

Proximity Sensor

E2EQ


A Series of Spatter-preventing Proximity Sensors with a Fluororesin-coated Metal Housing

- Fluororesin-coated metal housing endures high tightening torque.
- Pre-wired and plug-in models are available.
- Long sensing-distance type included in series.




Ordering Information


■ Standard Type Pre-wired Models

Shield	Size	Sensing distance	Output configuration	Models
Shielded 	M12	3 mm	NO	E2EQ-X3D1
	M18	7 mm		E2EQ-X7D1
	M30	10 mm		E2EQ-X10D1


Plug-in Models

Shield	Size	Sensing distance	Output configuration	Models
Shielded 	M12	3 mm	NO	E2EQ-X3D1-M1GJ
	M18	7 mm		E2EQ-X7D1-M1GJ
	M30	10 mm		E2EQ-X10D1-M1GJ

■ Long Sensing-distance Type Pre-wired Models

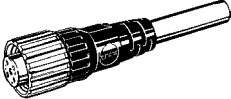

Shield	Size	Sensing distance	Output configuration	Models
Shielded 	M12	4 mm	NO	E2EQ-X4X1
	M18	8 mm		E2EQ-X8X1
	M30	15 mm		E2EQ-X15X1

Plug-in Models

Shield	Size	Sensing distance	Output configuration	Models
Shielded 	M12	4 mm	NO	E2EQ-X4X1-M1J
	M18	8 mm		E2EQ-X8X1-M1J
	M30	15 mm		E2EQ-X15X1-M1J

■ Accessories (Sold Separately)

Sensor I/O Connectors

Appearance	Cord length	Applicable Proximity Sensor	Models
	2 m	E2EQ-X□D1-M1GJ	XS2F-D421-DA0-A
		E2EQ-X□X1-M1J	XS2F-D421-DD0
	5 m	E2EQ-X□D1-M1GJ	XS2F-D421-GA0-A
		E2EQ-X□X1-M1J	XS2F-D421-GD0
	2 m	E2EQ-X□D1-M1GJ	XS2F-D422-DA0-A
		E2EQ-X□X1-M1J	XS2F-D422-DD0
	5 m	E2EQ-X□D1-M1GJ	XS2F-D422-GA0-A
		E2EQ-X□X1-M1J	XS2F-D422-GD0

Specifications

■ Ratings/Characteristics

Standard Type

Item	E2EQ-X3D1 E2EQ-X3D1-M1GJ	E2EQ-X7D1 E2EQ-X7D1-M1GJ	E2EQ-X10D1 E2EQ-X10D1-M1GJ
Supply voltage (operating voltage range)	12 to 24 VDC, ripple (p-p): 10% max., (10 to 30 VDC)		
Leakage current	0.8 mA max.		
Sensing object	Ferrous metals (refer to <i>Engineering Data</i> for non-ferrous metals)		
Sensing distance	3 mm ±10%	7 mm ±10%	10 mm ±10%
Setting distance (standard object)	0 to 2.4 mm (Mild steel, 12 x 12 x 1 mm)	0 to 5.6 mm (Mild steel, 18 x 18 x 1 mm)	0 to 8.0 mm (Mild steel, 30 x 30 x 1 mm)
Differential travel	10% max. of sensing distance		
Response frequency (see note)	1.0 kHz	0.5 kHz	0.4 kHz
Operating status (with sensing object approaching)	Load ON		
Control Output	Switching capacity	3 to 100 mA	
	Residual voltage	3 V max. (under load current of 100 mA with cable length of 2 m)	
Voltage influence	±2.5% max. of sensing distance in rated voltage range ±15%		
Circuit protection	Surge absorber, short-circuit protection		
Indicators	Operation indicator (red LED), operation set indicator (green LED)		
Ambient temperature	Operating: -25 to 70°C (with no icing)		
Ambient humidity	Operating: 35% to 95%		
Temperature influence	±10% max. of sensing distance at 23°C in the temperature range of -25 and 70°C		
Insulation resistance	50 MΩ min. (at 500 VDC) between current carry parts and case		
Dielectric strength	1,000 VAC for 1 min between current carry parts and case		
Vibration resistance	10 to 55 Hz, 1.5-mm double amplitude for 2 hrs each in X, Y, and Z directions		
Shock resistance	1,000 m/s ² (approx. 100G) for 10 times each in X, Y, and Z directions		
Enclosure rating	IEC60529 IP67		
Weight (pre-wired models)	Approx. 120 g	Approx. 160 g	Approx. 220 g
Material	Case	Fluororesin resin coating (base: brass)	
	Sensing surface	Fluororesin resin	

Note: The response frequencies for DC switching are average values measured on condition that the distance between each sensing object is twice as large as the size of the standard object and the sensing distance set is half of the maximum sensing distance.

Long Sensing-distance Type

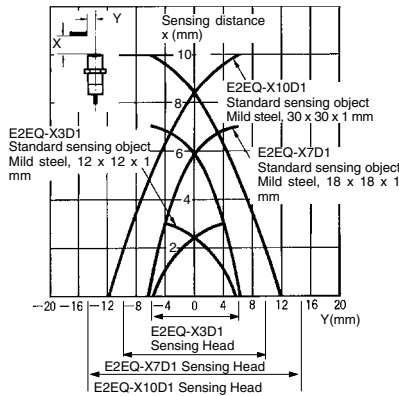
Item		E2EQ-X4X1 E2EQ-X4X1-M1J	E2EQ-X8X1 E2EQ-X8X1-M1J	E2EQ-X15X1 E2EQ-X15X1-M1J
Supply voltage (operating voltage range)		12 to 24 VDC, ripple (p-p): 10% max., (10 to 30 VDC)		
Leakage current		0.8 mA max.		
Sensing object		Ferrous metals (refer to <i>Engineering Data</i> for non-ferrous metals)		
Sensing distance		4 mm \pm 10%	8 mm \pm 10%	15 mm \pm 10%
Setting distance (standard object)		0 to 3.2 mm (Mild steel, 12 x 12 x 1 mm)	0 to 6.4 mm (Mild steel, 18 x 18 x 1 mm)	0 to 12 mm (Mild steel, 30 x 30 x 1 mm)
Differential travel		15% max. of sensing distance		
Response frequency (see note)		1.0 kHz	0.5 kHz	0.25 kHz
Operating status (with sensing object approaching)		Load ON		
Control Output	Switching capacity	3 to 100 mA		
	Residual voltage	5 V max. (under load current of 100 mA with cable length of 2 m)		
Voltage influence		\pm 1% max. of sensing distance in rated voltage range of \pm 15%		
Circuit protection		Surge absorber, short-circuit protection		
Indicators		Operation indicator (red LED), operation set indicator (green LED)		
Ambient temperature		Operating: -25°C to 70°C (with no icing)		
Ambient humidity		Operating: 35% to 95%		
Temperature influence		\pm 10% max. of sensing distance at 23°C in the temperature range of -25 and 70°C		
Insulation resistance		50 M Ω min. (at 500 VDC) between current carry parts and case		
Dielectric strength		1,000 VAC for 1 min between current carry parts and case		
Vibration resistance		10 to 55 Hz, 1.5-mm double amplitude for 2 hrs each in X, Y, and Z directions		
Shock resistance		1,000 m/s ² (approx. 100G) for 10 times each in X, Y, and Z directions		
Enclosure rating		IEC60529 IP67		
Weight (pre-wired models)		Approx. 120 g	Approx. 160 g	Approx. 220 g
Material	Case	Fluororesin resin coating (base: brass)		
	Sensing surface	Fluororesin resin		

Note: The response frequencies for DC switching are average values measured on condition that the distance between each sensing object is twice as large as the size of the standard object and the sensing distance set is half of the maximum sensing distance.

Engineering Data

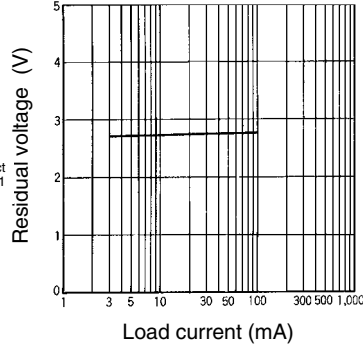
Operating Range (Typical)

E2EQ-X□D

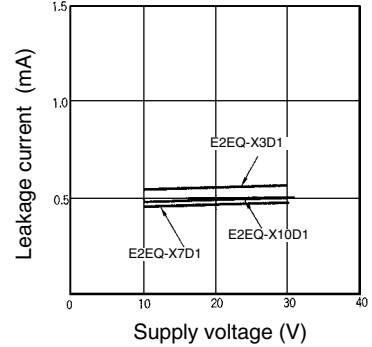


Residual Output Voltage Characteristics (Typical)

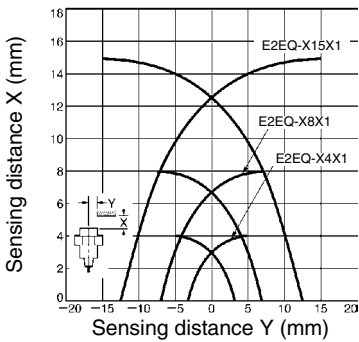
E2EQ-X□D1



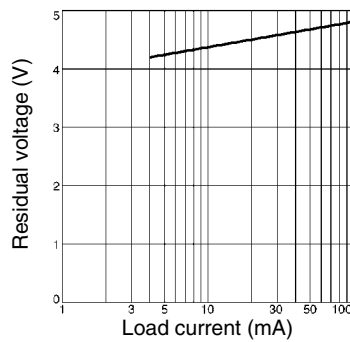
Leakage Current Characteristics (Typical)



E2EQ-X□X

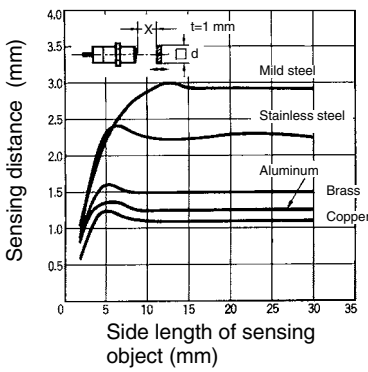


E2EQ-X□X

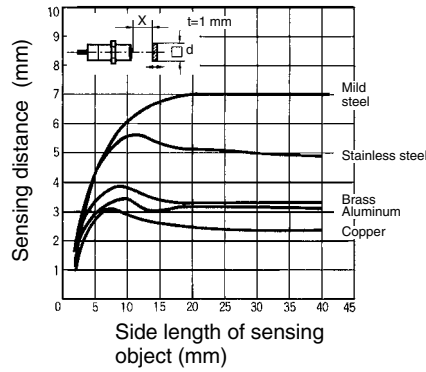


Influence of Sensing Object Size and Materials

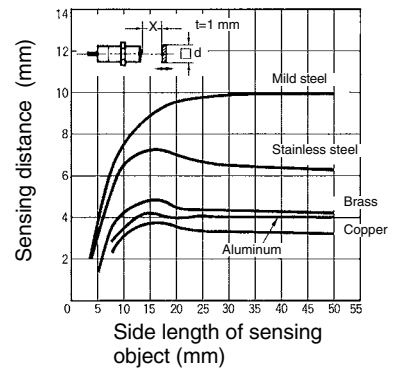
E2EQ-X3D1 (-M1GJ)



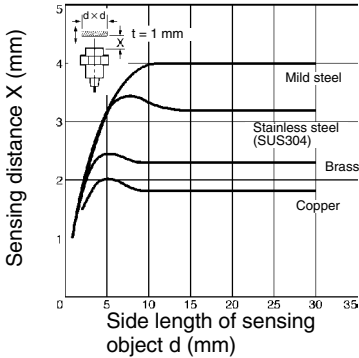
E2EQ-X7D1 (-M1GJ)



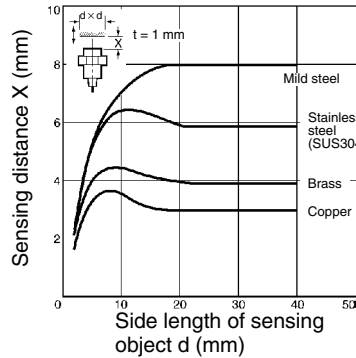
E2EQ-X10D1 (-M1GJ)



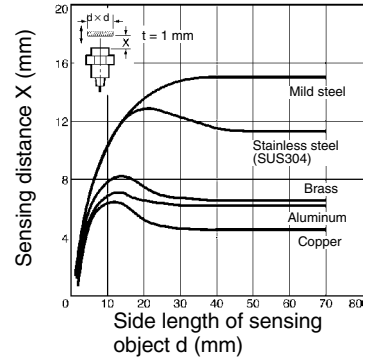
E2EQ-X4X1 (-M1J)



E2EQ-X8X1 (-M1J)

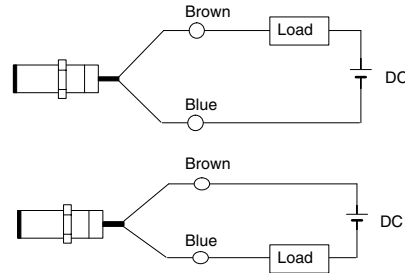
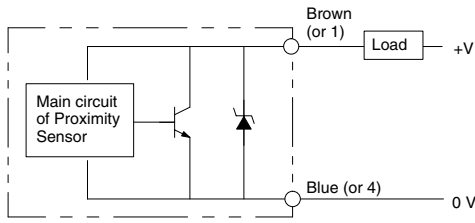


E2EQ-X15X1 (-M1J)



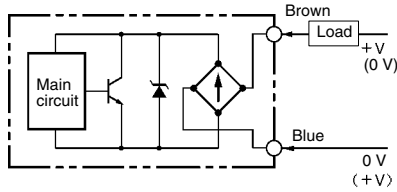
Operation

Output Circuit Diagram Standard Type



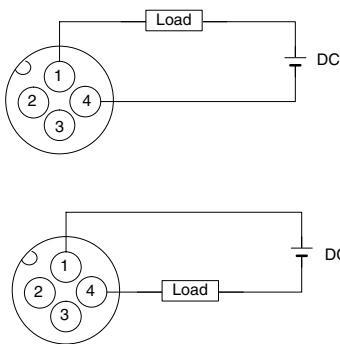
Note: It is possible to connect the load in two ways as shown in the above diagrams.

Long Sensing-distance Type



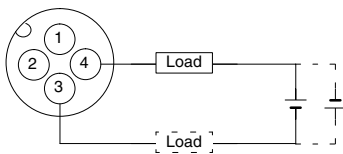
- Note:**
1. The load can be connected to either the +V or the 0-V line.
 2. Since there is no polarity, there is no need to pay attention to the brown or blue polarity.

Wiring Standard Type E2EQ-X□D1-M1GJ

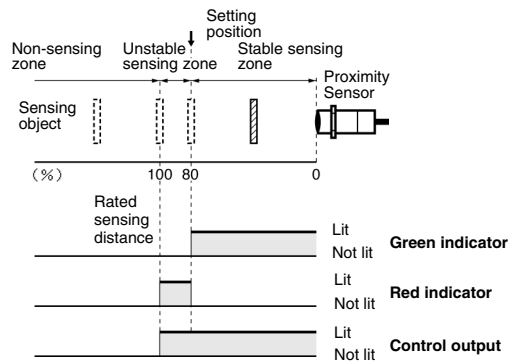
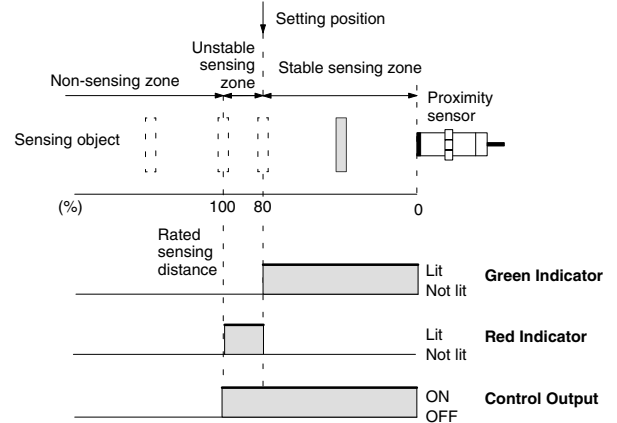


Note: Terminals 2 and 3 are not used.

Long Sensing-distance Type E2EQ-X□X-M1J



Operating Chart

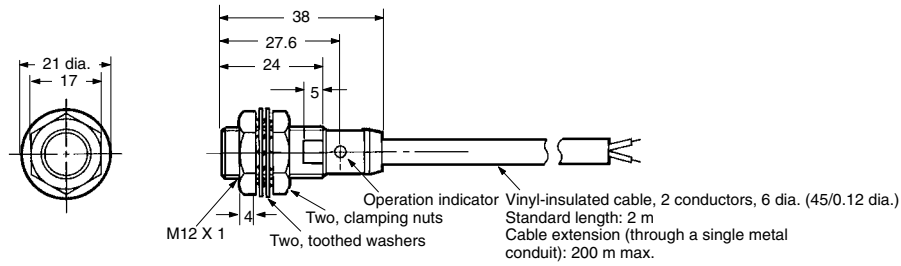


Dimensions

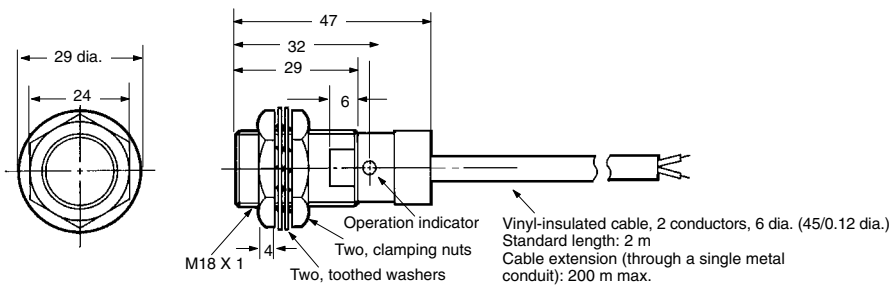
■ Standard Type

Note: All units are in millimeters unless otherwise indicated.

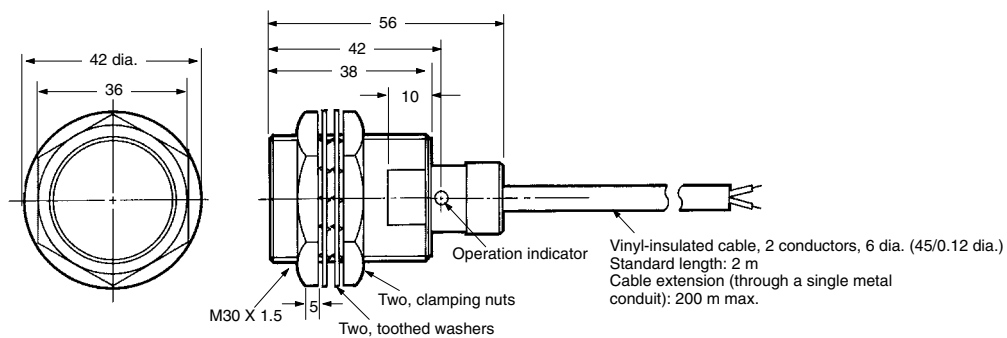
E2EQ-X3D1



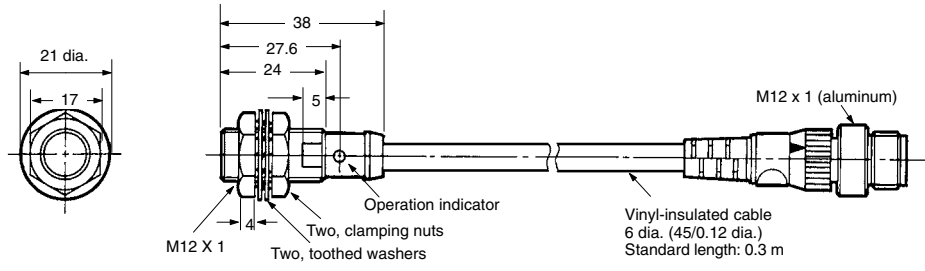
E2EQ-X7D1



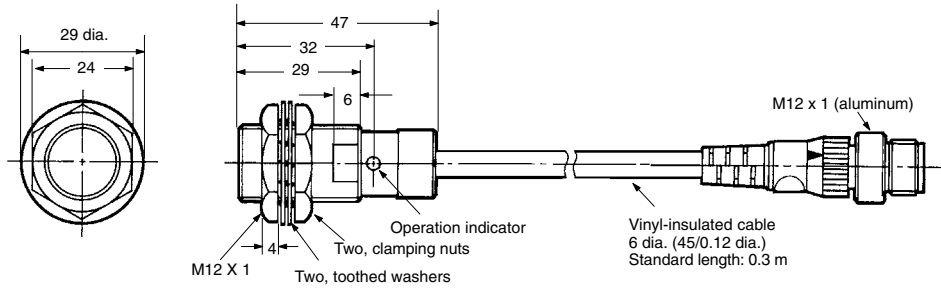
E2EQ-X10D1



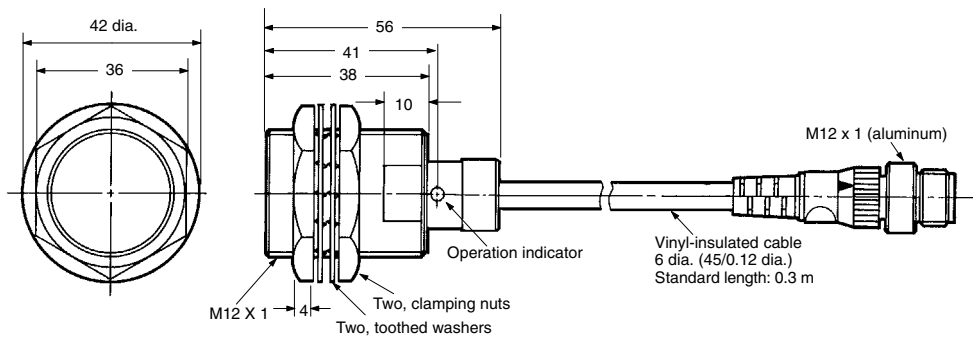
E2EQ-X3D1-M1GJ



E2EQ-X7D1-M1GJ

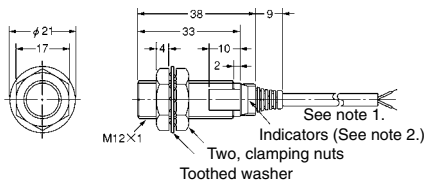


E2EQ-X10D1-M1GJ



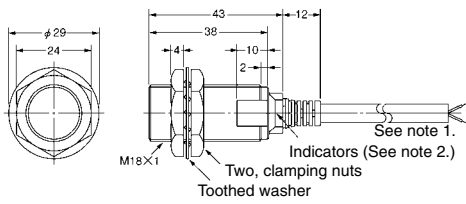
■ Long Sensing-distance Type

E2EQ-X4X1



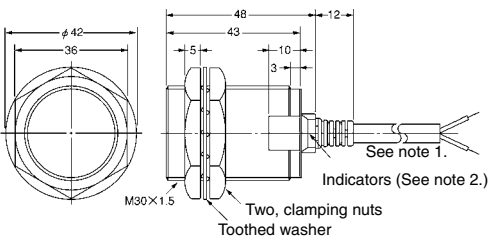
- Note:**
1. Vinyl-insulated round cable (flame-resistant), 4 dia. 2/3 conductors (conducting cross-sectional area: 0.3 mm²; insulator diameter: 1.3 mm) Standard length: 2 m Cable extension (through a single metal conduit): 200 m max.
 2. Operation indicator (red) and setting indicator (green).

E2EQ-X8X1



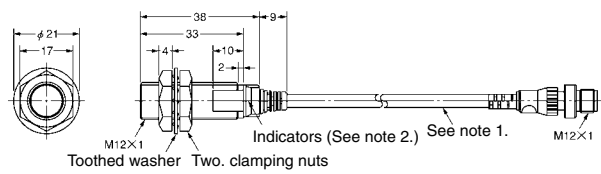
- Note:**
1. Vinyl-insulated round cable (flame-resistant), 6 dia. 2/3 conductors (conducting cross-sectional area: 0.5 mm²; insulator diameter: 1.9 mm) Standard length: 2 m Cable extension (through a single metal conduit): 200 m max.
 2. Operation indicator (red) and setting indicator (green).

E2EQ-X15X1



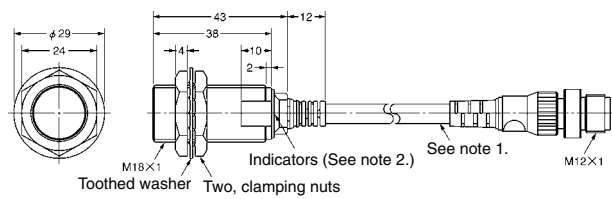
- Note:**
1. Vinyl-insulated round cable (flame-resistant), 6 dia. 2/3 conductors (conducting cross-sectional area: 0.5 mm²; insulator diameter: 1.9 mm) Standard length: 2 m Cable extension (through a single metal conduit): 200 m max.
 2. Operation indicator (red) and setting indicator (green).

E2EQ-X4X1-M1J



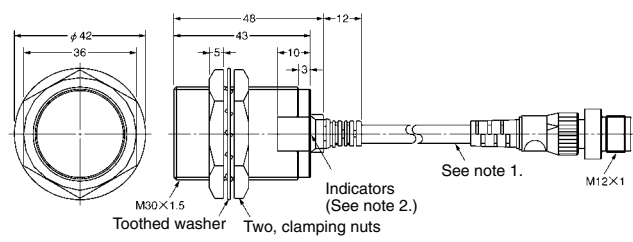
- Note:**
1. Vinyl-insulated round cable (flame-resistant), 4 dia. (Conducting cross-sectional area: 0.3 mm²; insulator diameter: 1.3 mm) Standard length: 300 mm
 2. Operation indicator (red) and setting indicator (green).

E2EQ-X8X1-M1J



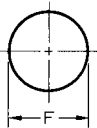
- Note:**
1. Vinyl-insulated round cable (flame-resistant), 5 dia. (Conducting cross-sectional area: 0.5 mm²; insulator diameter: 1.9 mm) Standard length: 300 mm
 2. Operation indicator (red) and setting indicator (green).

E2EQ-X15X1-M1J



- Note:**
1. Vinyl-insulated round cable (flame-resistant), 5 dia. (Conducting cross-sectional area: 0.5 mm²; insulator diameter: 1.9 mm) Standard length: 300 mm
 2. Operation indicator (red) and setting indicator (green).

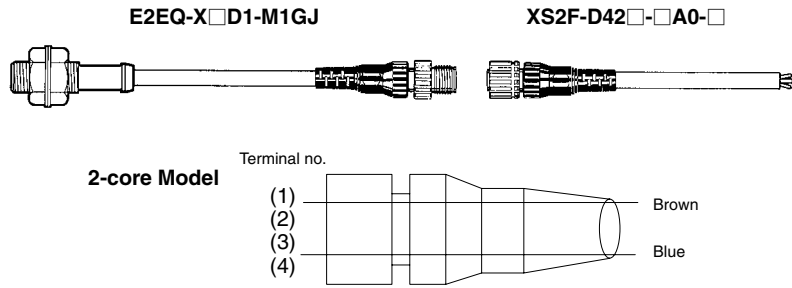
Mounting Hole Dimensions



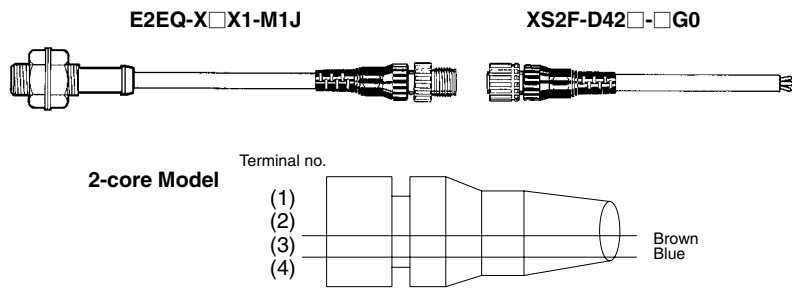
Models	F (mm)
E2EQ-X3/E2EQ-X4	12.5 ^{+0.5} ₀ dia.
E2EQ-X7/E2EQ-X8	18.5 ^{+0.5} ₀ dia.
E2EQ-X10/E2EQ-X15	30.5 ^{+0.5} ₀ dia.

Installation

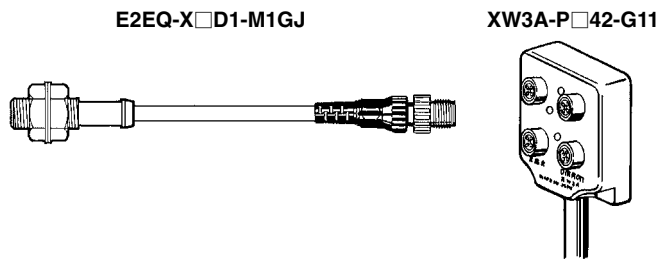
■ Connection with FA Connector E2EQ-X□D1-M1GJ to Terminal Board



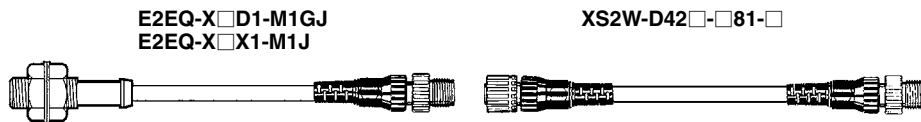
E2EQ-X□X1-M1J to Terminal Board



E2EQ-X□D1-M1GJ to XW3A (Connector Junction Box)



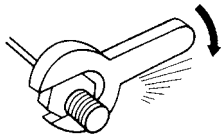
Connector Extension



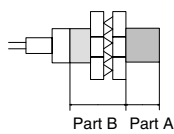
Precautions

Installation and Surroundings

Do not tighten the nut with excessive force. A washer must be used with the nut.



Shielded Model

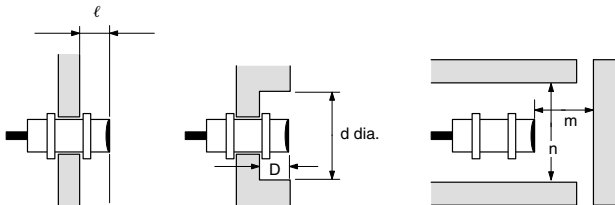


Note: The table below shows the tightening torques for part A and part B nuts. In the above example, the nut is on the sensor head side (part B) and hence the tightening torque for part B applies. If this nut is in part A, the tightening torque for part A applies instead.

Model	Part A		Part B
	Length	Torque	Torque
E2EQ-X3D1-□	24 mm	15 N • m	---
E2EQ-X7D1-□	29 mm		
E2EQ-X10D1-□	26 mm	39 N • m	78 N • m
E2EQ-X4X1-□	30 N • m		
E2EQ-X8X1-□	70 N • m		
E2EQ-X15X1-□	180 N • m		

Effects of Surrounding Metal

When mounting the E2EQ 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.

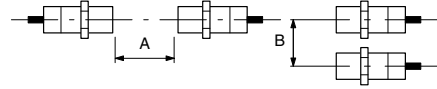


Model	E2EQ-X3D1-□	E2EQ-X7D1-□	E2EQ-X10D1-□
l	0 mm	0 mm	0 mm
d	12 mm	18 mm	30 mm
D	0 mm	0 mm	0 mm
m	8 mm	20 mm	40 mm
n	18 mm	27 mm	45 mm

Model	E2EQ-X4X1-□	E2EQ-X8X1-□	E2EQ-X15X1-□
l	2.4 mm	3.6 mm	6 mm
d	18 mm	2.7 mm	45 mm
D	2.4 mm	3.6 mm	6 mm
m	12 mm	24 mm	45 mm
n	18 mm	27 mm	45 mm

Mutual Interference

When installing two or more E2EQ face-to-face or side-by-side, ensure that the minimum distances given in the following table are maintained.



Model	A	B
E2EQ-X3D1-□	30 mm	20 mm
E2EQ-X7D1-□	50 mm	35 mm
E2EQ-X10D1-□	100 mm	70 mm
E2EQ-X4X1-□	30 mm	20 mm
E2EQ-X8X1-□	60 mm	35 mm
E2EQ-X15X1-□	110 mm	90 mm

Sensing Object

Sensing Object Material

The sensing distance is reduced for non-ferrous metals. The sensing distance for non-ferrous metal foils less than 0.01 mm thick is the same as that for ferrous metals. However, if the foil becomes so thin (e.g., from vaporization) that it loses its conductivity, then it will become undetectable.

Metal Plating

The sensing distance will change if the sensing object is plated. The following table shows the sensing distance of a plated object as a percentage of the sensing distance of an un-plated object.

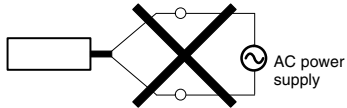
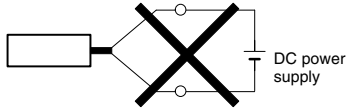
Plating thickness	Mild steel	Brass
No plating	100%	100%
Zn 5 to 15 μm	90% to 120%	95% to 105%
Cd 5 to 15 μm	100% to 110%	95% to 105%
Ag 5 to 15 μm	60% to 90%	85% to 100%
Cu 10 to 20 μm	70% to 95%	95% to 105%
Cu 5 to 15 μm	---	95% to 105%
Cu (5 to 10 μm) + Ni (10 to 20 μm)	75% to 95%	---
Cu (5 to 10 μm) + Ni (10 μm) + Cr (0.3 μm)	75% to 95%	---

Parallel Connection (OR Circuit)

When constructing OR circuits by connecting 2 or more Proximity Sensors in parallel, the leakage current through the load will be 0.8 mA times n, where n is the number of Proximity Sensors connected in parallel.

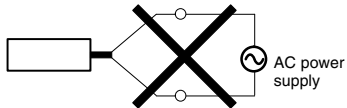
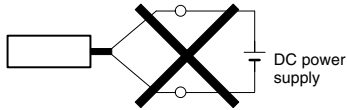
Direct Connection to a Power Supply

Never connect the Proximity Sensor directly to a power supply without a load in the circuit.



Direct Connection to a Power Supply

Never connect the Proximity Sensor directly to a power supply without a load in the circuit.



READ AND UNDERSTAND THIS DOCUMENT

Please read and understand this document before using the products. Please consult your OMRON representative if you have any questions or comments.

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

SUITABILITY FOR USE

THE PRODUCTS CONTAINED IN THIS DOCUMENT ARE NOT SAFETY RATED. THEY ARE NOT DESIGNED OR RATED FOR ENSURING SAFETY OF PERSONS, AND SHOULD NOT BE RELIED UPON AS A SAFETY COMPONENT OR PROTECTIVE DEVICE FOR SUCH PURPOSES. Please refer to separate catalogs for OMRON's safety rated products.

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the product.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

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

Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.

Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PERFORMANCE DATA

Performance data given in this document is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

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 model 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 model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ERRORS AND OMISSIONS

The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

COPYRIGHT AND COPY PERMISSION

This document shall not be copied for sales or promotions without permission.

This document is protected by copyright and is intended solely for use in conjunction with the product. Please notify us before copying or reproducing this document in any manner, for any other purpose. If copying or transmitting this document to another, please copy or transmit it in its entirety.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. D055-E1-04 **In the interest of product improvement, specifications are subject to change without notice.**

OMRON Corporation
Industrial Automation Company

Sensing Devices Division H.Q.
Industrial Sensors Division
Shiokoji Horikawa, Shimogyo-ku,
Kyoto, 600-8530 Japan
Tel: (81)75-344-7022/Fax: (81)75-344-7107