.3 m)	Pre-wired (cable length: 5 m)	Pre-wired robot (cable length: 2 m)
			Basic model number	-M1TJ 0.3M	5M	R 2M
Retro-reflective	200 mm (100 mm)	Light-ON	E3T-SR43	●	●	●
		Dark-ON	E3T-SR44	●	●	●
Diffuse-reflective	5 to 30 mm	Light-ON	E3T-FD13	●	●	●
		Dark-ON	E3T-FD14	●	●	●
Convergent-reflective	5 to 15 mm	Light-ON	E3T-SL13	●	●	●
		Dark-ON	E3T-SL14	●	●	●
	5 to 30 mm	Light-ON	E3T-SL23	●	●	●
		Dark-ON	E3T-SL24	●	●	●
BGS reflective	1 to 15 mm	Light-ON	E3T-FL13	●	---	●
		Dark-ON	E3T-FL14	●	---	●
	1 to 30 mm	Light-ON	E3T-FL23	●	---	●
		Dark-ON	E3T-FL24	●	---	●

* The sensing distance depends on the Reflector that is used. The sensing distance is 200 mm if an E39-R4 is used and 100 mm if an E39-R37-CA is used.

Accessories (Order Separately)

Slits (A Slit is not provided with the Sensor for through-beam. Order a Slit separately if required.) (Refer to *Dimensions* on page 18.)

Slit width	Sensing distance (typical) (Sensor model)	Minimum detectable object (typical)	Model	Quantity	Remarks
0.5-mm dia.	100 mm (E3T-ST1□)	0.5-mm dia.	E39-S63	One each for Emitter and Receiver; common with Slit widths of 1 dia. and 0.5 dia. (total of 2)	Plug-in type round slits Can be used with E3T-ST□□ Through-beam Models.
	30 mm (E3T-ST2□)				
1-mm dia.	300 mm (E3T-ST1□)	1-mm dia.			
	100 mm (E3T-ST2□)				
0.5-mm dia.	50 mm (E3T-FT1□)	0.5-mm dia.	E39-S64		Plug-in type round slits Can be used with E3T-FT□□ Through-beam Models.
	30 mm (E3T-FT2□)				
1-mm dia.	100 mm (E3T-FT1□)	1-mm dia.			
	50 mm (E3T-FT2□)				

Reflectors

(Requirement for retro-reflective: A Retroreflector is provided depending on the model number. Check the model number in remarks column.)
(For Compact Reflectors, refer to *Dimensions* on page 17. For Tape Reflectors, refer to *E39-L/F39-L/E39-S/E39-R*.)

Name	Recommended Sensor	Sensing distance	Minimum detectable object	Model	Quantity	Remarks
Small Reflectors	E3T-SR4□	200 mm (30 mm) *1	2-mm dia.	E39-R4	1	Provided with the E3T-SR4□
	E3T-SR4□-S	100 mm (10 mm) *1		E39-R37-CA *2		Provided with the E3T-SR4□-S
Tape Reflectors	E3T-SR4□-C	100 mm (10 mm) *1		E39-RS1-CA *2		Use Tape Reflectors in combination with the E3T-SR4□-C, which does not come with a Reflector.
				E39-RS2-CA *2		
				E39-RS3-CA *2		

*1. Values in parentheses indicate the minimum required distance between the Sensor and Reflector.

*2. The E3T-SR4□ cannot be used with the E39-R37 or E39-RS1/2/3 (without CA) Tape Reflectors.
The E39-□-CA Reflector is for use only with the E3T-SR4□. It cannot be used with other Sensors.

Sensitivity Adjustment Unit

(A Unit is not provided with the Sensor (for the E3T-ST1□). Order a Unit separately if required.)

(Refer to *Dimensions* on page 18.)

Appearance	Sensing distance (typical)	Model	Quantity	Remarks
	300 to 800 mm	E39-E10	1	Can be used with the E3T-ST1□ Through-beam Models.

Mounting Brackets

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

(Refer to *Dimensions* on page 18.)

Appearance	Model	Quantity	Remarks
	E39-L116	1	Can be used with the E3T-S□□□ Side-view Models. (A securing nut plate is provided with the Mounting Bracket.)
	E39-L117		
	E39-L118		
	E39-L119		Can be used with the E3T-F□□□ Flat Models.
	E39-L120		

Note: When using Through-beam models, order one bracket for the Receiver and one for the Emitter.

Set of Mounting Screws A Set is provided with the Sensor.

Applicable sensors	Model	Description	Material	Quantity	Remarks
Side-view models E3T-S□□□	E39-L164	Phillips screws (M2 × 14) Hexagonal nuts (M2) Spring washers (M2) Flat washers (M2)	Iron, zinc plating Iron, zinc plating Iron, nickel plating Iron, zinc plating	2 for each	Provided with the side-view models E3T-S□□□.
Flat models E3T-F□□□	E39-L165	Phillips screws (M2 × 8) Hexagonal nuts (M2) Spring washers (M2) Flat washers (M2)	Iron, zinc plating Iron, zinc plating Iron, nickel plating Iron, zinc plating		Provided with the flat models E3T-F□□□.

Note: If a Through-beam Model is used, order two sets of Mounting Screws, one for the Emitter and one for the Receiver.

Used for mounting sensors. Order the set separately if it becomes lost or damaged.

These screws are not used for mounting brackets to the equipment.

Sensor I/O Connectors

(Models with Pre-wired Connectors: A Connector is not provided with the Sensor. Be sure to order a Connector separately.)
 (For M12, refer to XS5. For e-CON, contact your OMRON representative.)

Size	Cable	Appearance	Cable type		Model
M12 (For-M1TJ models)	Standard	Straight 	2 m	4-wire	XS5F-D421-D80-A
			5 m		XS5F-D421-G80-A
e-CON	Standard cable	Connector on one end 	2 m	4-wire	E39-ECON2M
			5 m		E39-ECON5M
		Connector on both ends 	0.5 to 1 m		E39-ECONW□M Replace □ with the cable length in 0.1-m increments.
			1.1 to 1.5 m		
			1.6 to 2 m		

Note: When using Through-beam models, order one connector for the Receiver and one for the Emitter.

Ratings and Specifications

Sensing method		Through-beam				Retro-reflective (without M.S.R. function)	
		Side-view		Flat		Side-view	
		NPN	PNP	NPN	PNP	NPN	PNP
		E3T-ST11 E3T-ST12 E3T-ST21 E3T-ST22	E3T-ST13 E3T-ST14 E3T-ST23 E3T-ST24	E3T-FT11 E3T-FT12 E3T-FT21 E3T-FT22	E3T-FT13 E3T-FT14 E3T-FT23 E3T-FT24	E3T-SR41 E3T-SR42	E3T-SR43 E3T-SR44
Sensing distance		E3T-ST1□ E3T-ST2□	1 m 300 mm	E3T-FT1□ E3T-FT2□	500 mm 300 mm	E3T-SR4□ 200 mm (30 mm) (Using the E39-R4) 100 mm (10 mm) (Using the E39-R37-CA)	
Standard sensing object		Opaque, 2-mm dia. min.		Opaque, 1.3-mm dia. min.		Opaque, 27-mm dia. min.	
Minimum detectable object (typical)		2-mm dia opaque object		1.3-mm dia opaque object		2-mm dia. (sensing distance of 100 mm)	
Hysteresis (white paper)		---					
Black/white error		---					
Directional angle		Emitter: 2° to 20°, Receiver: 2° to 70°		Emitter: 3° to 25°, Receiver: 3° min.		2° to 20°	
Light source (wavelength)		Red LED ("Pin-point" LED) λ = 650 nm					
Power supply voltage		12 to 24 VDC ±10%, ripple (p-p) 10% max.					
Current consumption		30 mA max. (Emitter 10 mA max., Receiver 20 mA max.)				20 mA max.	
Control output		Load power supply voltage: 26.4 VDC max. Load current: 50 mA max. (residual voltage: 2 V max. for load current of 10 to 50 mA, 1 V max. for load current of less than 10 mA) Open-collector output Light ON: E3T-□□□1 and E3T-□□□3 Dark ON: E3T-□□□2 and E3T-□□□4					
Protection circuits		Power supply and control output reverse polarity protection Output short-circuit protection				Power supply and control output reverse polarity protection Output short-circuit protection, Mutual interference prevention	
Response time		Operate or reset: 1 ms max.					
Ambient illumination		Incandescent lamp: 5,000 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 2,000 Hz, 1.5-mm double amplitude or 300 m/s² for 0.5 hrs each in X, Y, and Z directions					
Shock resistance		Destruction: 1,000 m/s² 3 times each in X, Y, and Z directions					
Degree of protection		IP67 (IEC60529)					
Connection method		Pre-wired (standard length: 2 m)					
Weight		Approx. 40 g				Approx. 20 g	
Materials	Case	PBT (polybutylene terephthalate)					
	Display window	Denatured polyarylate					
	Lens	Denatured polyarylate				Methacrylic resin	
Accessories		Instruction manual, Installation Phillips screws (Side-view Models: M2 × 14, Flat Models: M2 × 8), Nuts, Spring washers, Flat washers, E39-R4 (E3T-SR4□ only), E39-R37-CA (E3T-SR4□-S only)					

* Values in parentheses indicate the minimum required distance between the Sensor and Reflector.

Sensing method		Diffuse-reflective		Convergent-reflective				BGS reflective			
		Flat		Side-view				Flat			
		NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP
		E3T-FD11 E3T-FD12	E3T-FD13 E3T-FD14	E3T-SL11 E3T-SL12	E3T-SL13 E3T-SL14	E3T-SL21 E3T-SL22	E3T-SL23 E3T-SL24	E3T-FL11 E3T-FL12	E3T-FL13 E3T-FL14	E3T-FL21 E3T-FL22	E3T-FL23 E3T-FL24
Sensing distance		5 to 30 mm (50 × 50 mm white paper)		5 to 15 mm (50 × 50 mm white paper)		5 to 30 mm (50 × 50 mm white paper)		1 to 15mm (50 × 50 mm white paper)		1 to 30mm (50 × 50 mm white paper)	
Standard sensing object		---									
Minimum detectable object (typical)		0.15-mm dia. (sensing distance of 10 mm)						0.15-mm dia non-glossy object (sensing distance of 10 mm)			
Hysteresis (white paper)		6 mm max.		2 mm max.		6 mm max.		0.5 mm max.		2 mm max.	
Black/white error		---						15% max.			
Directional angle		---									
Light source (wavelength)		Red LED (“Pin-point” LED) λ = 650 nm									
Power supply voltage		12 to 24 VDC ±10%, ripple (p-p) 10% max.									
Current consumption		20 mA max.									
Control output		Load power supply voltage: 26.4 VDC max. Load current: 50 mA max. (residual voltage: 2 V max. for load current of 10 to 50 mA, 1 V max. for load current of less than 10 mA) Open-collector output Light ON: E3T-□□□1 and E3T-□□□3 Dark ON: E3T-□□□2 and E3T-□□□4									
Protection circuits		Power supply and control output reverse polarity protection Output short-circuit protection, Mutual interference prevention									
Response time		Operate or reset: 1 ms max.									
Ambient illumination		Incandescent lamp: 5,000 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 2,000 Hz, 1.5-mm double amplitude or 300 m/s ² for 0.5 hrs each in X, Y, and Z directions									
Shock resistance		Destruction: 1,000 m/s ² 3 times each in X, Y, and Z directions									
Degree of protection		IP67 (IEC60529)									
Connection method		Pre-wired (standard length: 2 m)									
Weight		Approx. 20 g									
Materials	Case	PBT (polybutylene terephthalate)									
	Display window	Denatured polyarylate									
	Lens	Denatured polyarylate									
Accessories		Instruction manual, Installation Phillips screws (Side-view Models: M2 × 14, Flat Models: M2 × 8), Nuts, Spring washers, Flat washers									