High Precision Positioning Inductive Proximity Sensor

E2C-EDA

CSM E2C-EDA DS E 5 1

Proximity Sensor with Separate Amplifier Enables Easily Making High-precision Sensitivity Settings.

- Wide variety of Sensor Heads to select according to the application. The Sensor Heads use flexible cable.
- High resistance to changes in ambient temperature.
 Temperature characteristics of 0.08%/°C (for 5.4-dia. models).
- Make simple and reliable detection settings with micronlevel precision using the teaching function.
- Check the sensing excess gain level on the digital display.
- Support for high-precision positioning and screening with fine positioning to maximize variations.





Be sure to read Safety Precautions on page 9.

Ordering Information

Sensors [Refer to Dimensions on page 11.]

Sensor Heads

Туре	Арр	earance	Sensing distance	Repeat accuracy	Model
	Cylindrical	3 dia. × 18 mm	0.6 mm	1 μm	E2C-EDR6-F *2
		5.4 dia. × 18 mm	1 mm	1 μm	E2C-ED01-
		8 dia. × 22 mm	2 mm	2 μm	E2C-ED02-□ * 1 * 2 * 3
Shielded	Screw	M10 × 22 mm	2 mm	2 μm	E2C-EM02-□ *1 *2 *3
	Flat	30 × 14 × 4.8 mm	5 mm	2 μm	E2C-EV05-□ * 1 * 2 * 3
Unshielded	Screw	M18 × 46.3 mm	7 mm	5 μm	E2C-EM07M-□ *1 *2 *3
Heat-resistant	Screw	M12 × 22 mm	2 mm	2 μm	E2C-EM02H *2

^{*1} A Protective Spiral Tube is provided with models ending in the suffix -S. (example: E2C-ED01-S).

For detailed dimensions of the Protective Spiral Tube, refer to the information on the E39-F32A on the OMRON website.

^{*2} Two cable lengths are available. (3-dia.: free-cut type, Heat-resistant type: standard-length only).

Overall length of the standard-length type: 2.5 m, Length from the Sensor Head to the Preamplifier: 2.0 m (Example: E2C-ED01)

Overall length of the free-cut type: 3.5 m, Length from the Sensor Head to the Preamplifier: 0.5 m for models ending in the suffix -F (example: E2C-ED01F).

^{*3} Models ending in the suffix -S that come with Protective Spiral Tubes and free-cut models ending in the suffix -F are made-to-order products.

Amplifier Units

Amplifier Units with Cables

	Item	Appearance Functions		Model		
	item	Appearance	runctions	NPN output	PNP output	
Advanced models	Twin-output models		Area output, open circuit detection, differential operation	E2C-EDA11 2M	E2C-EDA41 2M	
Advanced models	External-input models		Remote setting, differential operation	E2C-EDA21 2M	E2C-EDA51 2M	

Amplifier Units with Connectors (An Amplifier Unit Connector (sold separately) is required.)

	Item	Annogranco	Functions	Model		
	Item	Appearance	FullCuons	NPN output	PNP output	
Advanced models	Twin-output models		Area output, open circuit detection, differential operation	E2C-EDA6	E2C-EDA8	
Advanced models	External-input models		Remote setting, differential operation	E2C-EDA7	E2C-EDA9	

Amplifier Unit Connectors (Order Separately)

Note: Protector seals provided. [Refer to E3X-DA-S/MDA.]

Item	Appearance	Cable length	No. of conductors	Model
Master Connector		2 m	4	E3X-CN21
Slave Connector		2 111	2	E3X-CN22

Ordering Precautions for Amplifier Units with Connectors

A Connector is not provided with the Amplifier Unit.

Refer to the following tables when ordering.

Amplifier Unit							
Model NPN output PNP output							
Advanced models	E2C-EDA6	E2C-EDA8					
Auvanceu models	E2C-EDA7	E2C-EDA9					

Applicable Connector (Order Separately)					
Master Connector Slave Connector					
E3X-CN21	E3X-CN22				

When Using 5 Amplifier Units

Amplifier Units (5 Units) + 1 Master Connector | 4 SI

Mobile Console (Order Separately) [Refer to E3X-DA-S/MDA.]

Appearance	Model	Remarks
	E3X-MC11-SV2 (model number of set)	Mobile Console with Head, Cable, and AC adapter provided as accessories
	E3X-MC11-C1-SV2	Mobile Console
	E3X-MC11-H1	Head
	E39-Z12-1	Cable (1.5 m)

Note: Use the E3X-MC11-SV2 Mobile Console with E2C-EDA-series Amplifier Units. If you use a Mobile Console like the E3X-MC11-S, some functions may not operate. For details, refer to *Ratings and Specifications* for E3X-DA-S/MDA.

Accessories (Order Separately)

Mounting Bracket

A Mounting Bracket is not provided with the Amplifier Unit. Order a Mounting Bracket separately if required.

[Refer to E39-L, F39-L, E39-S, and E39-R.]

Appearance	Model	Quantity
	E39-L143	1

End Plate

An End Plate is not provided with the Amplifier Unit. Order an End Plate separately if required.

[Refer to PFP-□.]

Appearance	Model	Quantity
	PFP-M	1

Extension Cables between Sensor Head and Amplifier Unit

A Mounting Bracket is not provided with the Amplifier Unit. Order an Extension Cable separately if required.

[Refer to Dimensions on page 12.]

Cable length	Model	Quantity
2 m	E22-XC2R	1
7 m	E22-XC7R	

Rating and Specifications

Sensor Heads

		Model	E2C-EDR6-F	E2C-ED01(-□)	E2C-ED02(-□)	E2C-EM02(-□)	E2C-EM07(-□)	E2C-EV05(-□)	E2C-EM02H		
Item		3 dia. × 18 mm	5.4 dia. × 18 mm	8 dia. × 22 mm	M10 × 22 mm	M18 × 46.3 mm	30 × 14 × 4.8 mm	M12 × 22 mn			
Sensing distance		0.6 mm	1 mm	2 mm		7 mm	5 mm	2 mm			
Sensing ol	oject			Magnetic metal (The sensing distance will decrease when sensing non-magnetic metal. Refer to Engineering Data on page 5.)							
Standard s	onoina a	hiost	$5 \times 5 \times 3 \text{ mm}$ $10 \times 10 \times 3 \text{ mm}$ $22 \times 22 \times 3 \text{ mm}$ $15 \times 15 \times 3 \text{ mm}$					$20 \times 20 \times 3 \text{ mm}$			
Stariuaru s	ensing c	bbject	Material: iron (S50C)							
Repeat acc	curacy 🕴	1	1 μm		2 μm		5 μm	2 μm			
Hysteresis	distance)	Variable								
Tempera-	Sensor	Head	0.3%/°C	0.08%/°C				0.04%/°C	0.2%/°C		
ture char- acteristic * 1	Preamp Amplifie	lifier and er	0.08%/°C								
Ambient	Operation	ng	-10°C to 60°C	(with no icing or	condensation)				−10°C to 200°C * 3		
Ambient temperature *2 Storage			-10°C to 60°C (with no icing or condensation) -20°C to 70°C (with no icing or condensation)								
Ambient h	umidity		Operating/storage: 35% to 85% (with no condensation)								
Insulation	resistan	се	50 MΩ min. (at 500 VDC)								
Dielectric s	strength		1,000 VAC at 50/60 Hz for 1 min between current carry parts and case								
Vibration r	esistanc	е	Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions								
Shock resi	stance		Destruction: 500 m/s² for 3 times each in X, Y, and Z directions								
Degree of	protectio	n	IEC60529 IP67					IEC60529 IP60 *4			
Connectio	n method	i	Connector (standard cable length: 2.5 m (2 m between Head and Preamplifier) "-F" model cable length: 3.5 m (0.5 m between Head and Preamplifier)								
Weight (pa	cked sta	te)	Approx. 120 g	(Models with pro	otective spiral tub	e ("-S" models)	are approx. 90 (g heavier.)			
	Sensor Head	Case	Brass	Stainless steel	Brass	Brass		Zinc	Brass		
		Sensing surface	Heat-resistant	ABS				PEEK			
		Clamping nut				Nickel-plated b	rass		Nickel-plated brass		
		Toothed washer				Zinc-plated iron	1		Zinc-plated iron		
	Preamplifier		PES								
Accessories		Preamplifier Mounting Brackets, Instruction Manual									

^{*1} The repeat accuracy and temperature characteristic are for a standard sensing object positioned midway through the rated sensing distance.

^{*2} A sudden temperature rise even within the rated temperature range may degrade characteristics. *3 For the Sensor Head only without the preamplifier (–10 to 60°C). With no icing or condensation.

^{*4} Do not operate in areas exposed to water vapor because the enclosure is not waterproof.

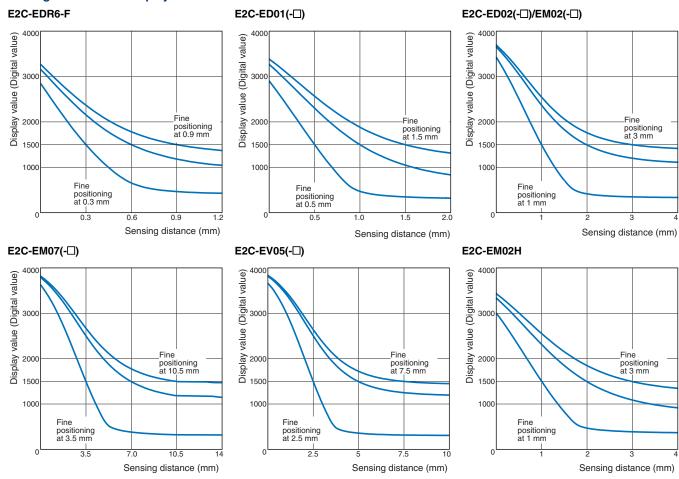
Amplifier Units

	Туре	Advanced Mod	lels with Twin Outputs	Advanced Mo	Advanced Models with External Inputs				
Model	NPN output	E2C-EDA11	E2C-EDA6	E2C-EDA21	E2C-EDA7				
Item	PNP output	E2C-EDA41	E2C-EDA8	E2C-EDA51	E2C-EDA9				
Supply voltag	je	12 to 24 VDC ±10%, ri	pple (p-p): 10% max.						
Power consu	mption	1,080 mW max. (current consumption: 45 mA at power supply voltage of 24 VDC)							
Control output		Load power supply vol (residual voltage: 1 V r		PNP open collector outp	ut; load current: 50 mA max.				
Super-high- speed mode *		150 μs for operation ar	nd reset respectively						
Response	High-speed mode	300 μs for operation and reset respectively							
time	Standard mode	1 ms for operation and	reset respectively						
	High-resolution mode	4 ms for operation and	reset respectively						
	Differential detection	Single edge: Can be so	ngle edge and double edge of the to 300 μ s, 500 μ s, 1 ms, 1 set to 500 μ s, 1 ms, 2 ms, 20	0 ms, or 100 ms					
	Timer function	Select from OFF-delay, ON-delay, or one-shot timer. 1 ms to 5 s (1 to 20 ms set in 1-ms increments, 20 to 200 ms set in 10-ms increments, 200 ms to 1 s set in 100-ms increments, and 1 to 5 s set in 1 s-increments)							
Functions	Zero-reset	Negative values can be	Negative values can be displayed. (Threshold is not shifted.)						
Functions	Initial reset	Settings can be returned	ed to defaults as required.						
	Mutual interference prevention	Possible for up to 5 Units. * Intermittent oscillation method (Response time = (number of Units connected + 1) ×15 ms)							
	Hysteresis settings	Setting range: 10 to 4,000							
	I/O settings	Output setting (Select from channel 2 output, area output, self-diagnosis, or open circuit detection.) Input setting (Select from teaching, fine position zero-reset, synchronous detection.)							
Digital displa	у	Select from the following: Incident level + threshold, incident level percentage +threshold, incident light peak level + incident light bottom level (updated with output), long bar display, incident level + peak hold, incident level + channel							
Display orien	tation	Switching between normal/reversed display is possible.							
Ambient temperature		Operating: When connecting 1 to 2 Units: -10°C to 55°C When connecting 3 to 5 Units: -10°C to 50°C When connecting 6 to 16 Units: -10°C to 45°C When used in combination with an EDR6-F When connecting 3 to 4 Units: -10°C to 50°C When connecting 5 to 8 Units: -10°C to 45°C When connecting 9 to 16 Units: -10°C to 40°C							
		Storage: –20°C to 70°C (with no icing)							
Ambient hum	idity	Operating/storage: 35% to 85% (with no condensation)							
Insulation res		20 M Ω min. (at 500 VDC)							
Dielectric stre		1,000 VAC at 50/60 Hz for 1 min							
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions							
Shock resista			for 3 times each in X, Y, and		, = 2 22				
Degree of pro		IEC60529 IP50							
Connection method		Prewired	Connector	Prewired	Connector				
Weight (pack		Approx. 100 g	Approx. 55 g	Approx. 100 g	Approx. 55 g				
	Case	PBT (polybutylene tere		1. 4.6	·				
Material	Cover	Polycarbonate	<u> </u>						
	55.5.	Polycarbonate							

^{*}Communications are disabled if the detection mode is selected during super-high-speed sensing mode, and the communications functions for mutual interference prevention and the Mobile Console will not function.

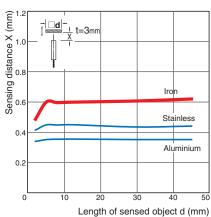
Engineering Data

Sensing Distance vs. Display Values

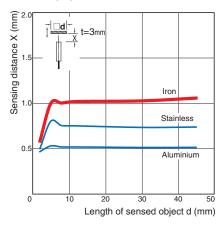


Influence of Sensing Object Size and Material

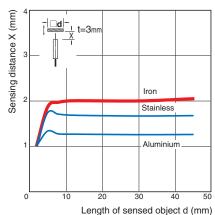


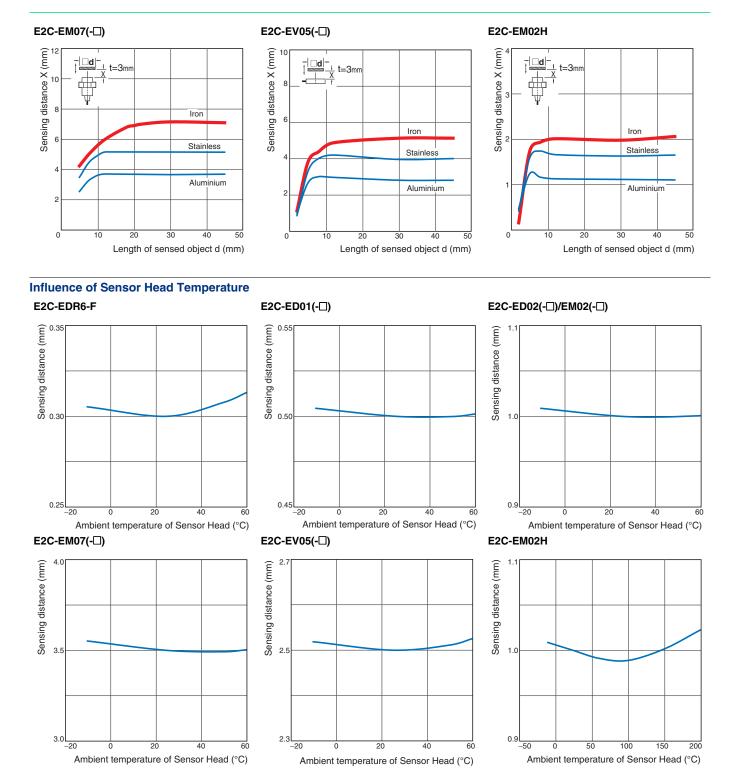


E2C-ED01(-□)



E2C-ED02(-□)/EM02(-□)





I/O Circuit Diagrams

NPN Output

Model	Operation mode	Timing chart	Mode selector	Output circuit
E2C-EDA11 E2C-EDA6	NO (Normally open)	Sensing Ves object No Operation indicator (orange) Output ON transistor OFF Load Operate (relay, etc.) Reset (Between brown and black lines)	NO	Operation indicator Operation indicator Display(orange) ch1 Orange) ch2 Brown Black Load Proximity Proximity Proximity 12 to 24
	NC (Normally closed)	Sensing object No Operation Lit indicator (orange) Not lit ON transistor OFF Load Operate (relay, etc.) Reset (Between brown and black lines)	NC	Sensor Amain Circuits Blue
E2C-EDA21 E2C-EDA7	NO (Normally open)	Sensing Ves object No Operation Lit indicator (orange) Not lit Operation transistor OFF Load Operate (relay, etc.) Reset (Between brown and black lines)	NO	Fine positioning indicator Operation (orange) Operation indicator (orange) Brown Black Load Black Load Control output 12 to 24
	NC (Normally closed)	Sensing object No No Operation indicator (orange) ON transistor OFF Load Operate (relay, etc.) Reset (Between brown and black lines)	NC	Black Proximity Sensor main circuits Blue Blue Load Tybe 12 to 24 VDC

Note: 1. Setting Areas for Twin-output Models

Normally open:ON between the thresholds for Channel 1 and Channel 2

Normally closed: ..OFF between the thresholds for Channel 1 and Channel 2

2. Timing Charts for Timer Settings (T: Set Time)

ON delay	OFF delay	One shot
Sensing Yes object No ON OFF OFF OFF	Sensing Yes object No ON OFF OFF OFF	Sensing No ON OFF ON OFF

PNP Output

Model	Operation mode	Timing chart	Mode selector	Output circuit
E2C-EDA41 E2C-EDA8	NO (Normally open)	Sensing object No Poperation (orange) No No Utput Cransistor OFF Load Operate (relay, etc.) Reset (Between blue and black lines)	NO	Operation indicator Operation indicator Display (orange) ch1 Operation indicator (orange) ch2 Brown Control Output ch2 Sensor Main Circuits Orange Control Output ch2 Load Orange Corange Control Output ch2 Load Orange Corange Control Output ch2 Load Orange Corange Control Output ch2 Corange Corange Control Output ch2 Corange Corange Control Output ch2 Corange Corange Corange Corange Control Output ch2 Corange C
	NC (Normally closed)	Sensing object No Operation Lit indicator (orange) Not lit Output transistor OFF Load Operate (relay, etc.) Reset (Between blue and black lines)	NC	Black Control output ch2 Load Orange Load Blue
E2C-EDA51 E2C-EDA9	NO (Normally open)	Sensing object No Operation Lit indicator (orange) No Utput transistor OFF Load Operate (relay, etc.) Reset (Between blue and black lines)	NO	Fine positioning indicator (orange) Display Operation (orange) Brown External input Orange
	NC (Normally closed)	Sensing object No Operation Indicator (orange) Output ON Itransistor OFF Load Operate (relay, etc.) Reset (Between blue and black lines)	NC	Orange External input Orange Proximity Sensor Proximity S

Note: 1. Setting Areas for Twin-output Models

Normally open:ON between the thresholds for Channel 1 and Channel 2 Normally closed: ..OFF between the thresholds for Channel 1 and Channel 2 2. Timing Charts for Timer Settings (T: Set Time)

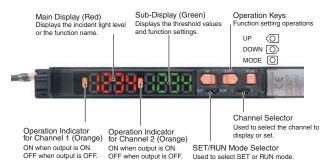
ON delay	OFF delay	One shot
Sensing Yes object No ON OFF THE NC ON OFF	Sensing Yes object No ON OFF THE NC ON OFF	Sensing No ON OFF OFF

Nomenclature

Amplifier Units

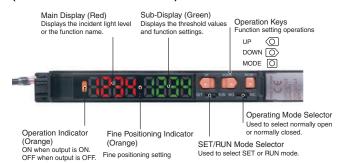
Twin-output Models

(E2C-EDA11/EDA41/EDA6/EDA8)



External-input Models

(E2C-EDA21/EDA51/EDA7/EDA9)



Safety Precautions

Refer to Warranty and Limitations of Liability.



Do not use this product in any safety device used for the protection of human lives.



Precautions for Correct Use

Do not use this product in operating atmospheres or environments outside the specified ratings.

Amplifier Units

Design

Power ON

The Sensor is ready to sense an object within 200 ms after turning the power ON. If the load and Sensor are connected to different power supplies, always turn ON the Sensor power first.

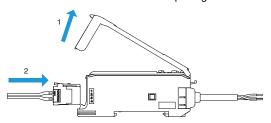
Cable

Use an external power cable of cross-section of 0.3 mm² or more for the Amplifier, and the total length of the cable must be 30 m or less.

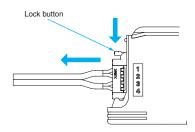
Connecting Sensor Heads

Connecting and Disconnecting Sensor Heads

- 1. Open the protective cover.
- 2. Making sure that the lock button is up, insert the fibers all the way to the back of the Connector insertion opening.



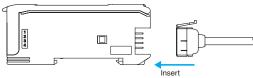
To disconnect the Sensor Head, pull out the fibers while pressing on the lock button.



Connecting and Disconnecting Connectors

<Connecting Connectors>

 Insert the Master or Slave Connector into the Amplifier Unit until it clicks into place.



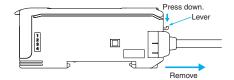
Apply the supplied seal to the non-connection surface of the Master/Slave Connector.



Note: Apply the seal to the grooved side.

<Disconnecting Connectors>

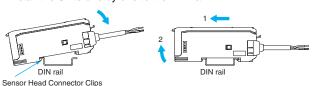
- 1. Slide the Slave Amplifier Unit.
- After the Amplifier Unit has been separated, press down on the lever on the Connector and remove it. (Do not attempt to remove Connectors without separating them from other Amplifier Units first.)



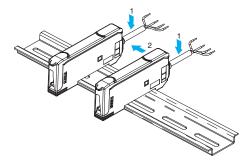
Installing and Removing Amplifier Units

<Installing Amplifier Units>

1. Install the Units one by one to the DIN rail.



2. Slide one Unit toward the other, match the clips at the front ends, and then bring them together until they "click."



<Removing Amplifier Units>

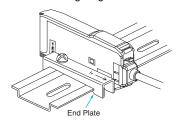
Slide one Unit away from the other and remove them one by one. (Do not remove the connected Units together from the DIN rail.)

Note: 1. When the Amplifier Units are connected to each other, the operable ambient temperature changes depending on the number of connected Amplifier Units. Check Specifications.

Before connecting or disconnecting the Units, always switch power OFF.

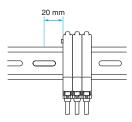
End Plate Mounting (PFP-M)

Mount End Plates on Amplifier Units to avoid movement due to vibration. When a Mobile Console is installed, mount the End Plate facing as shown in the following diagram.



Mounting a Communications Head for the Mobile Console

Leave a space of at least 20 mm on the left side of the Units for a Mobile Console Communications Head.



EEPROM Write Error

If the data is not written to the EEPROM correctly due to a power failure or static-electric noise, initialize the settings using the keys on the Amplifier Unit.

Optical Communications

When using more than one Amplifier Unit, mount the Units side-byside. Do not slide or remove Units while they are in use.

Miscellaneous

Protective Cover

Be sure to put on the Protective Cover before use.

Mobile Console

Use the E3X-MC11-SV2 Mobile Console for E2C-EDA-series Amplifier Units. Other Mobile Consoles, such as the E3X-MC11, cannot be used.

Sensor Head and Amplifier Unit Connection

Be sure to use only specified Sensor Head and Amplifier Unit combinations. The E3C-LDA-series Photoelectric Sensor with Separate Digital Amplifier is not compatible, and the E2C-EDA must not be used with products from that series.

Warm-up

The digital display will slowly change until the circuits stabilize after the power is turned ON. It takes about 30 minutes after the power is turned ON before the E2C-EDA is ready to sense.

Maintenance Inspection

- Be sure to turn OFF the power before adjusting, connecting, or disconnecting the Sensor Head.
- Do not use thinner, benzene, acetone, or kerosene to clean the Sensor Head or Amplifier Unit.

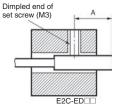
Sensor Heads

Mounting

Mounting Sensor Heads

Use the dimensions from the following table to mount unthreaded cylindrical models (E2C-ED-□□). Do not tighten screws with torque exceeding 0.2 N⋅m when mounting Sensor Heads.

Model	Tightening range A	
E2C-EDR6-F	9 to 18 mm	
E2C-ED01□□	9 to 18 mm	
E2C-ED02□□	11 to 12 mm	



 Use the torque given in the following table to tighten threaded cylindrical models (E2C-EM

).

Model	Tightening torque	
E2C-EM02□□	15 N⋅m max.	
E2C-EM07M□□	15 N⋅m max.	
E2C-EM02H□□	5.9 N⋅m max.	

- Do not use torque exceeding 0.5 N⋅m to tighten screws when mounting flat models (E2C-EV□□).
- Use a bending radius of at least 8 mm for the Sensor Head cable.
- Use only the special extension cable to extend the cable between the Sensor Head and the Amplifier Unit.

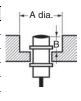
Model	Cable length		
E22-XC2R	2 m		
E22-XC7R	7 m		

Effects of Surrounding Metal

 Provide a minimum distance between the Sensor and the surrounding metal as shown in the table below.

Effects of Surrounding Metal

	(,	
Model	Counterbore A	Protrusion B
E2C-EDR6-F	3.1	0
E2C-ED01□□	5.4	0
E2C-ED02□□	8	0
E2C-EM02□□	10	0
E2C-EM07M□□	35	20
E2C-EV05□□	14 × 30	4.8
E2C-EM02H□□	12	0



Mutual Interference

- If more than one Sensor Head is installed face to face or in parallel, make sure that the distances between two Units adjacent to each other are the same as or larger than the corresponding values shown in the following table.
- The distance between Sensor Heads may be narrower than specified with these Sensors because the Mutual Interference Prevention Function is used for optical communications between the Amplifier Units.



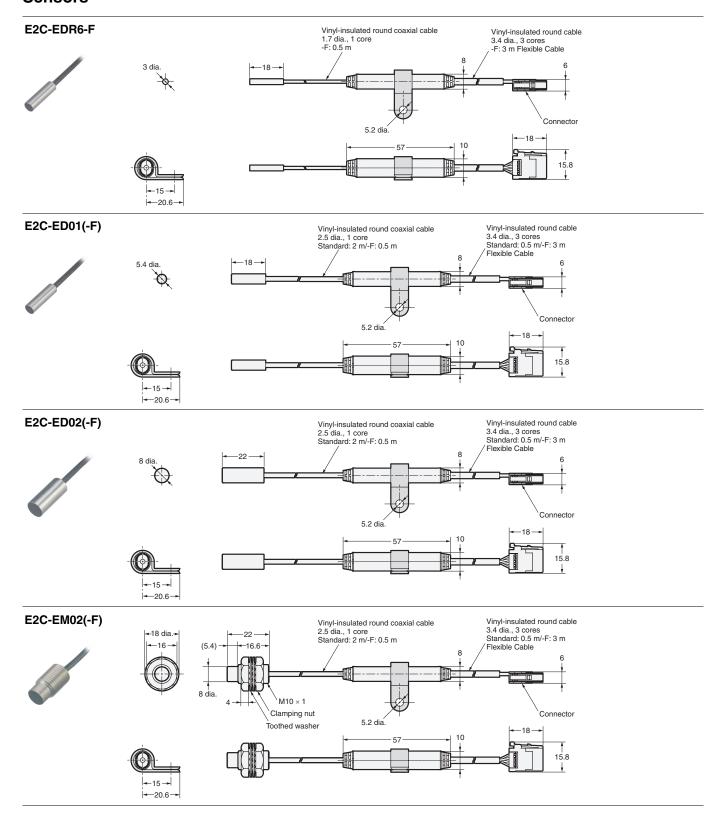
Mutual Interference

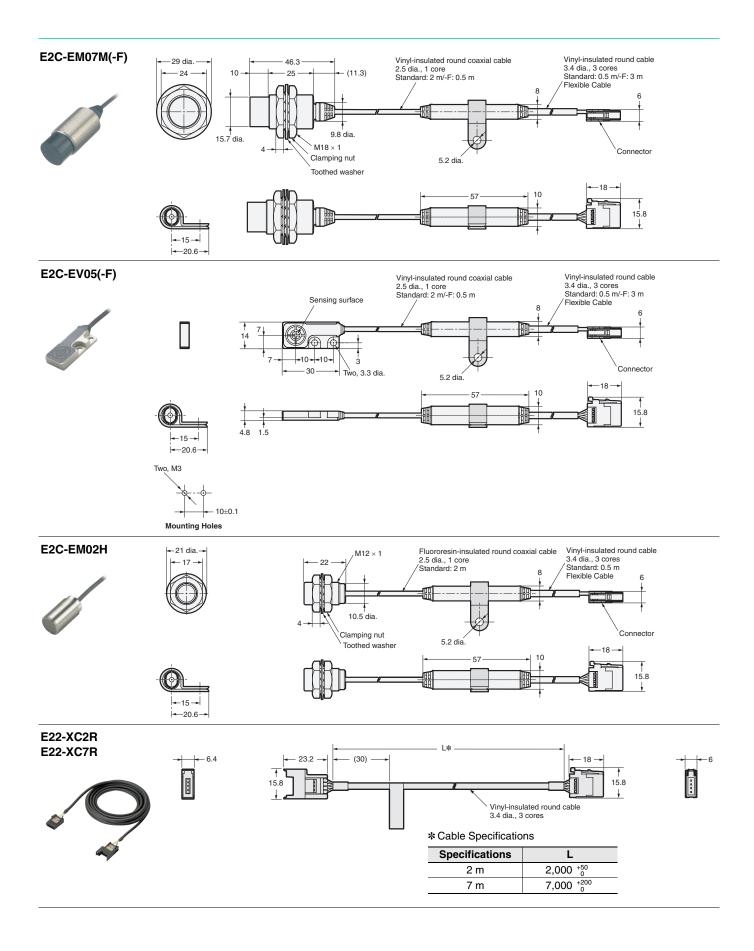
(Units: mm)

Model	Face-to-face arrangement A	Parallel arrangement B	Face-to-face arrangement using the Mutual Interference Prevention Function A'	Parallel arrangement using the Mutual Interference Prevention Function B'
E2C-EDR6-F	14	10	3.5	3.1
E2C-ED01□□	45	20	9	5.4
E2C-ED02□□	35	30	21	8
E2C-EM02□□	36	30	21	10
E2C-EM07M□□	140	120	35	18
E2C-EV05□□	65	30	21	14
E2C-EM02H□□	45	30	21	12

(Unit: mm)

Sensors





Amplifier Units

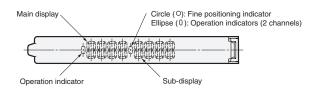
Amplifier Units with Cables Circle (O): Fine positioning indicator Ellipse (0): Operation indicators (2 channels) Main display E2C-EDA11 E2C-EDA21 E2C-EDA41 E2C-EDA51 Vinyl-insulated round cable, 4 dia., 4 cores (Conductor cross-sectional area: 0.2 mm²; insulation diameter: 1.1 dia.) Standard length: 2 m Operation indicator Sub-display Connector 0 With Mounting Bracket Attached * The Mounting Bracket can also be used on side A. 21.1 .A* -18.15 50.3 - PP 34.1 Hole for optical communications Two, 3.2 dia. holes E39-L143 Mounting Bracket: Sold separately Stainless steel (SUS304) Two, M3 Mounting Holes 34.1

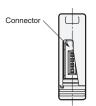
Amplifier Units with Connectors

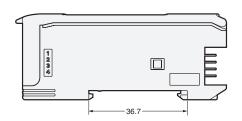
E2C-EDA6

E2C-EDA7 E2C-EDA8

E2C-EDA9



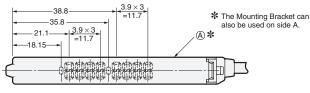


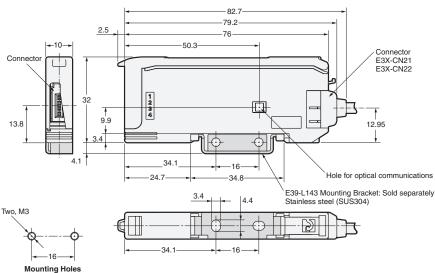






With Mounting Bracket Attached





Amplifier Unit Connectors

Refer to E3X-DA-S/MDA for details.

Mobile Console

Refer to E3X-DA-S/MDA for details.

Accessories (Order Separately)

Mounting Brackets

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

End Plate

Refer to DIN rail for details.

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