Ultra small size sensors in plastic housing

E3T

- Ultra small size with high power pin point LED where space is crucial
- 3.5 mm thin flat shape or 7 mm wide side view shape

Features

4 detection methods for selection according to work and space

Through-beam model

The side-view type has realized long, 1 m distance detection. Furthermore, it can detect a small, 0.5 mm or less dia. work with a pin-point beam (when slit is fitted). The visible light spot and narrow-visibility beam ensure a stable detection of lead frames and chip parts.

Diffuse reflective model

3.5 mm thin size and can be installed to a gap etc. The pin-point beam makes sensing position check easy, and the sensor is insensitive to the background and surrounding metal, ensuring stable detection.

Limited reflective model

Having the smallest size, this type can detect a merely 0.15 mm small object. In addition to this, it is insensitive to the background and surrounding metal, thus, ensuring a stable detection. The pin-point beam allows a clear vision of a red light spot, facilitating a sensing position check.

Retroreflective model

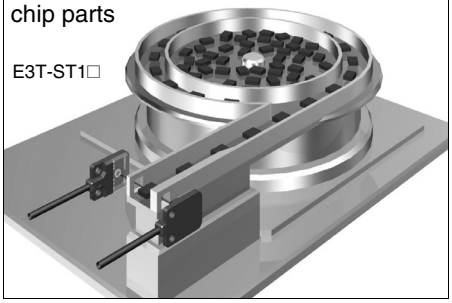
The world first coaxial Retroreflective type in this size. When used with a small reflector, this sensor completes 2 mm dia. small work detection and 200 mm sensing distance. The switch detects small works, such as IC chips on tape, and the pin-point beam makes optical axis adjustment easy, achieving stable detection.

Application

Through-beam

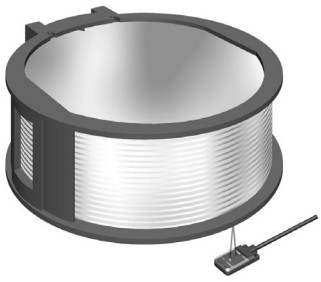
Detection of passing/staying parts on parts feeder
Stable detection of small works such as chip parts

E3T-ST1□



Diffuse-reflective

Detection of seated wafer cassette
Thin size. Can be mounted to a gap or like.

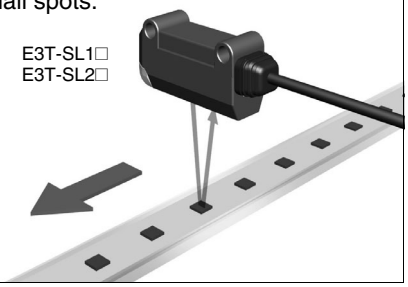


E3T-FD1□

Limited reflective

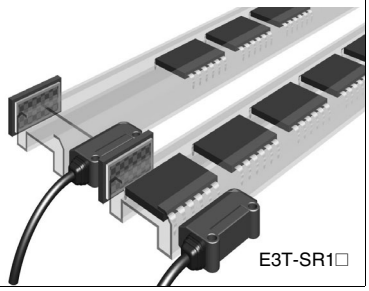
Detection of chip parts on tape (Taping machine)
Can detect small parts on 1 mm dia. small spots.

E3T-SL1□
E3T-SL2□



Retroreflective Models

Detection of stick full of ICs (IC handler/ DIP.SOP)
Retroreflection halves wiring man-hours.

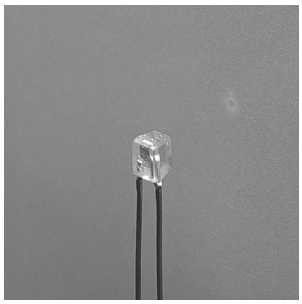


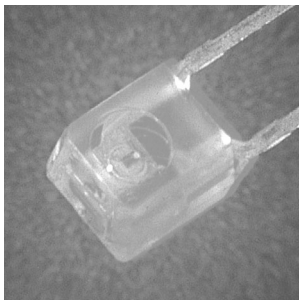
E3T-SR1□

Features

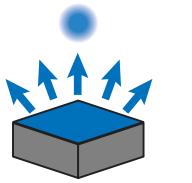
The hyper LED issues a 0.8 mm dia. pin-point beam (E3T-SL1□) Small works can be detected

The hyper LED performs a high-output narrow-visibility beam of 0.8 mm spot diameter (E3T-SL1□). A red spot can be seen clearly and optical axis alignment and detection position check become easy. Besides, the LED is insensitive to the work color and background and can detect a small work securely.

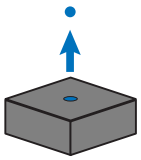




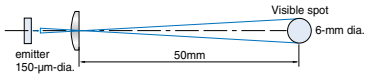
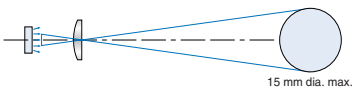
High output pin-point light source LED (wave length: 650 mm)



The conventional LED emits light from its surface. It has a large degree of light dispersion, increasing the loss when creating a small beam.



The hyper LED emits light from a small point. It has a small degree of light dispersion, achieving a loss-free, high-output, narrow-visibility beam.

E3T-ST	
Conventional through-beam type	

One-chip photo IC ensures high reliability.

The incident photo diode and analog/digital signal processing circuit are integrated densely into the one-chip fully customized IC in use. This photoelectric sensor has high reliability in the ultra small size.

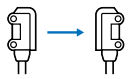
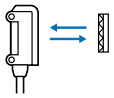
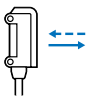
Equipped with OMRON's original FAO, this photoelectric sensor has achieved the world's first coaxial retroreflective type.

The FAO (FREE ANGLE OPTICS), or special beam splitter having multiple layers of dielectric films on a glass, has implemented the ultra small coaxial retroreflection. It can detect a small 2 mm dia. work, provides sensing position accuracy equivalent to that of the through-beam type, reducing wiring man-hours.

Ordering Information

Sensors

Red light

Sensor type	Shape		Connection method	Sensing distance	Output form	Model	
						NPN output *1	PNP output
Through-beam	Side-view		Pre-wired models	1m	Light ON	E3T-ST11	E3T-ST13
					Dark ON	E3T-ST12	E3T-ST14
	Flat			500mm	Light ON	E3T-FT11	E3T-FT13
					Dark ON	E3T-FT12	E3T-FT14
Retroreflective	Side-view			200mm [10mm] *2	Light ON	E3T-SR11	E3T-SR13
					Dark ON	E3T-SR12	E3T-SR14
Diffuse reflective	Flat			5 to 30 mm	Light ON	E3T-FD11	E3T-FD13
					Dark ON	E3T-FD12	E3T-FD14
Limited reflective	Side-view			5 to 15 mm	Light ON	E3T-SL11	E3T-SL13
					Dark ON	E3T-SL12	E3T-SL14
				5 to 30 mm	Light ON	E3T-SL21	E3T-SL23
					Dark ON	E3T-SL22	E3T-SL24

*1. The robot cable type is available. Its type ends with "R". (Example: E3T-ST11R)

*2. Values in parentheses indicate the minimum required distance between the sensor and reflector.

Accessories (Order Separately)

Slits

Slit width	Sensing distance (typical)	Minimum sensing object (typical)	Model	Quantity	Remarks
0.5 mm dia.	100 mm	0.5 mm dia.	E39-S63	One each for Emitter and Receiver; common with Slit widths of 1 dia. and 0.5 dia.	(Plug-in type round slit) Can be used with the through-beam E3T-ST1□.
1 mm dia.	300 mm	1 mm dia.			
0.5 mm dia.	50 mm	0.5 mm dia.	E39-S64		(Plug-in type round slit) Can be used with the through-beam E3T-FT1□.
1 mm dia.	100 mm	1 mm dia.			

Reflectors

Name	Sensing distance (typical)	Minimum sensing object (typical)	Model	Quantity	Remarks
Small reflector	200 mm [10 mm] * (rated value)	2 mm dia.	E39-R4	1	Attached to the E3T-SR1□ Retroreflective model.
	100 mm (10 mm)*		E39-R37		---

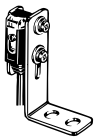
* Values in parentheses indicate the minimum required distance between the sensor and reflector.

Note: 1 . When the reflector used is other than the supplied one, set the sensing distance to about 0.7 times of the typical example as a guideline.
2 . Refer to the "Reflector list".

Sensitivity Adjustment Unit

Shape	Sensing distance (typical)	Model	Quantity	Remarks
	300 to 800 mm	E39-E10	1	For E3T-ST1□

Mounting Brackets

Shape	Model	Quantity	Remarks
	E39-L116	1	Can be used with the side-view E3T-S□□□.
	E39-L117		
	E39-L118		
	E39-L119		Can be used with the flat E3T-F□□□.
	E39-L120		

Note: 1 . If a through-beam model is used, order two Mounting Brackets for the emitter and receiver respectively.
2 . For details, refer to "Mounting bracket list".

Rating/performance

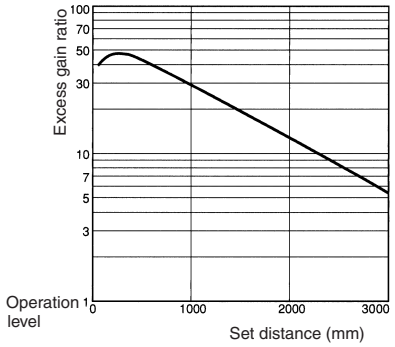
E3T-□□□□

Item	Through-beam				Retroreflective		Limited reflective				Diffuse reflective	
	Side-view		Flat		Side-view						Flat	
	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP
Light-ON	-ST11	-ST13	-FT11	-FT13	-SR11	-SR13	-SL11	-SL13	-SL21	-SL23	-FD11	-FD13
Dark-ON	-ST12	-ST14	-FT12	-FT14	-SR12	-SR14	-SL12	-SL14	-SL22	-SL24	-FD12	-FD14
Sensing distance	1 m (Sensitivity Adjustment Unit is available)		500 mm		200 mm (10 mm) (see note) (with the E39-R4)		5 to 15 mm (50 x 50 mm white paper)		5 to 30 mm (50 x 50 mm white paper)		5 to 30 mm (50 x 50 mm white paper)	
Standard sensing object (white paper)	Opaque, 2 dia. min.				Opaque, 27 dia. min.		---					
Min. sensing object (typical)	Opaque, 2 dia. min.				2 dia. (sensing distance of 100 mm)		0.15 dia. (sensing distance of 10 mm)					
Differential travel	---						2 mm max.		6 mm max.		6 mm max.	
Directional angle	Emitter: 3° to 10° Receiver: 3 to 70°		Emitter: 3° to 13° Receiver: 3 to 70°		Emitter: 2° to 5°		---					
Light source (wave length)	Red LED ("Pin-point" LED) (λ=650 nm)											
Power supply voltage	12 to 24 VDC ±10%, ripple (p-p) 10% max.											24 VDC ±10%
Current consumption	Emitter/Receiver: 12 mA max.				20 mA max.							
Control output	Open collector, load current: 50 mA max. at 24 VDC, residual voltage: 1 V max., operation mode: Light ON or Dark ON (separate models)											
Circuit protection	Protection from reversed power supply connection and output short-circuit				Protection from reversed power supply connection, output short-circuit, and mutual interference							
Response time	1 ms max. each for operation and release											
Ambient illumination (on Receiver lens)	Incandescent lamp: 5,000 ℓx max. Sunlight: 10,000 ℓx max.											
Ambient temperature	Operating: -25°C to 55°C Storage: -40°C to 70°C (with no icing or condensation)											
Ambient humidity	Operating: 35% to 85% Storage: 35% to 95% (with no condensation)											
Insulation resistance	20 M 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 (approx. 30G) for 0.5 hrs each in X, Y, and Z directions											
Shock resistance	Destruction: 1,000 m/s² (approx. 100G) 3 times each in X, Y, and Z directions											
Degree of protection	IEC60529: IP67											
Connection method	Prewired (standard length: 2 m)											
Weight (with packaging)	Approx. 40 g				Approx. 20 g							
Materials	Case: PBT Lens and cover: Polycarbonate											
Accessories	Phillips-head screws (side-view type: M2 x 14, flat type: M2 x 8), nuts, spring washers, flat washers, instruction sheet, and Reflector (for retroreflective model only)											

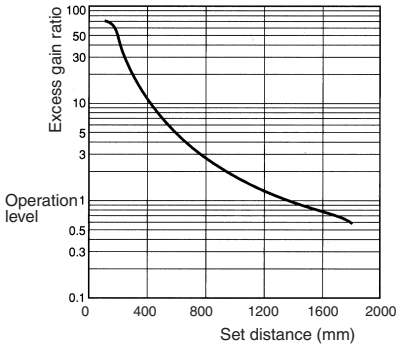
Engineering Data

Excess Gain vs. Set Distance (Typical)

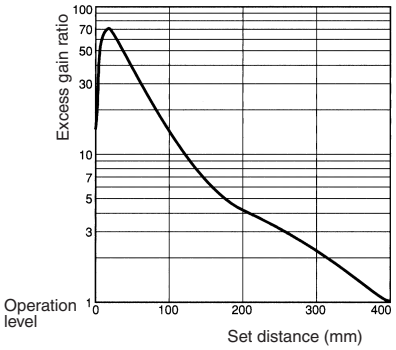
E3T-ST1□ (Through-beam)



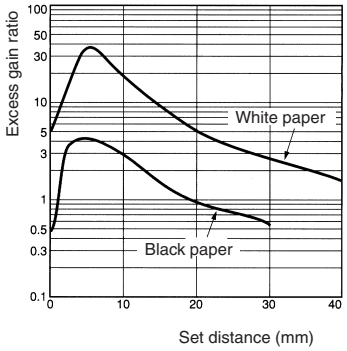
E3T-FT1□ (Through-beam)



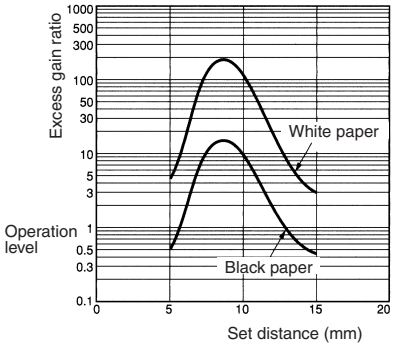
E3T-SR1□ with E39-R4 (Retroreflective)



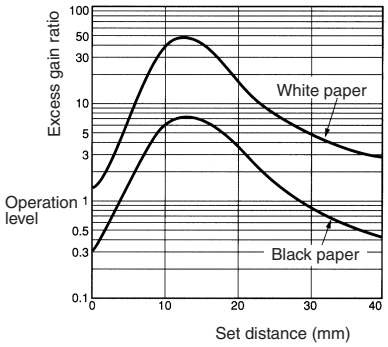
E3T-FD1□ (Diffuse Reflective)



E3T-SL1□ (Limited Reflective)



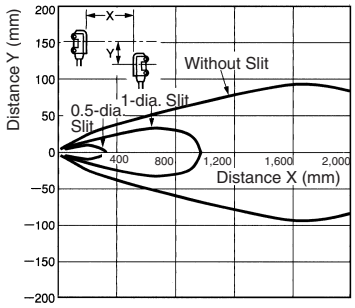
E3T-SL2□ (Limited Reflective)



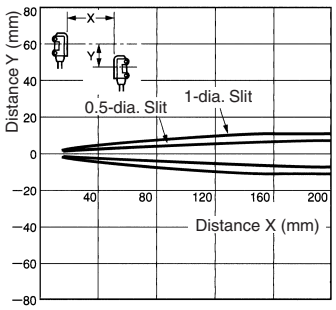
Parallel Operating Range (Typical)

(Through-beam)

E3T-ST1□ with Slit

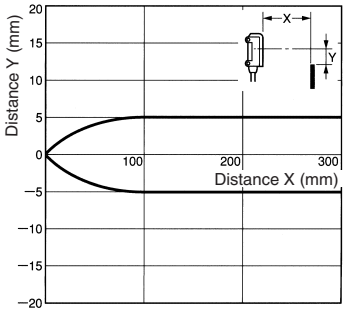


E3T-ST1□ with Slit (Enlarged graph)

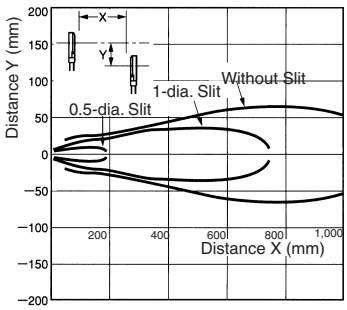


(Retroreflective)

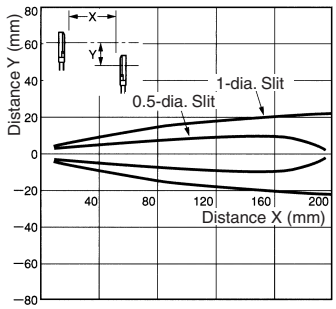
E3T-SR1□ with E39-R4



E3T-FT1□ with Slit



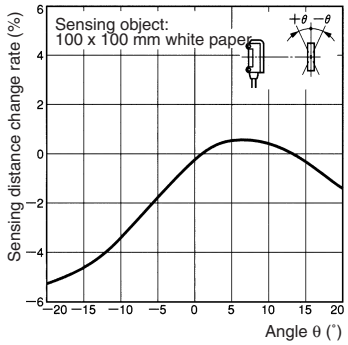
E3T-FT1□ with Slit (Enlarged graph)



Angle Characteristics (Typical)

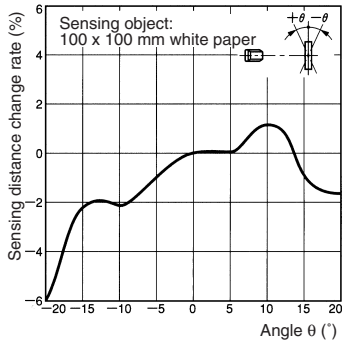
E3T-SL1□

(Up and Down)



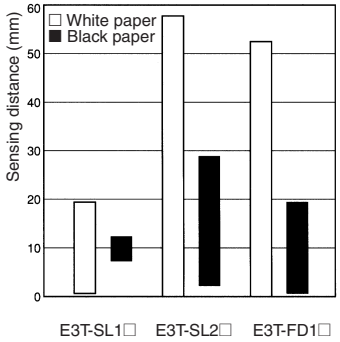
EE3T-SL1□

(Left and Right)



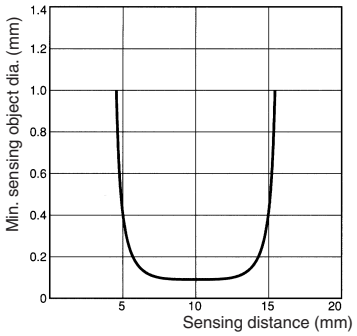
Close-distance Sensing Capability (Typical)

E3T-SL1□, E3T-SL2□, E3T-FD1□

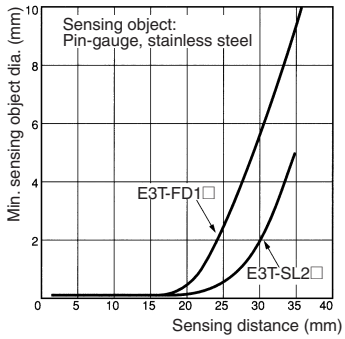


Sensing Object Size vs. Sensing Distance (Typical)

E3T-SL1□

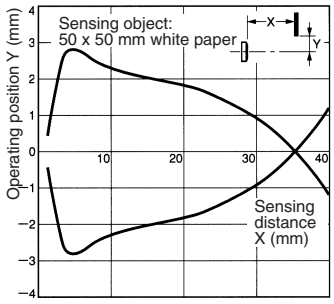


E3T-SL1□

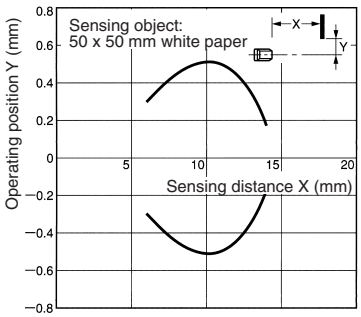


Operation Range (Typical)

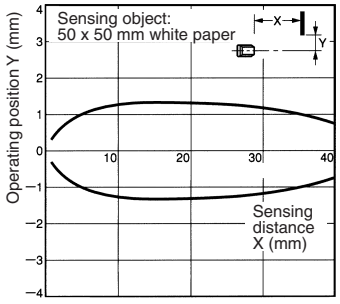
E3T-FD1□ (Diffuse Reflective)



E3T-SL1□ (Limited Reflective)

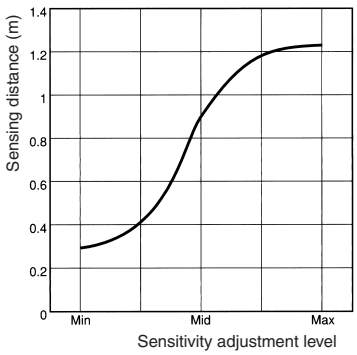


E3T-SL2□ (Limited Reflective)



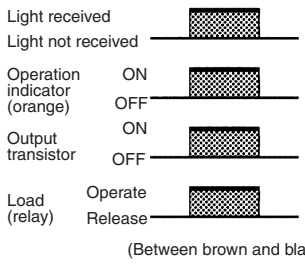
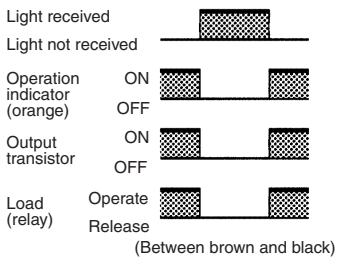
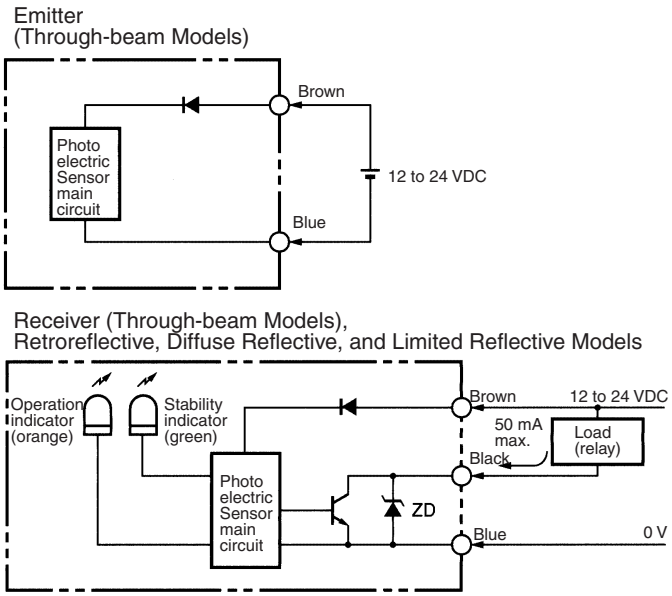
Sensing Distance Characteristics of Sensitivity Adjustment Unit (when completing optical axis adjustment)

E3T-SL1□ with E39-E10

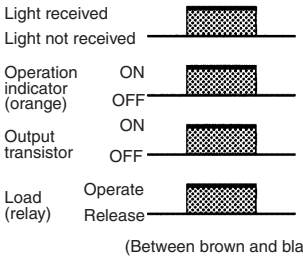
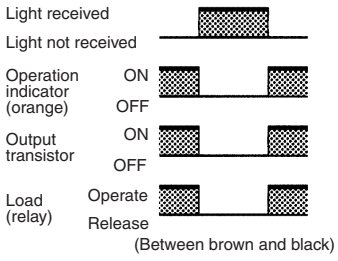
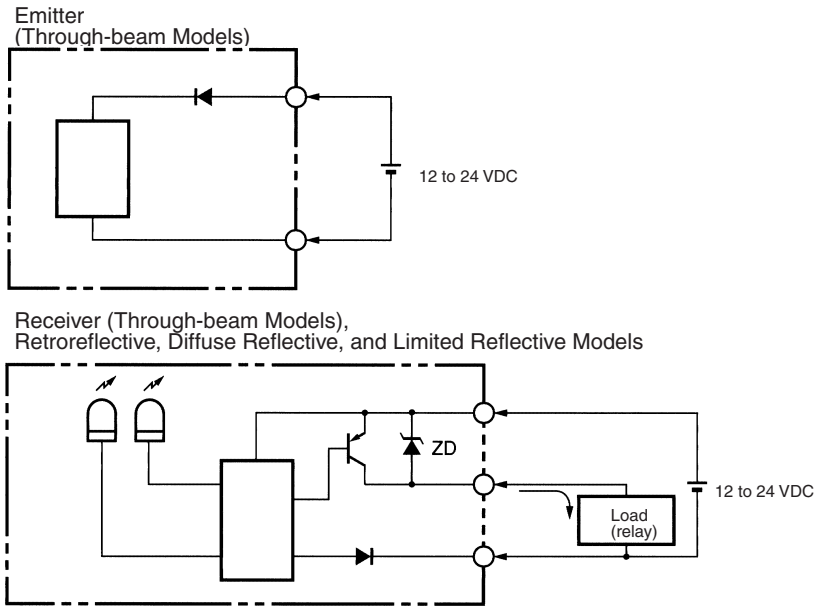


Operation

NPN Output Configuration

Model	E3T-□□□1	E3T-□□□2
State of output transistor	Light ON	Dark ON
Timing chart		
Output circuit		

PNP Output Configuration

Model	E3T-□□□3	E3T-□□□4
State of output transistor	Light ON	Dark ON
Timing chart		
Output circuit		

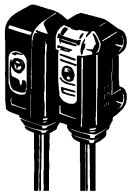
Dimensions

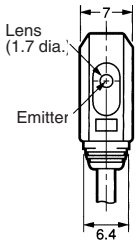
Note: All units are in millimeters unless otherwise indicated.

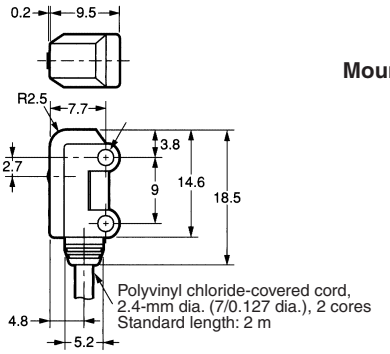
Photoelectric Sensors

Through-beam Models (Side-view Type)

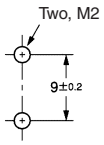
E3T-ST1□ (Emitter)



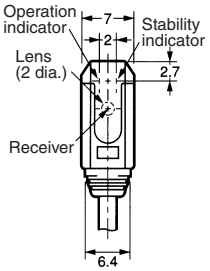


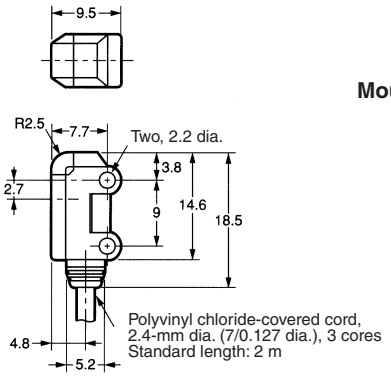


Mounting Holes

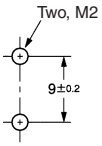


(Receiver)



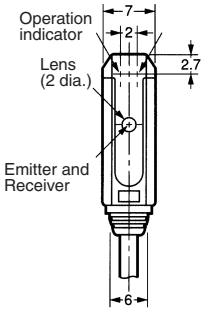


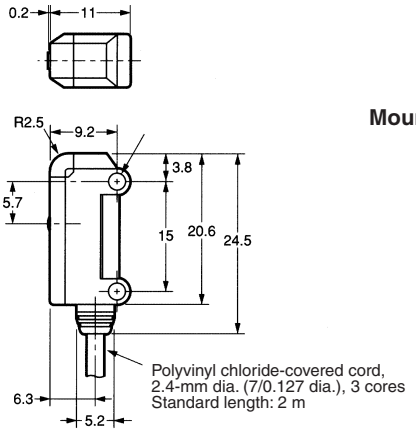
Mounting Holes



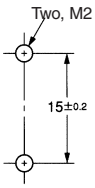
Retroreflective Models (Side-view Type)

E3T-SR1□



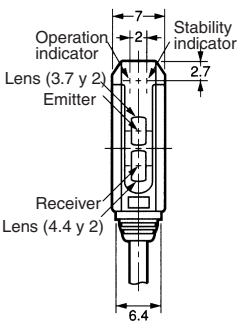


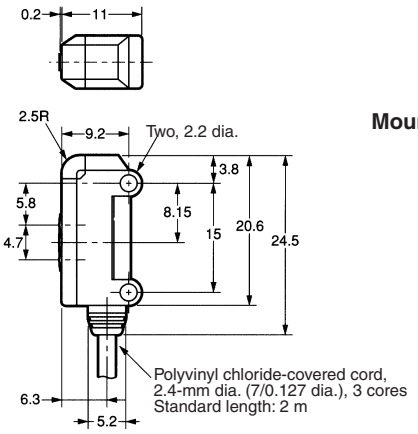
Mounting Holes



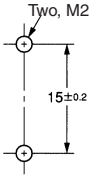
Limited Reflective Models (Side-view Type)

E3T-SL1□
E3T-SL2□



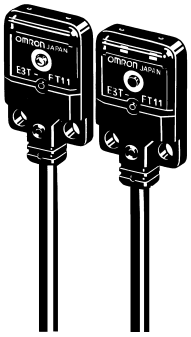


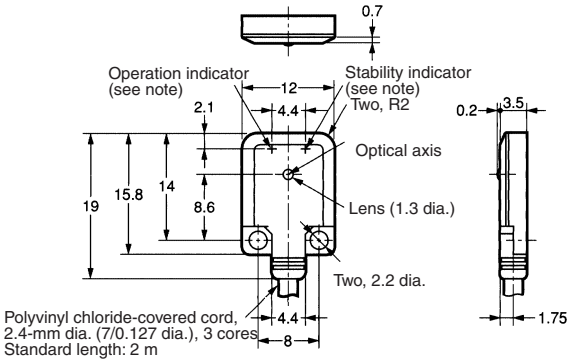
Mounting Holes



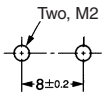
Through-beam Models (Flat Type)

E3T-FT1□
(Emitter, Receiver)





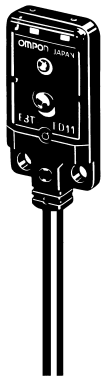
Mounting Holes

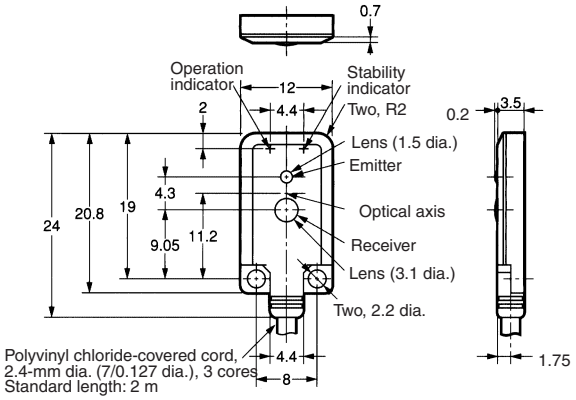


Note: For E3T-FT11/-FT13 and E3T-FT12/-FT14 Receivers only.

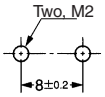
Diffuse Reflective Models (Flat Type)

E3T-FD1□





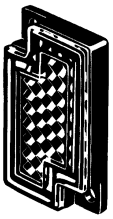
Mounting Holes



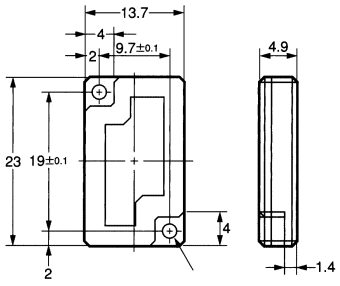
Accessories

Reflector (Attached to Retroreflective Models)

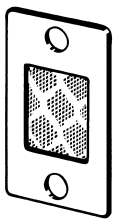
E39-R4



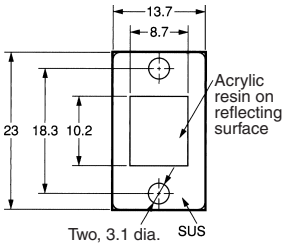
Material
Surface: Acryl
Back: ABS



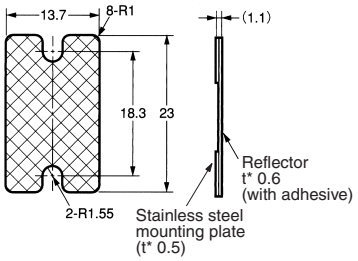
E39-R37



Mounting Plate



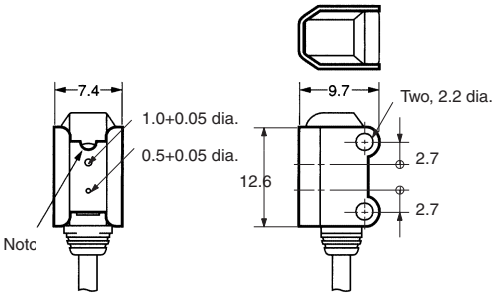
Reflector



Note: A reflector and a stainless steel mounting plate are supplied together as a set.

Slits (Order Separately)

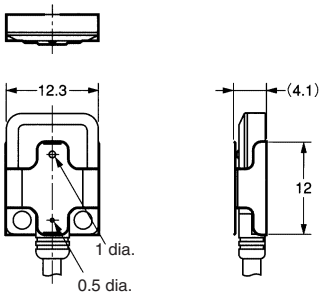
Through-beam E3T-ST1□ with E39-S63
With Slit mounted



Note: Align the notch direc tion of the Slit when installing on the Emitter and Receiver.

Material: 0.2-mm-thick stainless steel (SUS301)

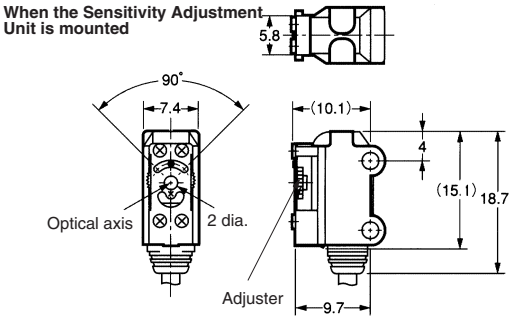
E39-S64 (for Through-beam E3T-FT1□)
With Slit mounted



Material: 0.2-mm-thick stainless steel (SUS301)

Sensitivity Adjustment Unit (for E3T-ST1□)

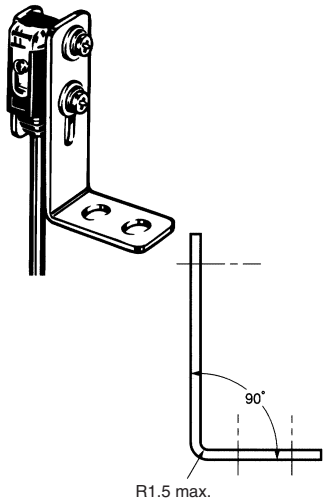
E39-E10

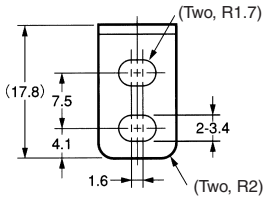


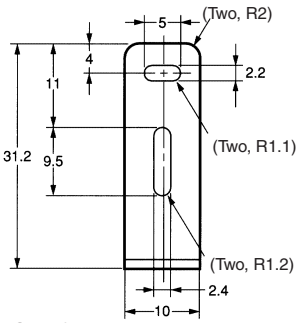
Material: Stainless steel (SUS301)

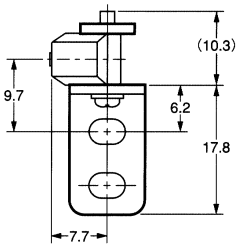
Mounting Brackets for E3T-S□ (Order Separately)

E39-L116



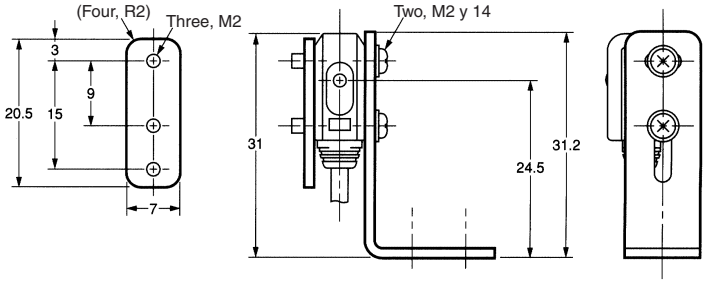




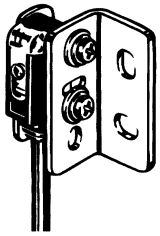


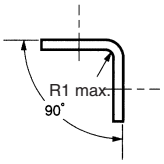
Material: 1.2-mm-thick stainless steel (SUS304)

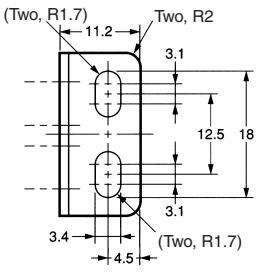
E3T-ST11 with E39-L116

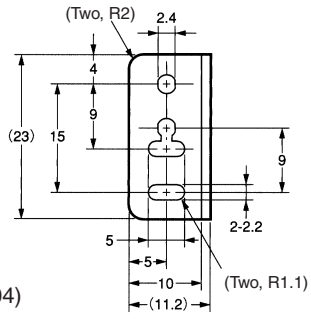


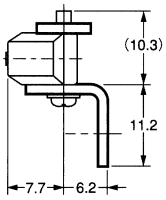
E39-L117





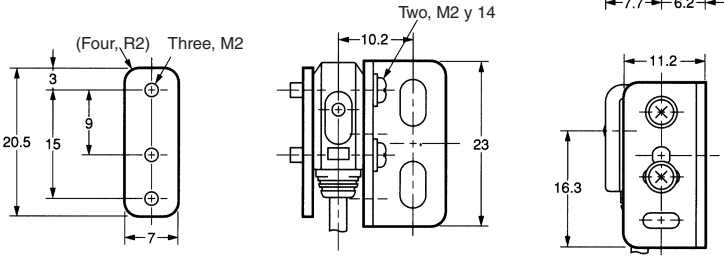




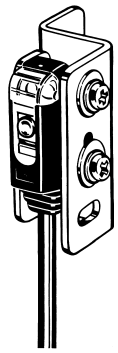


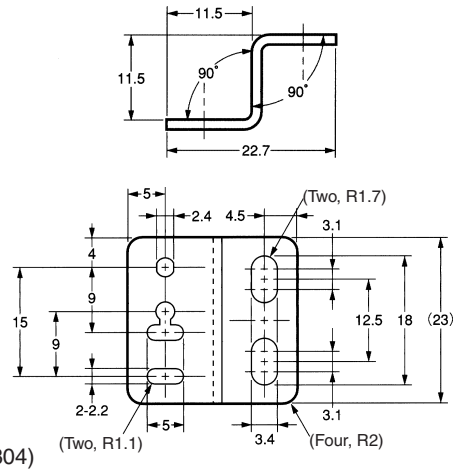
Material: 1.2-mm-thick stainless steel (SUS304)

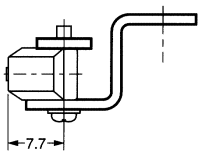
E3T-ST11 with E39-L117



E39-L118

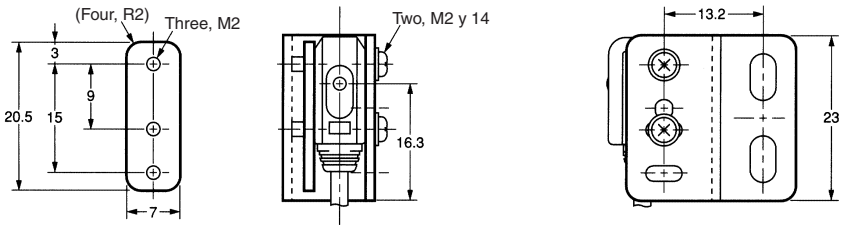






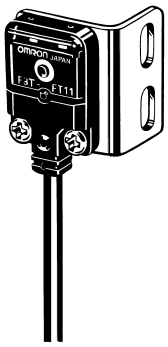
Material: 1.2-mm-thick stainless steel (SUS304)

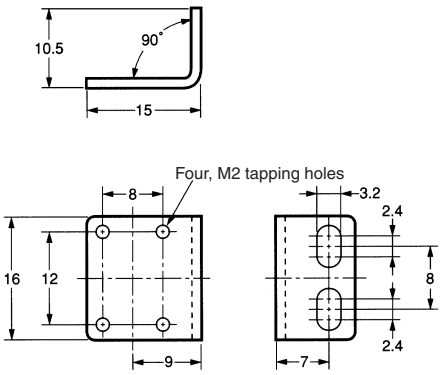
E3T-ST11 with E39-L118



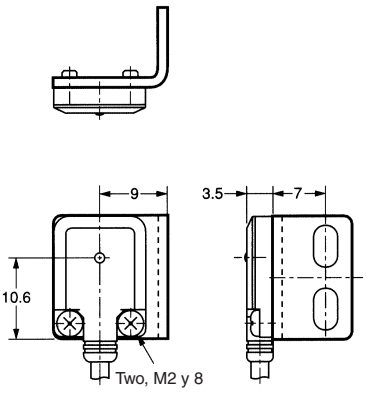
Mounting Brackets for E3T-FT1□/E3T-FD1□

E39-L119



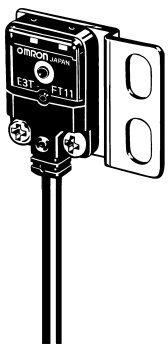


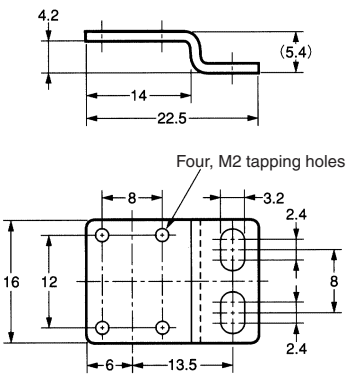
E3T-FT11 with E39-L119



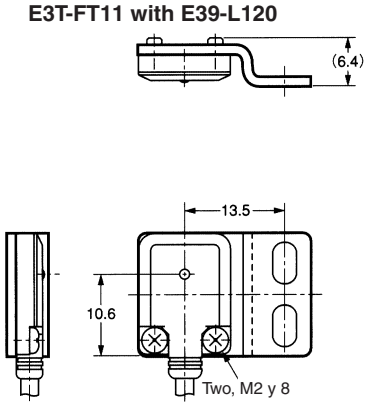
Material: 1.2-mm-thick stainless steel (SUS304)

E39-L120





E3T-FT11 with E39-L120



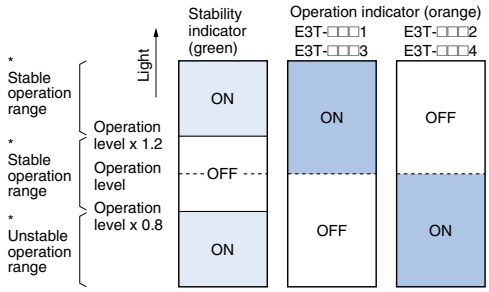
Material: 1.2-mm-thick stainless steel (SUS304)

Precautions

For adjustment

Display

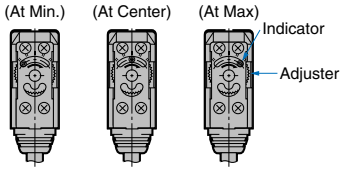
- The following graphs indicate the status of each operation level.
- Be sure to use the E3T within the stable operating range.



Note: If the E3T's operation level is set to the stable operation range, the E3T will be in most reliable operation without being influenced by temperature change, voltage fluctuation, dust, or setting change. If the operation level cannot be set to the stable operation range, pay attention to environmental changes while operating the E3T.

Use of E39-E10 Sensitivity Adjustment Unit

(Dark ON: E3T-ST12)



① Install the Unit on the Receiver.

② Set the adjustment dial of the sensitivity adjustment unit to Max. (Factory set to the Max. position)

③ After Sensor installation adjust the optical axis and secure the Sensor.

④ Place a work between the emitter and receiver, gradually turn the adjustment dial of the sensitivity unit to the Min position (CCW), and stop turning it when the operation indicator is turned ON and the stability indicator (green) is turned ON.

⑤ Remove the work and confirm that the operation indicator is turned OFF and the stability indicator (green) is turned ON. This completes the adjustment.

Note: If the light attenuation rate due to a work is 40% or less, the stability indicator is not turned ON whether or not light is received. When the variation of light is small (e.g. when sensing semi-transparent works), carefully perform preliminary testing.

Others

Do not install the E3T in the following places.

- Places where the E3T is exposed to direct sunlight.
- Places with high humidity and where condensation may result.

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. E12E-EN-01 In the interest of product improvement, specifications are subject to change without notice.