E2CY-SD

Proximity Sensor with Separate Amplifier Unit for Detection of Non-ferrous Metals with Simple Sensitivity Adjustment

- Detects aluminum, copper, and other non-ferrous metals.
- Product lineup includes compact, flat Sensor Head (E2CY-V3A) and model with fluororesin (E2CY-C2AF) for resistance to chemicals.
- Simple teaching function to easily adjust sensitivity.
- Check detection status at a glance with numeric values on a digital display.













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

Ordering Information

Sensors [Refer to Dimensions on page 7.]

Appe	pearance Stable sensing distance		Stable sensing distar		tance	Model
	M5		1.5mm			E2CY-X1R5A 3M
Chialdad	5.4 dia.		2mm			E2CY-C1R5A-1 3M
Shielded	8 dia.			2mm		E2CY-C2A 3M
	Flat				3mm	E2CY-V3A 3M
	8 dia.			2mm		E2CY-C2AF 3M

Amplifier Units

Output configuration	Model
DC 3-wire NPN open collector	E2CY-SD11 2M

Note: The E2CY-C2AF has a fluororesin head. We also offer a model with a 5-m fluororesin cable. Specify the cable length at the end of the model number. (Example: E2CY-C2AF 5M)

E2CY-SD

Ratings and Specifications

Sensors

36113013	Mada				
Model		E2CY-X1R5A E2CY-C1R5A-1	E2CY-C2A(F)	E2CY-V3A	
Stable sensing distance		0 to 1.5 mm	0 to 2 mm	0 to 3 mm	
Differential travel		10% max. of sensing distance with Amplifier Unit in FINE mode 15% max. of sensing distance with Amplifier Unit in NORM mode			
Detectable	object	Non-ferrous metal			
Standard s object	ensing	Aluminum: 8 ×	8 × 1 mm	Aluminum: 12×12×1 mm	
Response frequency	*1	40 Hz min. with 100 Hz min. wit	Amplifier Unit in Amplifier Unit	FINE mode in NORM mode	
Ambient temperatur	e range		o to 55°C, Stora icing or conder		
Ambient he range	umidity	Operating and (with no conde	Storage: 35% ensation)	to 95%	
Temperature influence *2	−10 to 55°C	±15% max. of sensing distance at 23°C	±10% max. of sensing	±15% max. of sensing distance at 23°C	
	0 to 40°C	±10% max. of sensing distance at 23°C *3	distance at 23°C	±10% max. of sensing distance at 23°C	
Vibration resistance		Destruction: 10 to 500 Hz, 2-mm double amplitude or 150 m/s 2 for 2 hours each in X, Y, and Z directions			
Shock resi	stance	Destruction: 500 m/s² 3 times each in X, Y, and Z directions			
Degree of protection		IEC 60529 IP67			
Connection	n method	Pre-wired Models (High-frequency coaxial cable, Standard cable length: 3 m)			
Cable leng		0.5 to 5 m *4			
Weight (packed sta	Weight (packed state)		Approx. 35 g		
	Case	Stainless stee	I	Zinc die-cast	
	Sensing surface	Heat-resistant ABS (E2CY-C2AF: Fluororesin)			
	Cable	Soft PVC (E2CY-C2AF: Fluo		ororesin)	
Materials	Clamping nut	Nickel-plated brass (E2CY-X1R5A only)			
	Toothed washer	Zinc-plated iron (E2CY-X1R5A only)			
	Mounting screws	Zinc-plated iron (E2CY-V3A only)			

- *2. When the temperature around the Amplifier Unit is stable at 23°C.
 *3. E2CY-C1R5A-1: ±15% max. of sensing distance at 23°C
 *4. When extending the cable, use a 1.5D-2V (equivalent to JIS C 3501) cable with characteristic impedance of 50 Ω .

Amplifier Units

Item	Model	E2CY-SD11	
Power supp	oly voltage	12 to 24 VDC ±10%, ripple: 10% max.	
Power con	sumption	1,080 mW max. (45 mA max. at 24 VDC)	
Sensing di adjustmen		10% min. of stable sensing distance	
Sensitivity	setting	Teaching / manual adjustment	
Control ou	tput	NPN open collector (26.4 VDC max.), load current:100 mA max., residual voltage: 1 V max.	
	OFF-delay timer	0 to 40 ms (1 to 20 ms: 1-ms increments, 20 to 40 ms: 5-ms increments)	
	Zero reset	Supported.	
Functions	Intial reset	Supported. (All settings are returned to their default values.)	
	Hysteresis setting	3 to variable	
	Self diagnosis	Displays errors (sensor disconnection, sensor short-circuit, or output short-circuit)	
Operation	mode	Changed with NO/NC switch.	
Protection	circuits	Power supply reverse polarity protection and output short-circuit protection	
Indicator		Operation indicator (orange)	
Digital disp	olay *1	Detection amount display (FINE: 4,000 max., NORM: 2,000 max.), bar display, function display (red)	
Reverse di	splay	Supported.	
Ambient temperature range		Operating: -10 to 55°C, Storage: -25 to 70°C (with no icing or condensation)	
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)	
Temperature influence *2		$\pm 10\%$ max. of sensing distance at 23°C in the temperature range of -10 to 55 °C	
Voltage inf	luence	$\pm 1\%$ max. of sensing distance in the rated voltage range $\pm 10\%$	
Insulation	resistance	$20~\text{M}\Omega$ min. (at 500 VDC) between current-carrying parts and case	
Dielectric s	strength	1,000 VAC, 50/60 Hz for 1 minute. between current-carrying parts and case	
Vibration r	esistance	Destruction: 10 to 150 Hz, 1.5-mm double amplitude or 100 m/s² for 2 hours each in X, Y, and Z directions	
Shock resi	stance	Destruction: 300 m/s ² 3 times each in X, Y, and Z directions	
Degree of	protection	IEC 60529 IP50 (with Sensor cable connected and protective cover attached)	
Connection method		Pre-wired Model (Standard cable length: 2 m)	
Weight (pag	ked state)	Approx. 100 g	
	Case	РВТ	
Matariala	Cover	Polycarbonate	
Materials	Cable connecting screws	Zinc-plated iron	
Accessorie		E39-L143 Mounting Bracket (SUS304 stainless steel), instruction manual	

^{*1.} If the Sensor approaches iron or other ferrous metals, the digital display will show negative values.

Note: You can mount the Amplifier Unit on a DIN Track without using the Mounting Bracket.

^{*1.} The average value when using the DC-switching control output on the Amplifier Unit.

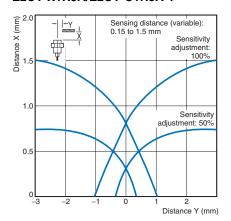
Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the stable sensing distance.

^{*2.} When the temperature around the Sensor is stable at 23°C.

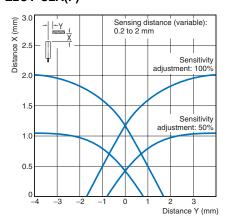
Engineering Data (Typical)

Sensing area

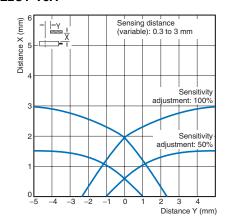
E2CY-X1R5A/E2CY-C1R5A-1



E2CY-C2A(F)

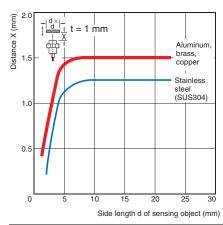


E2CY-V3A

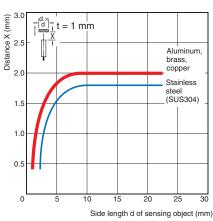


Influence of Sensing Object Size and Material

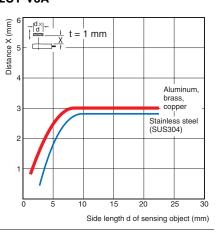
E2CY-X1R5A/E2CY-C1R5A-1



E2CY-C2A(F)

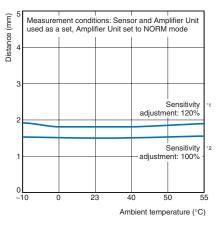


E2CY-V3A

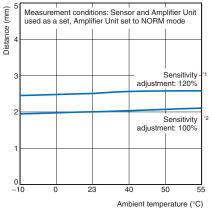


Temperature influence

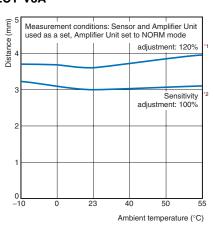
E2CY-X1R5A/E2CY-C1R5A-1



E2CY-C2A(F)



E2CY-V3A

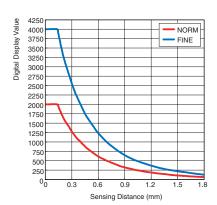


- *1. When the set distance is the maximum stable sensing distance multiplied by 1.2 and at an ambient temperature 23°C.
- *2. When the set distance is the maximum stable sensing distance and at an ambient temperature 23°C.

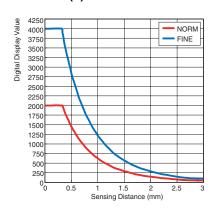
E2CY-SD

Sensing Distance Vs. Digital Display Value

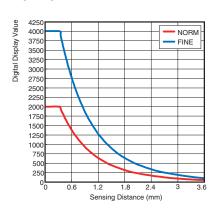
E2CY-X1R5A/E2CY-C1R5A-1



E2CY-C2A(F)



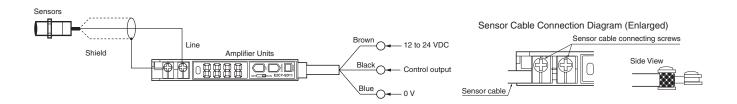
E2CY-V3A



I/O Circuit Diagrams

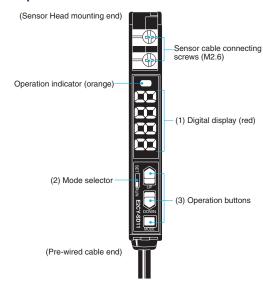
Operation mode	Timing Chart	Output circuit
NO	Sensing object Present Not present Output ON transistor OFF Amplifier Unit Operation ON indicator (orange) OFF	Brown 12 to 24 VDC 4.7 Ω Load Black 100 mA max.
NC	Sensing object Present Not present Output ON transistor OFF Amplifier Unit Operation ON indicator (orange) OFF	Proximity Sensor main circuit Blue 0 V

Connection



Nomenclature

Amplifier Units



(1) Digital Display

The digital display shows information such as the detection amount or the current function name.

(2) Mode Selector

The mode selector is used to switch between modes.

Mode	Description
SET	Select this mode to set detection conditions, perform teaching, or to initialize settings to their default values.
RUN	Select this mode to perform actual sensing operation or to perform the following functions. • Manually adjusting the threshold • Checking the current threshold value • Zero reset • Locking button operation

(3) Operation Buttons

Use these buttons to change the display or to change the function settings. Button functions depend on the current mode.

Button	SET Mode	RUN Mode
UP Button	Changes the function in the forward direction. Changes the set value in the forward direction. Performs positioning teaching.	Increases the threshold value.
DOWN Button	Changes the function in the reverse direction. Changes the set value in the reverse direction. Performs teaching without a workpiece.	Decreases the threshold value.
MODE Button	Selects the function. Selects the set value.	Checks the current threshold value. Performs a zero reset.

The following table lists the available functions.

		Description
Function	Set value	Change function: UP/DOWN Buttons Change set value: UP/DOWN Buttons Select function: MODE Button Select set value: MODE Button
ŁEch	Sensing threshold value	Performs the following types of teaching: • Teaching without a workpiece • Positioning teaching • Teaching with/without a workpiece
1- o p	NO/NC	Changes the operation mode. NO (normally open): Turn output ON when an object is detected. NC (normally close): Turn output ON when no object is detected.
2-fn	NORM/FINE	Changes sensor precision. • NORM: Standard * • FINE: High precision
3-tf	0 to 40ms	Changes the OFF-delay time. Sets a delay between 0 to 20 ms in increments of 1 ms. Sets a delay between 20 to 40 ms in increments of 5 ms.
4-dp	Value/segment bar	Changes the detection amount display.
5-r u	Normal or reverse	Changes the display direction. Normal: The Sensor is connected to the left end. Reverse: The Sensor is connected to the right end.
6-hy	3 to variable	Changes the hysteresis width.

^{*} FINE Mode enables you to perform measurements at twice the step of NORM Mode. However, this results in a slower response.

Safety Precautions

Refer to Warranty and Limitations of Liability.



This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.



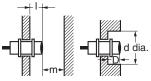
Precautions for Correct Use

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

Design

Influence of Surrounding Metal

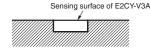
When mounting the Sensor within a metal panel, ensure that the clearances given in the following table are maintained. Failure to maintain these distances may cause deterioration in the performance of the Sensor.



Influence of Surrounding Metal (Unit: mm)

Model	Item	I	d	D	m
E2CY-X1R5A			5	0	9
E2CY-C1R5A-	1	0	5.4		
E2CY-C2A(F)		U	8		15
E2CY-V3A			12		18

The E2CY-V3A can be embedded in metal with the sensing surface at the same level as the metal surface.

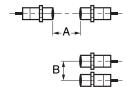


Mutual Interference

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	Α	В
E2CY-X1R5A			
E2CY-C1R5A-1		20	15
E2CY-C2A(F)		Š	
E2CY-V3A		30	12



Effects of a High-frequency Electromagnetic Field

If the Sensor is located near a device that generates high frequencies or a transceiver, it may be affected by such a device and malfunctions may occur.

Mounting

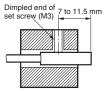
 Do not use excessive force when tightening the nuts on the E2CY-X1R5A. A toothed washer must be used with the nut.



Model	Torque
E2CY-X1R5A	0.98 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.



 Do not tighten the mounting screw for the E2CY-V3A with excessive force. Always use a washer when tightening the mounting screw.

Model	Torque
E2CY-V3A	0.15 N·m

Adjustment

Power ON

The E2CY requires a minimum of 200 ms from the time the power supply is turned ON before it can begin detection. Do not remove the Sensor Head while the power supply is turned ON. If the E2CY-SD11 and load are connected to separate power supplies, always turn ON the power supply to the E2CY-SD11 first.

Power OFF

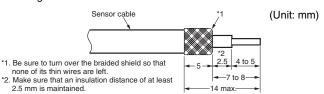
Output pulses may occur when the power supply is turned OFF. Turn OFF the power supply to the load or load line first.

Teaching

Make sure that the Sensor is in operating condition before making sensitivity adjustments.

Processing the Sensor Cable Ends

When cutting or extending the cable, the end of the Sensor cable connected to the E2CY- \square must be processed as shown in the following illustration.

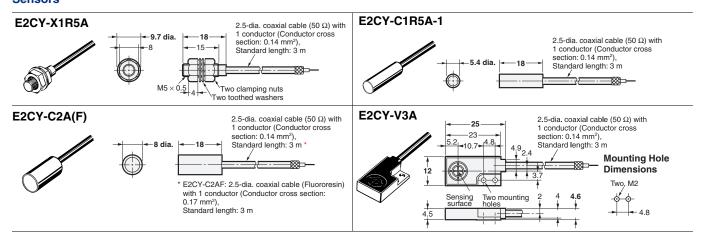


The length compensation range for cutting or extending the cable is 0.5 to 5 m. When extending the cable, use a 1.5D-2V (equivalent to JIS C 3501) cable with characteristic impedance of 50 Ω .

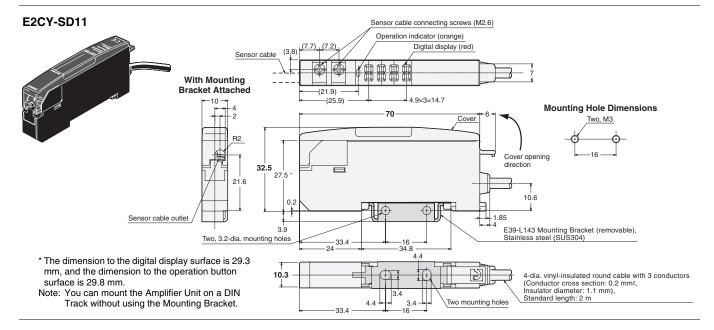
Amplifier Unit Cable Extension

Do not extend the cable to more than 30 m. Use a cable of $0.3 \ \text{mm}^2$ or greater for extensions.

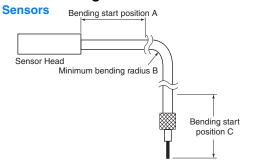
Sensors



Amplifier Units



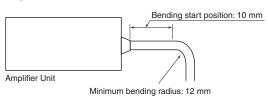
Cable Bending Start Position and Minimum Bending Radius



(Unit:	mm)

				(0
Model	Item	Α	В	С
E2CY-X1R5A				
E2CY-C1R5A-1		15	25	
E2CY-C2A				35
E2CY-C2AF		30	35	
E2CY-V3A		15	25	

Amplifier Units



Terms and Conditions of Sale

- Offer; Acceptance. These terms and conditions (these "Terms") are deemed part of all quotes, agreements, purchase orders, acknowledgments, price lists, catalogs, manuals, brochures and other documents, whether electronic or in catalogs, manuals, brochures and other documents, whether electronic or in writing, relating to the sale of products or services (collectively, the "Products") by Omron Electronics LLC and its subsidiary companies ("Omron"). Omron objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms. Prices: Payment Terms. All prices stated are current, subject to change without notice by Omron. Omron reserves the right to increase or decrease prices on any unshipped portions of outstanding orders. Payments for Products are due net 30 days unless otherwise stated in the invoice. Discounts. Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (i) the invoice is paid according to Omron's payment terms and (ii) Buyer has no past due amounts.

- and (ii) Buyer has no past due amounts.

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- Orders. Omron will accept no order less than \$200 net billing.

 Governmental Approvals. Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for the importation or sale of the Products.
- Taxes. All taxes, duties and other governmental charges (other than general real property and income taxes), including any interest or penalties thereon, imposed directly or indirectly on Omron or required to be collected directly or indirectly by Omron for the manufacture, production, sale, delivery, importation, consumption or use of the Products sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and remitted by Buyer to Omron.

 Financial. If the financial position of Buyer at any time becomes unsatisfactory
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 a. Shipments shall be by a carrier selected by Omron; Omron will not drop ship
- - except in "break down" situations.
 b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall
- constitute delivery to Buyer; c. All sales and shipments of Products shall be FOB shipping point (unless oth- c. All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in writing by Omron), at which point title and risk of loss shall pass from Omron to Buyer; provided that Omron shall retain a security interest in the Products until the full purchase price is paid;
 d. Delivery and shipping dates are estimates only; and
 e. Omron will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.

 12. Claims. Any claim by Buyer against Omron for shortage or damage to the Products occurring before delivery to the carrier must be presented in writing to Omron within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Products.
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Certain Precautions on Specifications and Use

- Suitability of Use. Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request. Omron will provide application of use of the Product. At Buyer's lequest, omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases but the following is a non-exhaustive list of applications for which particular attention must be given:

 (i) Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.

 (ii) Use in consumer products or any use in significant quantities.

 (iii) Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject and industrial consumers and consumers are consumers and status of the consumers and consumers.
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- Change in Specifications. Product specifications and accessories may be change in specifications. Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time
- to confirm actual specifications of purchased Product.

 <u>Errors and Omissions.</u> Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.



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