Cable Amplifier Proximity Sensor

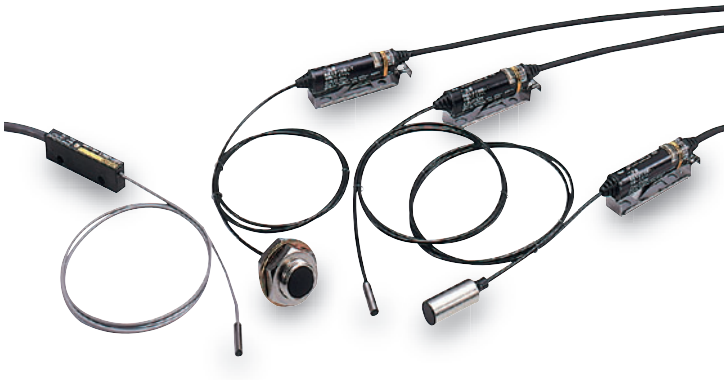
E2EC

CSM_E2EC_DS_E_8_1

Subminiature Sensors with Long-distance Detection

- Shielded Sensor Heads from 3-mm to M12 diameters that can be embedded in metal.
- Robotics cables provided as a standard feature (DC 2-Wire Models).
- Indicator provided in Amplifier cable for easy confirmation of operation.
- Power supply range of 5 to 24 VDC for DC 3-Wire Models.

⚠ Be sure to read *Safety Precautions* on page 6.



Ordering Information

Sensors [Refer to *Dimensions* on page 7.]

DC 2-Wire Models

Appearance		Sensing distance	Model	
			Operation mode	
			NO	NC
Shielded	3 dia.	0.8 mm	E2EC-CR8D1 2M *	E2EC-CR8D2 2M *
	5.4 dia.	1.5 mm	E2EC-C1R5D1 2M *	E2EC-C1R5D2 2M *
	8 dia.	3 mm	E2EC-C3D1 2M *	E2EC-C3D2 2M *
	M12	4 mm	E2EC-X4D1 2M *	E2EC-X4D2 2M *

* Models with different frequencies are also available. The model numbers are E2EC-□□□□5 (example: E2EC-CR8D15).

DC 3-Wire Models

Appearance		Sensing distance	Model	
			Output configuration	NO
Shielded	3 dia.	0.5 mm	NPN open-collector output	E2EC-CR5C1 2M *
	8 dia.	2.5 mm		E2EC-C2R5C1 2M *

* Models with different frequencies are also available. The model numbers are E2EC-□□□□5 (example: E2EC-CR5D15).

Accessories (Order Separately)

Mounting Bracket

The Mounting Bracket for the E2EC-C1R5D□ is not provided with the Sensor. Order a Mounting Bracket separately if required. [Refer to *Dimensions* on page 8.]

Appearance	Model	Applicable Sensors
	Y92E-F5R4	E2EC-C1R5D□ (5.4-mm-dia. Sensor)

Ratings and Specifications

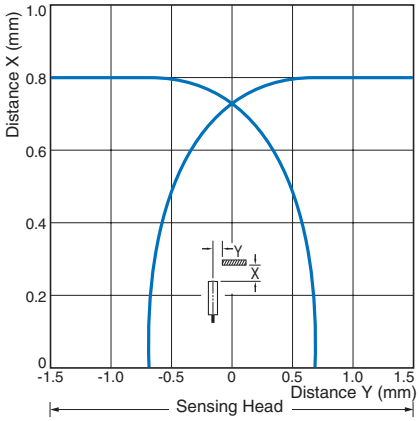
Item	Model	DC 2-Wire Models				DC 3-Wire Models	
		E2EC-CR8D□	E2EC-C1R5D□	E2EC-C3D□	E2EC-X4D□	E2EC-CR5C1	E2EC-C2R5C1
Sensing distance		0.8 mm ±15%	1.5 mm ±10%	3 mm ±10%	4 mm ±10%	0.5 mm ±15%	2.5 mm ±10%
Set distance		0 to 0.56 mm	0 to 1.05 mm	0 to 2.1 mm	0 to 2.8 mm	0 to 0.3 mm	0 to 1.7 mm
Differential travel		10% max. of sensing distance					
Detectable object		Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to *Engineering Data* on page 3.)					
Standard sensing object		Iron, 5 × 5 × 1 mm		Iron, 8 × 8 × 1 mm	Iron, 12 × 12 × 1 mm	Iron, 5 × 5 × 1 mm	Iron, 8 × 8 × 1 mm
Response frequency *1		1.5 kHz		1 kHz			
Power 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.				---	
Control output	Load current	5 to 100 mA				NPN open-collector output, 100 mA max. (30 VDC max.)	
	Residual voltage	3 V max. (Load current: 100 mA, Cable length: 2 m)				1 V max. (Load current: 100 mA, Cable length: 2 m)	
Indicators		D1 Models: Operation indicator (red), Setting indicator (green) D2 Models: Operation indicator (red)				Detection indicator (red)	
Operation mode (with sensing object approaching)		D1 Models: NO D2 Models: NC Refer to the timing charts under *I/O Circuit Diagrams* on page 5 for details.				NO Refer to the timing charts under *I/O Circuit Diagrams* on page 5 for details.	
Protection circuits		Load short-circuit protection, Surge suppressor				Surge suppressor	
Ambient temperature range		Operating/Storage: –25 to 70°C (with no icing or condensation)*2					
Ambient humidity range		Operating/Storage: 35% to 95% (with no condensation)					
Temperature influence		±20% max. of sensing distance at 23°C in the temperature range of –25 to 70°C					
Voltage influence		±2.5% max. of sensing distance at rated voltage in the rated voltage ±15% range				±5% max. of sensing distance at the rated voltage range in the voltage range of 4.75 to 30 V	
Insulation resistance		50 MΩ min. (at 500 VDC) between current-carrying parts and case					
Dielectric strength		1,000 VAC for 1 min between current-carrying parts and case				500 VAC for 1 min between current-carrying parts and case	
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions					
Shock resistance		Destruction: 1,000 m/s² 10 times each in X, Y, and Z directions				Destruction: 500 m/s² 10 times each in X, Y, and Z directions	
Degree of protection		IEC 60529 IP67, In-house standards: oil-resistant (For Sensor Head only)				IEC 60529 IP64	
Connection method		Pre-wired Models (Standard cable length: 2 m)					
Weight (packed state)		Approx. 45 g					
Materials	Case	Brass					
	Sensing surface	ABS					
	Clamping nut	---			Brass (nickel-plated)	---	
	Toothed washer	---			Iron (zinc-plated)	---	
Accessories		Amplifier Mounting Bracket, Instruction manual				Instruction manual	

*1. The response frequency is an average value.
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. Incorrect operation may occur if there is a large temperature difference between the Sensor Head and the Amplifier Unit.

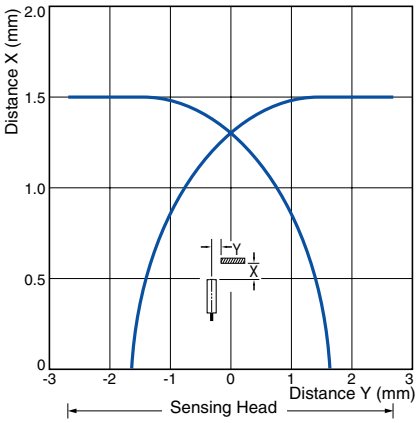
Engineering Data (Typical)

Sensing Area

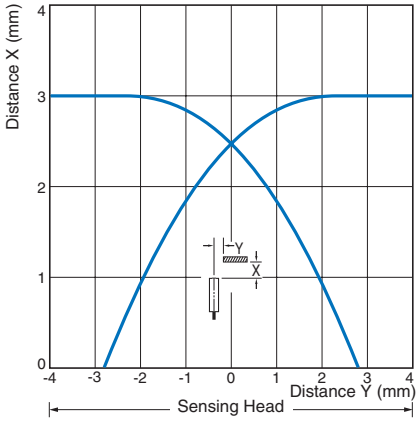
E2EC-CR8D1



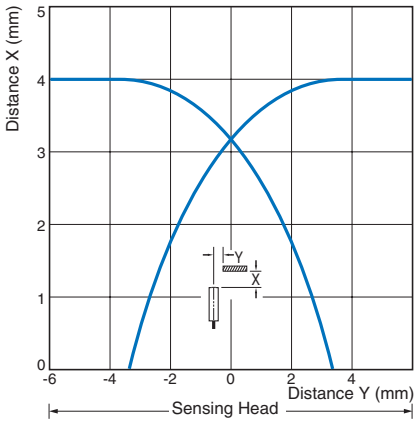
E2EC-C1R5D1



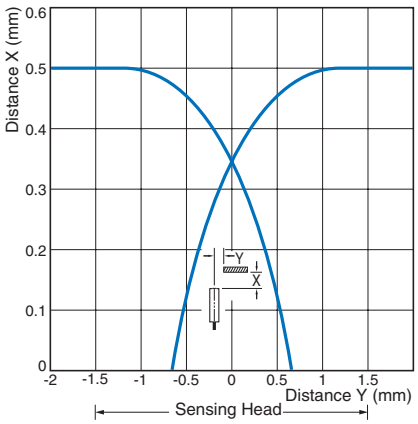
E2EC-C3D1



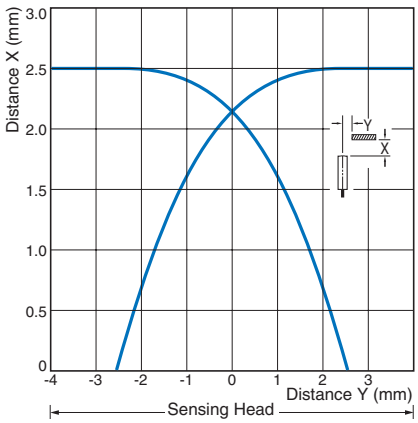
E2EC-X4D1



E2EC-CR5C1

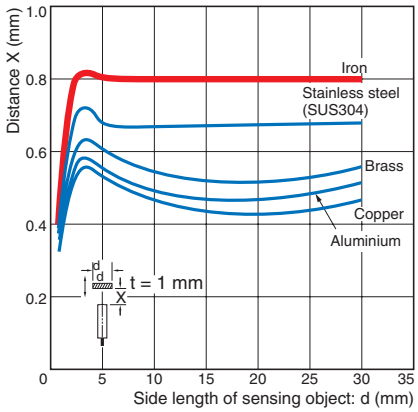


E2EC-C2R5C1

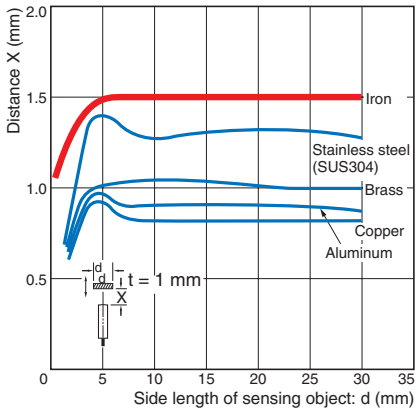


Influence of Sensing Object Size and Material

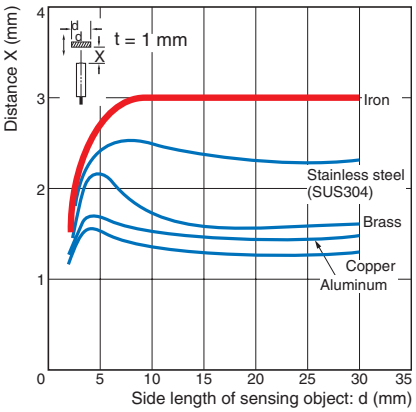
E2EC-CR8D1



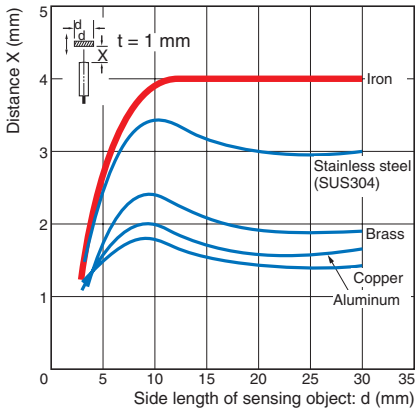
E2EC-C1R5D1



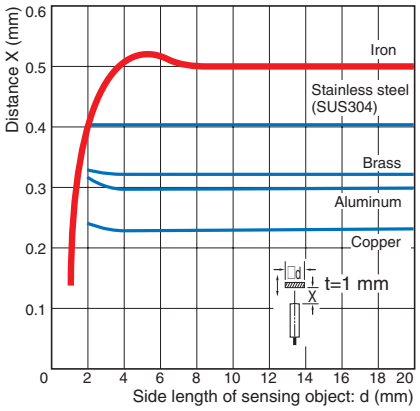
E2EC-C3D1



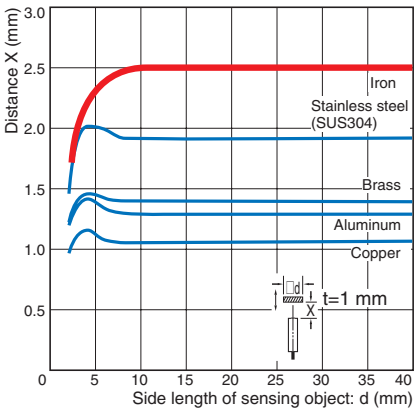
E2EC-X4D1



E2EC-CR5C1

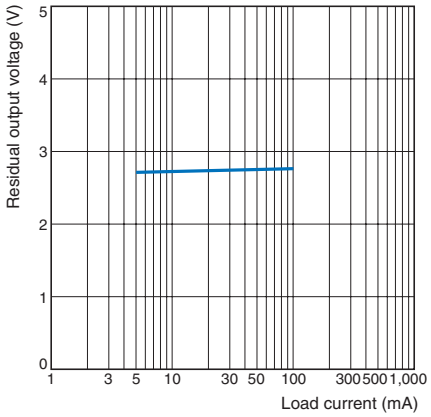


E2EC-C2R5C1



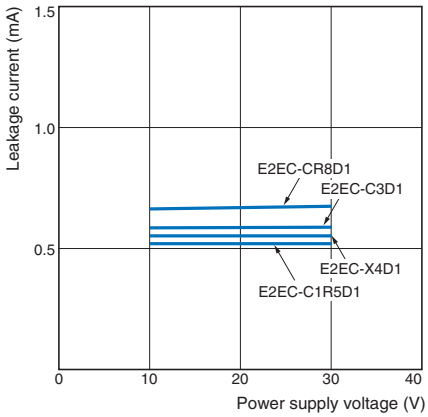
Residual Output Voltage

DC 2-Wire Models



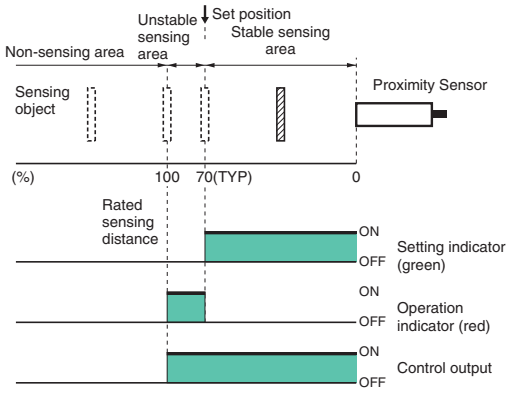
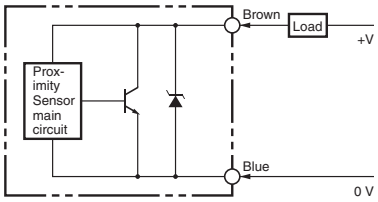
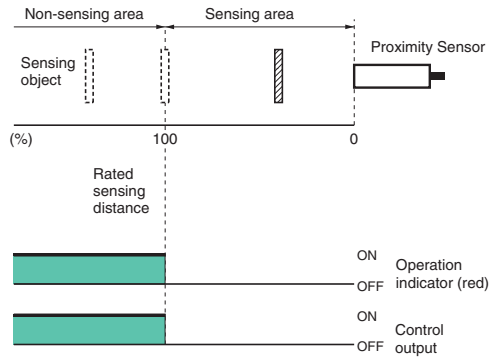
Leakage Current

E2EC

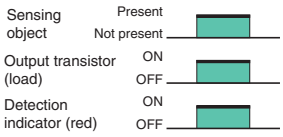
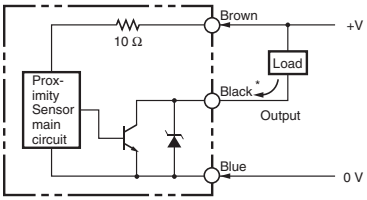


I/O Circuit Diagrams

DC 2-Wire Models

Operation	Model	Timing Chart	Output circuit
NO	E2EC-CR8D1 E2EC-C1R5D1 E2EC-C3D1 E2EC-X4D1		 Note: The load can be connected to either the +V or 0 V side.
NC	E2EC-CR8D2 E2EC-C1R5D2 E2EC-C3D2 E2EC-X4D2		

DC 3-Wire Models

Operation	Model	Timing Chart	Output circuit
NO	E2EC-CR5C1 E2EC-C2R5C1		 Maximum load current: 100 mA Note: The Sensor may be destroyed if mistakes are made in wiring.

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.

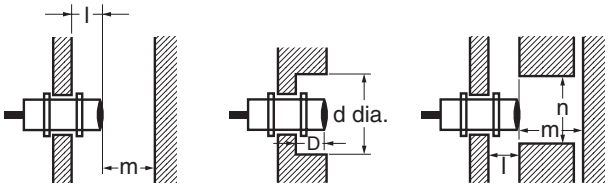
Precautions for Correct Use

Do not use this product 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 / Item	l	d	D	m	n
E2EC-CR8D□	0	3	0	2.4	6
E2EC-C1R5D□		5.4		4.5	10.8
E2EC-C3D□		8		9	16
E2EC-X4D□		12		12	24
E2EC-CR5C1		3		1.5	5
E2EC-C2R5C1		8		10	21

Influence of Temperature

Incorrect operation may occur if there is a large temperature difference between the Sensor Head and the Amplifier Unit.

Mutual Interference

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

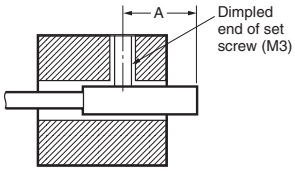
Mutual Interference (Unit: mm)

Model / Item	A	B
E2EC-CR8D□	18 (4)	6 (3)
E2EC-C1R5D□	15 (8)	10.8 (5.4)
E2EC-C3D□	30 (15)	16 (8)
E2EC-X4D□	40 (20)	24 (12)
E2EC-CR5C1	20 (10)	15 (3)
E2EC-C2R5C1	40 (20)	25 (15)

Note: Values in parentheses apply to Sensors operating at different frequencies.

● Mounting

- Refer to the following table for the torque and tightening ranges applied to mount the E2EC-C Unthreaded Cylindrical Model. Tightening must be as given in the following table.



Permissible Tightening Range and Torque

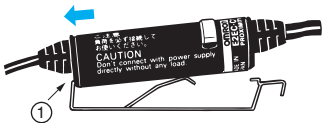
Model	Tightening	Set screw tightening
E2EC-CR8D□	6 to 10 mm	0.49 N·m
E2EC-C1R5D□	8 to 16 mm	
E2EC-C3D□		0.98 N·m
E2EC-CR5C1	6 to 10 mm	0.39 N·m
E2EC-C2R5C1	8 to 16 mm	

- The tightening torque applied to the E2EC-X4D□ Threaded Cylindrical Models must be 12 N·m max.

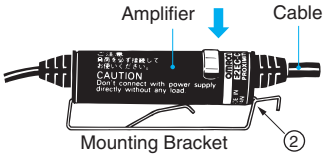
Amplifier Mounting Bracket for DC 2-Wire Models

Mounting

1. Insert the Amplifier into the trapezoidal end (i.e., the fixing side) of the Mounting Bracket.

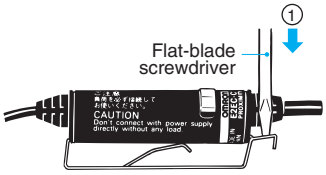


2. Press the other end of the Amplifier onto the Bracket.

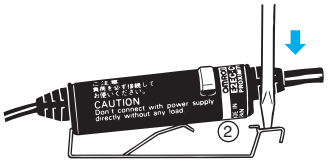


Dismounting

1. Lightly press the hook on the Mounting Bracket with a flat-blade screwdriver.



2. The Amplifier will be automatically released due to the spring force of the Mounting Bracket.

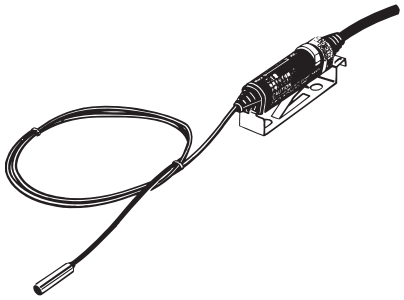


Dimensions

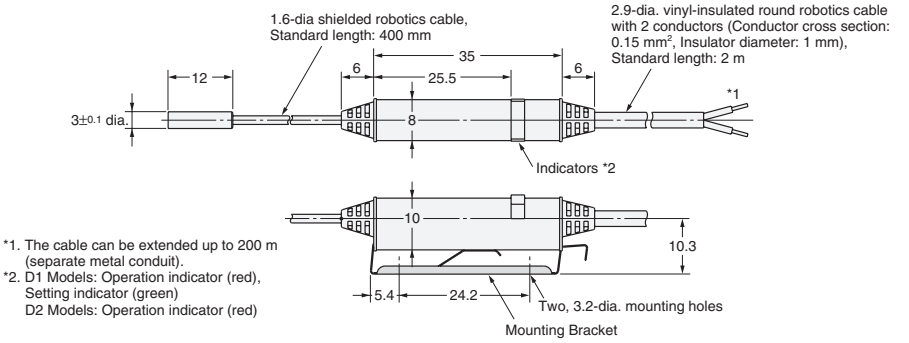
(Unit: mm)
Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

Main Units

E2EC-CR8D□

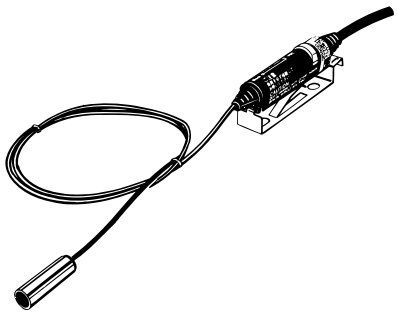


With Mounting Bracket Attached

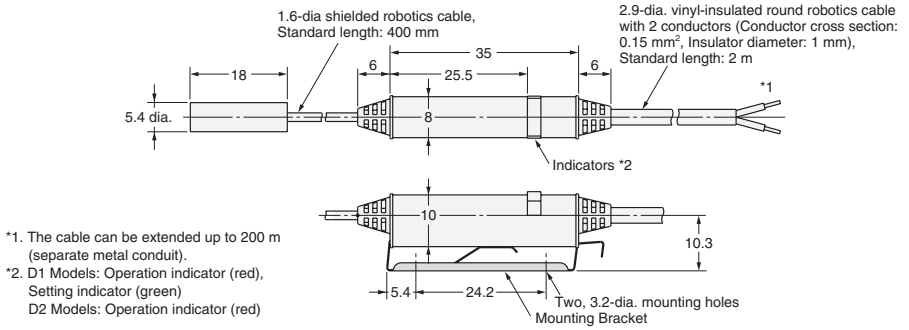


*1. The cable can be extended up to 200 m (separate metal conduit).
*2. D1 Models: Operation indicator (red), Setting indicator (green)
D2 Models: Operation indicator (red)

E2EC-C1R5D□

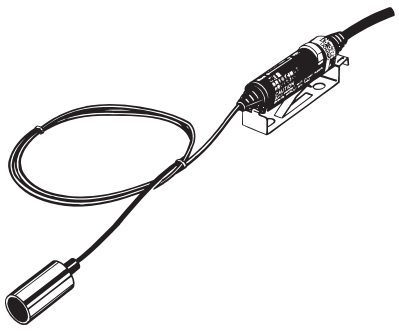


With Mounting Bracket Attached

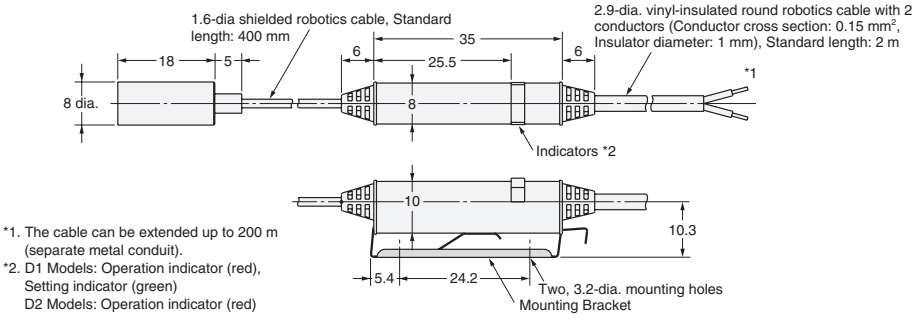


*1. The cable can be extended up to 200 m (separate metal conduit).
*2. D1 Models: Operation indicator (red), Setting indicator (green)
D2 Models: Operation indicator (red)

E2EC-C3D□

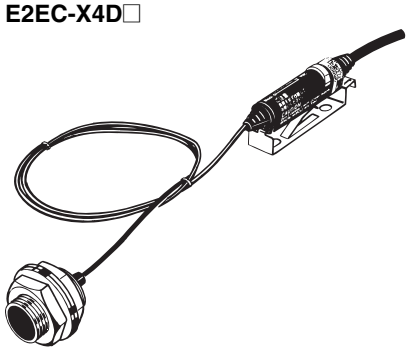


With Mounting Bracket Attached

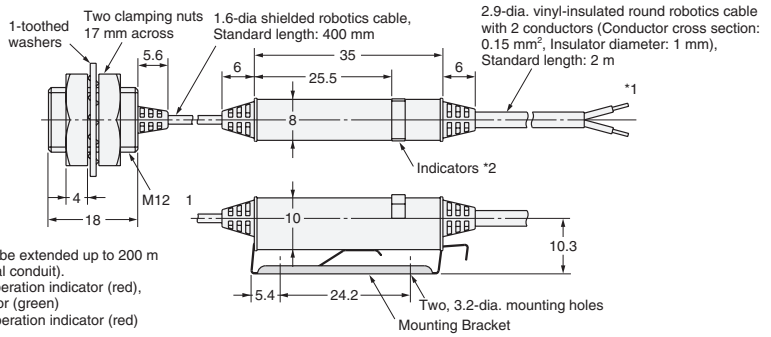


*1. The cable can be extended up to 200 m (separate metal conduit).
*2. D1 Models: Operation indicator (red), Setting indicator (green)
D2 Models: Operation indicator (red)

E2EC-X4D□

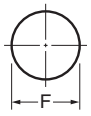


With Mounting Bracket Attached



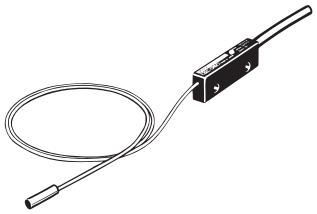
*1. The cable can be extended up to 200 m (separate metal conduit).
*2. D1 Models: Operation indicator (red), Setting indicator (green)
D2 Models: Operation indicator (red)

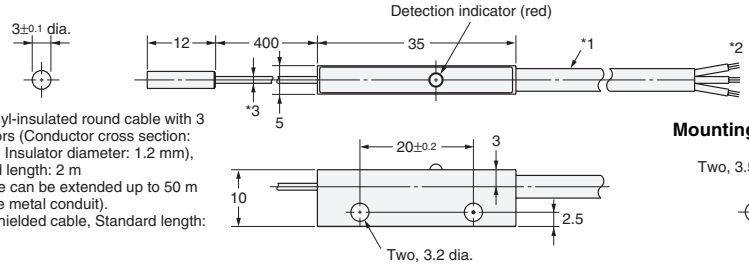
Mounting Hole Dimensions



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.

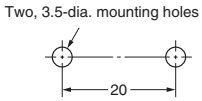
E2EC-CR5C1



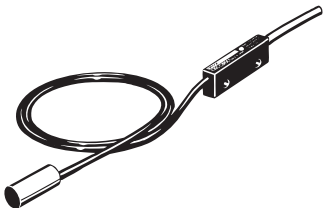


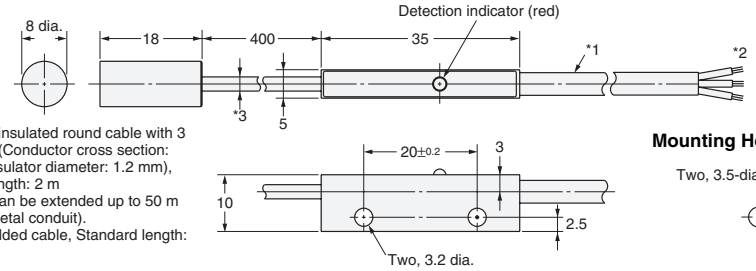
*1. 4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.2 mm^2, Insulator diameter: 1.2 mm), Standard length: 2 m
*2. The cable can be extended up to 50 m (separate metal conduit).
*3. 1.2-dia shielded cable, Standard length: 400 mm

Mounting Hole Dimensions



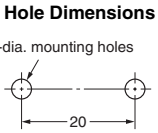
E2EC-C2R5C1





*1. 4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.2 mm^2, Insulator diameter: 1.2 mm), Standard length: 2 m
*2. The cable can be extended up to 50 m (separate metal conduit).
*3. 2.5-dia shielded cable, Standard length: 400 mm

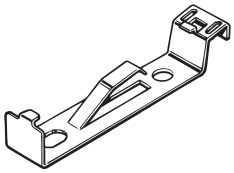
Mounting Hole Dimensions



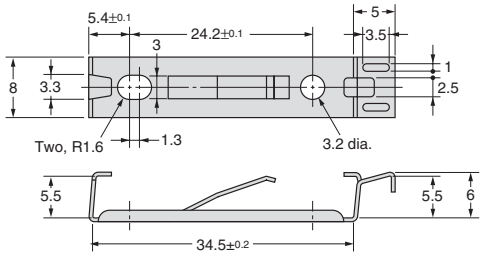
Mounting Hole Dimensions

Model	F (mm)
E2EC-CR5C1	3.3 $^{+0.3}_{0}$ dia.
E2EC-C2R5C1	8.5 $^{+0.5}_{0}$ dia.

Mounting Bracket



Material: Stainless steel (SUS301)
Note: Provided with DC 2-Wire Models.

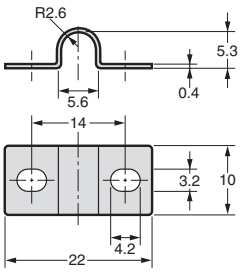


Accessories (Order Separately)

Mounting Bracket (for 5.4 dia.)

Y92E-F5R4

Material: Stainless steel (SUS304)
Note: Used for E2EC-C1R5D□ Head.



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2011.10

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Industrial Automation Company

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