Inductive Proximity Sensor

E2EC

Subminiature Sensor with “Cable Amplifier” Offers Greater Mounting Flexibility

- Programmable Controller-compatible
- Subminiature, shielded sensing head (3 or 8 dia.) allows the Sensor to be flush-mounted in metal.
- Longer sensing distance: 2.5 mm with 8-dia. sensing head
- Side-by-side mounting of cable amplifier units possible.

Ordering Information

DC 2-wire Models

Type		Sensing distance	Output configuration	Model
3 dia.	Shielded	0.8 mm	NO	E2EC-CR8D1
			NC	E2EC-CR8D2
5.4 dia.		1.5 mm	NO	E2EC-C1R5D1
			NC	E2EC-C1R5D2
8 dia.		3 mm	NO	E2EC-C3D1
			NC	E2EC-C3D2
M12		4 mm	NO	E2EC-X4D1
			NC	E2EC-X4D2

Note: Models different in frequency are available with the E2EC-□□□□5 models (e.g., E2EC-CR8D15).

DC 3-wire Models

Type		Sensing distance	Output configuration	Model	
				NPN	PNP
3 dia.	Shielded	0.5 mm	NO	E2EC-CR5C1	E2EC-CR5B1
8 dia.		2.5 mm	NO	E2EC-C2R5C1	E2EC-C2R5B1

Specifications

■ Ratings/Characteristics

Item		2-wire DC models				3-wire DC models (NPN)		3-wire DC models (PNP)	
Model		**E2EC-CR8D□**	**E2EC-C1R5D□**	**E2EC-C3D□**	**E2EC-X4D□**	**E2EC-CR5C1**	**E2EC-C2R5C1**	**E2EC-CR5B1**	**E2EC-C2R5B1**
Sensing distance		**0.8 mm ±15%**	**1.5 mm ±10%**	**3 mm ±10%**	**4 mm ±10%**	**0.5 mm ±15%**	**2.5 mm ±10%**	**0.5 mm ±15%**	**2.5 mm ±10%**
Supply voltage (operating voltage range)		12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.				5 to 24 VDC (4.75 to 30 VDC), ripple (P-P): 10% max.			
Current consumption		---				10 mA max.			
Leakage current		0.8 mA max.				---			
Sensing object		Magnetic metals (Refer to *Engineering Data* for non-magnetic metals.)							
Sensing distance (with standard sensing object)		0 to 0.56 mm (iron: 5 x 5 x 1 mm)	0 to 1.05 mm (iron: 5 x 5 x 1 mm)	0 to 2.1 mm (iron: 8 x 8 x 1 mm)	0 to 2.8 mm (iron: 12 x 12 x 1 mm)	0 to 0.3 mm (iron: 5 x 5 x 1 mm)	0 to 1.7 mm (iron: 8 x 8 x 1 mm)	0 to 0.3 mm (iron: 5 x 5 x 1 mm)	0 to 1.7 mm (iron: 8 x 8 x 1 mm)
Differential travel		10% max. of sensing distance							
Response frequency (see note)		1.5 kHz		1 kHz					
Operation (with sensing object approaching)		D1 models: Load operates. D2 models: Load is reset.				Load operates.			
Control output (switching capacity)		5 to 100 mA				100 mA max. at 30 VDC, open collector output			
Circuit protection		Surge absorber and load short-circuit protection				Surge absorber			
Indicator		D1 models: Operation indicator (red LED), operation set indicator (green LED) D2 models: Operation indicator (red LED)				Detection indicator (red LED)			
Ambient temperature		Operating: –25°C to 70°C (with no icing)							
Ambient humidity		Operating: 35% to 95%							
Temperature influence		±20% max. of sensing distance at 23°C in temperature range of –25°C and 70°C							
Voltage influence		±2.5% max. of sensing distance in rated voltage when operated within ±15% of the rated supply voltage				±5% max. of sensing distance in rated voltage range of 4.75 to 30 V			
Residual voltage		3.0 V max. (under load current of 100 mA with cable length of 2 m)				1.0 V max. (under load current of 100 mA with cable length of 2 m)			
Insulation resistance		50 MΩ (at 500 VDC) between current carry parts and case							
Dielectric strength		1,000 VAC (50/60 Hz) for 1 min between current carry parts and case				500 VAC (50/60 Hz) for 1 min between current carry parts and case			
Vibration resistance		Malfunction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hrs each in X, Y, and Z directions							
Shock resistance		Malfunction: 1,000 m/s^2 (approx. 100G) for 10 times each in X, Y, and Z directions				Malfunction: 500 m/s^2 (approx. 50G) for 10 times each in X, Y, and Z directions			
Enclosure rating		IEC IP67				IEC IP64			
Weight		Approx. 45 g							
Head material	**Case**	Brass							
	Sensing surface	ABS resin							

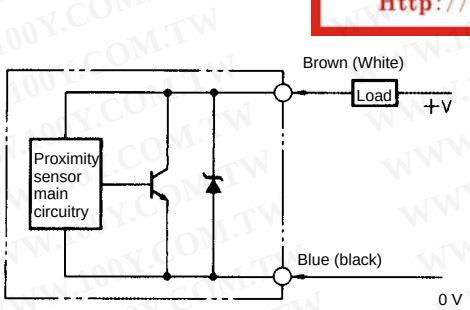
Note: Response frequencies are mean values measured with standard sensing objects, each separated from one another with a distance that is double the size of the sensing object and located at a distance that is half the sensing distance.

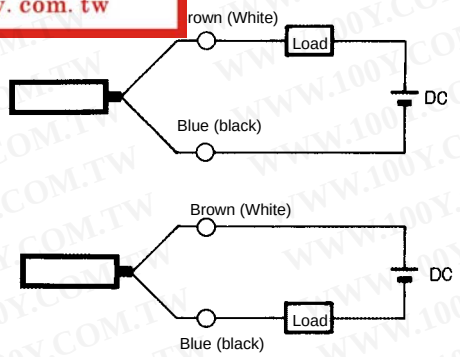
Operation

■ Output Circuits

Colors in parentheses are previous ones.

DC 2-wire Models

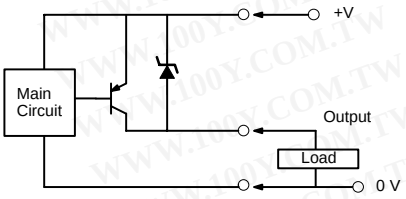




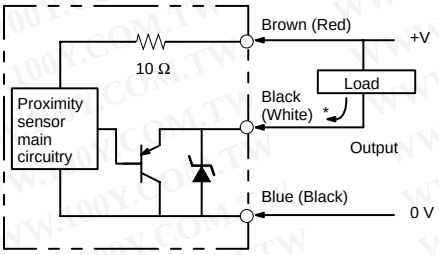
Note: As shown in the above circuit diagrams, the load can be connected in two ways.

DC 3-wire Models

PNP



NPN

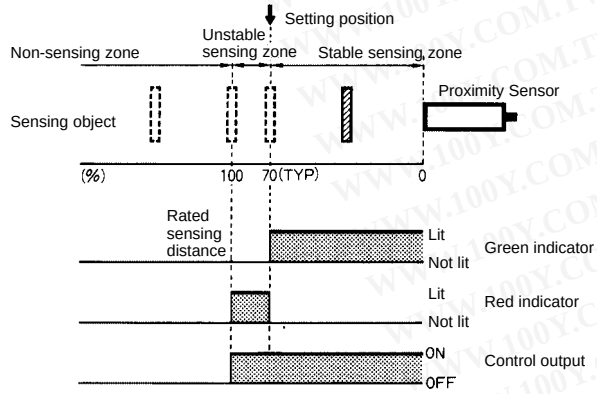


Note: 100 mA max. (load current)

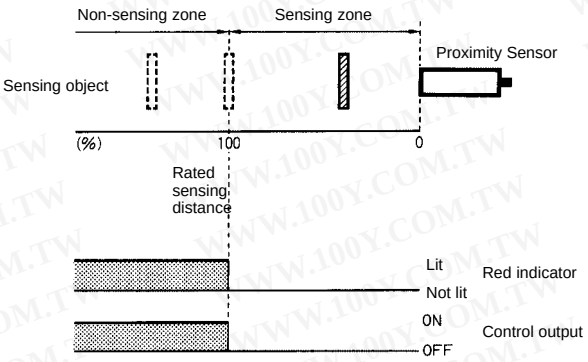
■ Operating Charts

DC 2-wire Models

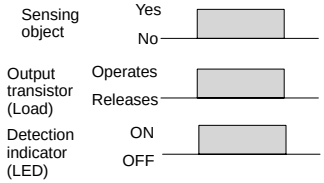
NO Model



NC Model



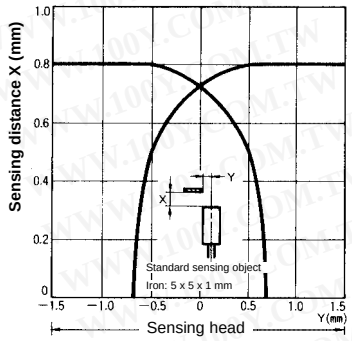
DC 3-wire Models



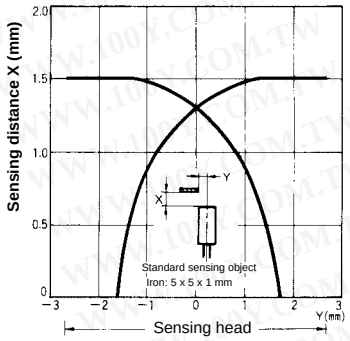
Engineering Data

Operating Range (Typical)

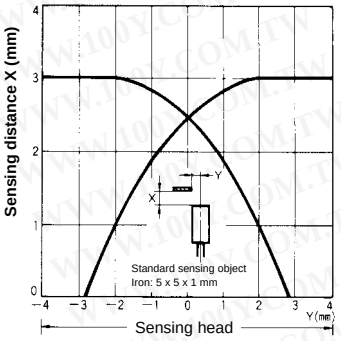
E2EC-CR8D1



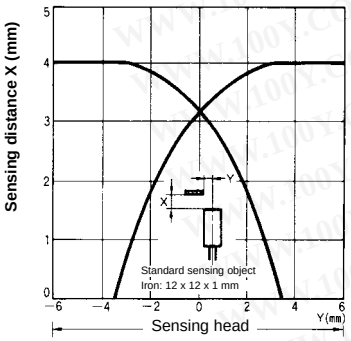
E2EC-C1R5D1



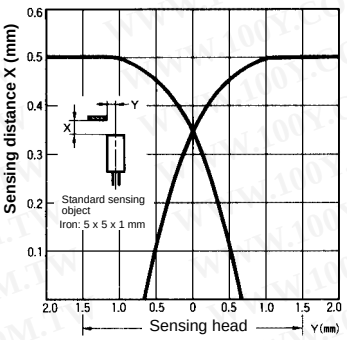
E2EC-C3D1



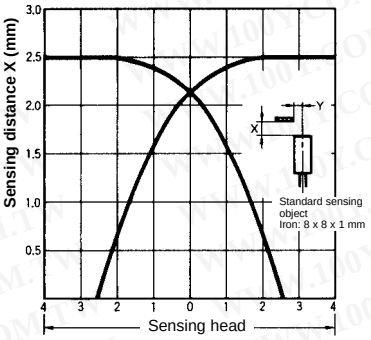
E2EC-X4D1



E2EC-CR5C1

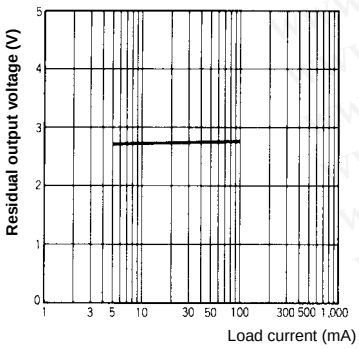


E2EC-C2R5C1



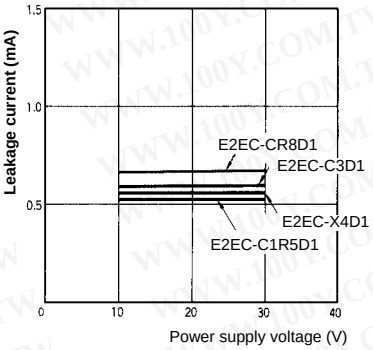
Residual Output Voltage (Typical)

DC 2-wire Models



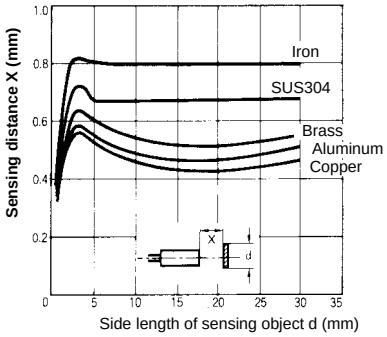
Leakage Current (Typical)

DC 2-wire Models

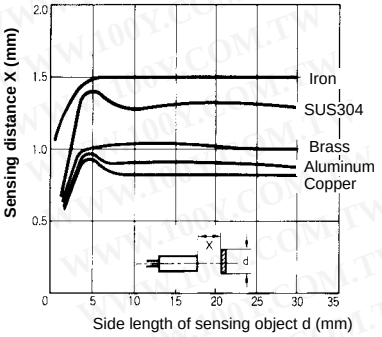


Sensing Distance vs. Sensing Object (Typical)

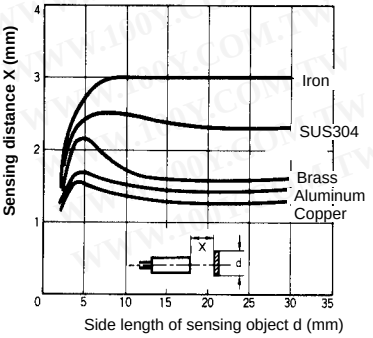
E2EC-CR8D1



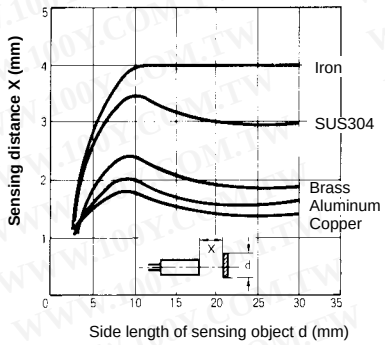
E2EC-C1R5D1



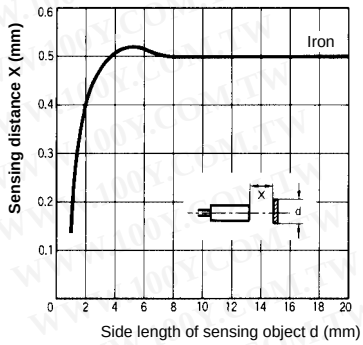
E2EC-C3D1



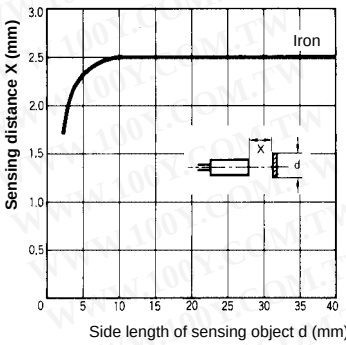
E2EC-X4D1



E2EC-CR5C1

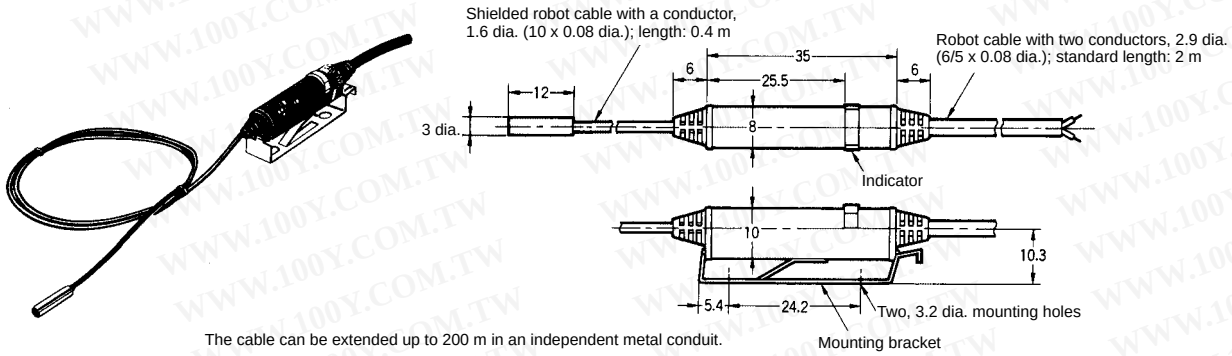


E2EC-C2R5C1



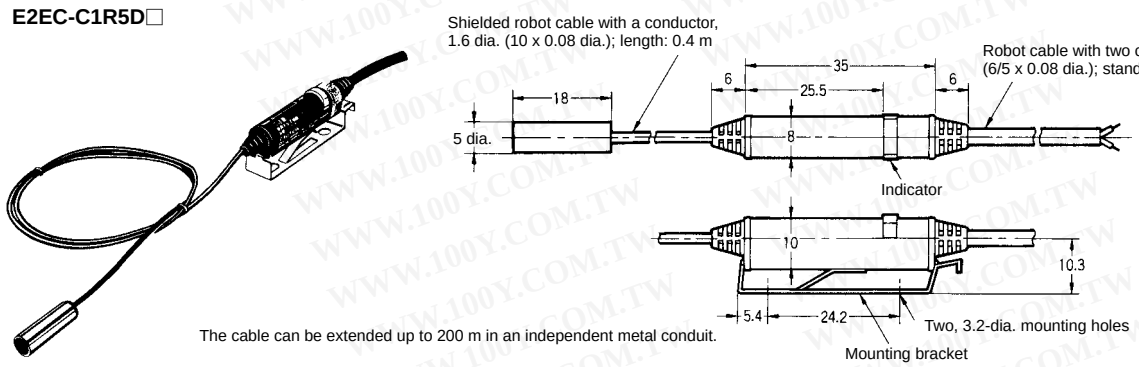
Dimensions

E2EC-CR8D□



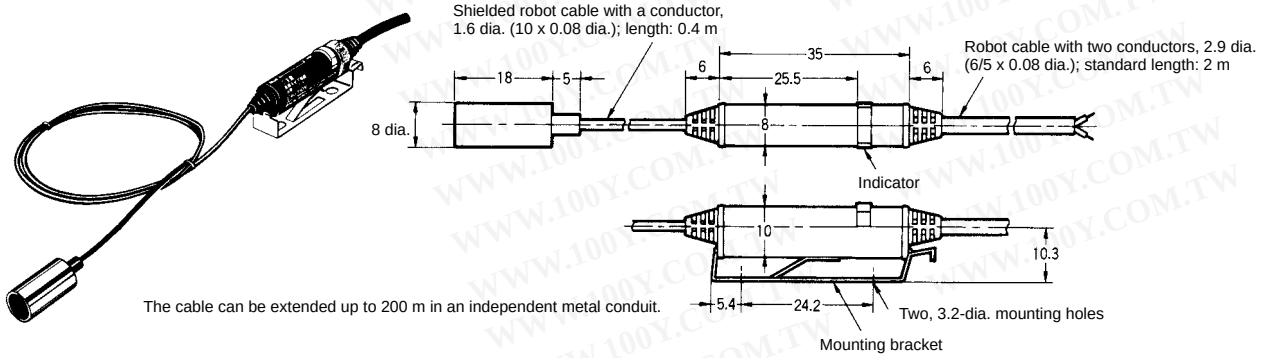
The cable can be extended up to 200 m in an independent metal conduit.

E2EC-C1R5D□



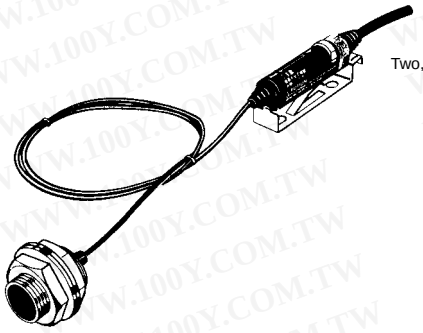
The cable can be extended up to 200 m in an independent metal conduit.

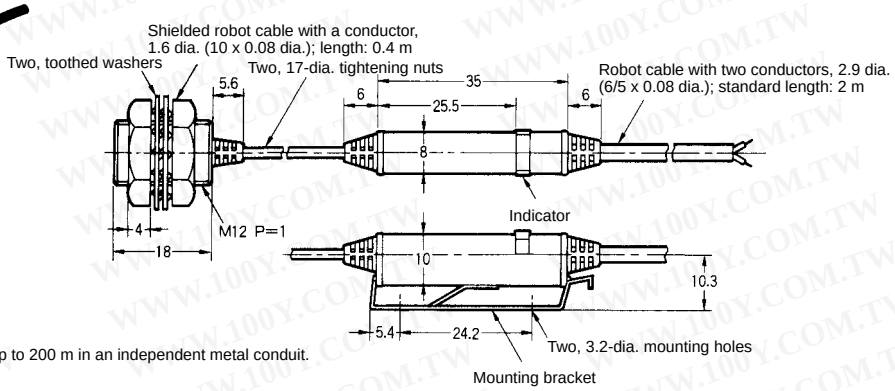
E2EC-C3D□



The cable can be extended up to 200 m in an independent metal conduit.

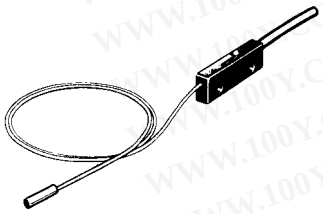
E2EC-X4D□

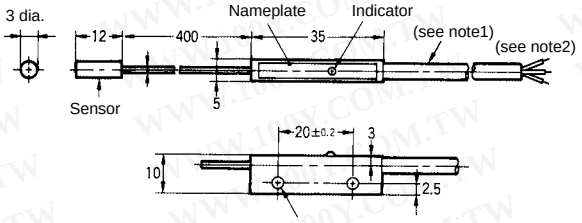




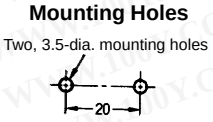
The cable can be extended up to 200 m in an independent metal conduit.

E2EC-CR5C1



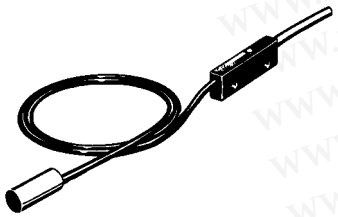


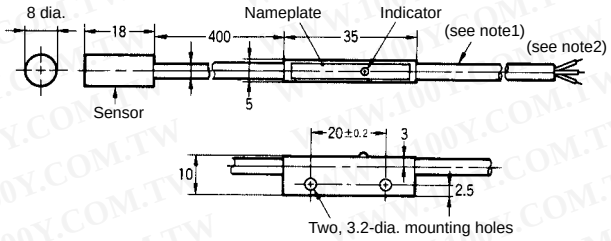
Mounting Holes



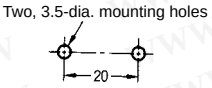
Note:
1. Oil-and vibration-resistant, vinyl-insulated round cable with three conductors, 4 dia. (0.5 mm x 3); standard length: 2 m
2. The cable can be extended up to 200 m in an independent metal conduit.

E2EC-C2R5C1



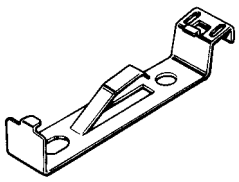


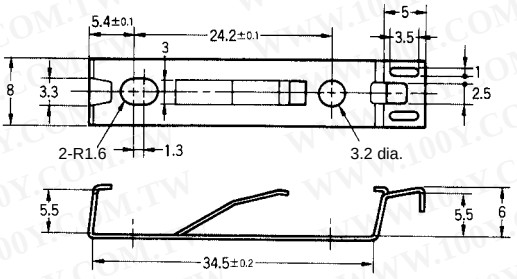
Mounting Holes



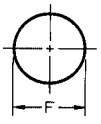
Note:
1. Oil-and vibration-resistant, vinyl-insulated round cable with three conductors, 4 dia. (0.5 mm x 3); standard length: 2 m
2. The cable can be extended up to 200 m in an independent metal conduit.

Mounting Bracket (Provided with DC 2-wire Models)





Mounting Hole Dimension

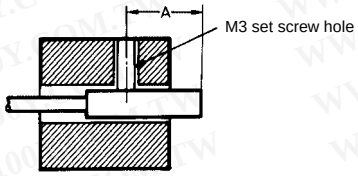


Model	F (mm)
E2EC-CR8D□	$3.3^{+0.3}_{0}$ dia
E2EC-C1R5D□	$5.7^{+0.3}_{0}$ dia
E2EC-C3D□	$8.5^{+0.5}_{0}$ dia
E2EC-X4D□	$12.5^{+0.5}_{0}$ dia
E2EC-CR5□1	$3.3^{+0.3}_{0}$ dia
E2EC-C2R5□1	$8.5^{+0.5}_{0}$ dia

Precautions

Mounting

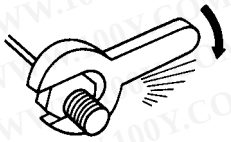
Refer to the following table for the torque and tightening ranges applied to mount the E2EC-C (i.e., non-screw model).



Permissible Tightening Range and Torque

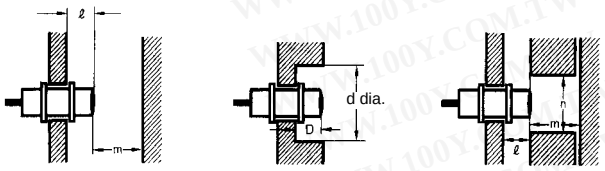
Model	Tightening range A	Set-screw tightening torque
E2EC-CR8D	6 to 10 mm	5 kgf • cm {0.49 N • m}
E2EC-C1R5D	8 to 16 mm	5 kgf • cm {0.49 N • m}
E2EC-C3D	8 to 16 mm	10 kgf • cm {0.98 N • m}
E2EC-CR5□1	6 to 10 mm	4 kgf • cm {0.39 N • m}
E2EC-C2R5□1	8 to 16 mm	

The tightening torque applied to the E2EC-X4D (i.e., models with column screws) must be 120 kgf • cm (12 N • m) max.



Effects of Surrounding Metal

When mounting the E2EC within a metal panel, ensure that the clearances given in the following table are maintained.



Mounting Conditions

Item	E2EC-CR8D	E2EC-C1R5D	E2EC-C3D	E2EC-X4D	E2EC-CR5□1	E2EC-C2R5□1
ℓ	0	0	0	0	0	0
d	3	5.4	8	12	3	8
D	0	0	0	0	0	0
m	2.4	4.5	9	12	1.5	10
n	6	10.8	16	24	5	21

Mutual Interference

When mounting more than one E2EC face to face or side by side, ensure that the minimum distances given in the following table are maintained.

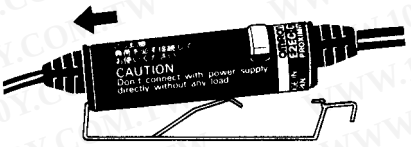
Item	E2EC-CR8D	E2EC-C1R5D	E2EC-C3D	E2EC-X4D	E2EC-CR5□1	E2EC-C2R5□1
A	8 (4)	15 (8)	30 (15)	40 (20)	20 (10)	40 (20)
B	6 (3)	10.8 (5.4)	16 (8)	24 (12)	15 (3)	25 (15)

Note: Figures in parentheses are for Sensors operating at different frequencies.

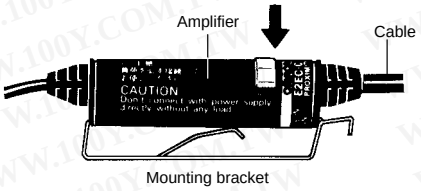
Mounting Bracket for DC 2-wire Models

Mounting

1. Insert the amplifier into the trapezoidal end (i.e., the fixing side) of the mounting bracket.

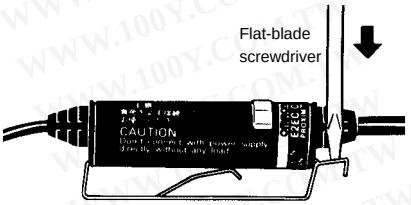


2. Press the other end of the amplifier onto the bracket.



Dismounting

1. Lightly press the hook of the mounting bracket with a flat-blade screwdriver.



2. The amplifier will be automatically dismounted due to the spring force of the mounting bracket.