

# E2C/E2C-H

## Separate Amplifier Sensor with Sensitivity Adjustment

- Compact design with smaller Sensor Head.
- Heat-resistance model available for application between  $-10$  and  $200^{\circ}\text{C}$ .



Be sure to read *Safety Precautions* on page 15.

## Ordering Information

### Sensors [Refer to *Dimensions* on page 18.]

#### Standard Models

Sensor			Combination	Amplifier Units			
Appearance	Stable sensing area *	Model		Model	Power supply/Output	Timer function	Self-diagnostic output
Shielded	3.5 dia.	0.8 (1.8) mm		E2C-CR8A 3M			
	3.8 dia.	0.8 (1.8) mm		E2C-CR8B 3M			
	M5	1 (2) mm		E2C-X1A 3M			
	5.4 dia.	1 (2) mm		E2C-C1A 3M			
	M8	1.5 (3) mm		E2C-X1R5A 3M			
	M12	2 (5) mm		E2C-X2A 3M			
	M18	5 (10) mm		E2C-X5A 3M			
	M30	10 (18) mm		E2C-X10A 3M			
Unshielded	40 dia.	20 (50) mm		E2C-C20MA 3M			

\*1. Values in parentheses are for the maximum sensing distances at  $23^{\circ}\text{C}$ .

\* Self-diagnostic output, timer, and DIN Track mounting.

#### Heat-resistant Model

Sensor			Combination	Amplifier Unit	
Appearance	Stable sensing area	Model		Model	Model
Shielded	M8	1.5 mm		E2C-X1R5AH 3M	E2C-JC4CH 2M
	M12	2 mm		E2C-X2AH 3M	E2C-JC4DH 2M
	M18	5 mm		E2C-X5AH 3M	E2C-JC4EH 2M

Note: Characteristics will change if the cable length changes. Do not cut or extend the cable.

**Accessories (Order Separately)**

**Mounting Brackets** A Mounting Bracket is not provided with the Sensor. Order a Mounting Bracket separately if required.  
 [Refer to Dimension on page 21.]

Name	Model	Applicable Sensors	Remarks
Mounting Brackets	Y92E-F3R5	E2C-CR8A, for 3.5 dia.	---
	Y92E-F5R4	E2C-C1A, for 5.4 dia.	

**Connection Sockets** A Socket is not provided with the Amplifier Unit. Order a Socket separately if required.

[Refer to Dimension on page 21.]

Name	Model	Applicable Amplifier Unit	Remarks
Front Connection Sockets	PYF08A	E2C-GE4A E2C-GF4A	Hold-down Clips (Order Separately) PYC-A1 Sold as a set.
	P2CF-08	E2C-AM4A	
	P2CF-11	E2C-AK4A	
Back Connection Sockets	P3G-08	E2C-AM4A	---
	P3GA-11	E2C-AK4A	
	PY08	E2C-GE4A E2C-GF4A	

**Adapters** An Adapter is not provided with the Amplifier Unit. Order an Adapter separately if required.

[Refer to Dimension on page 21.]

Name	Model	Applicable Amplifier Unit	Remarks
Embedded Adapters	Y92F-30	E2C-AM4A/-AK4A	---
	Y92F-70		
	Y92F-71		

For details on *Mounting Brackets, Protective Covers, and Sputter Protective Covers*, refer to Accessories on Y92□.

## Ratings and Specifications

### Standard Models

#### Sensors

Item	Model	E2C-CR8A/-CR8B	E2C-X1A/-C1A	E2C-X1R5A	E2C-X2A	E2C-X5A	E2C-X10A	E2C-C20MA						
<b>Sensing distance (at 23°C)</b>		1.8 mm	2 mm	3 mm	5 mm	10 mm	18 mm	50 mm						
Stable sensing area	Ambient temperature	0 to 0.8 mm	0 to 1 mm	0 to 1.5 mm	0 to 2 mm	0 to 5 mm	0 to 10 mm	0 to 20 mm						
	At 0 to 40°C	0 to 1.2 mm	0 to 1.5 mm	0 to 2 mm	0 to 2.5 mm	0 to 7 mm	0 to 15 mm	0 to 28 mm						
<b>Differential travel</b>	Refer to <i>Ratings and Specifications</i> on page 4 for Amplifier Unit specifications.													
<b>Detectable object</b>	Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to <i>Engineering Data</i> on page 7.)													
<b>Standard sensing object</b>	Iron, 5 × 5 × 1 mm		Iron, 8 × 8 × 1 mm	Iron, 12 × 12 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, 30 × 30 × 1 mm	Iron, 50 × 50 × 1 mm							
<b>Response frequency *1</b>	1 kHz		800 Hz		350 Hz	100 Hz	50 Hz							
<b>Ambient temperature range</b>	Operating/Storage: -25 to 70°C (with no icing or condensation)													
<b>Ambient humidity range</b>	Operating/Storage: 35% to 95% (with no condensation)													
<b>Temperature influence</b>	15% max. of sensing distance at 23°C in the temperature range of -25 to 70°C													
<b>Vibration resistance</b>	Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X and Y directions													
<b>Shock resistance</b>	Destruction: 500 m/s <sup>2</sup> 3 times each in X and Y directions													
<b>Degree of protection</b>	IEC 60529 IP67, in-house standards: oil-resistant													
<b>Connection method *2</b>	Pre-wired Models High-frequency coaxial cable (Standard cable length: 3 m)													
<b>Weight (packed state)</b>	Approx. 40 g	Approx. 45 g	Approx. 50 g	Approx. 60 g	Approx. 140 g	Approx. 270 g	Approx. 300 g							
Materials	<b>Case</b>	Stainless steel	Brass											
	<b>Sensing surface</b>	ABS resin												
	<b>Cable</b>	Polyethylene												
	<b>Clamping nut</b>	---	Brass, nickel-plated (except E2C-C1A)											
	<b>Toothed washer</b>	---	Brass, zinc-plated (except E2C-C1A)											
<b>Accessories</b>	---													

\*1. The minimum value when using the solid-state control output on the Amplifier Unit.

Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.

\*2. Refer to 6 for cable lengths when combining Amplifier Units and Sensors.

The characteristic impedance of the high-frequency coaxial cable is 50 Ω.

## Amplifier Units

Item	Model	E2C-GE4A	E2C-GF4A	E2C-JC4A E2C-JC4AP	E2C-AM4A	E2C-AK4A					
<b>Power supply voltage (operating voltage range)</b>		12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max. *1									
<b>Current consumption</b>		25 mA max.		45 mA max.	50 mA max.	55 mA max.					
<b>Sensing distance adjustment range *2</b>		20% min. of rated sensing distance with 4-turn potentiometer				20% to 100% of rated sensing distance with 4-turn potentiometer					
<b>Differential travel adjustment range</b>		Differential travel fixed (10% max. of sensing distance)			1% to 5% of rated sensing distance						
<b>Response time</b>	<b>Solid-state</b>	(Refer to the response frequency of the Proximity Sensor.)									
	<b>Relay</b>	---									
<b>Control outputs</b>	<b>Solid-state</b>	NPN Load resistance: 4.7 kΩ, 100 mA max. (40 VDC max.) (Residual voltage: 1.5 V max.)	PNP Load resistance: 4.7 kΩ, 100 mA max. (40 VDC max.) (Residual voltage: 1.5 V max.)	NPN Open-collector output 100 mA max. (40 VDC max.) (Residual voltage: 0.7 V max.) (E2C-JC4AP: 1 V max.)	NPN/PNP output Open-collector output 200 mA max. (40 VDC max.) (Residual voltage: 1.5 V max.)	Transistor/photocoupler 50 mA max. (40 VDC max.) (Residual voltage: 2 V max.)					
	<b>Relay</b>	---									
<b>Indicators</b>		Detection indicator (red) (OPERATION)		Detection indicator (red) (OPERATION) Stability indicator (green) (STABILITY)	Detection indicator (red) (OPERATION) Stability indicator (green) (STABILITY)						
<b>Operation mode</b>	Changed with NO/NC switch.										
<b>Self-diagnostic output</b>	---		(E2C-JC4AP only) Output transistor turns ON when Sensor open circuit or unstable sensing is detected; solid-state NPN open-collector 50 mA max. (40 VDC max.) (Residual voltage: 1 V max.)	---							
<b>Timer function</b>	---		OFF-delay: 40 ±10 ms	---							
<b>Cable length compensation between Sensor and Amplifier Unit</b>	---		(E2C-JC4AP only) 3 m/5 m, terminals Short-plate switching Shorted: 1 to 3 m Open: 3 to 5 m	Mode switched with 4-position switch.							
<b>Ambient temperature range</b>	Operating/storage: -10 to 55°C (with no icing or condensation)										
<b>Ambient humidity range</b>	Operating/Storage: 35% to 85% (E2C-JC4AP: 35% to 95%) (with no condensation)										
<b>Temperature influence</b>	10% max. of sensing distance at 23°C in the temperature range of -10 to 55°C										
<b>Voltage influence</b>	DC Models: ±1% max. of sensing distance at rated voltage in the rated voltage ±20% range AC Models: ±1% max. of sensing distance at rated voltage in the rated voltage ±10% range										
<b>Insulation resistance</b>	50 MΩ min. (at 500 VDC) between current-carrying parts and case										
<b>Dielectric strength</b>	DC Models: 1,000 VAC, 50/60 Hz for 1 min between current-carrying parts and case AC Models: 1,500 VAC, 50/60 Hz for 1 min between current-carrying parts and case										
<b>Vibration resistance</b>	Destruction: 10 to 25 Hz, 2-mm double amplitude for 2 hours each in X, Y, and Z directions		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions	Destruction: 10 to 25 Hz, 2-mm double amplitude for 2 hours each in X, Y, and Z directions							

\*1. A full-wave rectification power supply of 24 VDC ±10% (average value) can be used (except for the E2C-GE4□).

\*2. The sensing distance range required to maintain performed is given for using the Amplifier Unit in combination with the Sensor.

\*3. Internal relay: G2R-14 DC 12V

Model Item	E2C-GE4A	E2C-GF4A	E2C-JC4A E2C-JC4AP	E2C-AM4A	E2C-AK4A
<b>Shock resistance</b>	Destruction: 100 m/s <sup>2</sup> 3 times each in X, Y, and Z directions				
<b>Life expectancy</b>	---				
<b>Connection method</b>	Terminal block		Pre-wired Models (Standard cable length: 2 m)	Terminal block	
<b>Weight (packed state) *4</b>	Approx. 20 g		E2C-JC4A: Approx. 50 g E2C-JC4AP: Approx 80 g	Approx. 140 g	Approx. 250 g
<b>Accessories</b>	Instruction manual		Caution labels, Mounting Bracket (E2C-JC4A: M3 × 15 Phillips mounting screw), instruction manual	Instruction manual	

\*4. The weight of the Connection Socket is not included.

## Heat-resistant Models

### Sensors

Item	Model	E2C-X1R5AH	E2C-X2AH	E2C-X5AH		
<b>Detectable object</b>	Ferrous metal (The sensing distance decreases with non-ferrous metal, refer to <i>Engineering Data</i> on page 7.)					
<b>Standard sensing object</b>	Iron, 8 × 8 × 1 mm	Iron, 12 × 12 × 1 mm	Iron, 18 × 18 × 1 mm			
<b>Stable sensing area</b>	0 to 1.5 mm	0 to 2 mm	0 to 5 mm			
<b>Differential travel</b>	0.04 mm max.		0.1 mm max.			
<b>Response frequency *1</b>	300 Hz					
<b>Ambient temperature range</b>	Operating/Storage: -10 to 200°C (with no icing or condensation)					
<b>Ambient humidity range</b>	Operating/Storage: 35% to 95% (with no condensation)					
<b>Temperature influence</b>	±0.2%/ <sup>o</sup> C					
<b>Vibration resistance</b>	Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions					
<b>Shock resistance</b>	Destruction: 500 m/s <sup>2</sup> 3 times each in X, Y, and Z directions					
<b>Degree of protection</b>	IEC 60529 IP60 *2					
<b>Connection method</b>	Pre-wired Models (Cable length: 3 m) Heat-resistant, high-frequency coaxial cable					
<b>Weight (packed state)</b>	Approx. 50 g	Approx. 60 g	Approx. 140 g			
<b>Materials</b>	<b>Case</b>	Brass				
	<b>Sensing surface</b>	PEEK (polyether ether ketone)				
	<b>Cable</b>	Fluorine resin				
	<b>Clamping nut</b>	Brass, nickel-plated				
	<b>Toothed washer</b>	Iron, zinc-plated				

Note: Ratings and characteristic are given for 50% of the stable sensing area.

\*1. Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.

\*2. Do not operate the Sensor in areas exposed to water vapor because the enclosure is not waterproof.

### Amplifier Units

Item	Model	E2C-JC4CH	E2C-JC4DH	E2C-JC4EH			
<b>Power supply voltage *1 (operating voltage range)</b>	12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.						
<b>Current consumption</b>	45 mA max.						
<b>Sensing distance adjustment range *2</b>	20% to 100% of rated sensing distance 4-turn potentiometer						
<b>Control outputs</b>	<b>Load current</b>	NPN open collector, 100 mA max. (40 VDC max.)					
	<b>Residual voltage</b>	0.8 V max.					
<b>Indicators</b>	Detection indicator (red)						
<b>Operation mode</b>	Changed with NO/NC switch.						
<b>Cable length compensation</b>	Switched between 3 and 5 m.						
<b>Ambient temperature range</b>	Operating/storage: -10 to 55°C (with no icing or condensation)						
<b>Ambient humidity range</b>	Operating/storage: 35% to 85% (with no condensation)						
<b>Temperature influence</b>	±0.08%/ <sup>o</sup> C						
<b>Voltage influence</b>	±2% max. of sensing distance at rated voltage in the rated voltage ±20% range						
<b>Insulation resistance</b>	50 MΩ min. (at 500 VDC) between current-carrying parts and case						
<b>Dielectric strength</b>	1,000 VAC, 50/60 Hz for 1 min between current-carrying parts and case						
<b>Vibration resistance</b>	Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions						
<b>Shock resistance</b>	Destruction: 100 m/s <sup>2</sup> 3 times each in X, Y, and Z directions						
<b>Degree of protection</b>	IEC 60529 IP20						
<b>Connection method</b>	Pre-wired Models (Cable length: 2 m)						
<b>Weight (packed state)</b>	Approx. 80 g						
<b>Accessories</b>	Caution labels, Mounting Bracket, instruction manual						

\*1. A full-wave rectification power supply of 24 VDC ±10% (average value) can be used.

\*2. The sensing distance range required to maintain performed is given for using the Amplifier Unit in combination with the Sensor.

## Cable Lengths for Sensor-Amplifier Unit Combinations

### Standard Models

Sensor Amplifier Units	E2C-CR8A	E2C-CR8B	E2C-X1A	E2C-C1A	E2C-X1R5A	E2C-X2A	E2C-X5A	E2C-X10A	E2C-C20MA
E2C-GE4A	Restricted to 3 m.					---	---	---	---
E2C-GF4A									
E2C-JC4AP			1 to 3 m: Short cable length terminals *	3 to 5 m: Open cable length terminals *			---	---	---
E2C-JC4A			Restricted to 3 m.				---	---	---
E2C-AM4A	0 to 5 m Set cable length switch to desired position. *				0 to 10 m Set cable length switch to desired position. *				
E2C-AK4A									

Note: The standard cable length is 3 m. Models with 5-m or 10-m are manufactured upon order.

\* Refer to page 14 for the operation of cable length switching.

### Heat-resistant Models

Sensor Amplifier Units	E2C-X1R5AH	E2C-X2AH	E2C-X5AH
E2C-JC4CH	Set 3 m/5 m cable length switch to desired position.		
E2C-JC4DH			
E2C-JC4EH			

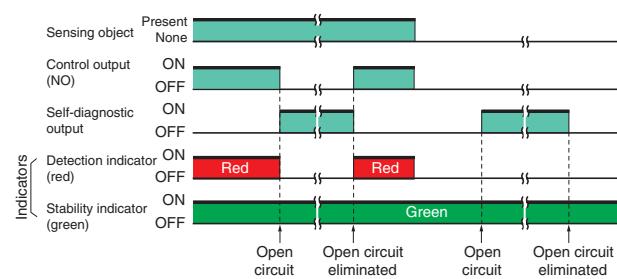
Note: The standard cable length is 3 m. Models with 5-m are manufactured upon order.

## Self-diagnostic Function

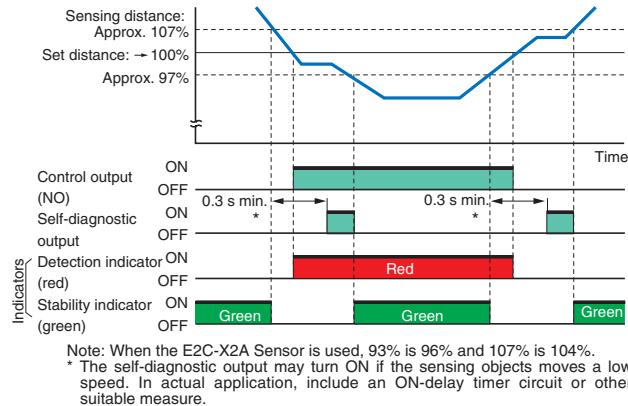
The self-diagnostic output transistor will turn ON in the following cases. (The output will turn ON for any of these conditions individually.)

(1) Sensor open circuit: Transistor will turn ON the instance there is an open circuit for the Sensor (including the cable).

### Sensor Open Circuit



### Sensor Connected

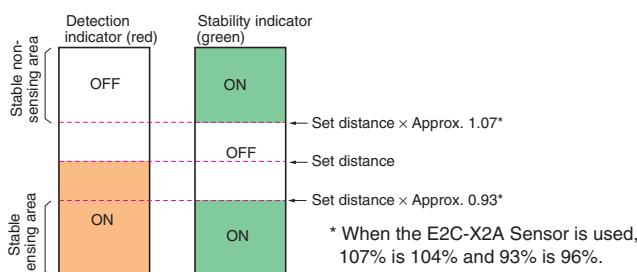


(2) Detection: The output will turn ON if a sensing object is within 93% to 100% of the sensing distance continuously for 0.3 s or longer (e.g., for sensing object position offset).

(3) No detection: The output will turn ON if a sensing object is within 100% to 107% of the sensing distance continuously for 0.3 s or longer (e.g., when background is influencing detection).

## Indicators

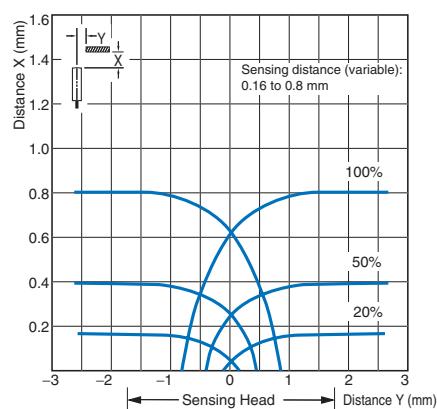
- The detection indicator lights when a sensing object approaches the sensing distance to indicate that a sensing object has been detected.
- The stability indicator lights when the sensing object approaches within 93% of the sensing distance or moves away from 107% of the sensing distance to indicate a stable sensing or non-sensing condition.



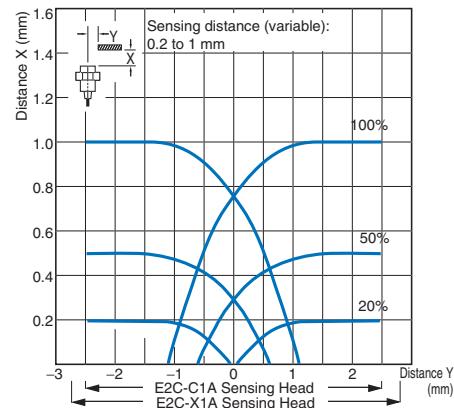
## Engineering Data (Reference Value)

## Sensing Area

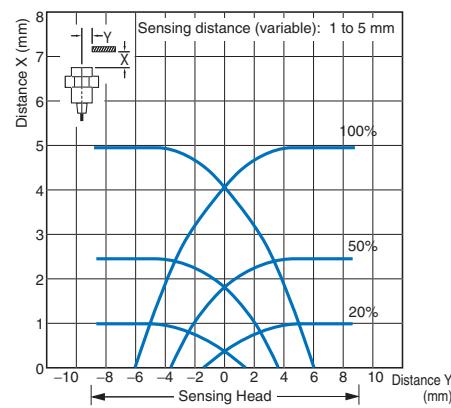
E2C-CR8□



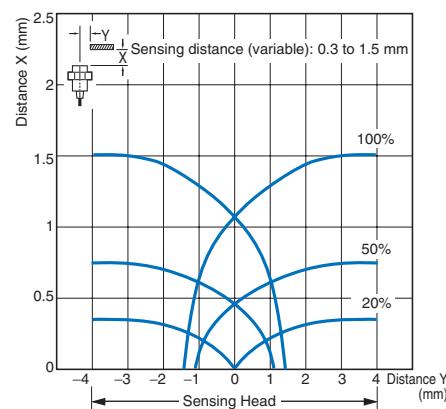
E2C-X1A-C1A



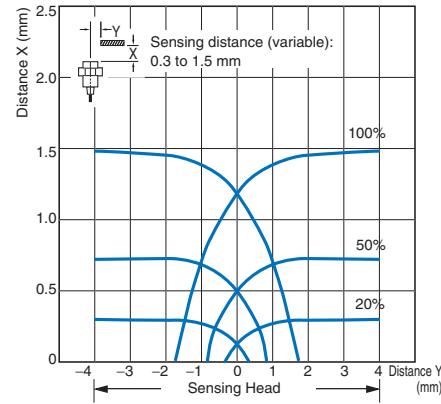
E2C-X5A



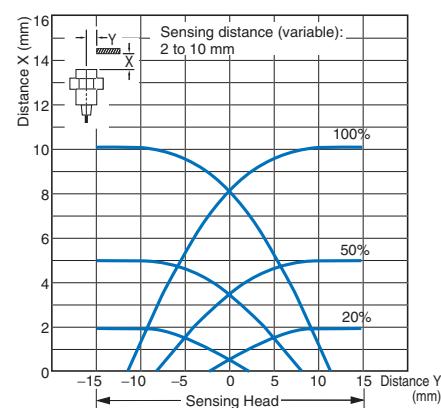
E2C-X1R5AH + E2C-JC4CH



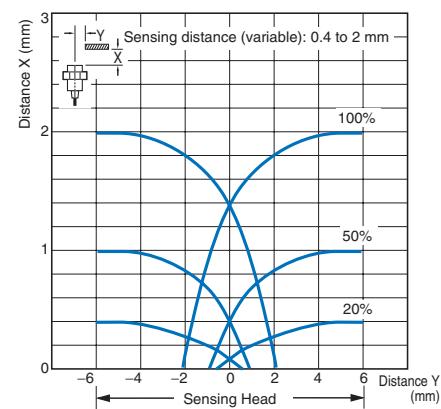
E2C-X1R5A



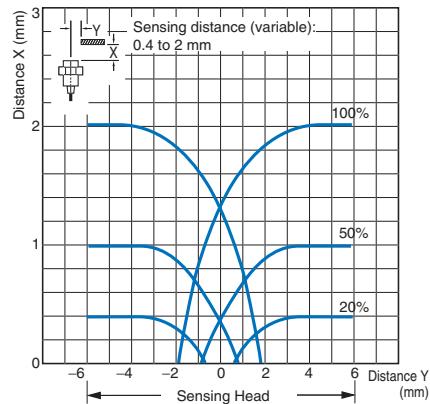
E2C-X10A



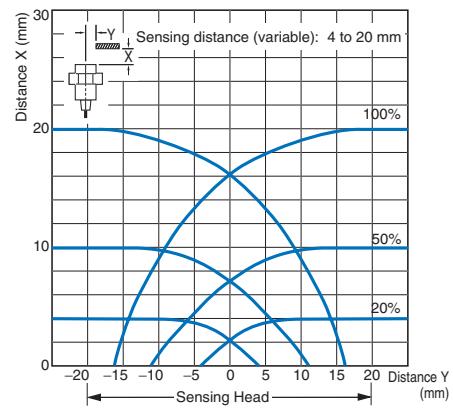
E2C-X2AH + E2C-JC4DH



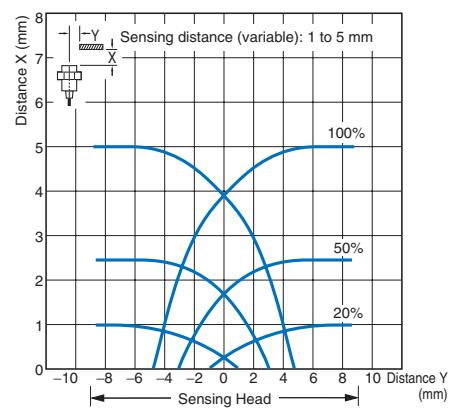
E2C-X2A



E2C-C20MA

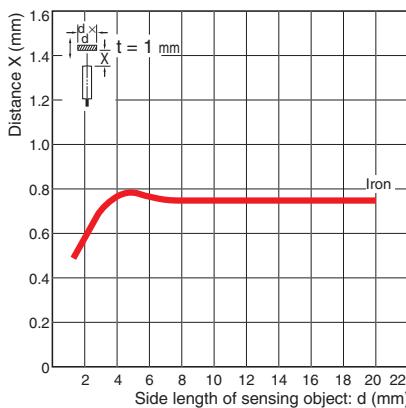
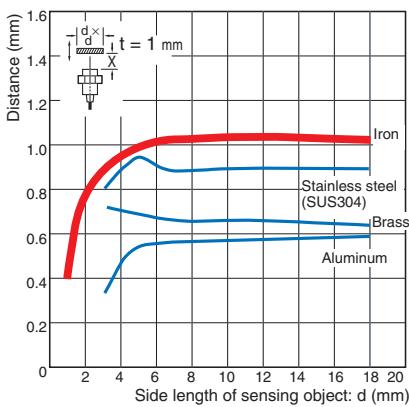
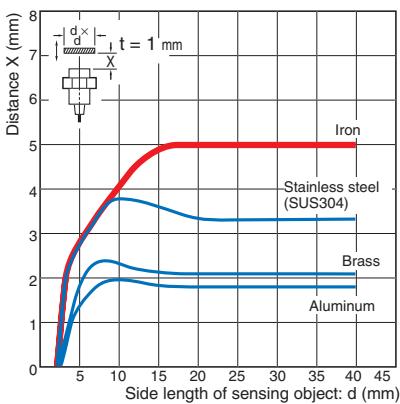
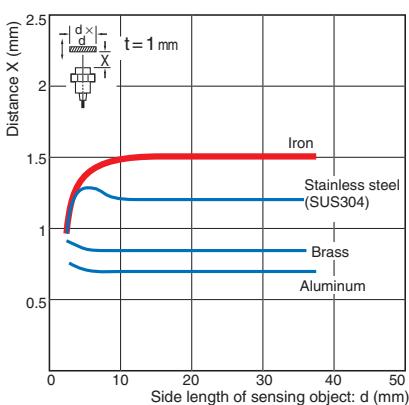
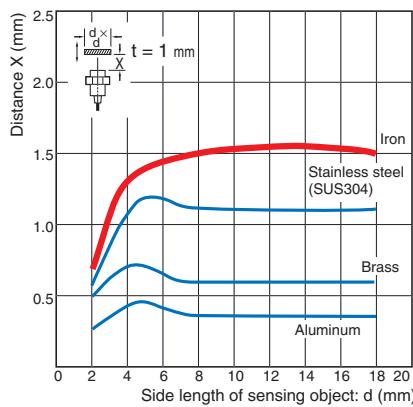
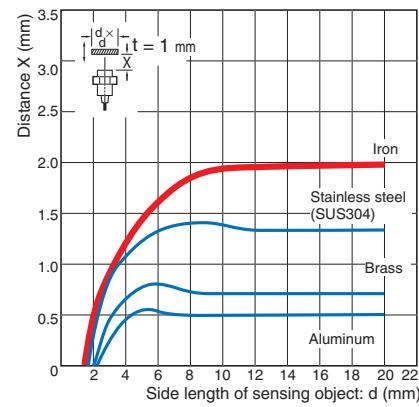
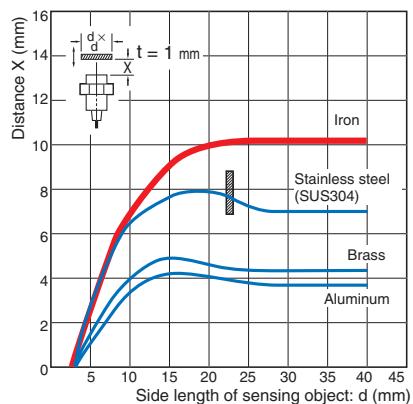
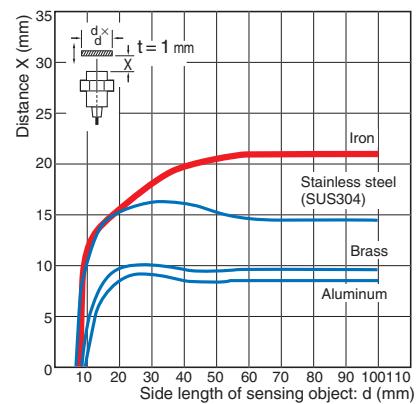
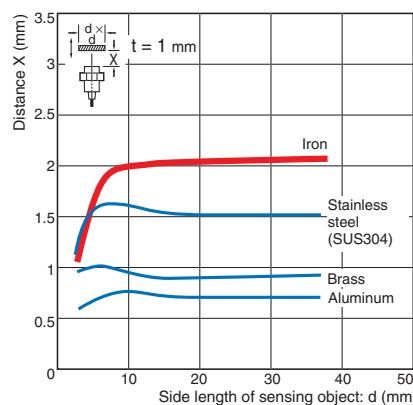
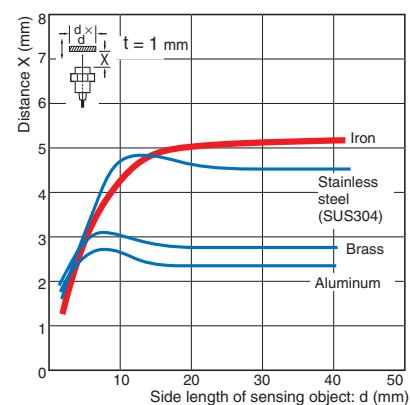


E2C-X5AH + E2C-JC4EH

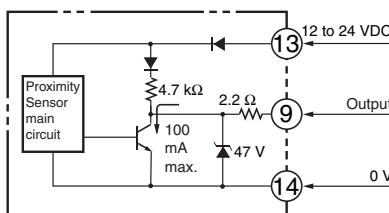
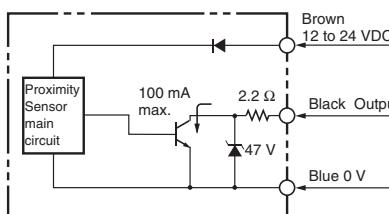
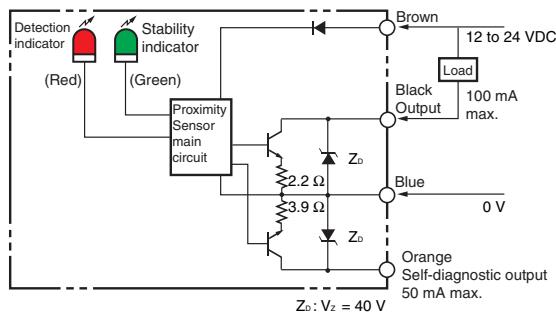
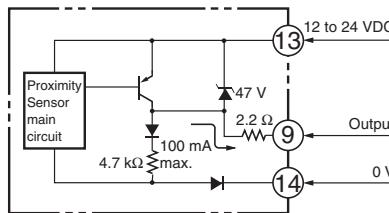
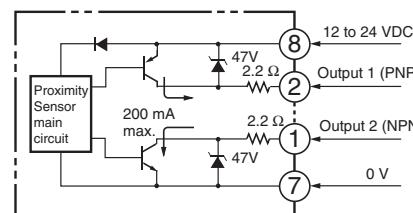
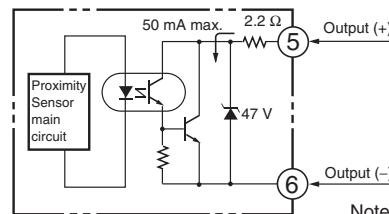


### Influence of Sensing Object Size and Material

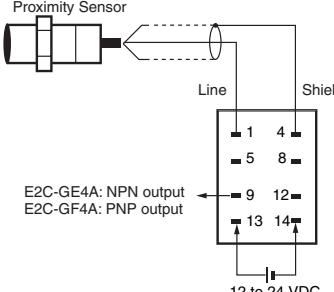
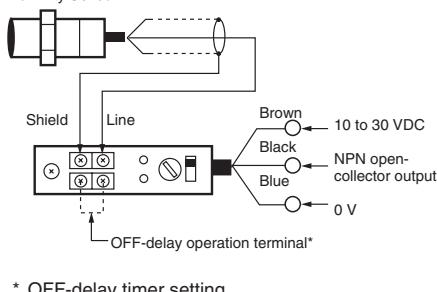
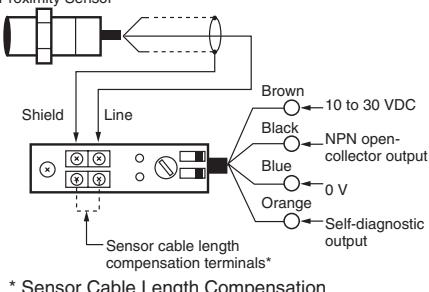
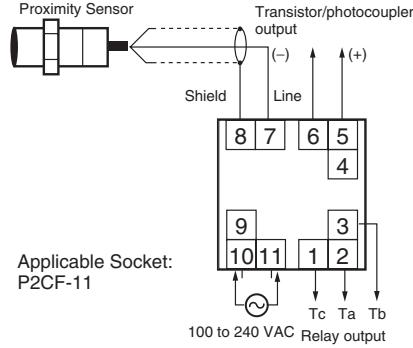
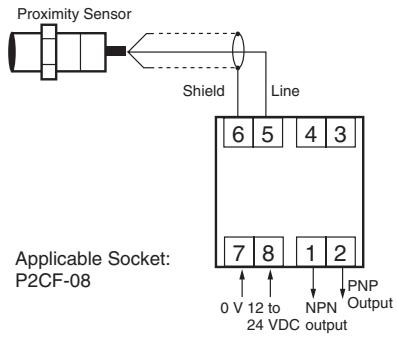
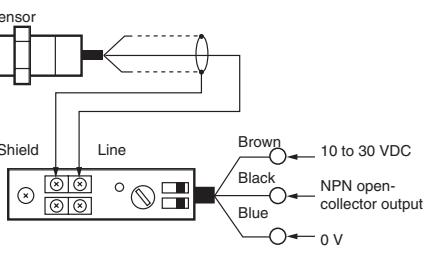
**E2C-CR8** □

**E2C-X1A-C1A****E2C-X5A****E2C-X1R5AH + E2C-JC4CH****E2C-X1R5A****E2C-X2A****E2C-X10A****E2C-C20MA****E2C-X2AH + E2C-JC4DH****E2C-X5AH + E2C-JC4EH**

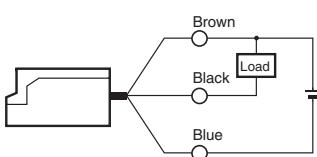
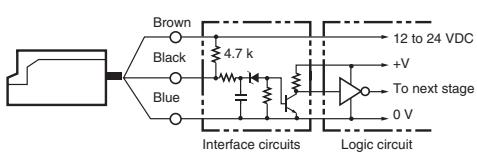
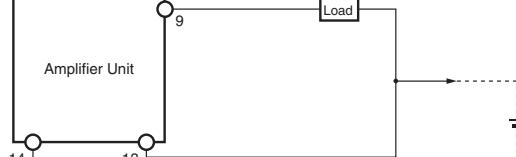
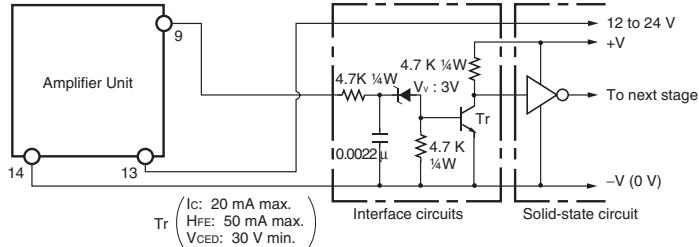
## I/O Circuit Diagrams

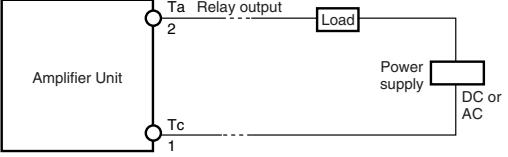
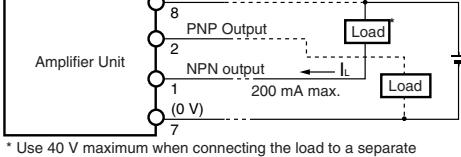
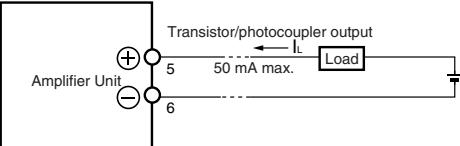
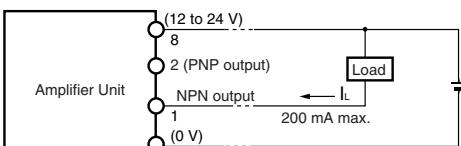
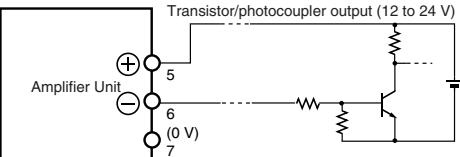
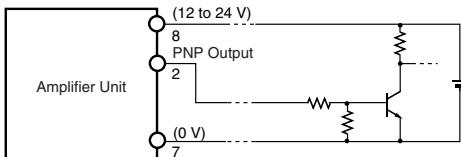
Output configuration	E2C-GE4A *	E2C-JC4A, E2C-JC4CH, E2C-JC4DH, E2C-JC4EH
NPN output	 <p>* A voltage output can be used if the NO/NC switch on the E2C-GE4A is set to NC, but an approximately 60-ms pulse will be generated when the power supply is turned ON. An initial reset will thus be required. If the E2C-GF4A (model for PNP output) is used, the initial pulse will not occur.</p>	
NPN output Self-diagnosis Function	<b>E2C-JC4AP</b>	
		
PNP Output		
Both NPN and PNP outputs	<b>E2C-AM4A</b>	
		
Transistor/photocoupler Relay output	<b>E2C-AK4A</b>	
	 <p>Note: Terminals 1, 2, and 3 are the relay contact output (SPDT).</p>	

## Connections between Amplifier Unit and Sensor

E2C-G□4A	E2C-JC4A	E2C-JC4AP
 <p>Proximity Sensor</p> <p>Line</p> <p>Shield</p> <p>E2C-GE4A: NPN output E2C-GF4A: PNP output</p> <p>12 to 24 VDC</p> <p>Applicable Socket: PYF08A</p>	 <p>Proximity Sensor</p> <p>Line</p> <p>Shield</p> <p>10 to 30 VDC</p> <p>Black</p> <p>Blue</p> <p>OFF-delay operation terminal*</p> <p>* OFF-delay timer setting If the OFF-delay operation terminals are shorted, a 40-ms OFF-delay timer will start.</p>	 <p>Proximity Sensor</p> <p>Line</p> <p>Shield</p> <p>10 to 30 VDC</p> <p>Brown</p> <p>Black</p> <p>Blue</p> <p>0 V</p> <p>Orange</p> <p>Sensor cable length compensation terminals*</p> <p>NPN open-collector output</p> <p>0 V</p> <p>Self-diagnostic output</p> <p>* Sensor Cable Length Compensation These terminals can be used to switch the cable length. Terminals shorted: 1 to 3 m Terminals open: 3 to 5 m</p>
E2C-AK4A	E2C-AM4A	E2C-JC4□H
 <p>Proximity Sensor</p> <p>Transistor/photocoupler output</p> <p>Shield</p> <p>Line</p> <p>100 to 240 VAC Relay output</p> <p>Applicable Socket: P2CF-11</p>	 <p>Proximity Sensor</p> <p>Line</p> <p>Shield</p> <p>0 V 12 to 24 VDC output</p> <p>Applicable Socket: P2CF-08</p>	 <p>Proximity Sensor</p> <p>Line</p> <p>Shield</p> <p>10 to 30 VDC</p> <p>Brown</p> <p>Black</p> <p>Blue</p> <p>0 V</p> <p>NPN open-collector output</p> <p>0 V</p> <p>Note: Characteristics will change if the cable length changes. Do not cut or extend the cable.</p>

## Load Connections

Model	E2C-JC4A, E2C-JC4□H
Load	
DC load • Relay • Solenoid	
Current-sink-ing load • Program-mable Controller • Sensor Controller	
Voltage load (logic circuit)	
Model	E2C-GE4A
Load	
DC load • Relay • Solenoid	
Solid-state load • Program-mable Controller • Sensor Controller	
Voltage load (logic circuit)	
Remarks	When connecting to a CMOS IC or TLL, provide an interface circuit as shown above and connect to the solid-state circuit in the next stage.

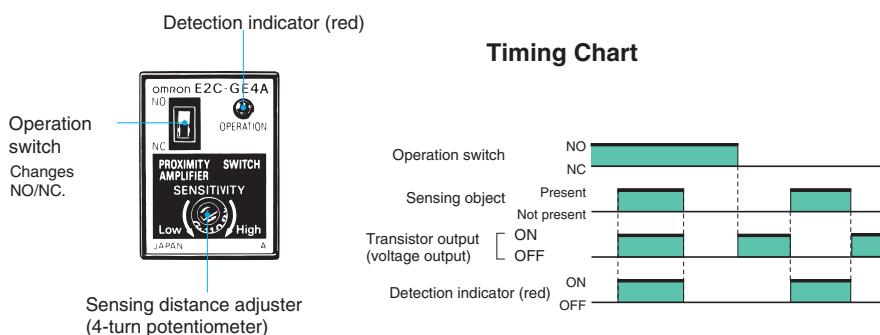
Model	E2C-AK4A	E2C-AM4A
Load		
DC load • Relay • Solenoid		 <p>* Use 40 V maximum when connecting the load to a separate power supply.</p>
Solid-state load • Programmable Controller • Sensor Controller	 <p>* For a current-sourcing load, connect to the negative side of the transistor/photocoupler output.</p>	 <p>* For a current-sourcing load, connect the PNP output.</p>
Voltage loads (logic circuit)		

The E2C-AK4A supports relay and transistor/photocoupler outputs, and the E2C-AM4A supports both NPN and PNP open-collector output. They can be connected to a wide variety of load types and power polarities.

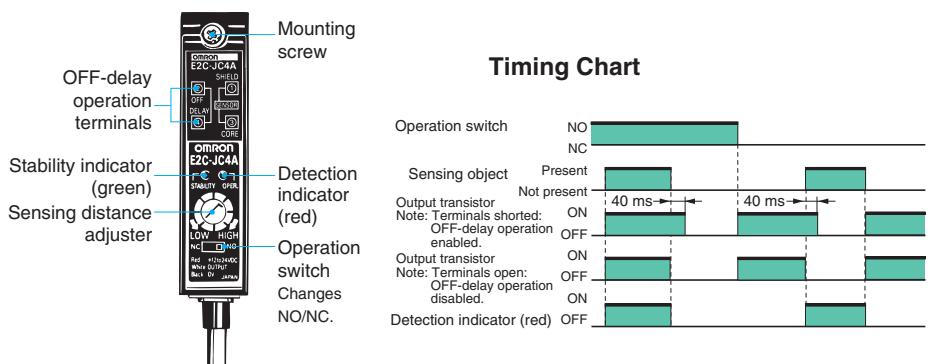
## Nomenclature and Timing Charts

### Amplifier Units

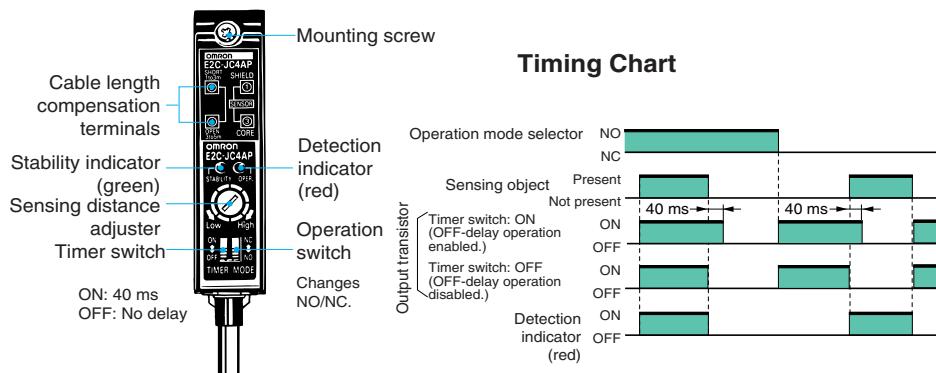
#### E2C-G□4A



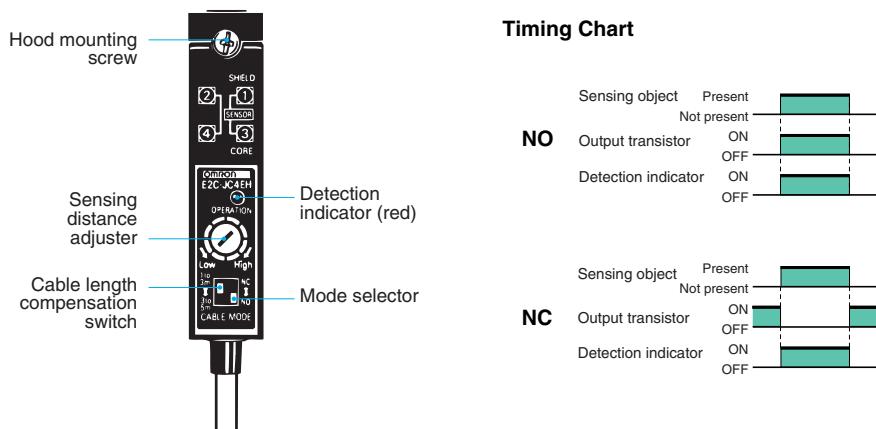
#### E2C-JC4A



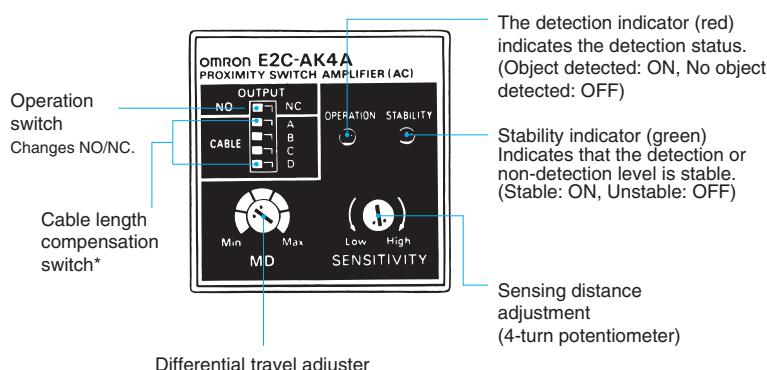
## E2C-JC4AP



## E2C-JC4CH, E2C-JC4DH, E2C-JC4EH



## E2C-A□4A



\* Cable Length Compensation Switching  
Set this switch to the proper setting depending on whether the standard cable length is being used or the cable has been cut shorter.

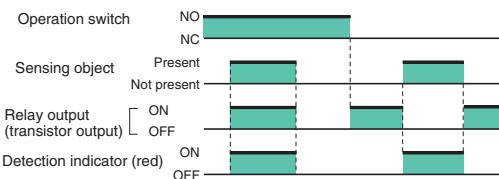
## Amplifier Unit Switch Settings

Applicable Sensors	Cable length	0 to 1 m	1 to 2 m	2 to 3 m	3 to 4 m	4 to 5 m	5 to 6 m	6 to 7 m	7 to 8 m	8 to 9 m	9 to 10 m
E2C-CR8A							—	—	—	—	—
E2C-CR8B							—	—	—	—	—
E2C-X1A							—	—	—	—	—
E2C-C1A							—	—	—	—	—
E2C-X1R5A							—	—	—	—	—
E2C-X2A											
E2C-X5A											
E2C-X10A											
E2C-C20MA											

Note: 1. Mutual Interference Prevention: When mounting Sensors with the same diameter and cable length in parallel, set the DIP switch to modes that differ by 1 m in cable length. Specifications, however, may not be sufficiently met, so always check operation before actual application. This method cannot be used for the E2C-C20MA.

2. When using the E2C-CR5B + E2C-AM4A (or AK4A), set all the pins on the Amplifier Unit DIP switch to the left.

## Timing Chart



## 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.**



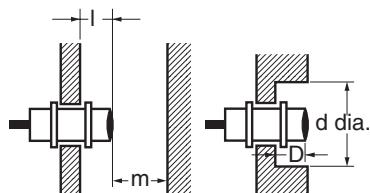
### Precautions for Correct Use

Do not use the Encoder under ambient conditions that exceed the ratings.

#### ● Design

##### Influence of Surrounding Metal

When mounting the Sensor within a metal panel, ensure that the clearances given in the following table are maintained. Failure to maintain these distances may cause deterioration in the performance of the Sensor.



##### Influence of Surrounding Metal (Unit: mm)

Model	Distance	<i>l</i>	<i>d</i>	<i>D</i>	<i>m</i>
E2C-CR8			(3.5)		2.4
E2C-X1A			(5)		3
E2C-C1A			(5.4)		
E2C-X1R5A(H)	0		(8)	0	4.5
E2C-X2A(H)			(12)		6
E2C-X5A(H)			(18)		15
E2C-X10A			(30)		30
E2C-C20MA	25	120	40	60	

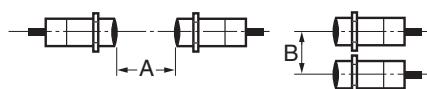
Note: Values in parentheses for diameter *d* are the outer diameters of Shielded Models.

#### Mutual Interference

When installing Sensors face-to-face or side-by-side, ensure that the minimum distances given in the following table are maintained.

Mutual interference can be prevented by using the cable length compensation switch, but doing so will also change coil characteristics. Specifications such as temperature specifications and sensing distance, may not be sufficiently met, so always check operation before actual application.

This method cannot be used for the E2C-G□4A, E2C-JC4A, E2C-C20MA.



##### Mutual Interference (Unit: mm)

Model	Distance	<i>A</i>	<i>B</i>
E2C-CR8			
E2C-X1A		20	15
E2C-C1A			
E2C-X1R5A(H)			
E2C-X2A(H)	30	20	
E2C-X5A(H)	50	35	
E2C-X10A	100	70	
E2C-C20MA	300	200	

Note: The above values are for a differential travel setting of 5%.

#### Mounting

- Do not use excessive force when tightening the nuts on the E2C-X and E2C-C20MA. A washer must be used with the nut.

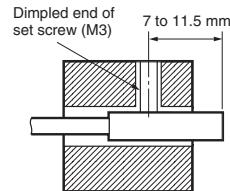


Model	Torque
E2C-X1A	0.98 N·m
E2C-X1R5A(H)	2.0 N·m
E2C-X2A(H)	5.9 N·m
E2C-X5A(H)	15 N·m
E2C-X10A	39 N·m
E2C-C20MA	15 N·m

Note: The above leeways in tighten torque assume that a toothed washer is being used.

- Mounting Unthreaded Cylindrical Models

When using a set screw, tighten it to a torque of 0.2 N·m max.



Y92E-F3R5 Mounting Bracket (for 3.5 dia.) (Order Separately)



The Y92E-F5R4 (for 5.4 dia.) is also sold separately.

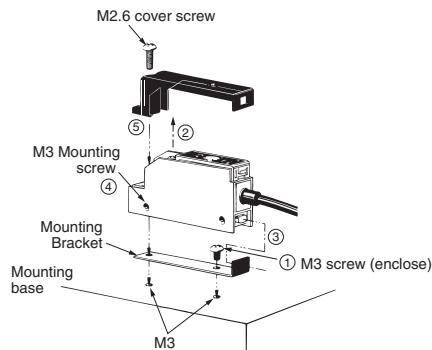
## ● Mounting

### Mounting the Amplifier Unit

#### E2C-JC4A

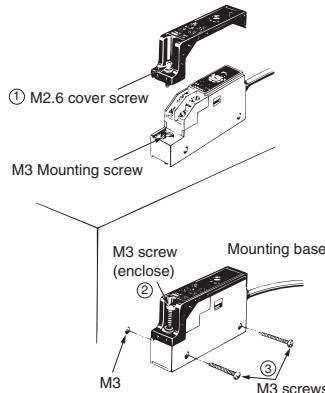
##### Lengthwise Mounting

- (1)Secure the Mounting Bracket with the enclosed M3 screws.
- (2)Loosen the M2.6 cover screw and remove the cover.
- (3)Slide the protrusion on the Amplifier Unit into the hole on the Mounting Bracket.
- (4)Using the M3 mounting screw inside the Amplifier Unit, secure the Amplifier Unit to the mounting base.
- (5)Secure the cover to the case.



##### Mounting to the Side

- (1)Loosen the M2.6 cover screw and remove the cover. Loosen the M2.6 cover screw and remove the cover, and remove the M3 screw.
- (2)Attached the enclosed M3 screw to the cover and secure the cover to the case.
- (3)Secure the Amplifier Unit with M3 screws from the side. You must provide these screws.



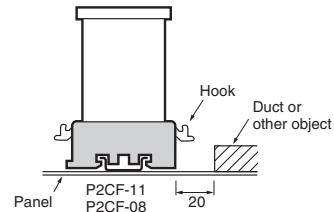
After completing adjustments, attach the enclosed caution label over the adjustment holes to prevent adjustment mistakes.



#### E2C-A□4A

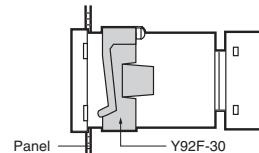
##### Using P2CF-11, P2CF-08

When aligning the Amplifier Unit vertically with the Socket, consider the space required for the hooks and allow a leeway of about 20 mm above and below the Amplifier Unit.

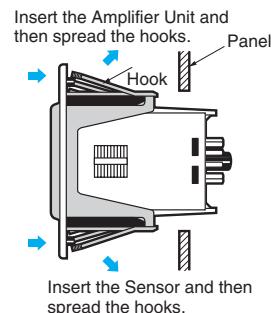


##### Mounting Embedded in a Panel

- (1)When using the Y92F-30 Embedded Mounting Adapter, insert the Amplifier Unit into a square hold in the panel, attach the Adapter from the back and press in to reduce the gap with the panel. Then secure the Adapter with the screws.

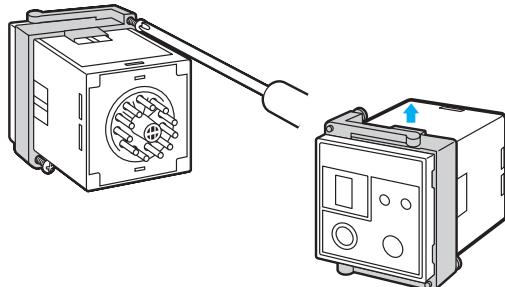


- (2)When using the Y92F-70 or Y92F-71 Embedded Mounting Adapter, just press the Amplifier into a square hole in the panel. If the panel coating is too thick and the hooks do not lock in place, spread the hooks from the back by pushing in the directions of the arrows.

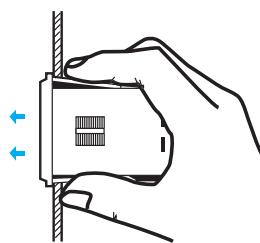


### Removing the Amplifier Unit

- When the Amplifier Unit is mounted using the Y92F-30, loosen the screws on the adapter, spread the hooks at the top and bottom, and remove the Adapter.



- Using Y92F-70, Y92F-71  
Press in on the hooks with your thumb and forefinger and press forward on the Amplifier Unit.



### ● Wiring

#### Self-diagnostic Output

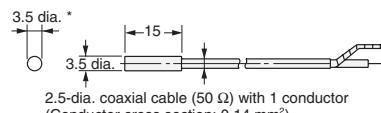
When not using the self-diagnostic output, connect the orange wire to 0 V or cut it and wrap it with insulation tape so that it does not come into contact with other terminals.

### ● Miscellaneous

The sensor does not have a water-resistant structure. Do not use it where it would be subjected to water or water vapor.

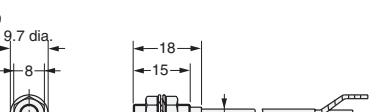
(Unit: mm)

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

**Dimensions****Main Units****Sensor****E2C-CR8A/-CR8B**

2.5-dia. coaxial cable (50 Ω) with 1 conductor  
(Conductor cross section: 0.14 mm<sup>2</sup>),  
Standard length: 3 m

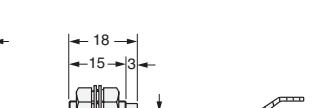
\*E2C-CR8B: Diameter is 3.8.

**E2C-X1A**

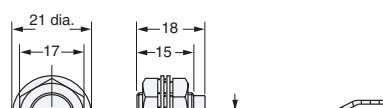
M5 × 0.5  
2.5-dia. coaxial cable (50 Ω) with 1 conductor (Conductor cross section: 0.14 mm<sup>2</sup>), Standard length: 3 m

**E2C-C1A**

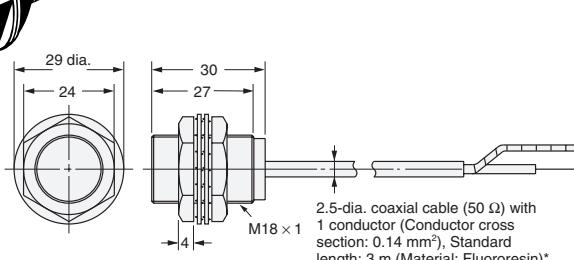
2.5-dia. coaxial cable (50 Ω) with 1 conductor (Conductor cross section: 0.14 mm<sup>2</sup>), Standard length: 3 m

**E2C-X1R5A****E2C-X1R5AH\***

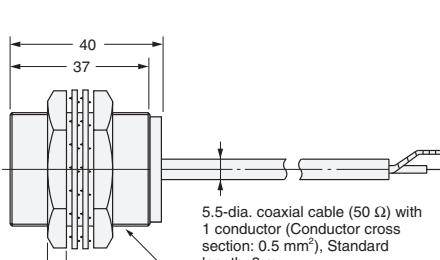
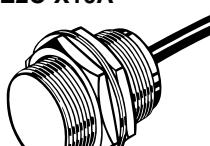
M8 × 1  
2.5-dia. coaxial cable (50 Ω) with 1 conductor (Conductor cross section: 0.14 mm<sup>2</sup>), Standard length: 3 m (Material: Fluororesin)\*

**E2C-X2A****E2C-X2AH\***

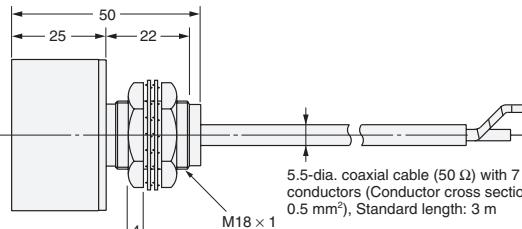
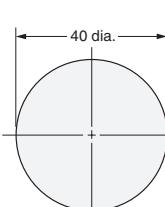
M12 × 1  
2.5-dia. coaxial cable (50 Ω) with 1 conductor (Conductor cross section: 0.14 mm<sup>2</sup>), Standard length: 3 m (Material: Fluororesin)\*

**E2C-X5A****E2C-X5AH\***

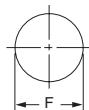
2.5-dia. coaxial cable (50 Ω) with 1 conductor (Conductor cross section: 0.14 mm<sup>2</sup>), Standard length: 3 m (Material: Fluororesin)\*

**E2C-X10A**

M30 × 1.5  
5.5-dia. coaxial cable (50 Ω) with 1 conductor (Conductor cross section: 0.5 mm<sup>2</sup>), Standard length: 3 m

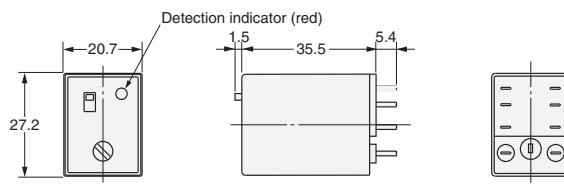
**E2C-C20MA**

5.5-dia. coaxial cable (50 Ω) with 7 conductors (Conductor cross section: 0.5 mm<sup>2</sup>), Standard length: 3 m

**Mounting Hole Dimensions**

Model	F (mm)	Model	F (mm)	Model	F (mm)
E2C-CR8A	3.7-dia. <sup>+0.3</sup> <sub>0</sub>	E2C-X1A	5.4-dia. <sup>+0.5</sup> <sub>0</sub>	E2C-X5A	18.5-dia. <sup>+0.5</sup> <sub>0</sub>
E2C-CR8B	4.0-dia. <sup>+0.3</sup> <sub>0</sub>	E2C-X1R5A	8.5-dia. <sup>+0.5</sup> <sub>0</sub>	E2C-X10A	30.5-dia. <sup>+0.5</sup> <sub>0</sub>
E2C-C1A	5.7-dia. <sup>+0.3</sup> <sub>0</sub>	E2C-X2A	12.5-dia. <sup>+0.5</sup> <sub>0</sub>	E2C-C20MA	18.5-dia. <sup>+0.5</sup> <sub>0</sub>

## Amplifier Units

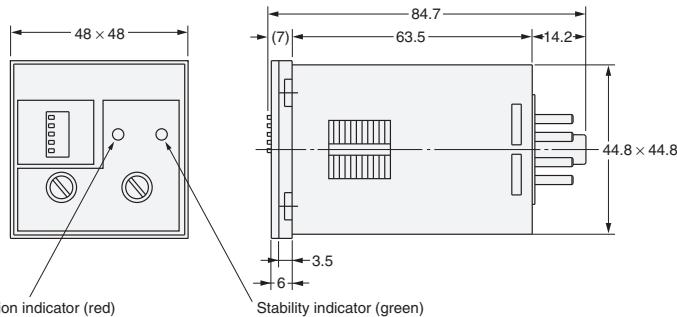
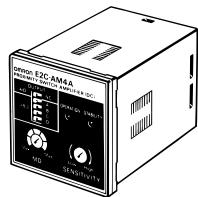
E2C-GE4A  
E2C-GF4AApplicable Sockets  
(Sold Separately)

- PYF08A

- PYF08

## Hold-down Clip

- PYC-A1

E2C-AK4A (11-pin)  
E2C-AM4A (8-pin)Applicable Sockets  
(Sold Separately)

For E2C-AK4A (11-pin)

- P2CF-11

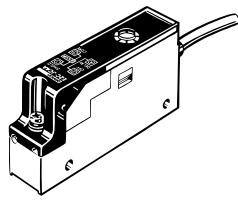
- P3GA-11

For E2C-AM4A (8-pin)

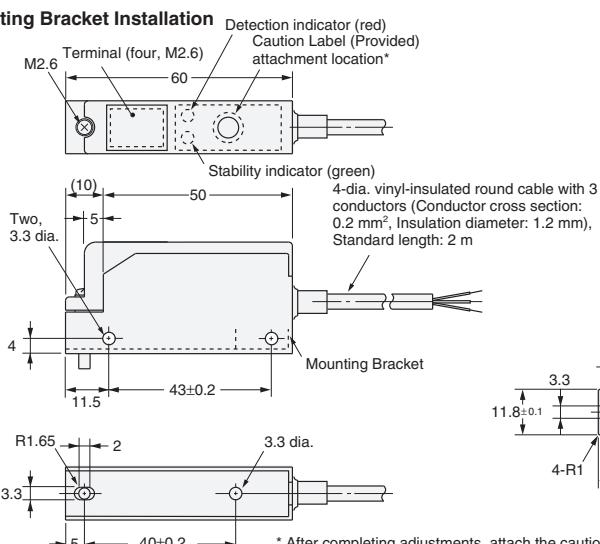
- P2CF-08

- P3G-08

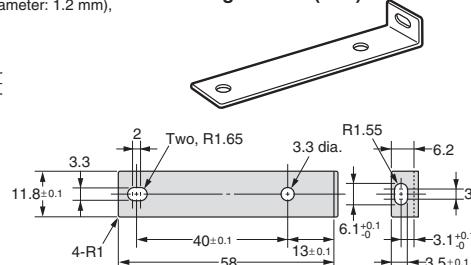
## E2C-JC4A



## Mounting Bracket Installation

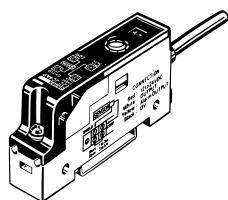


## Mounting Bracket (Iron)

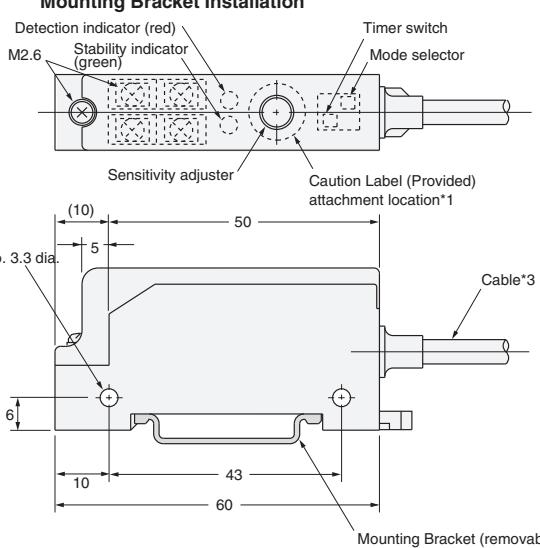


\* After completing adjustments, attach the caution label to prevent adjustment mistakes.

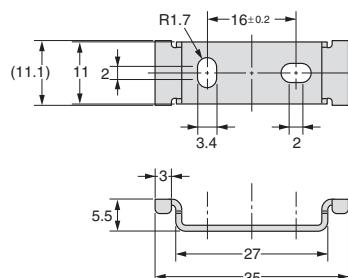
## E2C-JC4AP



## Mounting Bracket Installation

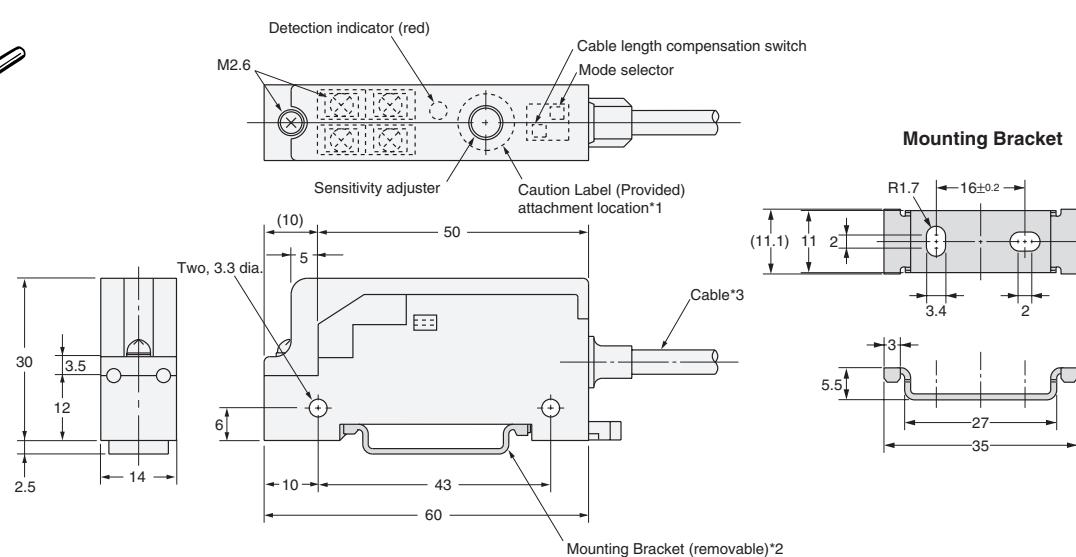
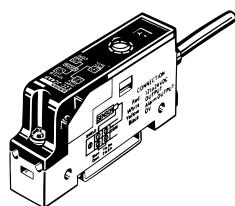


## Mounting Bracket (Iron)



\*1. After completing adjustments, attach the caution label to prevent adjustment mistakes.  
 \*2. Not required when mounting to DIN Track.  
 \*3: 4.5-dia. vinyl-insulated round cable with 4 conductors (Conductor cross section: 0.2 mm², Insulator diameter: 1.2 mm), Standard length: 2 m

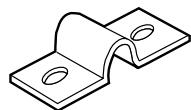
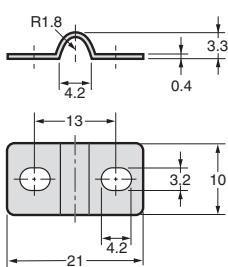
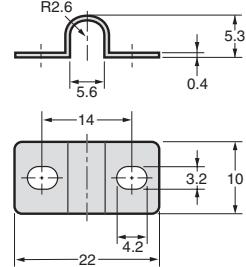
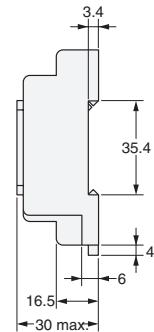
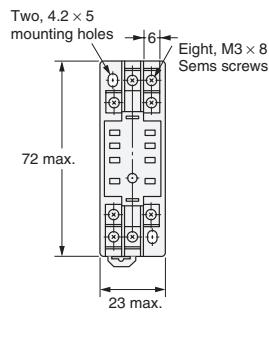
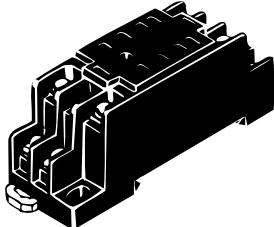
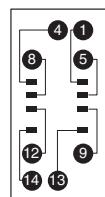
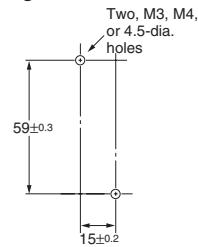
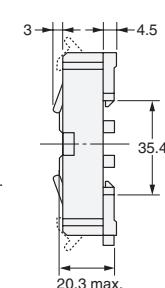
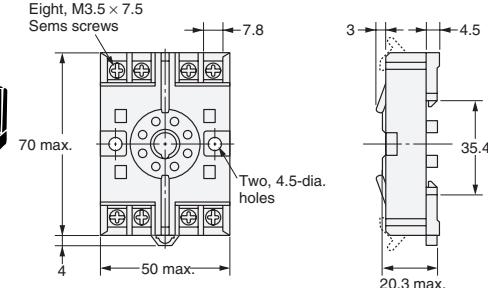
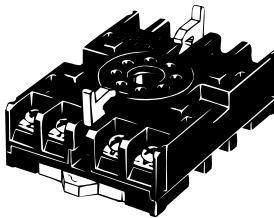
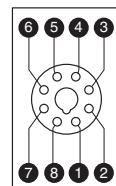
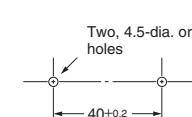
## E2C-JC4□H



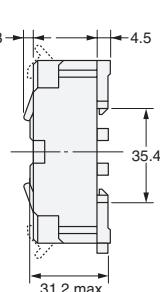
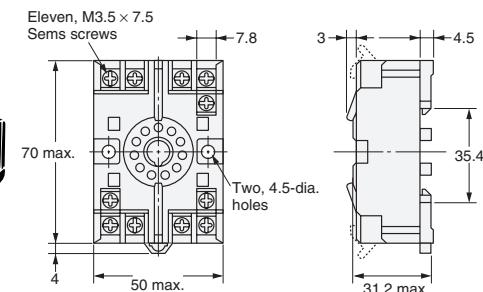
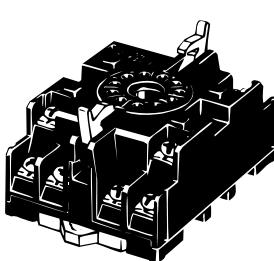
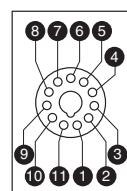
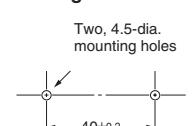
\*1. After completing adjustments, attach the caution label to prevent adjustment mistakes

\*2. Not required when mounting to DIN Track.

\*3. 4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.2 mm<sup>2</sup>, Insulator diameter: 1.2 mm). Standard length: 2 m  
The cable can be extended up to 200 m (separate metal conduit).

**Accessories (Order Separately)****Mounting Bracket****Mounting Bracket (for Unthreaded Cylindrical Models)****Y92E-F3R5 (for 3.5 dia.)****Y92E-F5R4 (for 5.4 dia.)****Y92E-F3R5****Y92E-F5R4****Front Connection Sockets****PYF08A****Terminal Arrangement and Internal Connections (Top View)****Mounting Hole Dimensions****P2CF-08****Terminal Arrangement and Internal Connections (Top View)****Mounting Hole Dimensions**

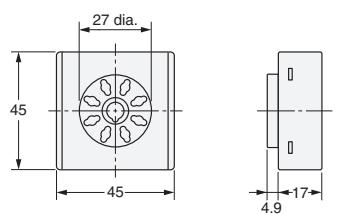
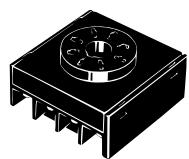
Note: Track mounting is also possible.

**P2CF-11****Terminal Arrangement and Internal Connections (Top View)****Mounting Hole Dimensions**

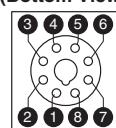
Note: Track mounting is also possible.

## Back Connection Sockets

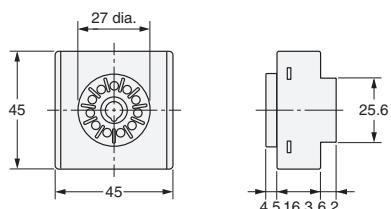
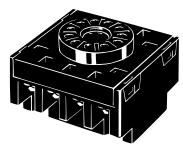
P3G-08



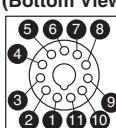
Terminal Arrangement and Internal Connections (Bottom View)



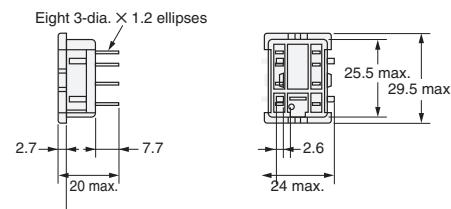
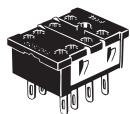
P3GA-11



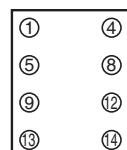
Terminal Arrangement and Internal Connections (Bottom View)



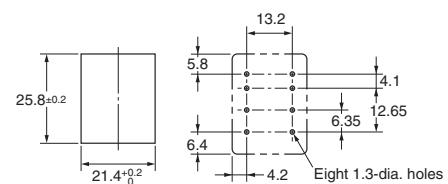
PY08



Terminal Arrangement and Internal Connections (Bottom View)

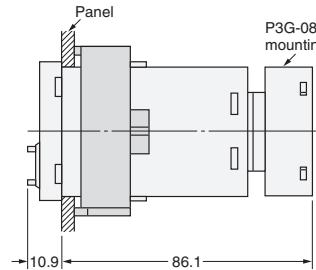
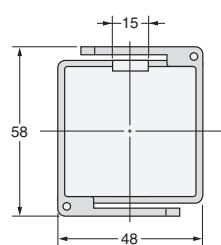
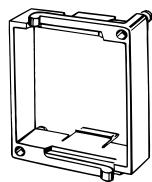


Mounting Holes and PCB Cutout Dimensions

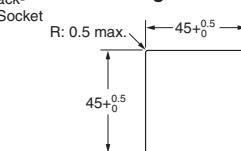


## Embedded Mounting Adapter (for E2C-AK4A/E2C-AM4A Amplifier Unit)

## Y92F-30



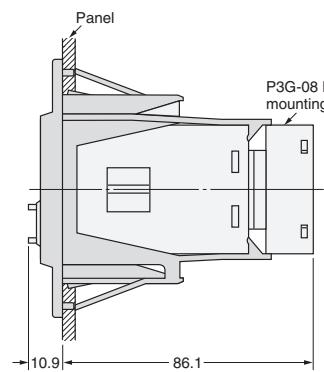
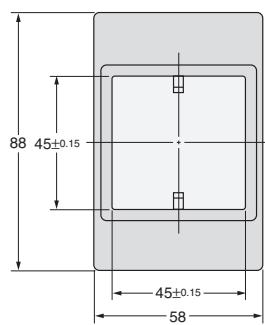
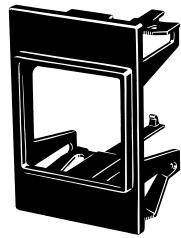
## Mounting Hole Dimensions



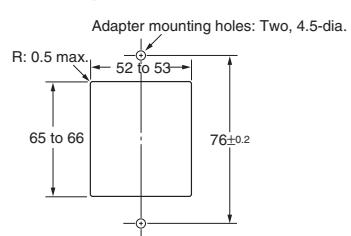
Note 1. Suitable mounting panel thickness:  
1 to 5 mm

Note 2. Check the direction of the Adapter,  
which depends on whether  
Amplifier Units are arranged  
vertically or horizontally.

## Y92F-70

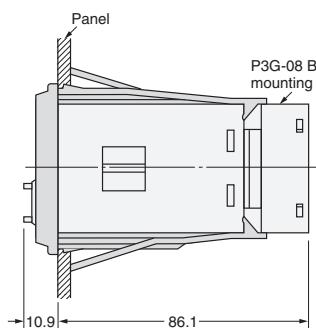
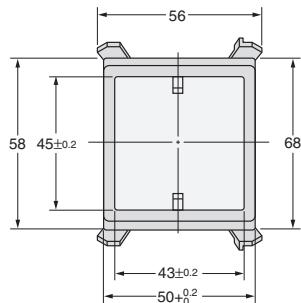


## Mounting Hole Dimensions

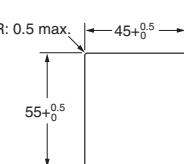


Note: Suitable mounting panel thickness:  
1 to 3.2 mm

## Y92F-71



## Mounting Hole Dimensions



Note: Suitable mounting panel thickness:  
1 to 3.2 mm

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2012.12

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