


# E3C

**Thin, Compact Head Saves Space and Mounts Closely. Built-in Interference Protection Provided.**

- Input indicator on the Sensor Unit simplifies settings.








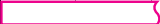






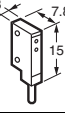






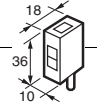

 Be sure to read *Safety Precautions* on page 8.

## Ordering Information

### Sensors

Sensor Units [Refer to *Dimensions* on page 9.]

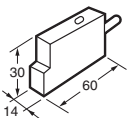
 Red light  Infrared light

Sensing method	Application	Appearance	Sensing distance	Model
Through-beam (Emitter + Receiver)	Small type		 100 mm	<b>E3C-S10 2M *1</b> Emitter E3C-S10L 2M Receiver E3C-S10D 2M
			 500 mm	<b>E3C-S50 2M *1 *2</b> Emitter E3C-S50L 2M Receiver E3C-S50D 2M
			 1 m	<b>E3C-1 2M *1</b> Emitter E3C-1L 2M Receiver E3C-1D 2M
			 2 m	<b>E3C-2 2M *1</b> Emitter E3C-2L 2M Receiver E3C-2D 2M
	Slim type		 200 mm	<b>E3C-S20W 2M</b>
			 300 mm	<b>E3C-S30W 2M</b>
		Side-view		
Diffuse-reflective	Small type		 100 mm	<b>E3C-DS10 2M</b>
	Slim type		 50 mm	<b>E3C-DS5W 2M</b>
	Side-view		 100 mm	<b>E3C-DS10T 2M</b>
Convergent-reflective	Small type		 30±3 mm	<b>E3C-LS3R 2M</b>



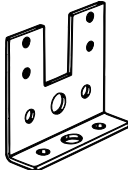

\*1. Through-beam Sensors are normally sold in sets that include both the Emitter and Receiver.

\*2. You cannot order the Emitter and Receiver with separate model numbers. Always order them together using the model number for the set (E3C-S50 2M).

**Amplifier Units** [Refer to *Amplifier Units* on page 12.]

Power supply	Application	Appearance	Functions	Model
DC	Slim type		Self diagnostic	E3C-JC4P 2M

**Accessories (Order Separately)**
**Mounting Brackets** [Refer to *E39-L/E39-S/E39-R* for Dimensions.]

Appearance	Model	Quantity	Remarks
	E39-L41	2	Provided with the E3C-1.
	E39-L42	2	Provided with the E3C-2. Can be used with the E3C-DS10.
	E39-L127-T1	1	Can be used with the E3C-S10.
	E39-L127-T2	1	
	E39-L127-T3	1	
	E39-L31	1*	Can be used with the E3C-S50.

Note: Refer to *E39-L/E39-S/E39-R* for Dimensions.

\* When using through-beam models, order one bracket for the Receiver and one for the Emitter.

## Ratings and Specifications

### Sensors

Sensing method		Through-beam					
Item	Model	E3C-S10	E3C-S20W	E3C-S50	E3C-S30T E3C-S30W	E3C-1	E3C-2
Sensing distance		100 mm	200 mm	500 mm	300 mm	1 m	2 m
Standard sensing object		Opaque, 2-mm dia. min.		Opaque, 3-mm dia. min.	Opaque, 1.5-mm dia. min.	Opaque, 4-mm dia. min.	Opaque, 8-mm dia. min.
Directional angle		Emitter/Receiver: 10 to 60° each		Emitter/Receiver: 10 to 40° each		Emitter/Receiver: 3 to 20° each	Emitter/Receiver: 3 to 15° each
Light source (wavelength)		Infrared LED (950 nm)			Infrared LED (940 nm)	Infrared LED (950 nm)	
Ambient illuminance (Receiver side)		Incandescent lamp: 3,000 lx max., Sunlight 10,000 lx max.					
Ambient temperature range		Operating/Storage: -25 to 70°C (with no icing or condensation)					
Ambient humidity range		Operating/Storage: 35% to 85%RH (with no condensation)					
Insulation resistance		20 MΩ min. at 500 VDC					
Dielectric strength		500 VAC at 50/60 Hz for 1 minute					
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions					
Shock resistance		Destruction: 500 m/s <sup>2</sup> for 3 times each in X, Y, and Z directions					
Degree of protection		IEC 60529 IP64 Limited to indoor use	IEC 60529 IP50 Limited to indoor use	IEC 60529 IP64 Limited to indoor use	IEC 60529 IP60 Limited to indoor use	IEC 60529 IP66 Limited to indoor use	
Connection method		Pre-wired models (standard length: 2 m)					
Weight (packed state)		Approx. 50 g			Approx. 24 g	Approx. 60 g	Approx. 120 g
Material	Case	Polycarbonate		ABS	Polycarbonate		Zinc die-cast
	Lens	Polycarbonate		Acrylics	Polycarbonate		
	Mounting Brackets	---				Steel	
Accessories	Instruction manual	Phillips screw M2×8, spring washer, flat washer, M2 nut, instruction manual	Instruction manual	Phillips screw M2×8, spring washer, flat washer, nut M2, instruction manual	Mounting Bracket (with screws), instruction manual	Mounting Bracket (with screws), instruction manual	

Sensing method		Diffuse-reflective			Convergent-reflective	
Item	Model	E3C-DS5W	E3C-DS10T	E3C-DS10	E3C-LS3R	
Sensing distance		50 mm (White paper 100 × 100 mm)	100 mm (White paper 100 × 100 mm)	100 mm (White paper 50 × 50 mm)	30 ± 3 mm (White paper 10 × 10 mm)	
Differential travel		20% max. of sensing distance			10% max.	±3% max.
Light source (wavelength)		Infrared LED (950 nm)	Infrared LED (950 nm)		Red LED (680 nm)	
Ambient illuminance (Receiver side)		Incandescent lamp: 3,000 lx max., Sunlight 10,000 lx max.				
Ambient temperature range		Operating/Storage: -25 to 70°C (with no icing or condensation)				
Ambient humidity range		Operating/Storage: 35% to 85%RH (with no condensation)				
Insulation resistance		20 MΩ min. at 500 VDC				
Dielectric strength		500 VAC at 50/60 Hz for 1 minute				
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions				
Shock resistance		Destruction: 500 m/s <sup>2</sup> for 3 times each in X, Y, and Z directions				
Degree of protection		IEC 60529 IP50 (Limited to indoor use)		IEC 60529 IP64 (Limited to indoor use)		
Connection method		Pre-wired models (standard length: 2 m)				
Weight (packed state)		Approx. 50 g			Approx. 55 g	
Material	Case	Polycarbonate				
	Lens	Polycarbonate				
Accessories		Phillips screw M2×8, spring washer, flat washer, M2 nut, instruction manual	Instruction manual			

## Amplifier Units

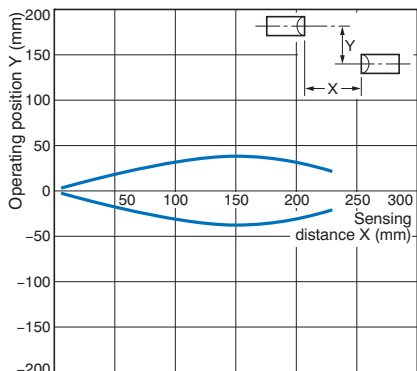
Item	Model	E3C-JC4P
Power supply voltage		12 to 24 VDC±10%, ripple (p-p): 1 V max.
Power (current) consumption		40 mA max.
Control output		Load power supply voltage: 24 VDC max., load current: 100 mA max., NPN open collector output type (residual voltage: 1 V max.) Light-ON/Dark-ON switch selectable
Timer function		OFF-delay 0/40 ms (switch selectable)
Ambient temperature range		Operating: -10° to 55°C, Storage: -25° to 70°C (with no icing or condensation)
Ambient humidity range		Operating: 35% to 85%, Storage: 35% to 85% (with no condensation)
Insulation resistance		20 MΩ min. at 500 VDC
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute
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: 300 ms <sup>2</sup> three times in each of X, Y and Z directions
Degree of protection		IEC IP40 (limited to indoor use)
Protection		Reverse polarity protection, output short-circuit protection, mutual interference prevention
Response time		Operate or reset: 1 ms max.
Connection method		Terminal block input cable pullout (standard cable length: 2 m)
Weight (packed state)		Approx. 80 g
Material	Case	ABS
	Mounting Brackets	Iron
Accessories		Mounting Bracket, Adjustment screwdriver, Caution label, Instruction manual

# Engineering Data (Reference Value)

## Parallel Operating Range

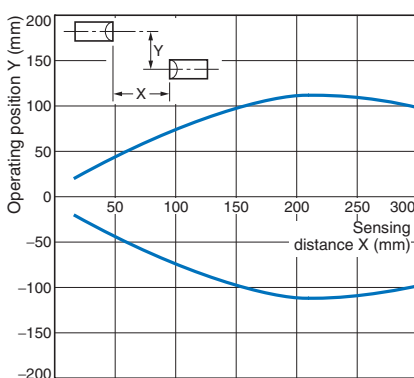
### Through-beam

#### E3C-S10



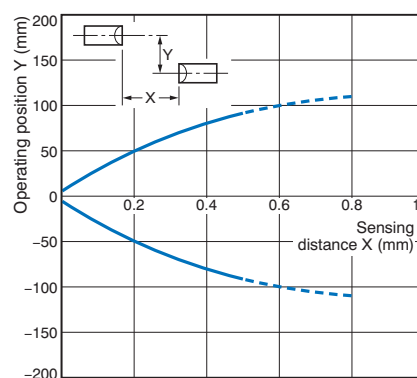
### Through-beam

#### E3C-S20W



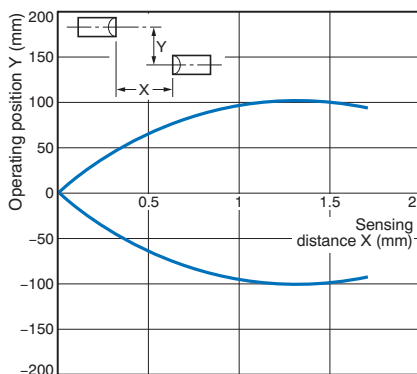
### Through-beam

#### E3C-S50



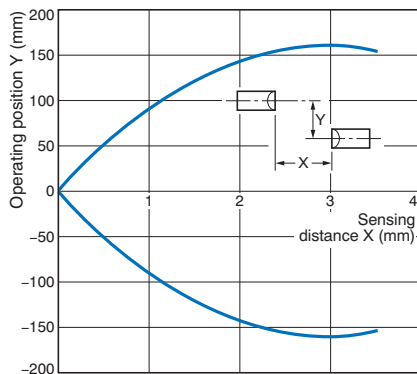
### Through-beam

#### E3C-1



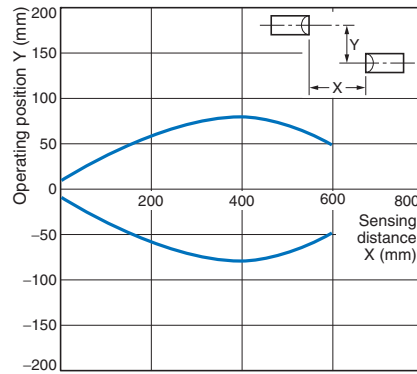
### Through-beam

#### E3C-2



### Through-beam

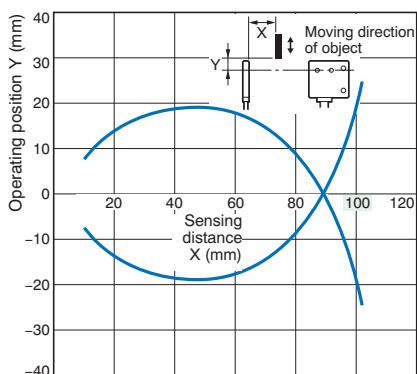
#### E3C-S30T/-S30W



## Operating Range

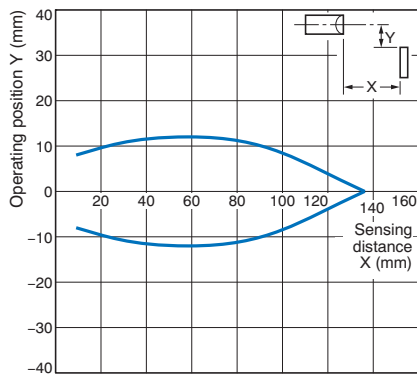
### Diffuse-reflective

#### E3C-DS5W



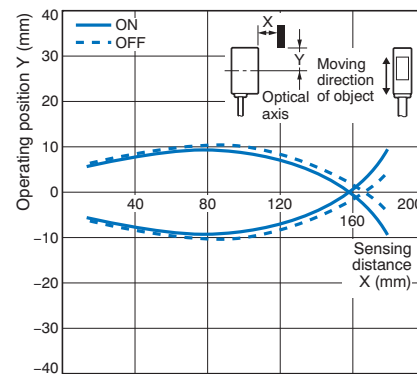
### Diffuse-reflective

#### E3C-DS10T

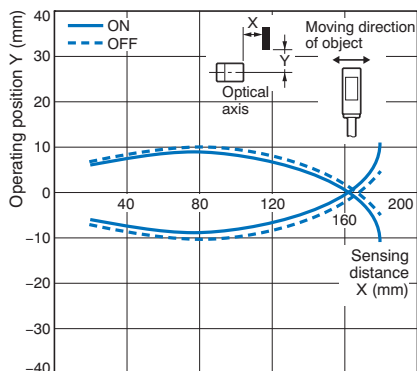


### Diffuse-reflective

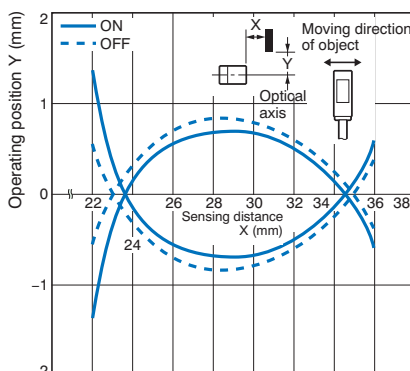
#### E3C-DS10 (Example 1)



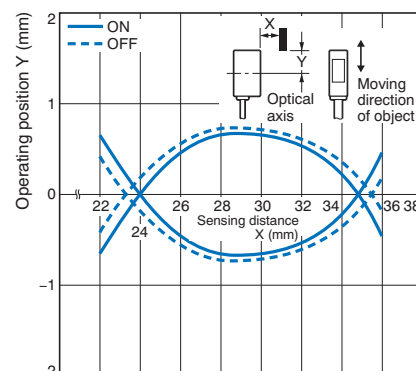
**Diffuse-reflective**  
**E3C-DS10 (Example 2)**



**Convergent-reflective**  
**E3C-LS3R (Example 1)**

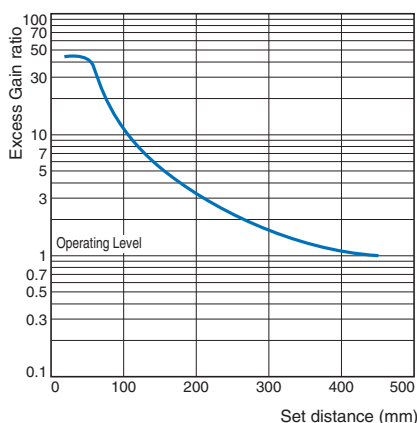


**Convergent-reflective**  
**E3C-LS3R (Example 2)**

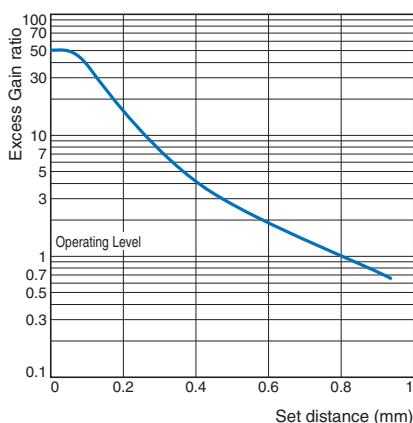


**Excess Gain vs. Set Distance**

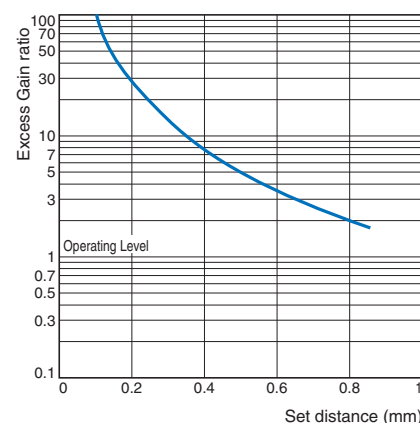
**E3C-S20W**



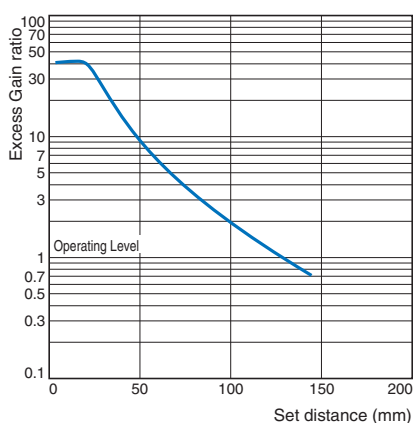
**E3C-S30T/-S30W**



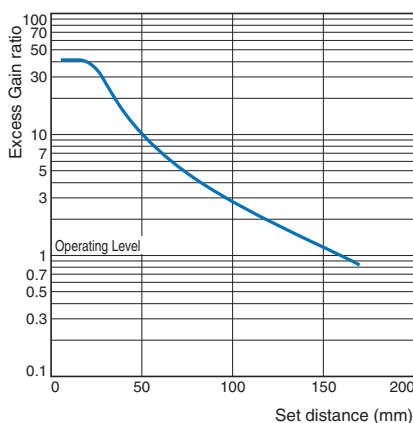
**E3C-S50**



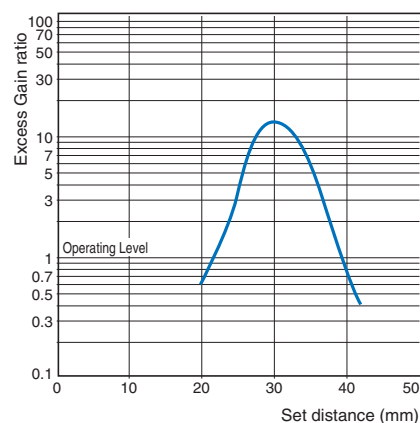
**E3C-DS5W**



**E3C-DS10T**



**E3C-LS3R**



## I/O Circuit Diagrams

### NPN output

Model	Operation mode	Timing charts	Operation selector	Output circuit
E3C-JC4P	Light-ON	<p>Incident light: ON (green bar) No incident light: OFF Light indicator (red): ON (green bar) Output transistor: ON (green bar) Load (relay etc.): ON (green bar) 40 ms</p>	L-ON (LIGHT ON)	<p>Brown 12 to 24 VDC Black Output Blue 0 V Orange Self diagnostic output 50 mA max.</p>
	Dark-ON	<p>Incident light: ON (green bar) No incident light: OFF Light indicator (red): OFF Output transistor: OFF Load (relay etc.): OFF 40 ms</p>	D-ON (DARK ON)	

## Connection

Amplifier Units	Connected to the through-beam model	Connected to the reflective model	Note
E3C-JC4P			Note: 1. The strip-off length of the shielded cable should always be 20 mm max. on the Receiver side (white) and 50 mm max. on the Emitter side (red).

## Nomenclature/Settings

Amplifier Units	Nomenclature
E3C-JC4P	<p>Stability indicator (green) Sensitivity adjuster (4-turn endless adjuster) Light indicator (red) Operation selector</p>

## Safety Precautions

Refer to *Warranty and Limitations of Liability*.

### ⚠ WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.



### Precautions for Correct Use

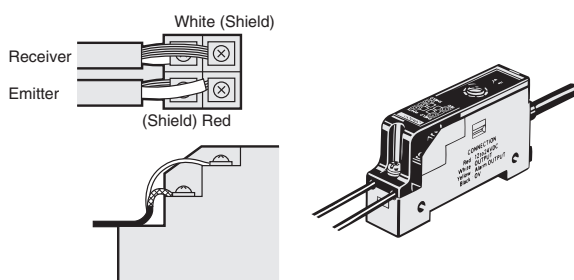
Do not use the product in atmospheres or environments that exceed product ratings.

#### Amplifier Units

##### ● Wiring

##### Connection of Amplifier Unit and Sensor

Always run the shielded wires of the Emitter and Receiver separately. Also, route the sensor cable along the cable grooves of the cover and sensor and fix it with the cover.

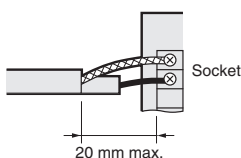


#### Sensor Units

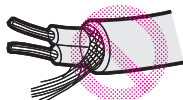
##### ● Wiring

##### Extension Cable

- The extension distance of the sensor connection cable should be within 10 m including sensor cable.
- The strip-off length of the core in the connection cable should be 20 mm max. on the Receiver side and 50 mm max. on the Emitter side, and the core should be as short as possible. Avoid using the joint terminal and connector.



- Use independent shielded wires for the Emitter and Receiver. Using a common shielded wire can cause a malfunction.



##### Extension Cable

##### Through-beam

Cable Model	Specified cable	Replacement cable
E3C-S10 E3C-1 E3C-2 E3C-S50	Polyethylene insulation shield Round cable 2.4 dia. Shield White (polyethylene) 12-conductor, 0.18 dia.	1-conductor shield/vinyl wire, conductor cross section: 0.3 mm <sup>2</sup> min. Shield White (vinyl) Gray (vinyl sheath)
E3C-S20W	Vinyl insulation shield round cable 1.7 dia. Sheath Shield Polyethylene Conductor 12-conductor, 0.18 dia.	1-conductor shield/vinyl wire, conductor cross section: 0.3 mm <sup>2</sup> min.
E3C-S30T E3C-S30W	Vinyl insulation shield round cable (robot cable) 1.8 dia. Sheath Shield Polyethylene Conductor 30-conductor, 0.08 dia.	1-conductor shield/vinyl wire, conductor cross section: 0.3 mm <sup>2</sup> min.

##### Reflective model

Cable Model	Specified cable	Replacement cable
E3C-DS10 E3C-DS10T E3C-VS1G E3C-VS3R E3C-LS3R	Vinyl insulation shielded parallel cable 2.4 4.3 Sheath Internal sheath Shield Polyethylene Conductor 12-conductor, 0.18 dia.	When there is no 1-conductor shielded, vinyl cable (parallel wire), use two 1-conductor shielded, vinyl wires.
E3C-DS5W E3C-VS7R E3C-VM35R	Vinyl insulation shielded parallel cable Sheath Shield Polyethylene Conductor 7-conductor, 0.18 dia.	When there is no 1-conductor shielded, vinyl cable (parallel wire), use two 1-conductor shielded, vinyl wires.

##### ● Others

When the E3C is used in a place where high-frequency noise will be generated, e.g. ultrasonic welder, grounding the 0-V terminal (on the shield side of the connection cable) of the Receiver may avoid a malfunction caused by induction.



Dimensions

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

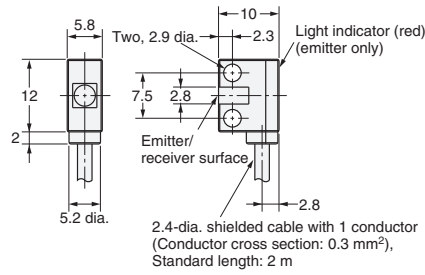
Sensors

Sensor Units

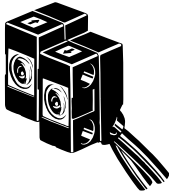
E3C-S10



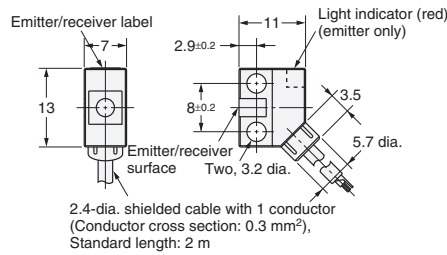
Emitter: E3C-S10L  
Receiver: E3C-S10D



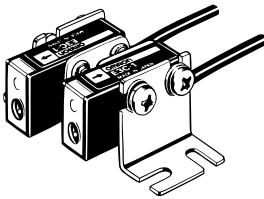
E3C-S50



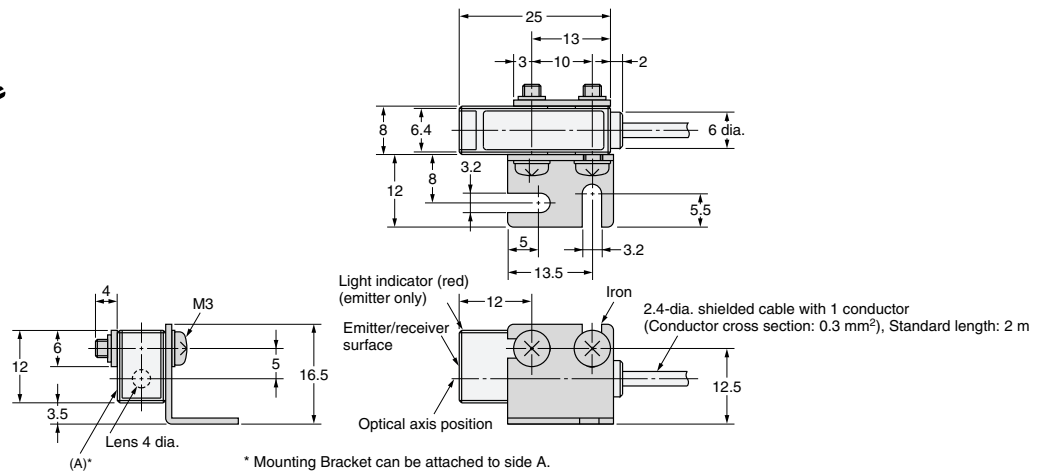
Emitter: E3C-S50L  
Receiver: E3C-S50D



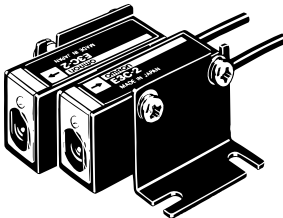
E3C-1



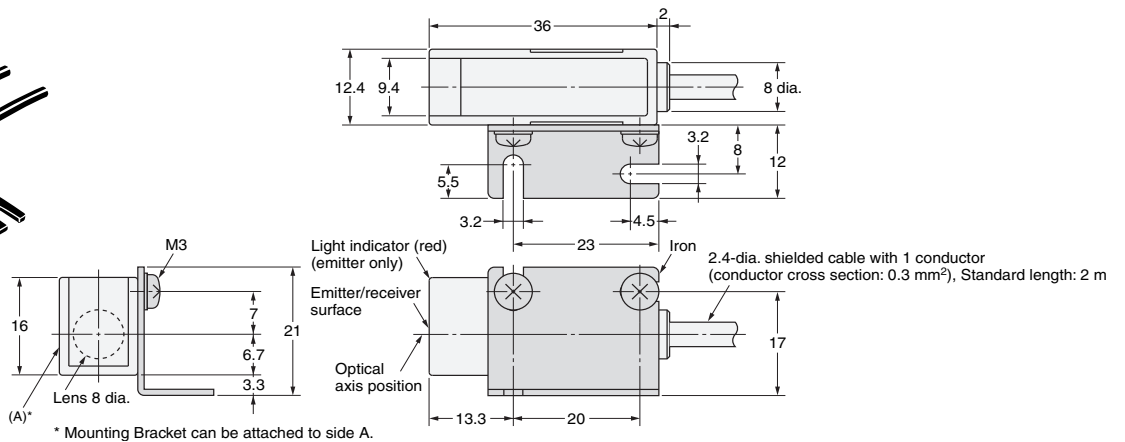
Emitter: E3C-1L  
Receiver: E3C-1D



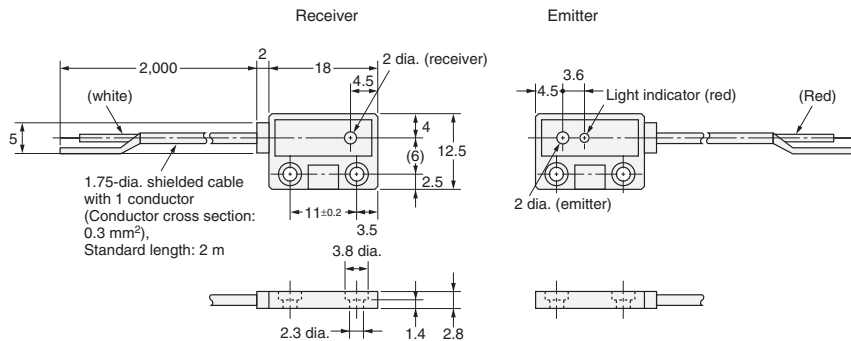
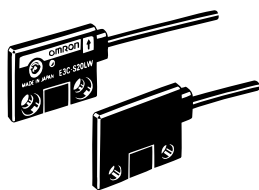
E3C-2



Emitter: E3C-2L  
Receiver: E3C-2D

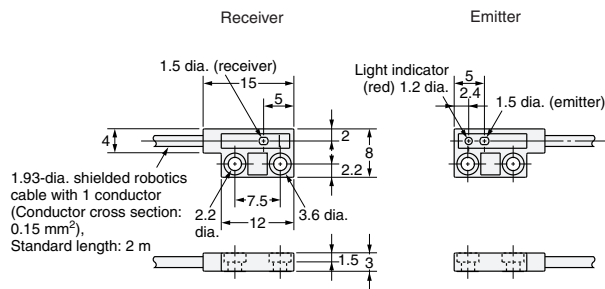
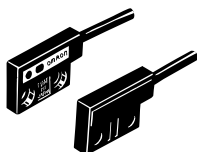


E3C-S20W



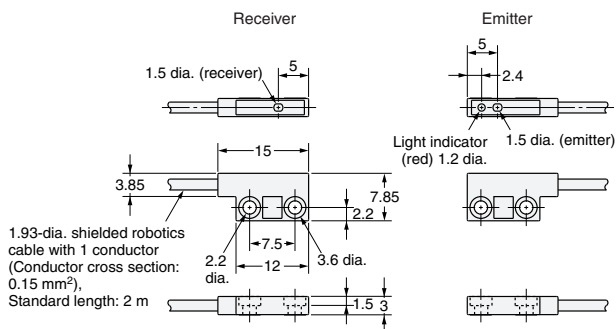
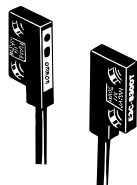
Emitter: E3C-S20LW  
Receiver: E3C-S20DW

E3C-S30W



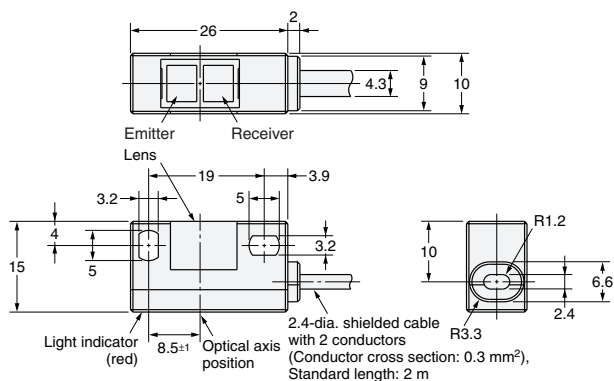
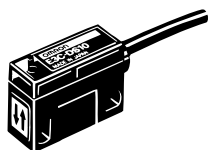
Emitter: E3C-S30LW  
Receiver: E3C-S30DW

E3C-S30T

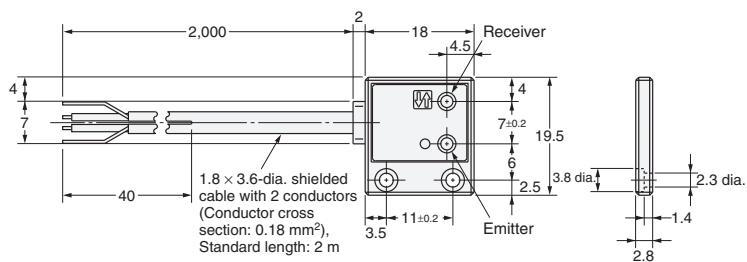
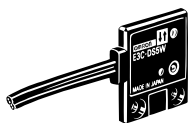


Emitter: E3C-S30LT  
Receiver: E3C-S30DT

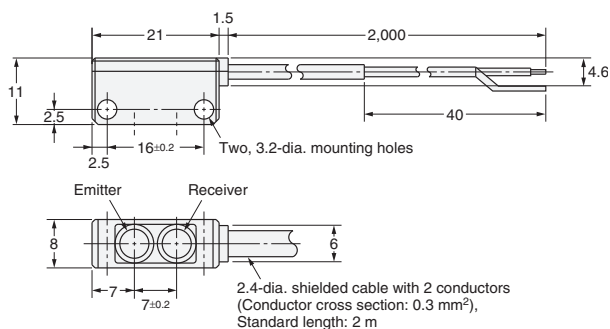
E3C-DS10



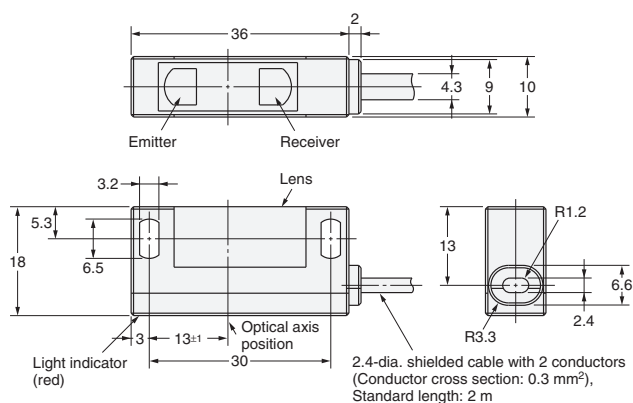
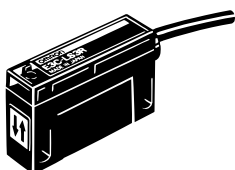
E3C-DS5W



E3C-DS10T

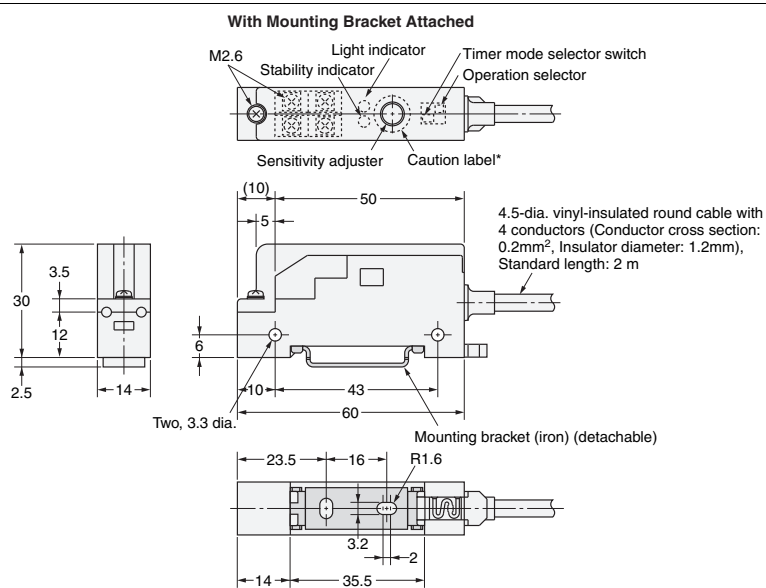
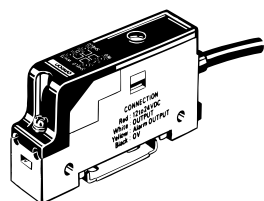



E3C-LS3R



## Amplifier Units

## E3C-JC4P



\*After adjusting the sensitivity, attach the caution label at the location indicated by  above to prevent malfunction.

## Accessories (Order Separately)

## Mounting Brackets

Refer to E39-L/E39-S/E39-R for details.

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2015.9

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