

### Miniature Sensors with Separate Amplifiers Fit Tight Spaces

- Fast, 1 ms response time
- Light incident indicator on sensor
- Dust-resistant flat lens surface
- New, thin side view model
- Prewired sensors have 2 m (6.56 ft) cable
- Amplifier with built-in ON-, OFF- and one-shot delays available
- New prewired DC amplifier designed for track mounting has alarm output to signal unstable sensing conditions



## Ordering Information

### ■ SENSORS

#### Through-beam Type

Shape							
Sensing distance	10 cm (3.94 in)	20 cm (7.87 in)	30 cm (11.81 in)		50 cm (19.69 in)	1 m (3.28 ft)	2 m (6.56 ft)
Part number	E3C-S10	E3C-S20W	E3C-S30W	E3C-S30T	E3C-S50	E3C-1	E3C-2

#### Diffuse Reflective Type

Shape		
Sensing distance	5 cm (1.97 in)	10 cm (3.94 in)
Part number	E3C-DS5W	E3C-DS10

### ■ AMPLIFIERS

Shape	Fits 1/16 DIN panel cutout	For S3D8 controller	Miniature	Slim, prewired			
Supply voltage	100 to 240 VAC, 50/60 Hz		12 to 24 VDC				
Output	Relay and NPN solid-state		NPN and PNP solid-state	NPN solid-state	PNP solid-state	NPN	PNP
Timer functions	—	ON-delay OFF-delay One-shot	—	—		40 ms OFF-delay	
Mounting style	Socket (included)		Track	Socket Track (order separately)			
Part number	E3C-A	E3C-C	E3C-WH4F	E3C-GE4	E3C-GF4	E3C-JC4P	E3C-JB4P

## ■ ACCESSORIES

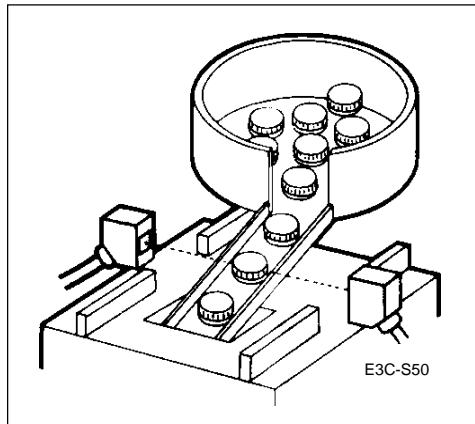
Description	Part number	
Mounting brackets	U-shaped, for E3C-S10, with 10 mm (0.394 in) sensing distance gap	OAC-T1
	U-shaped, for E3C-S10, with 20 mm (0.787 in) sensing distance gap	OAC-T2
	U-shaped, for E3C-S10, with 30 mm (1.181 in) sensing distance gap	OAC-T3
	L-shaped, for E3C-DS10	E39-L42
	L-shaped, for E3C-S50	E39-L31
Sockets required for E3C-G□4 amplifier	Bottom surface mount socket	PYF08M
	Combination bottom surface and track-mount socket	PYF08A-E
Mounting track	DIN rail, 50 cm (1.64 ft) length	PFP-50N
	DIN rail, 1 m (3.28 ft) length	PFP-100N
	End plate	PFP-M
	Spacer	PFP-S

## ■ REPLACEMENT PARTS

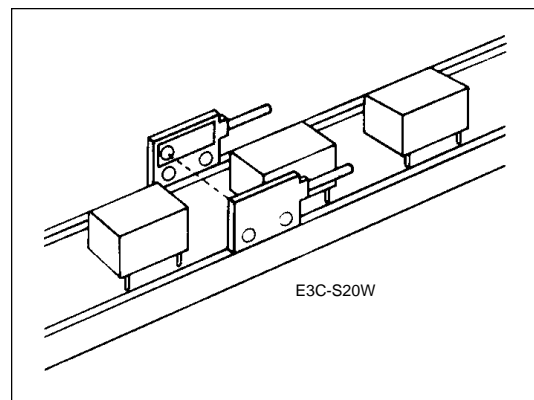
Description	Part number
Track-mount socket for E3C-A and E3C-C amplifiers	PF113A-E
Mounting bracket for E3C-1	E39-L41
Mounting bracket for E3C-2	E39-L42
Mounting bracket for E3C-J□4P	E39-L48

## ■ TYPICAL APPLICATIONS

Detect parts coming from a bowl feeder in a space-confined location



Space-saving flat sensors can detect small parts in tight spaces



# Specifications

## ■ THROUGH-BEAM TYPE

Part number	E3C-S10	E3C-S20W	E3C-S30□	E3C-S50	E3C-1	E3C-2
Sensing distance	10 cm (3.94 in)	20 cm (7.87 in)	50 cm (1.64 ft)		1 m (3.28 ft)	2 m (3.28 ft)
Light source	Pulse modulated infrared LED					
Detectable object	Type	Opaque materials				
	Size	2 mm (0.08 in) min. dimension	2 mm (0.09 in) min. dimension	3 mm (1.18 in) min. dimension		4 mm (0.16 in) min. dimension
Required amplifier	E3C-A, E3C-C, E3C-GE4, E3C-GF4, E3C-JC4P, E3C-JB4P, E3C-WH4F					
Indicators	Emitter	Light Incident (red LED)				
	Receiver	None				
Materials	Lens	Plastic, polycarbonate				
	Case	Plastic, polycarbonate				Zinc die-cast
	Cable sheath	Plastic, polyethylene				
Mounting	Side surface with two through holes. Brackets OAC-T1, OAC-T2, OAC-T3 optional, see Accessories	Side surface with two through holes.	Side surface with two through holes. Bracket E39-L31 optional, see Accessories		Side surface with two through holes. Bracket E39-L41 and hardware included.	Side surface with two through holes. Bracket E39-L42 and hardware included.
Connections	Prewired	Emitter: 2-conductor cable, 2 m (6.56 ft) length Receiver: 2-conductor cable, 2 m (6.56 ft) length				
Weight	Emitter	25 g (0.9 oz.)			30 g (1.1 oz.)	60 g (2.2 oz.)
	Receiver	25 g (0.9 oz.)			30 g (1.1 oz.)	60 g (2.2 oz.)
Enclosure ratings	UL	—				
	NEMA	1, 2, 12	1	1	1, 2, 12	1, 2, 4, 4X, 12
	IEC 144	IP64	IP50	IP60	IP64	IP66
Approvals	UL	—				
	CSA	—				
Ambient temperature	Operating	-25° to 70°C (-13° to 158°F)				
	Storage	-25° to 70°C (-13° to 158°F)				

## ■ DIFFUSE REFLECTIVE TYPE

Part number	E3C-DS5W	E3C-DS10	
Sensing distance	5 cm (1.97 in) with 10 X 10 cm (3.94 in) 90% reflectance white mat paper	10 cm (3.94 in) with 5 X 5 cm (1.97 in) 90% reflectance white mat paper	
Detectable object type	Opaque and transparent materials		
Required amplifier	E3C-A, E3C-C, E3C-GE4, E3C-GF4, E3C-JC4P, E3C-JB4P, E3C-WH4F		
Indicators	Light Incident (red LED)		
Materials	Lens	Plastic, polycarbonate	
	Case	Plastic, polycarbonate	
	Cable sheath	Plastic, polyethylene	
Mounting	Side surface with two through holes.	Side surface with two through holes. Bracket E39-L42 optional, see Accessories.	
Connections	Prewired	4-conductor cable, 2 m (6.56 ft) length	
Weight	50 g (1.8 oz.)		
Enclosure ratings	UL	—	
	NEMA	1	1, 2, 12
	IEC 144	IP50	IP64
Approvals	UL	—	
	CSA	—	
Ambient temperature	Operating	-25° to 70°C (-13° to 158°F)	
	Storage	-25° to 70°C (-13° to 158°F)	

## ■ AMPLIFIERS

### AC Powered

Part number		E3C-A		E3C-C	
Supply voltage		100 to 240 VAC, 50/60 Hz			
Power consumption		3 VA max.			
Operation mode		Light-ON/Dark-ON, switch selectable			
Sensitivity		Adjustable			
Control output	Relay	Type	SPDT		
		Max. load	1 A, 240 VAC (p.f. = 1)		
		Min. load	1 mA, 5 VDC		
	DC solid-state	Type	NPN-SPST with constant current source		
		Max. load	Load (relay, sink) logic, 80 mA, 24 VDC Voltage logic (source): 1.5 to 4 mA		
		Max. on-state voltage drop	1.0 VDC		
Response time	ON	Solid-state	1 ms or 2 ms max., switch selectable		
		Contact	20 ms max.		
	OFF	Solid-state	1 ms or 2 ms max., switch selectable		
		Contact	20 ms max.		
Timer functions		Type	—		
		Range	—		
Circuit protection		Output short-circuit	Not available		
Indicators		Light Incident (red LED), Output Stability (green LED), Output Operation (red LED)			
Materials		Case	Plastic		
Mounting		Requires PF113A-E socket (included); socket mount to DIN rail track			
Connections		Terminal screws on socket			
Weight		220 g (7.8 oz.), including socket			
Enclosure ratings	UL	—			
	NEMA	1			
	IEC144	IP20			
Approvals	UL	—			
	CSA	—			
Ambient temperature	Operating	-10° to 55°C (14° to 131°F)			
	Storage	-25° to 70°C (-13° to 158°F)			

### DC Powered

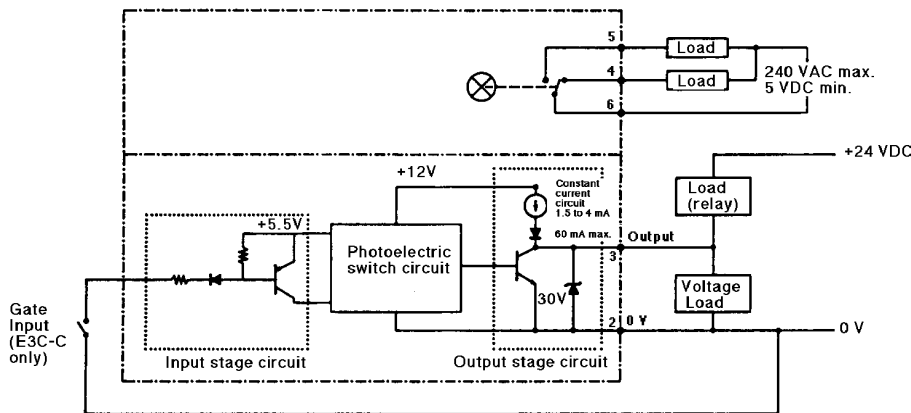
Part number		E3C-JB4P	E3C-JC4P	E3C-GE4	E3C-GF4	E3C-WH4F	
Supply voltage		12 to 24 VDC $\pm$ 10%; 1 V max. permissible ripple peak-to-peak					
Current consumption		50 mA					
Operation mode		Light-ON/Dark-ON switch selectable		Light-ON/Dark-ON, jumper selectable		Light-ON/Dark-ON switch selectable	
Sensitivity		Adjustable					
Control output	DC solid-state	Type	PNP output	NPN output	NPN output with constant current source	PNP output	NPN and PNP open collector outputs
		Max. load	100 mA max. 24 VDC	100 mA max. 24 VDC	Load (relay, sink) logic: 80 mA, 24 VDC Voltage logic (source): 1.5 to 4 mA	100 mA max. 24 VDC	100 mA, 40 VDC (each output)
		Max. on-state voltage drop	0.7 VDC	0.7 VDC	1.2 VDC		0.7 VDC
Alarm output	Type	PNP	NPN	—			
	Max. load	50 mA, 24 VDC	50 mA, 24 VDC	—			
Response time	ON	1 ms		1 ms or 2 ms max., selectable		1 ms or 2 ms max. switch selectable	
	OFF	1 ms or 40 ms, selectable		1 ms or 2 ms max., selectable		1 ms or 2 ms max. switch selectable	
Circuit protection	Output short-circuit	Yes		Yes		Yes	
	DC power supply reverse polarity	Yes		Yes		Yes	

DC Amplifiers, continued

Part number		E3C-JB4P	E3C-JC4P	E3C-GE4	E3C-GF4	E3C-WH4F
Indicators		Light Incident (red LED), Output Stability (green LED)				
Materials	Case	Plastic				
Mounting		DIN rail track or mounting bracket E39-L48 (included) or side surface with two through holes	Requires PYF08A-E or PYF08M socket (not included). Order separately from Accessories.		DIN rail track or bottom surface with two through holes.	
Connections		Prewired with 5 conductor cable, 2 m (6.56 ft) length	Terminal screws on socket		Terminal screws or direct connection to S3D8 Sensor Controller with E99-C connector (included).	
Weight		80 g (2.8 oz.)	15 g (0.5 oz.)		100 g (3.5 oz.)	
Enclosure	UL	—		—		
	NEMA	1, 2		1		
	IEC 144	IP50		IP20		
Approvals	UL	—				
	CSA	—				
Ambient temperature	Operating	-10° to 55°C (14° to 131°F)				
	Storage	-25° to 70°C (-13° to 158°F)				

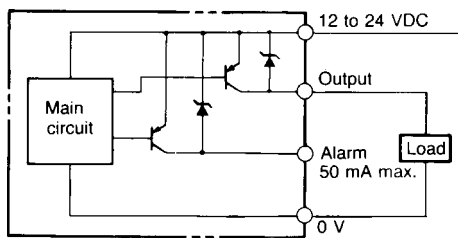
■ OUTPUT CIRCUIT DIAGRAMS

Amplifiers E3C-A, E3C-C

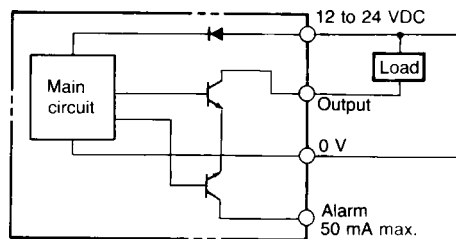


Amplifiers E3C-J□4P

PNP output type  
E3C-JB4P

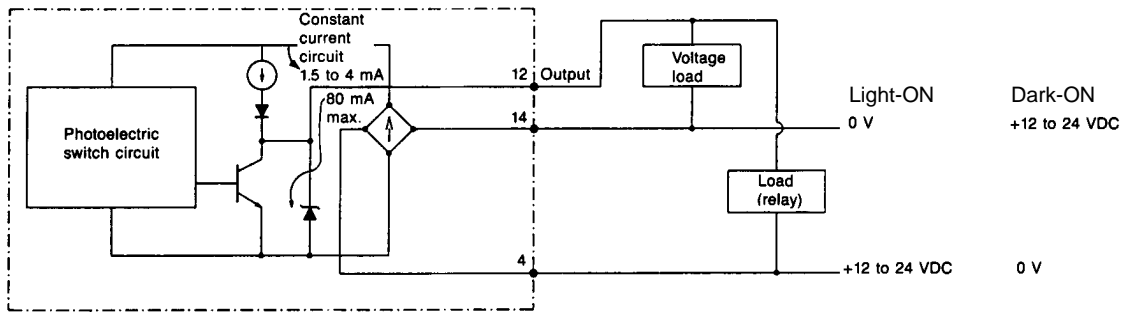


NPN output type  
E3C-JC4P

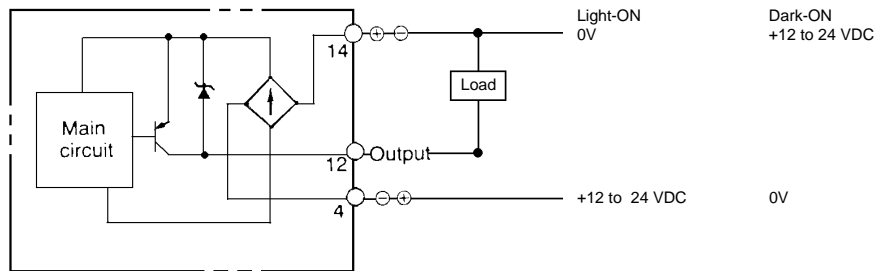


OUTPUT CIRCUIT DIAGRAMS, continued

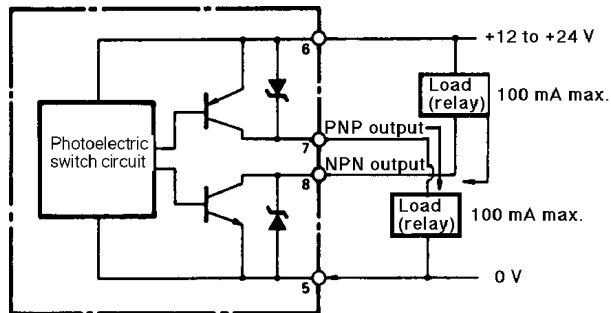
Amplifier E3C-GE4



PNP Output E3C-GF4



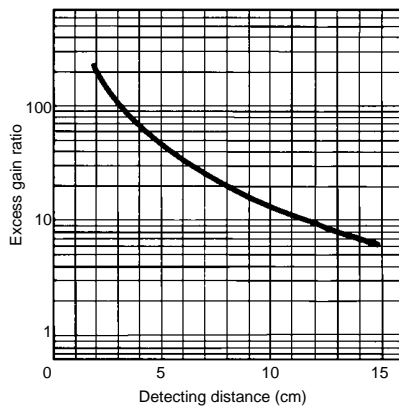
Amplifier E3C-WH4F



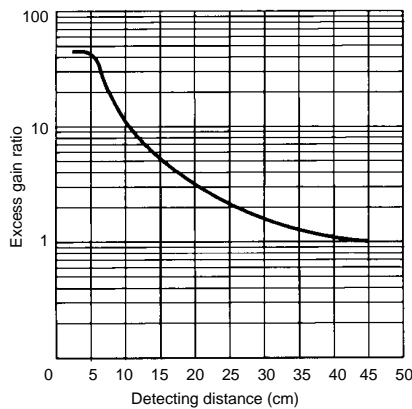
Engineering Data

EXCESS GAIN RATIO

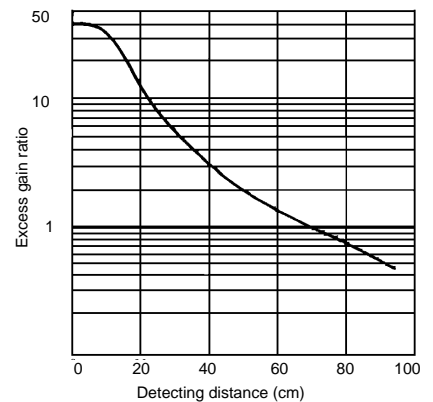
E3C-S10



E3C-S20W

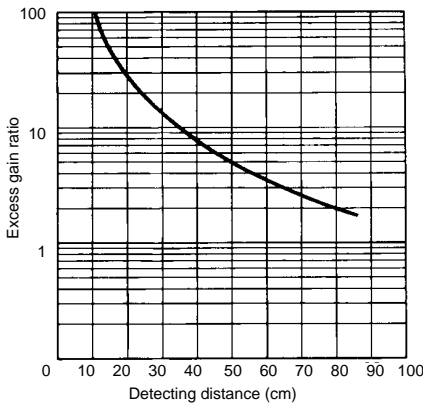


E3C-S30T, E3C-S30W

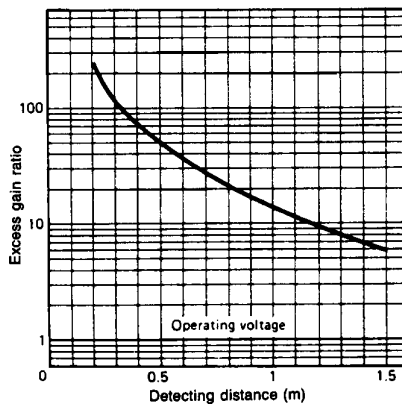


**EXCESS GAIN RATIO, continued**

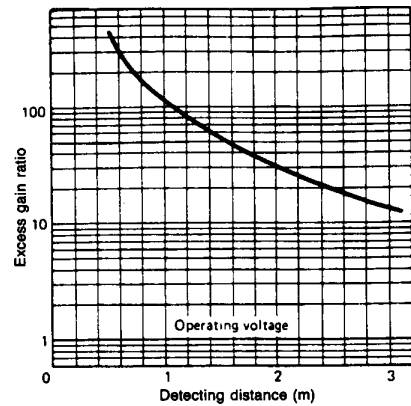
**E3C-S50**



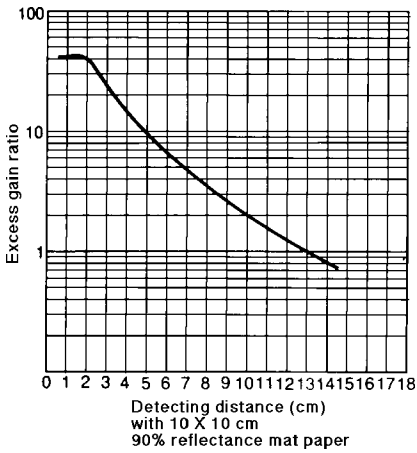
**E3C-1**



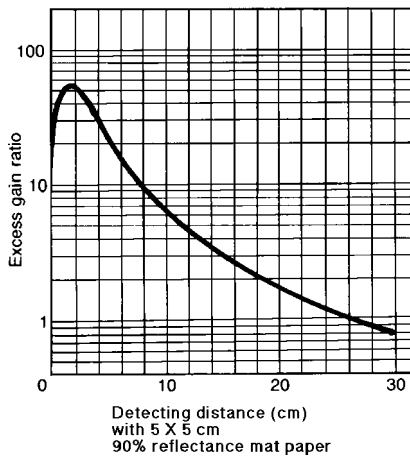
**E3C-2**



**E3C-DS5W**



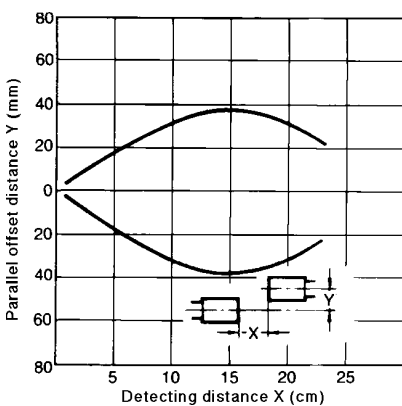
**E3C-DS10**



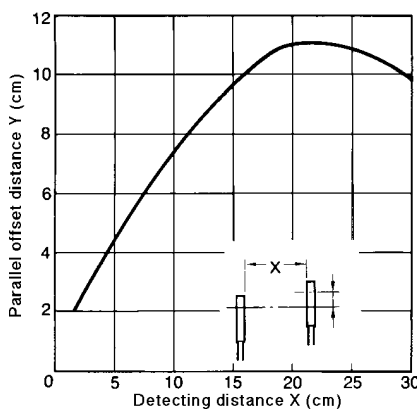
**■ LIGHT SOURCE/RECEIVER SETTING RANGE**

Separate type

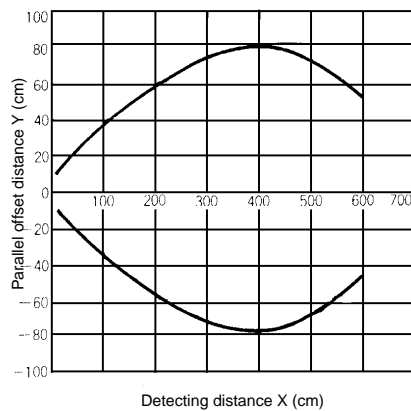
**E3C-S10**



**E3C-S20W**

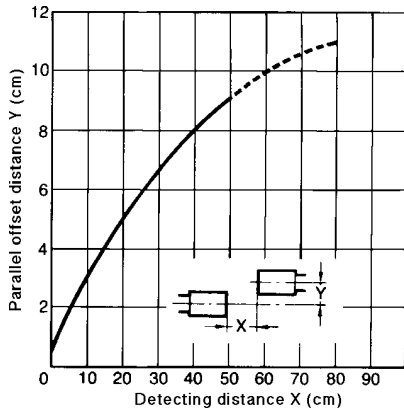


**E3C-S30T, E3C-S30W**

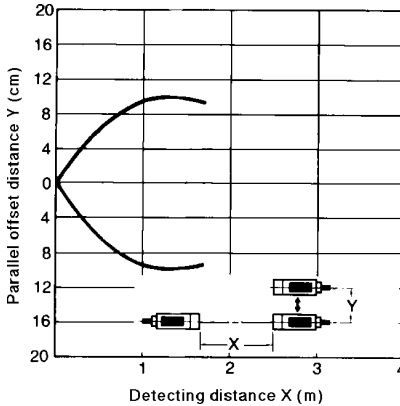


**LIGHT SOURCE/RECEIVER SETTING RANGE, continued**

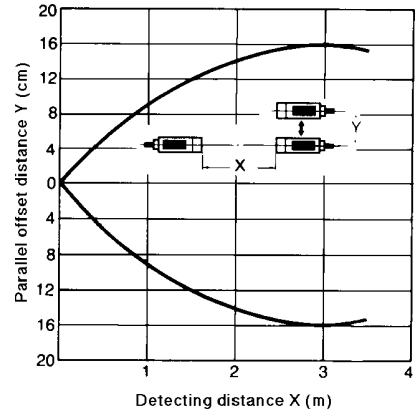
**E3C-S50**



**E3C-1**



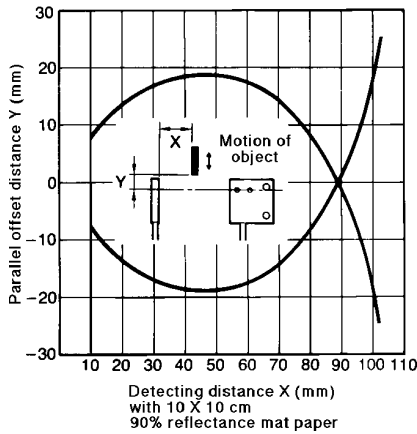
**E3C-2**



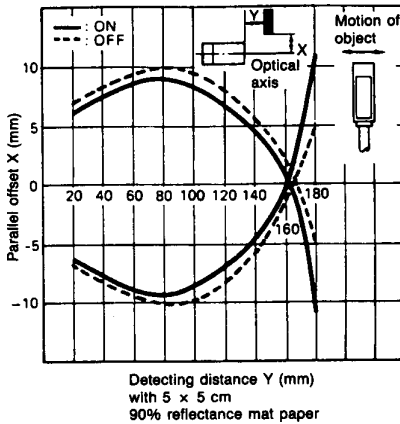
**OPERATING RANGE**

Diffuse Reflective Type

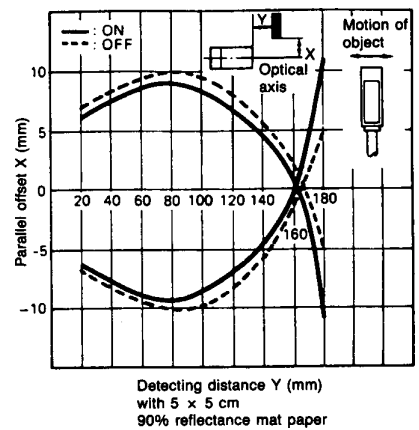
**E3C-DS5W**



**E3C-DS10 (Example 1)**



**E3C-DS10 (Example 2)**

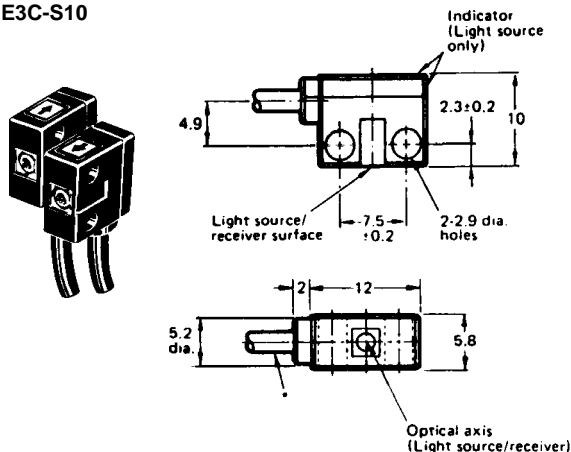


**Dimensions**

Unit: mm

**SENSORS**

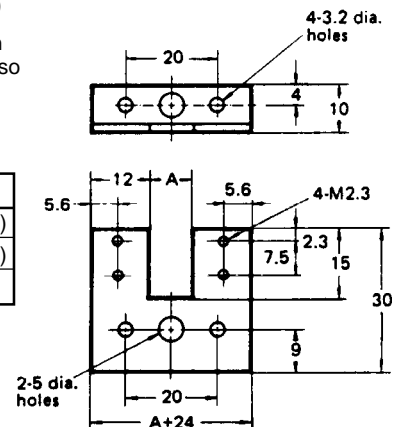
**E3C-S10**



**Mounting Brackets for E3C-S10**

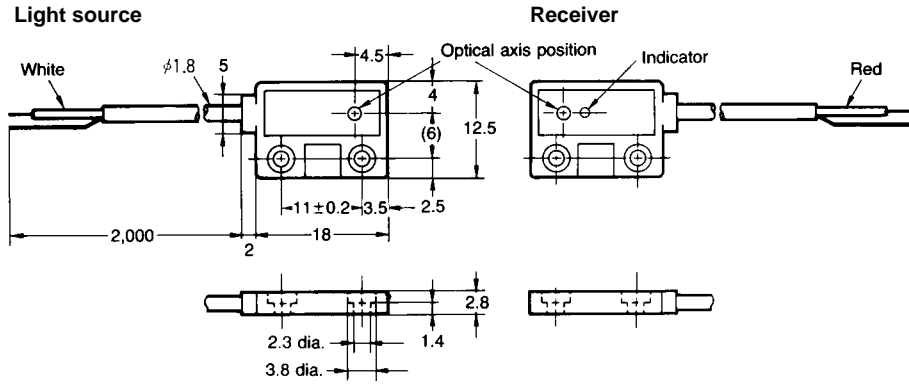
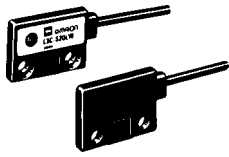
Mount the emitter and receiver on the legs of the U-shaped bracket so they face each other. Dimension "A" shows the fixed sensing distance.

Part number	Dimension A
OAC-T1	10 mm (0.394 in)
OAC-T1	20 mm (0.787 in)
OAC-T3	30 mm (1.81 in)

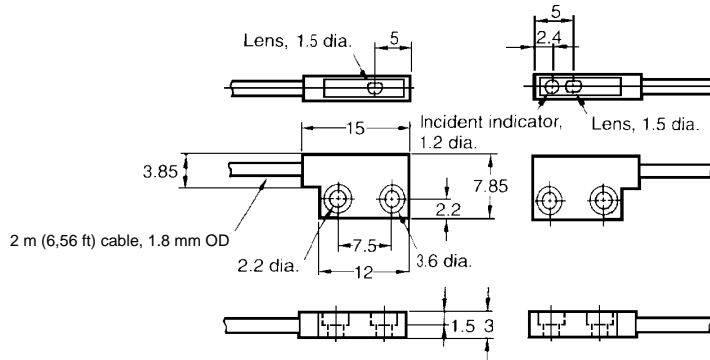
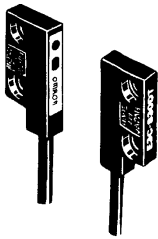




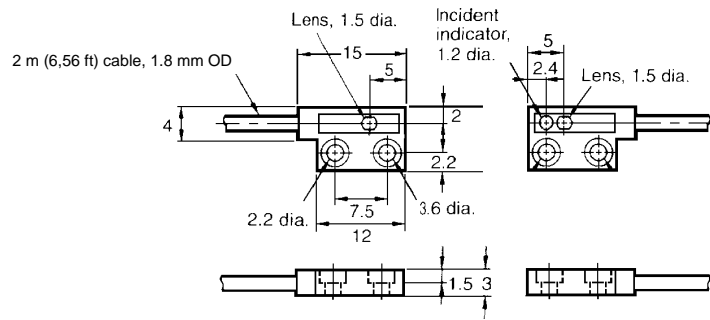
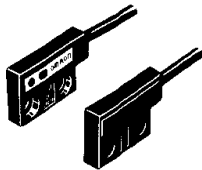
E3C-S20W



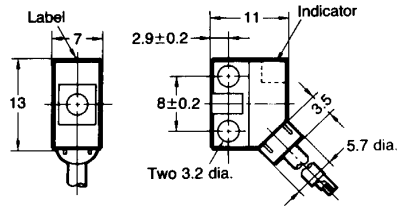
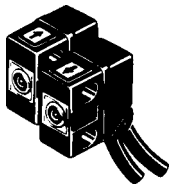
E3C-S30T



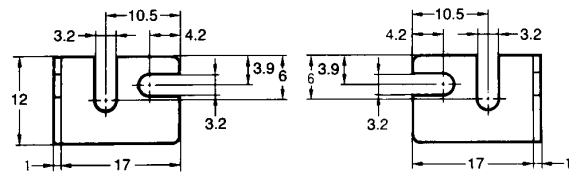
E3C-S30W



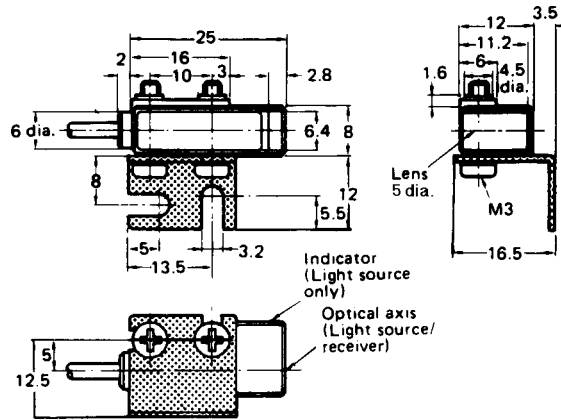
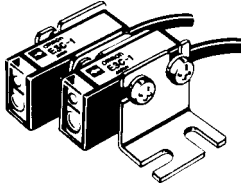
E3C-S50



E39-L31 Optional Mounting Bracket

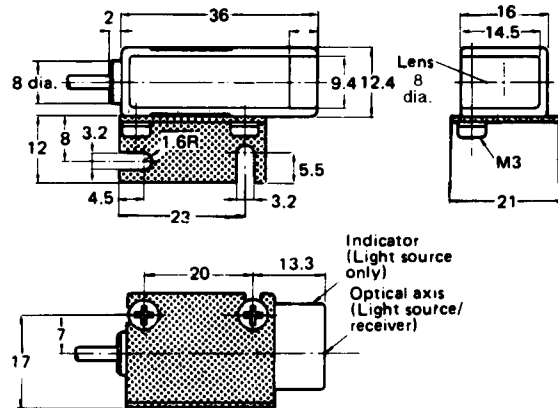
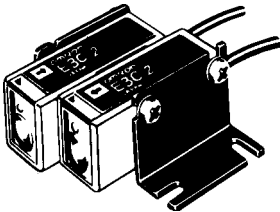


E3C-1



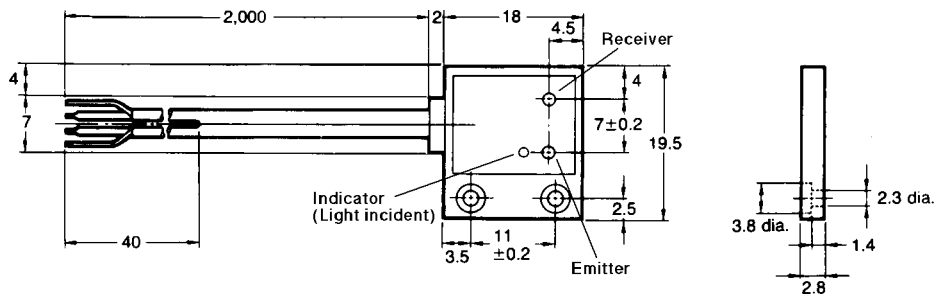
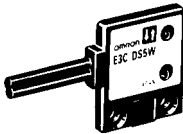
NOTE:  
E3C-1 is shown  
mounted in E39-L41  
bracket supplied with  
each sensor.

E3C-2

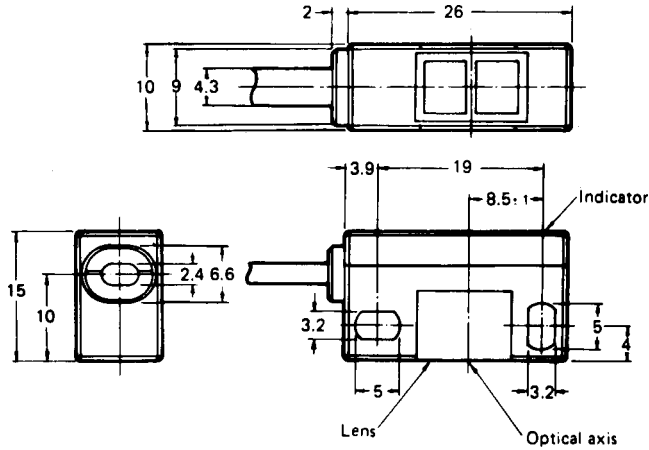
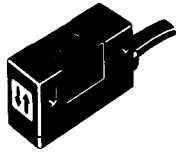


NOTE:  
E3C-2 is shown mounted  
in E39-L42 bracket  
supplied with each  
sensor.

E3C-DS5W



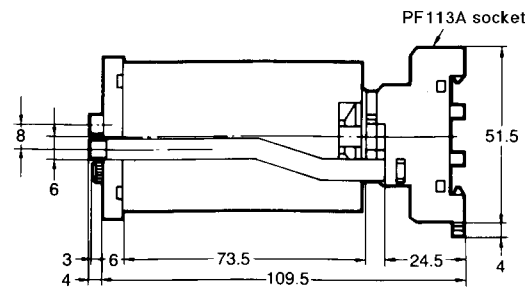
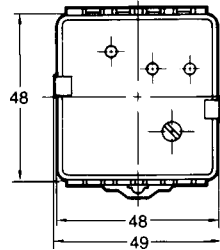
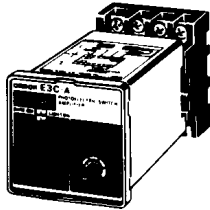
E3C-DS10



NOTE:  
Use mounting bracket  
E39-L42, shown on  
E3C-2; order separately  
from Accessories.

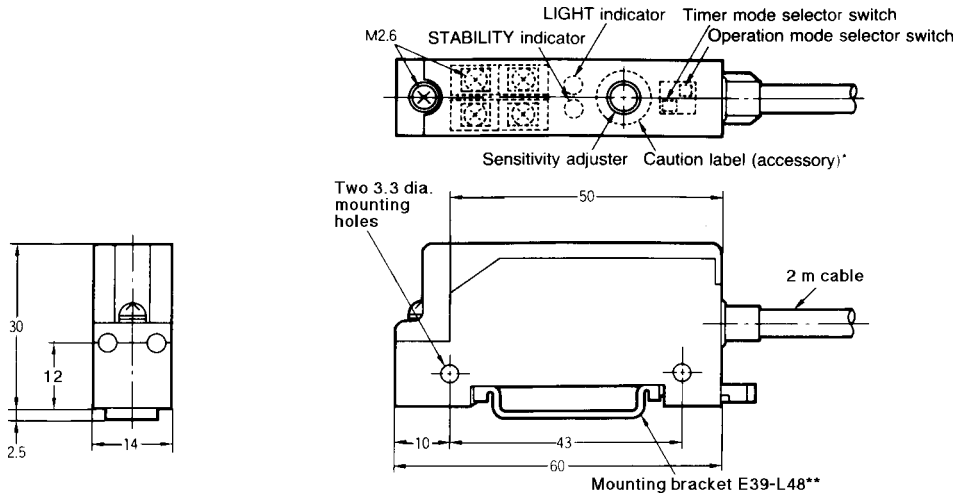
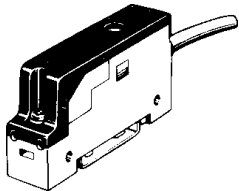
■ AMPLIFIERS

E3C-A, E3C-C



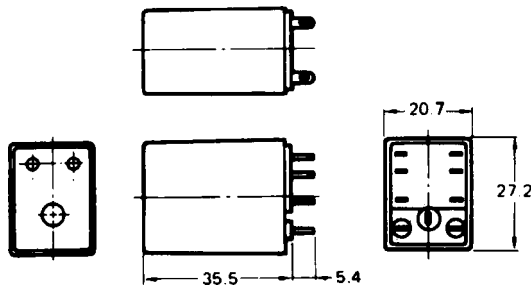
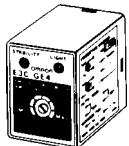
NOTE: Socket PF113A-E and two hold-down clips are included with these amplifiers.

E3C-JB4P, E3C-JC4P



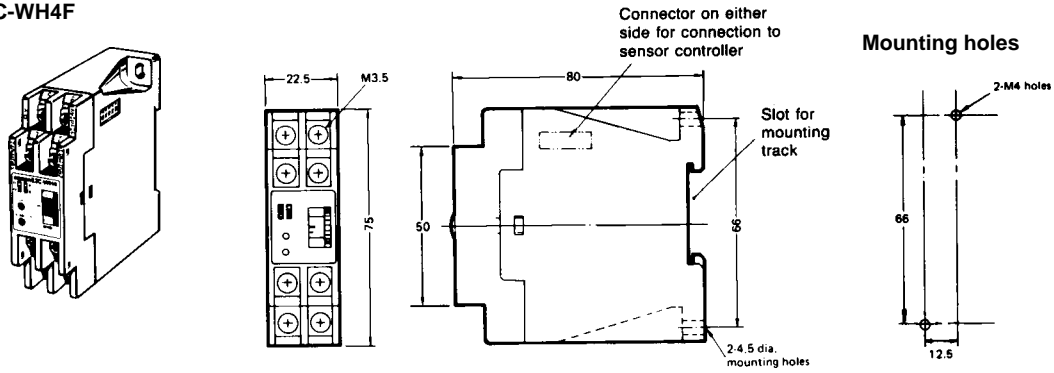
\* Attach the caution label after adjusting the sensitivity adjuster.  
\*\* This is not necessary when mounting the amplifier  
on DIN rail track.

E3C-GE4, E3C-GF4



NOTE:  
Order required socket  
PYF08A-E or PYF08M from  
Accessories section.

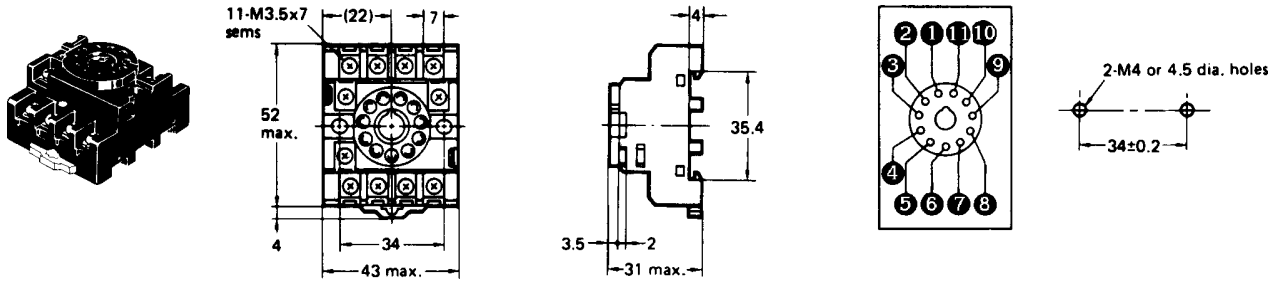
E3C-WH4F



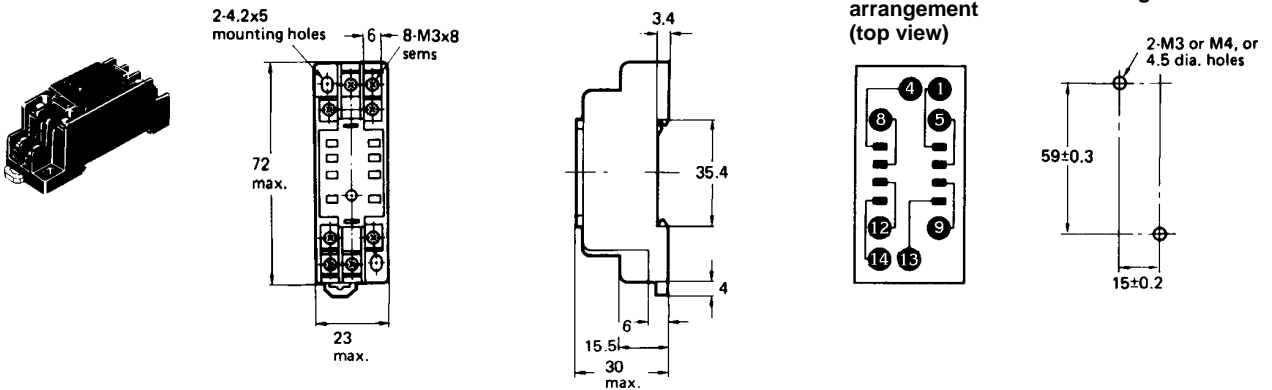
■ SOCKETS

PF113A-E Track-Mount Socket

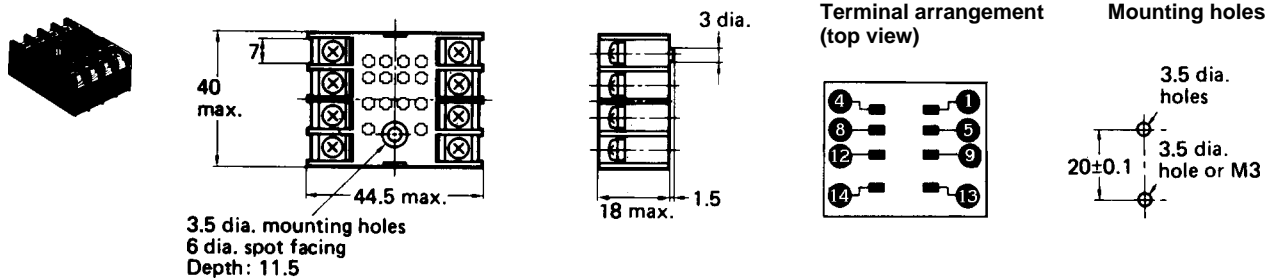
Socket PF113A-E and two hold-down clips are supplied with E3C-A and E3C-C amplifiers.



PYF08A-E Combination Track and Bottom Mount Socket for E3C-GE4, E3C-GF4

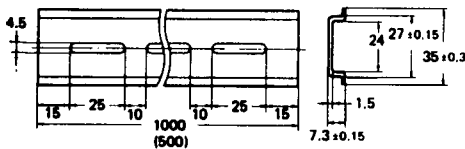


PYF08M Bottom Surface Mount Socket for E3C-GE4, E3C-GF4

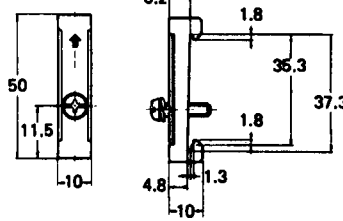


■ MOUNTING TRACK AND ACCESSORIES

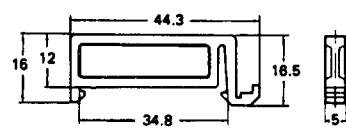
PF100N/PPF-50N DIN Rail



PF100N End Plate



PF100N Spacer



Connections

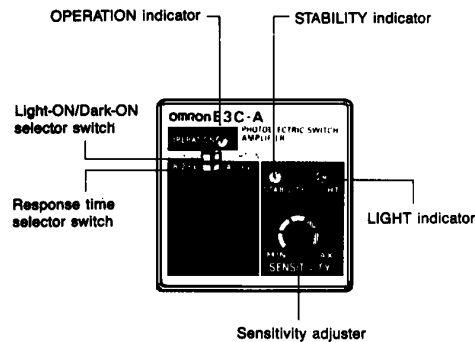
Amplifier model	Sensors	
	Through-beam type	Diffuse reflective type
	E3C-S10, E3C-S20W, E3C-S30, E3C-S50, E3C-1, E3C-2	E3C-DS5W, E3C-DS10
E3C-A, E3C-C		
E3C-JB4P and E3C-JC4P		
E3C-GE4		
Notes	<p>*Shielded wires must not be peeled in excess of 2 cm (0.787 in) for receiver (white lead) and 5 cm (1.969 in) for the light source (red lead).                      **Response time is 1 ms when terminal 8 is left open and 2 ms when terminal 8 is short-circuited with the 0 V terminal of the power supply (negative side).</p>	

Connections, continued

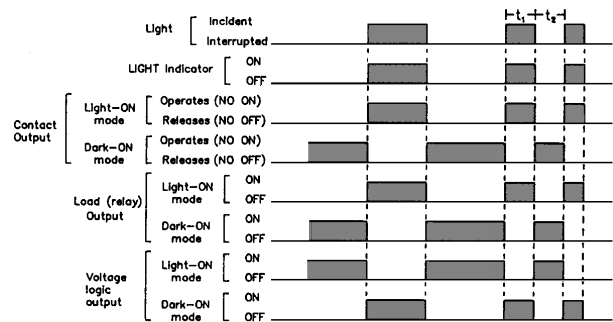
Amplifier model	Sensors	
	Through-beam type	Diffuse reflective type
	E3C-S10, E3C-S20W, E3C-S30, E3C-S50, E3C-1, E3C-2	E3C-DS5W, E3C-DS10
E3C-WH4F	<p>NOTE: Terminals 5, 6, 7, and 8 are not used when connected to S3D8 or S3D-F sensor controllers.</p>	<p>NOTE: Terminals 5, 6, 7, and 8 are not used when connected to S3D8 or S3D-F sensor controllers.</p>
Notes	*Shielded wires must not be peeled in excess of 2 cm (0.787 in) for the receiver (white lead) and 5 cm (1.969 in) for the light source (red lead).	*Shielded wires must not be peeled in excess of 2 cm (0.787 in).

Operation

■ E3C-A Amplifier



■ E3C-A Timing Chart



Selection of operation mode

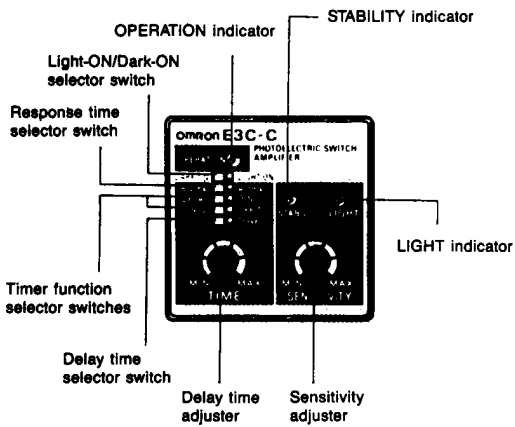
- DARK ON  LIGHT ON: When light is incident, the output relay operates and solid-state output becomes high (H).
- DARK ON  LIGHT ON: When light is interrupted, the output relay operates and the solid-state output becomes high (H).

NOTE: 1. Control output is produced only during the input time.  
 2. When t exceeds 1 ms or 2 ms, solid-state output is produced. To produce relay contact output, t must be longer than 20 ms.

Selection of response time

- 2 msec (B)  1 msec (A): The response time is set to 2 ms.
- 2 msec (B)  1 msec (A): The response time is set to 1 ms.

■ E3C-C AMPLIFIER



**Gate input operation**

When the gate input terminal 9 is opened at HIGH level (6 to 30 VDC), the output relay performs the timer operation according to the input signal (light incident or light interrupted).

When the gate input terminal 9 is short-circuited with the 0 V terminal 2 at LOW level (0 to 2 VDC), the output relay releases without regard to the input signal or output state. The terminal generates an inhibit signal.

**Selection of operation mode**

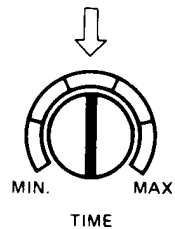
- DARK ON  LIGHT ON  When light is incident, the output relay operates and solid-state output becomes high (H).
- DARK ON  LIGHT ON  When light is interrupted, the output relay operates the solid-state output becomes high (H).

**Selection of response time**

- 2msec (B)  1msec (A)  The response time is set to 2 ms.
- 2msec (B)  1msec (A)  The response time is set to 1 ms.

**Setting the delay time**

- 1sec  10sec  The delay time can be set within a range of 0.1 to 1 second.
- 1sec  10sec  The delay time can be set within a range of 1 to 10 seconds.

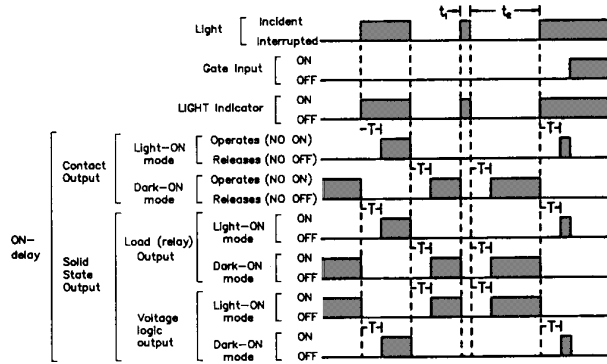


After selecting the delay time range by slide switch, set the delay time adjuster to the specific value. Turn the adjuster clockwise to increase the delay time.

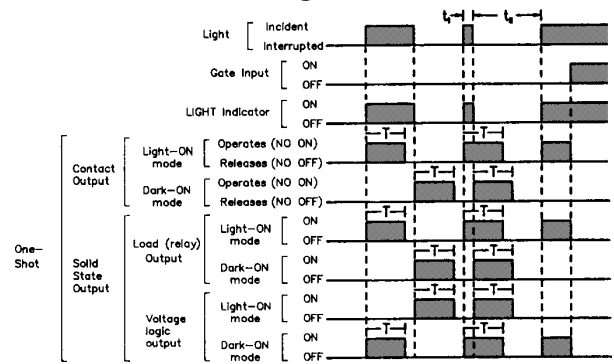
**Selecting timer function**

<p>ON D. (ON-delay) operation</p>	<p>DARK ON <input type="checkbox"/> LIGHT ON <input checked="" type="checkbox"/> -- Set to either position as desired.</p> <p>2ms (B) <input type="checkbox"/> 1ms (A) <input checked="" type="checkbox"/> -- Set to either position as desired.</p> <p>DELAY <input checked="" type="checkbox"/> O.S.D. <input type="checkbox"/></p> <p>ON D. <input checked="" type="checkbox"/> OFF D. <input type="checkbox"/></p> <p>1sec <input type="checkbox"/> 10sec <input checked="" type="checkbox"/> -- Set to either position as desired.</p>
<p>OFF D. (OFF-delay) operation</p>	<p>DARK ON <input type="checkbox"/> LIGHT ON <input checked="" type="checkbox"/> -- Set to either position as desired.</p> <p>2ms (B) <input type="checkbox"/> 1ms (A) <input checked="" type="checkbox"/> -- Set to either position as desired.</p> <p>DELAY <input checked="" type="checkbox"/> O.S.D. <input type="checkbox"/></p> <p>ON D. <input type="checkbox"/> OFF D. <input checked="" type="checkbox"/></p> <p>1sec <input type="checkbox"/> 10sec <input checked="" type="checkbox"/> -- Set to either position as desired.</p>
<p>O.S.D. (One-shot delay) operation</p>	<p>DARK ON <input type="checkbox"/> LIGHT ON <input checked="" type="checkbox"/> -- Set to either position as desired.</p> <p>2ms (B) <input type="checkbox"/> 1ms (A) <input checked="" type="checkbox"/> -- Set to either position as desired.</p> <p>DELAY <input type="checkbox"/> O.S.D. <input checked="" type="checkbox"/></p> <p>ON D. <input type="checkbox"/> OFF D. <input checked="" type="checkbox"/> -- Position of this switch is independent of this operation.</p> <p>1sec <input type="checkbox"/> 10sec <input checked="" type="checkbox"/> -- Set to either position as desired.</p>

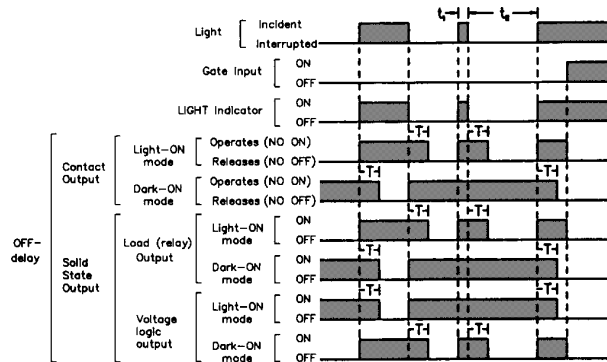
### E3C-C ON-Delay Timing Chart



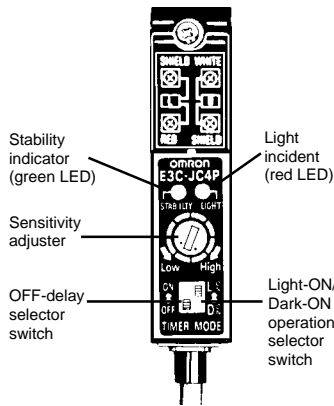
### E3C-C One-Shot Timing Chart



### E3C-C OFF-Delay Timing Chart



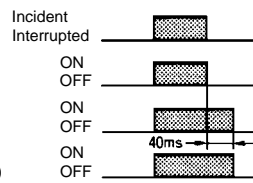
## ■ E3C-JB4P, E3C-JC4P AMPLIFIERS



### Timing Charts

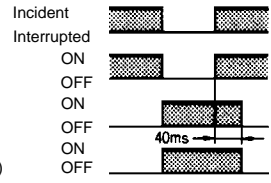
#### Light-ON

Light beam  
LIGHT indicator  
Transistor Output (1 ms)  
Transistor Output (40 ms OFF-delay)



#### Dark-ON

Light beam  
LIGHT indicator  
Transistor Output (1 ms)  
Transistor Output (40 ms OFF-delay)

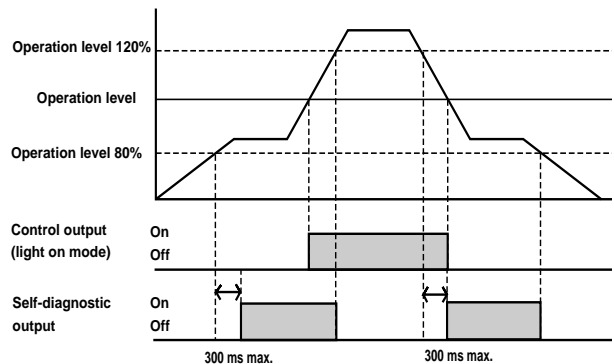


### Alarm Output Timing Chart

The alarm output operates when the control output approaches critical OFF or ON state for more than 300 ms. An unstable state occurs when the amount of light incident upon the receiving element is within 20% of the amount of light needed to change the control output state.

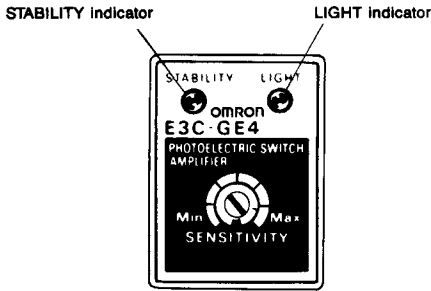
The alarm output feature is designed to indicate gradual changes in sensor/reflector position, atmosphere, temperature or ambient light which result in an unstable control output. A change occurring less than 300 ms will not cause the alarm output to operate.

A 300 ms time delay is built into the alarm output circuit. This prevents false triggering of the alarm output as the leading and trailing edges of the object to be detected are sensed. The time can be extended by using an ON-delay timer in the circuit.





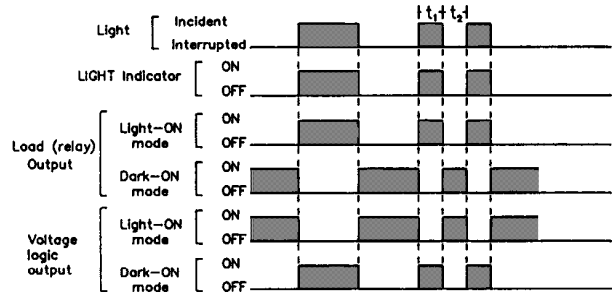
**E3C-GE4 , E3C-GF4 AMPLIFIER**



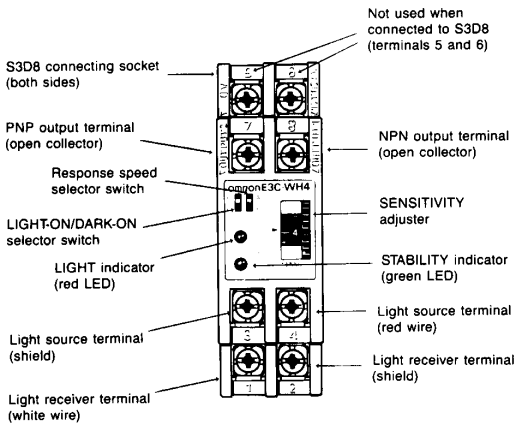
**Selection of response time**

Response	Wiring
1 ms	Terminal 8 open
2 ms	Terminal 8 shorted with terminal 4 (0 V)

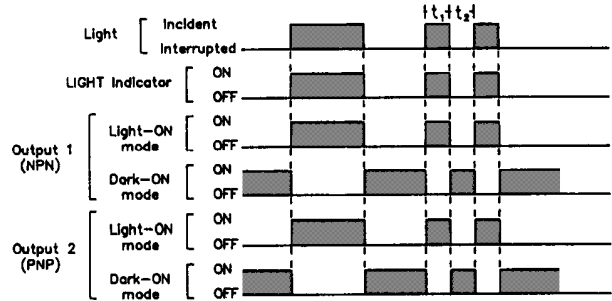
**E3C-GF4 Timing Chart**



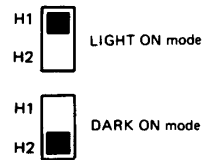
**E3C-WH4F AMPLIFIER**



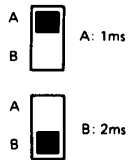
**E3C-WH4F Timing Chart**



**Selection of operation mode**



**Selection of response time**



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11/01

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