

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 11.

Ordering Information

Sensors

Sensor Units [Refer to *Dimensions* on page 12.]

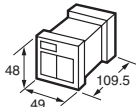
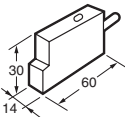
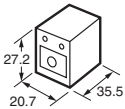
Red light Infrared light

Sensing method	Application	Appearance	Sensing distance	Model
Through-beam (Emitter + Receiver) *	Small type		100 mm	E3C-S10 2M Emitter E3C-S10L 2M Receiver E3C-S10D 2M
			500 mm	E3C-S50 2M Emitter E3C-S50L 2M Receiver E3C-S50D 2M
			1 m	E3C-1 2M Emitter E3C-1L 2M Receiver E3C-1D 2M
			2 m	E3C-2 2M Emitter E3C-2L 2M Receiver E3C-2D 2M
	Slim type		200 mm	E3C-S20W 2M Emitter E3C-S20LW 2M Receiver E3C-S20DW 2M
			300 mm	E3C-S30W 2M Emitter E3C-S30LW 2M Receiver E3C-S30DW 2M
	Side-view			E3C-S30T 2M Emitter E3C-S30LT 2M Receiver E3C-S30DT 2M
Diffuse-reflective	Small type		100 mm	E3C-DS10 2M
	Slim type		50 mm	E3C-DS5W 2M
	Side-view		100 mm	E3C-DS10T 2M
Convergent-reflective	Small type		30±3 mm	E3C-LS3R 2M

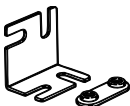
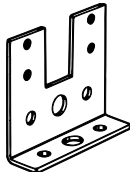
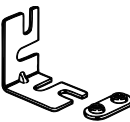
* Through-beam Sensors are normally sold in sets that include both the Emitter and Receiver.

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

Amplifier Units [Refer to *Amplifier Units* on page 15.]

Power supply	Application	Appearance	Functions	Model
AC	Standard models		---	E3C-A
			Timer	E3C-C
DC	Slim type		Self diagnostic	E3C-JC4P 2M
	Small type		---	E3C-GE4

Accessories (Order Separately)
Mounting Brackets [Refer to *E39-L/F39-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/F39-F/E39-S/E39-R* for Dimensions.

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

Connector [Refer to *E39-L/F39-L/E39-S/E39-R* for Dimensions.]

Name	Appearance	Model	Quantity	Remarks
Front connection socket		PF113A	1	Provided with the E3C-A/C.
		PYF08A	1	Can be used with the E3C-GE4.
Rear connection socket		PY08	1	Can be used with the E3C-GE4.

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°C 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		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 ² 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	
	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°C 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		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 ² 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-A	E3C-C	E3C-JC4P	E3C-GE4
Power supply voltage			100 to 240 VAC $\pm$ 10%, 50/60 Hz		12 to 24 VDC $\pm$ 10%, ripple (p-p): 1 V max.	
Power (current) consumption			3 W max.		50 mA max.	
Control output	Transistor output		Load power supply voltage: 24 VDC max., load current: 80 mA max., voltage output type, output current: 1 to 4 mA (residual voltage: 1.2 V max.) Light-ON/Dark-ON switch selectable		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	Load power supply voltage: 24 VDC max., load current: 80 mA max., voltage output type, output current: 1 to 4 mA (residual voltage: 0.7 V max.) Light-ON/Dark-ON cable connection selectable
	Relay output		220 VAC 1 A $\cos\phi=1$ (resistive load) SPDT contact only		---	
External synchronous input			---	H = 6 to 30 V L = 0 to 2 V When L, turns OFF the control output forcibly.	---	
Timer function			---	ON/OFF, oneshot delay (selectable): 1 or 10 s max.	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 95% (with no condensation)			
Insulation resistance			20 M Ω 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: 300 ms ² three times in each of X, Y and Z directions			
Degree of protection			IEC IP20 (limited to indoor use)		IEC IP60 (limited to indoor use)	IEC IP20 (limited to indoor use)
Protection			Reverse polarity protection, output short-circuit protection, mutual interference prevention			
Response time	No contact		Operate or reset: 1 ms max./2 ms max. each (switch selectable)		Operate or reset: 1 ms max.	Operate or reset: 1 ms max./2 ms max. each (switch selectable)
	Relay		Operate or reset: 20 ms max.		---	
Connection method			Terminal block		Terminal block input cable pullout (standard cable length: 2 m)	Terminal block
Weight (packed state)			Approx. 200 g		Approx. 80 g	Approx. 15 g
Material	Case		ABS			Polycarbonate
	Mounting Brackets		Stainless steel	---	Iron	---
Accessories			Connection Socket (PF113A) Instruction manual		Mounting Bracket, Adjustment screwdriver, Caution label, Instruction manual	Instruction manual

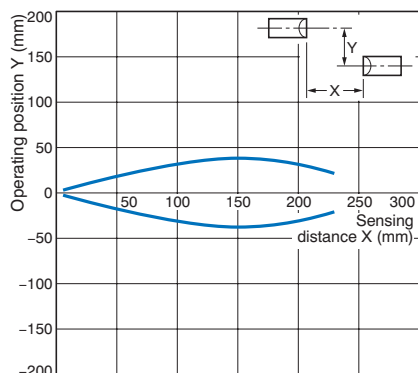
* The terminal pins are used for connection between amplifiers for synchronous operation.

Engineering Data (Typical)

Parallel Operating Range

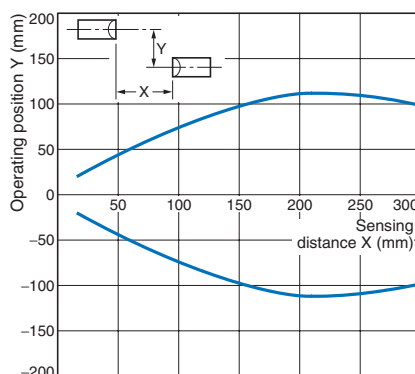
Through-beam

E3C-S10



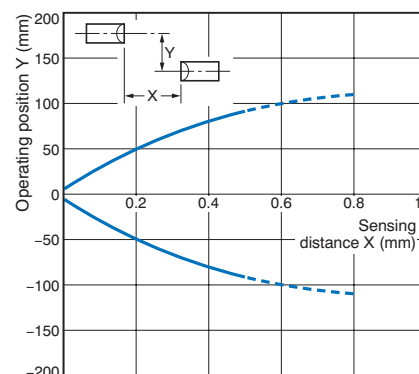
Through-beam

E3C-S20W



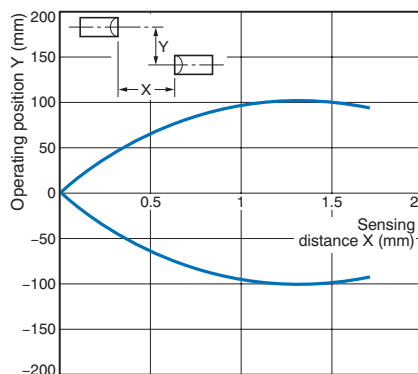
Through-beam

E3C-S50



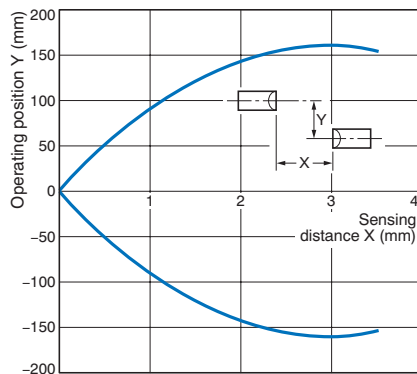
Through-beam

E3C-1



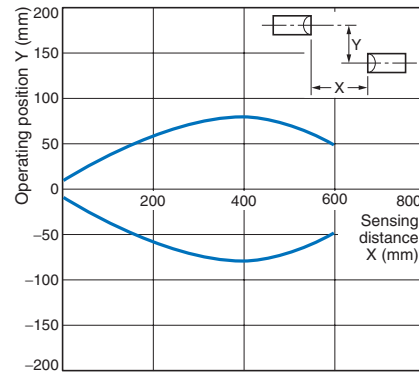
Through-beam

E3C-2



Through-beam

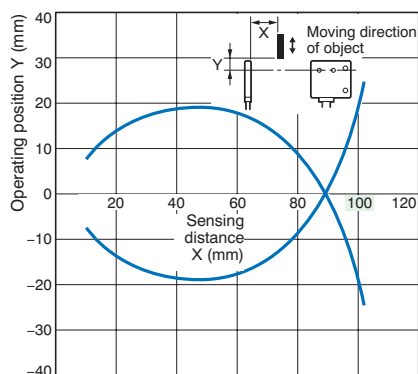
E3C-S30T/-S30W



Operating Range

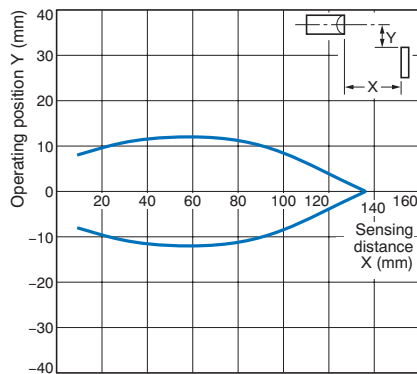
Diffuse-reflective

E3C-DS5W



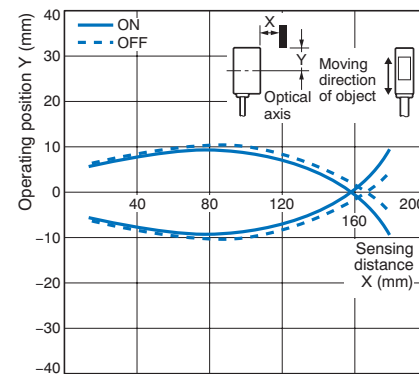
Diffuse-reflective

E3C-DS10T

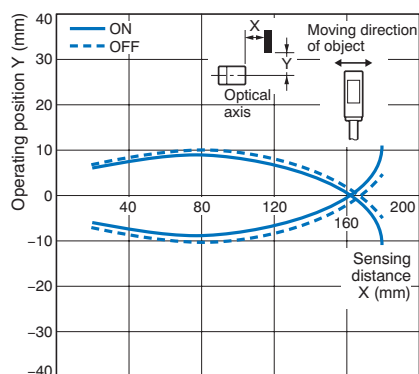


Diffuse-reflective

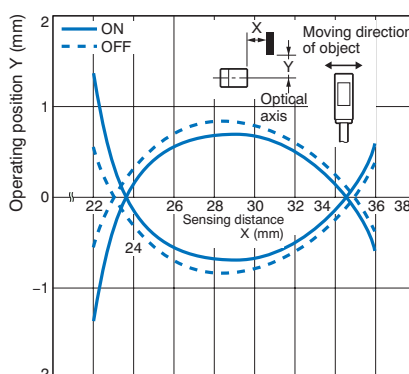
E3C-DS10 (Example 1)



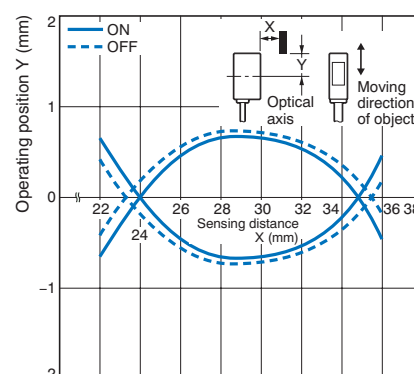
Diffuse-reflective E3C-DS10 (Example 2)



Convergent-reflective E3C-LS3R (Example 1)

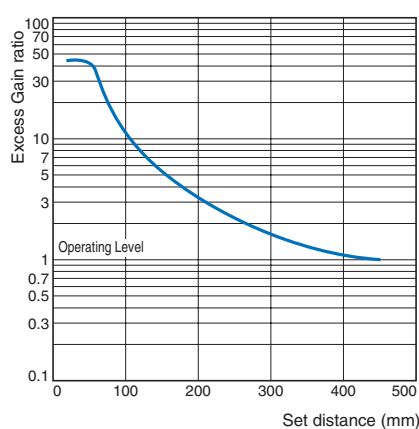


Convergent-reflective E3C-LS3R (Example 2)

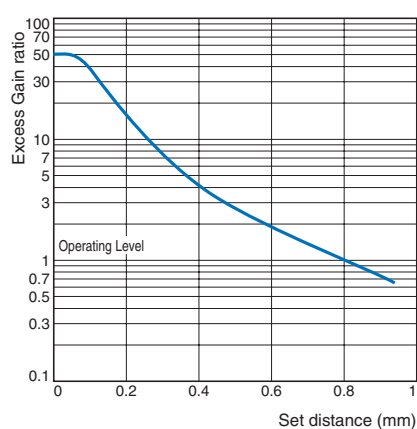


Excess Gain vs. Set Distance

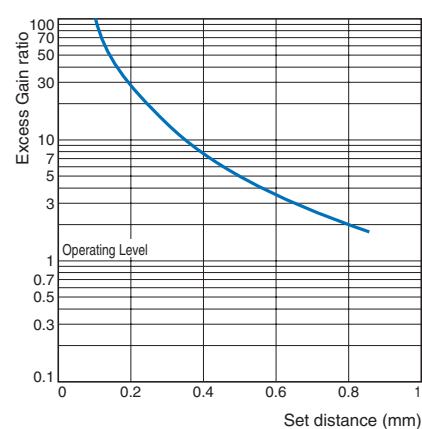
E3C-S20W



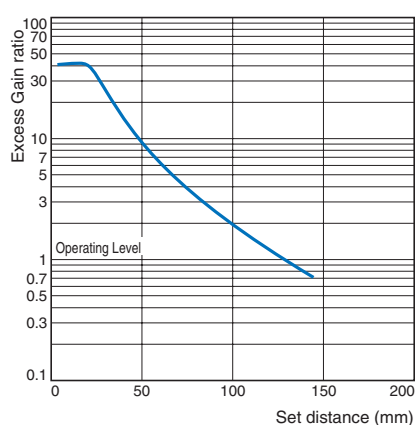
E3C-S30T/-S30W



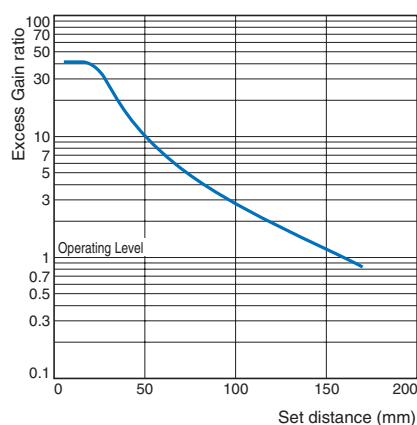
E3C-S50



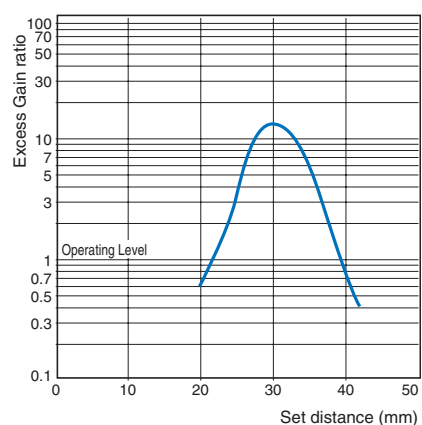
E3C-DS5W



E3C-DS10T



E3C-LS3R



I/O Circuit Diagrams

NPN output

Model	Operation mode	Timing charts *	Operation selector	Output circuit
E3C-A E3C-C	Light-ON		LIGHT ON	
	Dark-ON		DARK ON	
E3C-JC4P	Light-ON		L-ON (LIGHT ON)	
	Dark-ON		D-ON (DARK ON)	
E3C-GE4	Light-ON		Switched with wiring. (LIGHT ON)	
	Dark-ON		Switched with wiring. (DARK ON)	

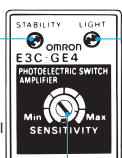
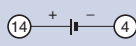
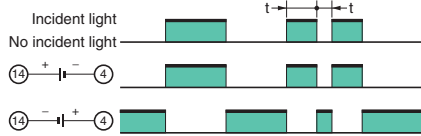
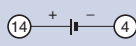
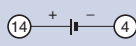
* For t in the timing chart, refer to *Part Names/Selection Method* on page 9.

Connection

Amplifier Units	Connected to the through-beam model	Connected to the reflective model	Note
E3C-A/C + PF113A			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). 2. The E3C-A does not have a gate input function. 3. L when the gate input 2-9 terminals are connected, H when they are disconnected.
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).
E3C-GE4			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). 2. The response time is 1 ms when (8) is disconnected, and 2 ms when (8) is connected to 0 V (negative side) of the power supply. 3. By setting the power supply terminal (4) to – and (14) to +, the output turns "H" when the light is received. With the E2 mode, the output transistor turns OFF. By setting (4) to + and (14) to +, the output turns "L" when the light is received. With the E1 mode, the output transistor turns ON.

Nomenclature/Settings

Amplifier Units	Nomenclature	Settings																								
E3C-A	Operation indicator (red) When a relay-switch operates, the indicator turns on. Stability indicator (green) When the light receiving input becomes +20% or more and -20% or less of operating voltage, it will be turned on. (Indicate stable status) Operation selector Response time selector switch Sensitivity adjuster Light indicator (red) When the light inputs, it will be turned on.	Operation switching <table><tr><td>DARK ON</td><td>☐</td><td>LIGHT ON</td><td>DARK turns the relay ON and the transistor output "H".</td></tr><tr><td>DARK ON</td><td>☐</td><td>LIGHT ON</td><td>LIGHT turns the relay ON and the transistor output "H".</td></tr></table> Response time changing (The different frequency type can be made up by changing the response speed.) <table><tr><td>2 ms (B)</td><td>☐</td><td>1 ms (A)</td><td>The response time is set to 2 ms.</td></tr><tr><td>2 ms (B)</td><td>☐</td><td>1 ms (A)</td><td>The response time is set to 1 ms.</td></tr></table> Timing chart Note 1. Control output is produced only during input time. 2. When t exceeds 1 ms or 2 ms, solid-state output is produced. To produce relay output, t must be longer than 20 ms.	DARK ON	☐	LIGHT ON	DARK turns the relay ON and the transistor output "H".	DARK ON	☐	LIGHT ON	LIGHT turns the relay ON and the transistor output "H".	2 ms (B)	☐	1 ms (A)	The response time is set to 2 ms.	2 ms (B)	☐	1 ms (A)	The response time is set to 1 ms.								
	DARK ON	☐	LIGHT ON	DARK turns the relay ON and the transistor output "H".																						
DARK ON	☐	LIGHT ON	LIGHT turns the relay ON and the transistor output "H".																							
2 ms (B)	☐	1 ms (A)	The response time is set to 2 ms.																							
2 ms (B)	☐	1 ms (A)	The response time is set to 1 ms.																							
E3C-C	Operation indicator (red) When a relay-switch operates, the indicator turns on. Stability indicator (green) When the light receiving input becomes +20% or more and -20% or less of operating voltage, it will be turned on. (Indicate stable status) Operation selector Selector switch for response time Timer function setting switch Delay time setting switch Delay time adjuster Sensitivity adjuster Light indicator (red) When the light inputs, it will be turned on.	Operation switching <table><tr><td>DARK ON</td><td>☐</td><td>LIGHT ON</td><td>DARK turns the relay ON and the transistor output "H".</td></tr><tr><td>DARK ON</td><td>☐</td><td>LIGHT ON</td><td>LIGHT turns the relay ON and the transistor output "H".</td></tr></table> Response time changing (The different frequency type can be made up by changing the response speed.) <table><tr><td>2 ms (B)</td><td>☐</td><td>1 ms (A)</td><td>The response time is set to 2 ms.</td></tr><tr><td>2 ms (B)</td><td>☐</td><td>1 ms (A)</td><td>The response time is set to 1 ms.</td></tr></table> Delay time setting <table><tr><td>1 sec</td><td>☐</td><td>10 sec</td><td>0.1 to 1 s can be set.</td></tr><tr><td>1 sec</td><td>☐</td><td>10 sec</td><td>1 to 10 s can be set.</td></tr></table> After setting the selector, fine-adjust the delay time with the variable adjuster. (Clockwise turn increases the delay time.) Timing chart Note 1. t must be longer than 1 ms or 2 ms. 2. T denotes a delay time. External synchronous input operation When the external synchronous input terminal (9) is open (HIGH), the output relay performs timer operation according to the input signals (LIGHT, DARK). When the external synchronous input terminal (9) is connected to the 0 V terminal (2) (LOW), the output relay turns OFF, independently of the input signals and output status, and acts as an inhibit signal.	DARK ON	☐	LIGHT ON	DARK turns the relay ON and the transistor output "H".	DARK ON	☐	LIGHT ON	LIGHT turns the relay ON and the transistor output "H".	2 ms (B)	☐	1 ms (A)	The response time is set to 2 ms.	2 ms (B)	☐	1 ms (A)	The response time is set to 1 ms.	1 sec	☐	10 sec	0.1 to 1 s can be set.	1 sec	☐	10 sec	1 to 10 s can be set.
	DARK ON	☐	LIGHT ON	DARK turns the relay ON and the transistor output "H".																						
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1 sec	☐	10 sec	0.1 to 1 s can be set.																							
1 sec	☐	10 sec	1 to 10 s can be set.																							

Amplifier Units	Nomenclature	Settings																			
E3C-JC4P		---																			
E3C-GE4	Stability indicator (green) When the light receiving input becomes +20% or more and -20% or less of operating voltage, it will be turned on. (Indicate stable status)  Light indicator (red) When the light inputs, it will be turned on Sensitivity adjuster	Operation switching <table><tr><td></td><td>DARK turns the output "H".</td></tr><tr><td></td><td>LIGHT turns the output "H".</td></tr></table> Response time changing (The different frequency type can be made up by changing the response speed.) <table><tr><td>⑧-0 V * connected</td><td>The response time is set to 2 ms.</td></tr><tr><td>⑧ disconnected</td><td>The response time is set to 1 ms.</td></tr></table> * 0 V of power supply Timing chart  <table><tr><td>No incident light</td><td>No-contact output</td><td>(Output transistor)</td></tr><tr><td>"H"</td><td>(OFF)</td></tr><tr><td>"L"</td><td>(ON)</td></tr><tr><td>"H"</td><td>(OFF)</td></tr><tr><td>"L"</td><td>(ON)</td></tr></table>		DARK turns the output "H".		LIGHT turns the output "H".	⑧-0 V * connected	The response time is set to 2 ms.	⑧ disconnected	The response time is set to 1 ms.	No incident light	No-contact output	(Output transistor)	"H"	(OFF)	"L"	(ON)	"H"	(OFF)	"L"	(ON)
	DARK turns the output "H".																				
	LIGHT turns the output "H".																				
⑧-0 V * connected	The response time is set to 2 ms.																				
⑧ disconnected	The response time is set to 1 ms.																				
No incident light	No-contact output	(Output transistor)																			
"H"	(OFF)																				
"L"	(ON)																				
"H"	(OFF)																				
"L"	(ON)																				

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

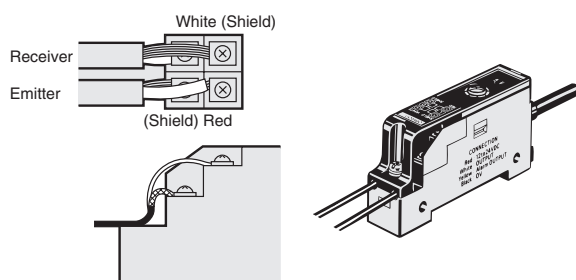
Do not use the product in atmospheres or environments that exceed product ratings.

Amplifier Units

● Wiring

Connection of E3C-JC4P 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.



Connection Socket

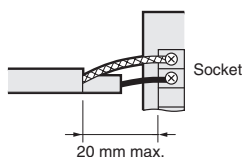
The standard socket is the PF113A for the E3C-A and -C, and the PYF08A, PYF08M or PY08 for the E3C-GE4. Avoid using any other sockets since they may not satisfy the characteristics. (There will be no problem when the STABILITY indicator turns ON)

Sensor Units

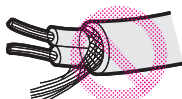
● Wiring

Extension Cable

- The extension distance of the sensor connection cable should be within 10 m.
- 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 ² 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 ² 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 ² 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.

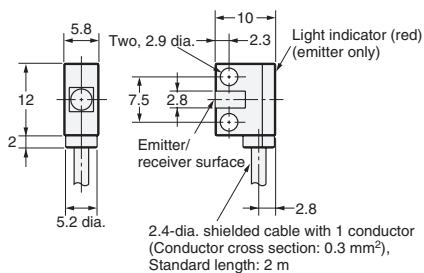
● Others

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.

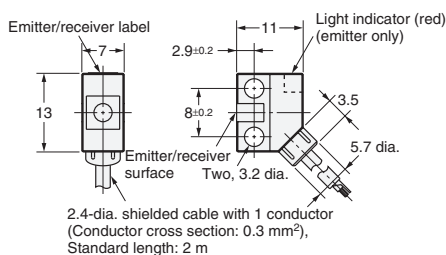
Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

Sensor Units

Emitter:	E3C-S10L
Receiver:	E3C-S10D

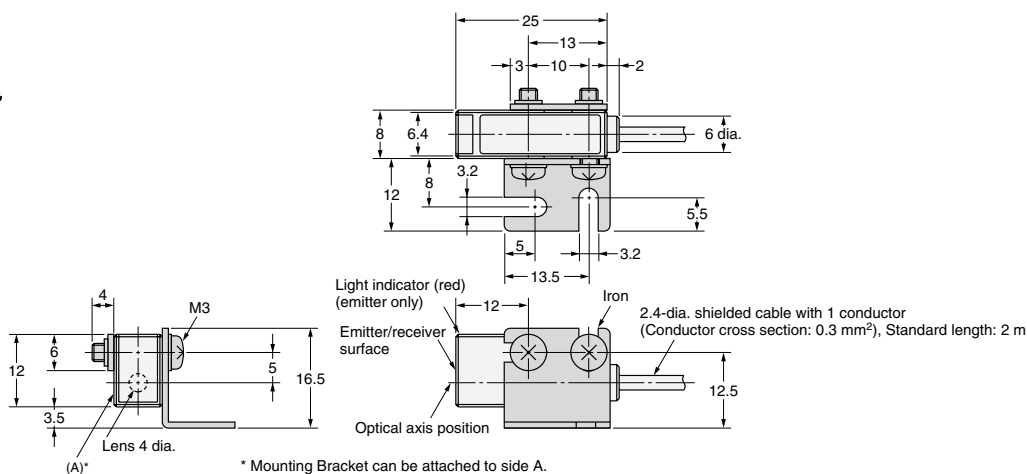


Emitter:	E3C-S50L
Receiver:	E3C-S50D

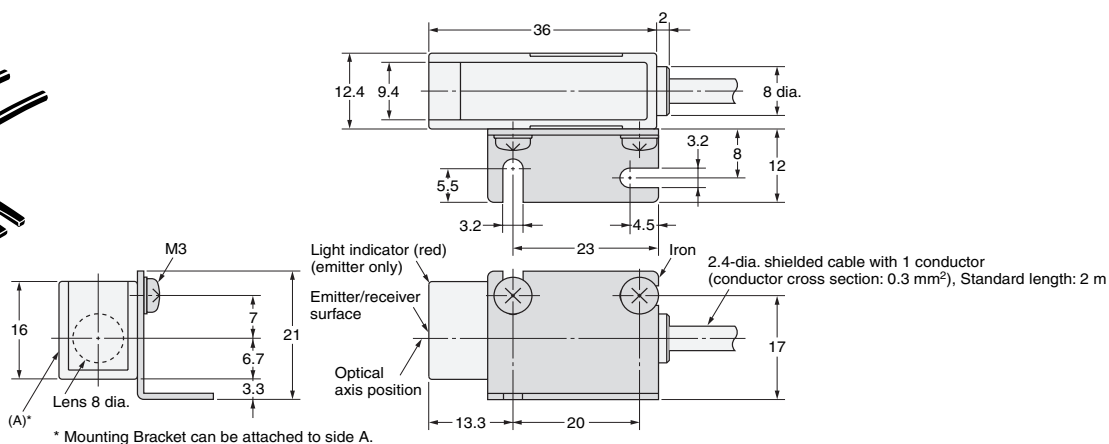


A diagram showing three relays connected in parallel. Each relay has two terminals on its top. Wires connect the terminals of all three relays to a common terminal block with three slots. The first slot receives a wire from the first relay, the second slot from the second relay, and the third slot from the third relay. A common return wire is connected to the bottom of the terminal block.

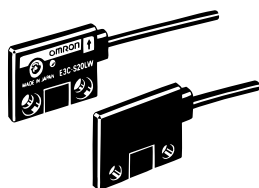
Emitter:	E3C-1L
Receiver:	E3C-1D



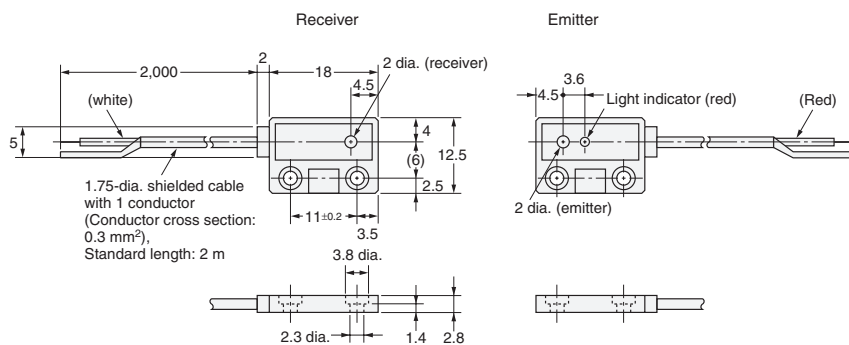
Emitter: E3C-2L
Receiver: E3C-2D



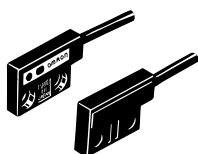
E3C-S20W



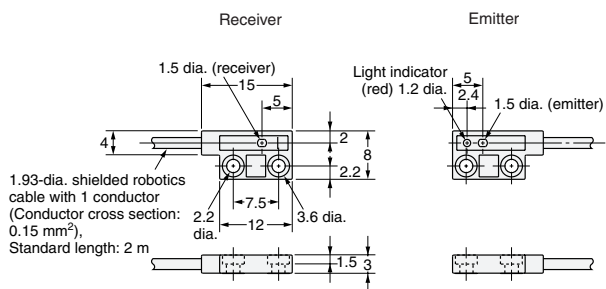
Emitter: E3C-S20LW
Receiver: E3C-S20DW



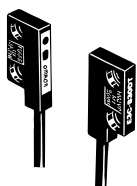
E3C-S30W



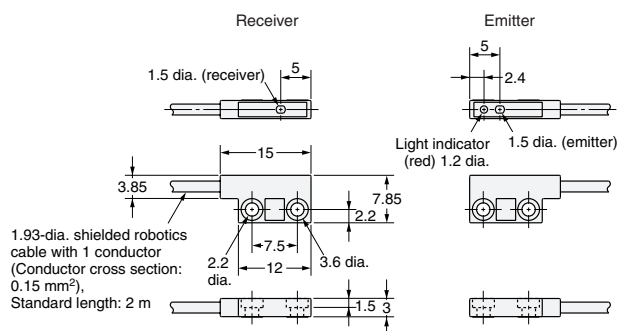
Emitter: E3C-S30LW
Receiver: E3C-S30DW



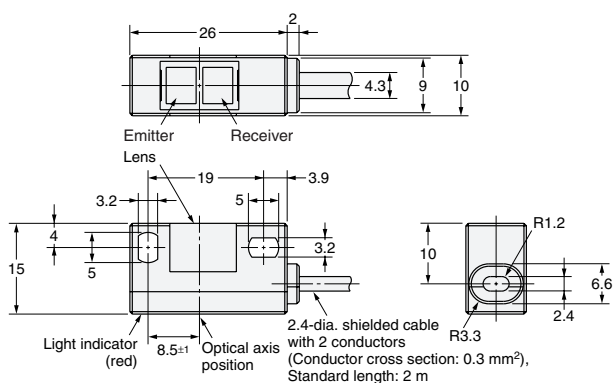
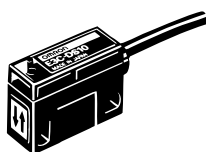
E3C-S30T



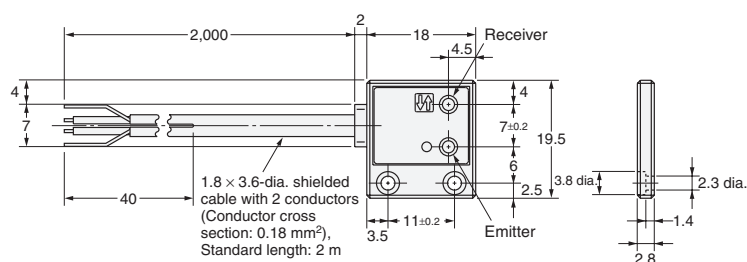
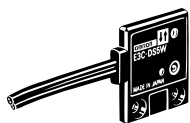
Emitter: E3C-S30LT
Receiver: E3C-S30DT



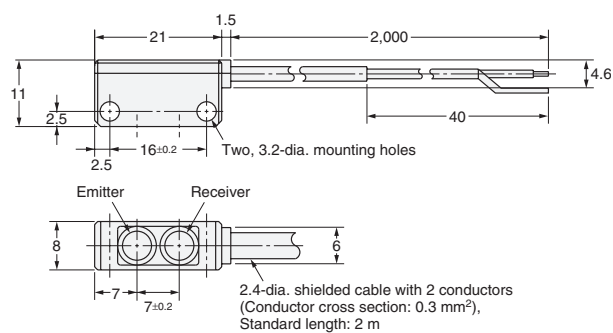
E3C-DS10



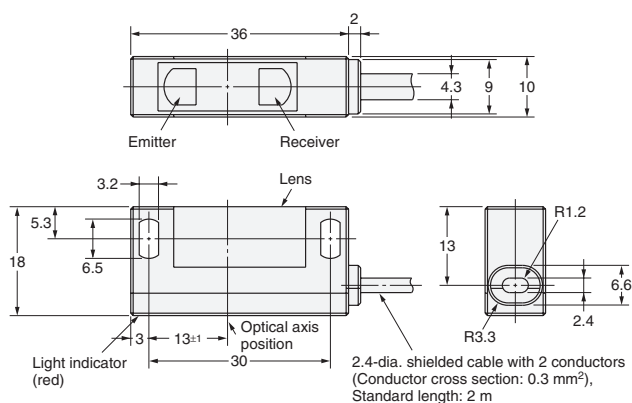
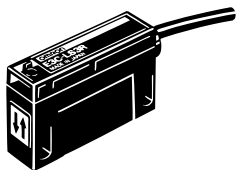
E3C-DS5W



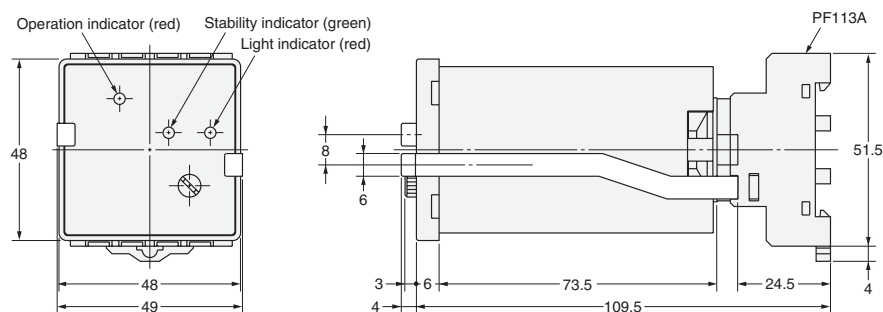
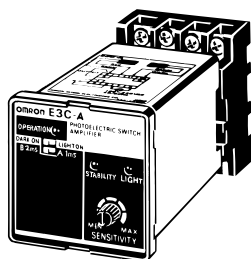
E3C-DS10T



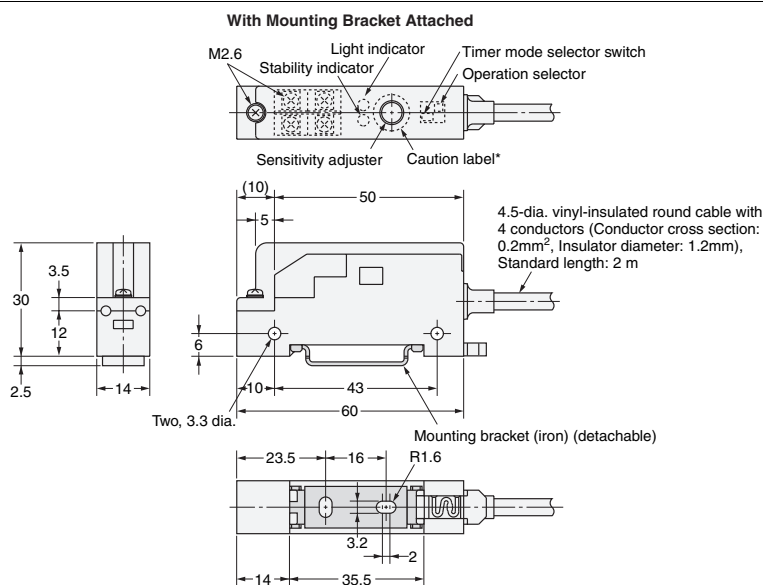
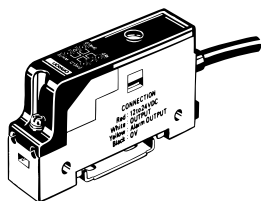
E3C-LS3R



Amplifier Units

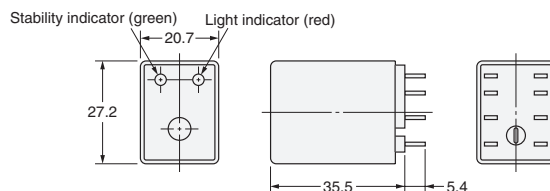
E3C-A
E3C-C

E3C-JC4P



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

E3C-GE4

**Connector**

Use the PYF08A front connection socket or PY08 rear connection socket.

Accessories (Order Separately)

Mounting Brackets

Refer to E39-L/F39-L/E39-S/E39-R for details.

Connecting Sockets

Refer to E39-L/F39-L/E39-S/E39-R for details.

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