D29I-E-01

# **Proximity Sensor with Resin Case** with Superb Water Resistance

- Rugged, watertight plastic housing offers good chemical resistance and withstands washdown; IP68 protection
- Wide operating voltages: 10 to 30 VDC and 20 to 264 VAC
- Operation indicator on all models
- Short-circuit protection available on all DC and some AC
- Mutual interference prevention with models with different frequencies is also available.



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.



Be sure to read Safety Precautions on page 5.

## **Ordering Information**

## Sensors [Refer to Dimensions on page 6.]

| Model    |         | Sensing distance |        |                      | М               | odel            |
|----------|---------|------------------|--------|----------------------|-----------------|-----------------|
|          |         |                  |        | Output configuration | Operation mode  |                 |
|          |         |                  |        |                      | NO              | NC              |
|          | M8      | 1 5 222          |        | DC 3-wire, NPN       | E2F-X1R5E1 2M   | E2F-X1R5E2 2M   |
| IV       | IVIO    | 1.5 mm           | im<br> | AC 2-wire            | E2F-X1R5Y1 2M   | E2F-X1R5Y2 2M   |
|          | M12     | 2 mm             |        | DC 3-wire, NPN       | E2F-X2E1 2M *1  | E2F-X2E2 2M *1  |
| Shielded | IVI I Z |                  |        | AC 2-wire            | E2F-X2Y1 2M *1  | E2F-X2Y2 2M *1  |
|          | M18     | 5 mm             |        | DC 3-wire, NPN       | E2F-X5E1 2M *1  | E2F-X5E2 2M *1  |
|          | IVI IO  |                  |        | AC 2-wire            | E2F-X5Y1 2M *1  | E2F-X5Y2 2M *1  |
|          | Mao     | 40               |        | DC 3-wire, NPN       | E2F-X10E1 2M *1 | E2F-X10E2 2M *1 |
|          | M30     | 10 mn            | ו      | AC 2-wire            | E2F-X10Y1 2M *1 | E2F-X10Y2 2M *1 |

<sup>\*1.</sup> Models with different frequencies are also available. The model numbers are E2F-X□□□5 (e.g., E2F-X5E15). \*2. Models are also available with short-circuit protection. The model numbers are E2F-X□Y□-53 (e.g., E2F-X5Y1-53). The power supply voltage, however, is 100 to 120 VAC.

## **Ordering Information**

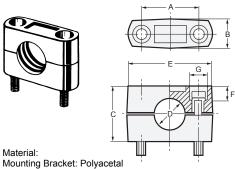
## **Accessories (Order Separately)**

#### **Protective Covers**

Refer to Y92 of or details.

## **Mounting Brackets**

Special resin mounting sleeves: Four different models available. Simply select the size that fits the outside diameter of the Sensor.



## **Mounting Bracket Dimensions**

| Item     | Dimension (mm) |           |    |         |         |    |          | Applied hexagonal | Applicable Sensor |
|----------|----------------|-----------|----|---------|---------|----|----------|-------------------|-------------------|
| Model    | Α              | В         | С  | D       | E       | F  | G        | bolts             | diameter          |
| Y92E-B8  | 18±0.2         | 10 max.   | 18 | 8 dia.  | 28 max. | 6  | 7.4 dia. | M4 × 20           | M8                |
| Y92E-B12 | 24±0.2         | 12.5 max. | 20 | 12 dia. | 37 max. | 6  | 8 dia.   | M4 × 25           | M12               |
| Y92E-B18 | 32±0.2         | 17 max.   | 30 | 18 dia. | 47 max. | 7  | 9.8 dia. | M5 × 32           | M18               |
| Y92E-B30 | 45±0.2         | 17 max.   | 50 | 30 dia. | 60 max. | 10 | 9.8 dia. | M5 × 50           | M30               |

Note: Consider the influence of surrounding metal when mounting non-shielded Sensors. (Refer to information on individual Sensors for dimensions.)

# Hexagonal bolt and spring washer: Nickel-plated iron

#### **Nut Sets**

These nut sets are for mounting the Sensors. Order them if you lose the mounting nuts supplied with the sensor. Order the correct set for the outer diameter of your Sensor.

| Model        | Item | Applicable Sensor | Applicable Sensor diameter | Set contents                  |
|--------------|------|-------------------|----------------------------|-------------------------------|
| Y92E-NWM08-I | E2F  |                   | M8                         |                               |
| Y92E-NWM12-I | E2F  | E2F               | M12                        | Clamping puts (polygoodal): 2 |
| Y92E-NWM18-I | E2F  |                   | M18                        | Clamping nuts (polyacetal): 2 |
| Y92E-NWM30-I | E2F  |                   | M30                        |                               |

# **Ratings and Specifications**

| Item                                 | Model                     | E2F-X1R5E□<br>E2F-X1R5Y□  | E2F-X2E□<br>E2F-X2Y□                              | E2F-X5E□<br>E2F-X5Y□   | E2F-X10E□<br>E2F-X10Y□               |  |  |
|--------------------------------------|---------------------------|---|---|--|--------------------------------------|--|--|
| Sensing d                            | listance                  | 1.5 mm ±10%   | 2 mm ±10%   | 5 mm ±10%  | 10 mm ±10%                           |  |  |
| Set distance                         |                           | 0 to 1.2 mm   | 0 to 1.6 mm                                       | 0 to 4 mm  | 0 to 8 mm                            |  |  |
| Differentia                          | al travel                 | 10% max. of sensing distance  | )e  |  |                                      |  |  |
| Detectable                           | e object                  | Ferrous metal (The sensing  | distance decreases with n                         | on-ferrous metal. Refer to Er  | ngineering Data on page 3.)          |  |  |
| Standard object                      | sensing                   | Iron, 8 × 8 × 1 mm  | Iron, 12 × 12 × 1 mm                              | Iron, 18 × 18 × 1 mm   | Iron, 30 × 30 × 1 mm                 |  |  |
| Response<br>*1                       | frequency                 | E Models: 2 kHz,<br>Y Models: 25 Hz   | E Models: 1.5 kHz,<br>Y Models: 25 Hz             | E Models: 600 Hz,<br>Y Models: 25 Hz   | E Models: 400 Hz,<br>Y Models: 25 Hz |  |  |
| Power sup<br>(operating<br>range)    | oply voltage<br>g voltage | E Models: 12 to 24 VDC (10 Y Models: 24 to 240 VAC (20  |   | 0% max.  |                                      |  |  |
| Current co                           | onsumption                | E Models: 17 mA max.  |   |  |                                      |  |  |
| Leakage o                            | urrent                    | Y Models: 1.7 mA max. at 20   | 00 VAC (Refer to Engineer                         | ring Data on page 3.)  |                                      |  |  |
| Control                              | Load current              | E Models: 200 mA max.<br>Y Models: 5 to 100 mA  |   | E Models: 200 mA max.<br>Y Models: 5 to 300 mA   |                                      |  |  |
| output                               | Residual voltage          | E Models: 2 V max. (Load cu<br>Y Models: Refer to <i>Engineer</i>   | urrent: 200 mA, Cable leng<br>ing Data on page 4. | yth: 2 m)  |                                      |  |  |
| Indicators                           | •                         | E1 Models: Detection indicator (red), E2 Models: Operation indicator (red) Y Models: Operation indicator (red)        |   |  |                                      |  |  |
| Operation<br>(with sens<br>approachi | sing object               | E1/Y1 Models: NO E2/Y2 Models: NC Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 4 for details. |   |  |                                      |  |  |
| Protection                           | circuits                  | E Models: Reverse polarity p  | uit protection, Surge suppres                     | sor; Y Models: None  |                                      |  |  |
| Ambient<br>temperatu                 | ire range                 | Operating/Storage: -25 to 70°C (with no icing or condensation)  |   |  |                                      |  |  |
| Ambient<br>humidity ı                | range                     | Operating/Storage: 35% to 9   | 15%   |  |                                      |  |  |
| Temperate                            | ure influence             | ±10% max. of sensing distance at 23°C in the temperature range of –25 to 70°C   |   |  |                                      |  |  |
| Voltage in                           | fluence                   | E Models: ±2.5% max. of set Y Models: ±1% max. of sens  |   |  |                                      |  |  |
| Insulation                           | resistance                | 50 M $\Omega$ min. (at 500 VDC) be  | tween current-carrying pa                         | rts and case   |                                      |  |  |
| Dielectric                           | strength                  | Y Models: (M8 Models): 2,00   | 00 VAC, 50/60 Hz for 1 mir                        | n between current-carrying pan between current-carrying pan between current-carrying pan | arts and case                        |  |  |
| Vibration                            | resistance                | Destruction: 10 to 55 Hz, 1.5   | i-mm double amplitude for                         | 2 hours each in X, Y, and Z  | directions                           |  |  |
| Shock res                            | istance                   | Destruction: 1,000 m/s <sup>2</sup> 10 times each in X, Y, and Z directions   |   |  |                                      |  |  |
| Degree of                            | protection                | IEC 60529 IP68, in-house st   | andards: oil-resistant *2                         |  |                                      |  |  |
| Connectio                            | n method                  | Pre-wired Models (Standard  | cable length: 2 m)                                |  |                                      |  |  |
| Weight (p                            | acked state)              | Approx. 40 g  | Approx. 50 g                                      | Approx. 130 g  | Approx. 170 g                        |  |  |
|                                      | Case                      |   |   | 1  | 1                                    |  |  |
| Materials                            | Sensing surface           | Polyarylate resin   |   |  |                                      |  |  |
|                                      | Clamping nuts             | Polyacetal  |   |  |                                      |  |  |
|                                      | 1                         | Instruction manual  |   |  |                                      |  |  |

<sup>\*1.</sup> 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. When using the Sensor in environments subject to splashing cutting oil, deterioration may result due to the additives in the oil. The E2E is recommended in such environments.

#### **OMRON Test Method**

Usage conditions: 10 m or less under water in natural conditions

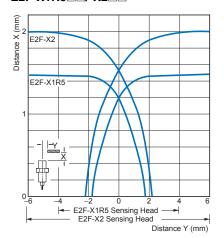
- 1. No water ingress after 1 hour under water at 2 atmospheres of pressure.

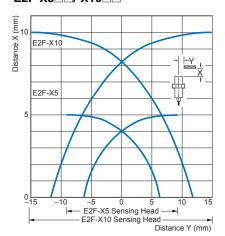
  2. Sensing distance and insulation resistance specifications must be met after 20 repetitions of 1 hour in 0°C water and 1 hour in 70°C water.

## **Engineering Data (Reference Value)**

## **Sensing Area**

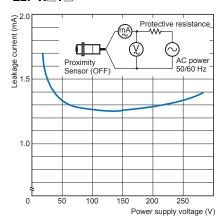
#### 





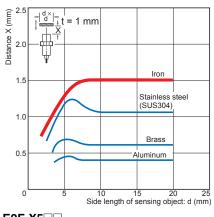
## **Leakage Current**



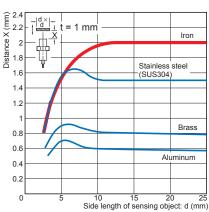


## **Influence of Sensing Object Size and Material**

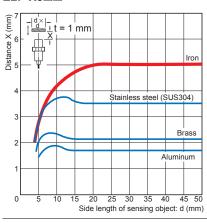
#### E2F-X1R5□□



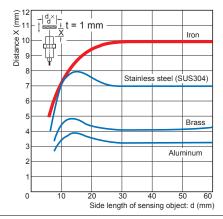
#### E2F-X2□□





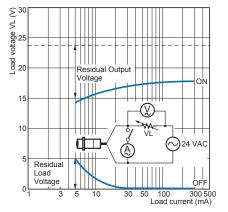


**E2F-X10**□□

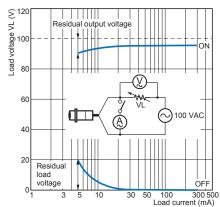


## **Residual Output Voltage**

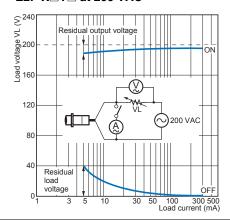
## E2F-X□Y□ at 24 VAC



## E2F-X□Y□ at 100 VAC



E2F-X□Y□ at 200 VAC



# I/O Circuit Diagrams

| Output configuration | Operation mode                                     | Model   | Timing chart   | Output circuit  |
|----------------------|--|---|--|---|
|                      | NO   | E2F-X1R5E1<br>E2F-X2E1<br>E2F-X5E1<br>E2F-X10E1 | Sensing object Present Not present Load (between brown Operate and black leads) Output voltage (between black and blue leads) Detection indicator (red) ON OFF | E2F-X1R5  Brown 330 Ω  Proximity Sensor main circuit  Output 2  Tr  |
| DC 3-wire            | NC   | E2F-X1R5E2<br>E2F-X2E2<br>E2F-X5E2<br>E2F-X10E2 | Sensing object Present  Load (between brown Operate and black leads)  Output voltage (between High black and blue leads)  Detection indicator (red)  ON OFF    | *1. Load current: 200 mA max. *2. When a transistor is connected.  Except the E2F-X1R5  Brown  100 \Omega |
| AC 2-wire            | NO   | E2F-X1R5Y1<br>E2F-X2Y1<br>E2F-X5Y1<br>E2F-X10Y1 | Sensing object Present Not present Load Operate Reset Operation ON Indicator (red) OFF   | Proximity Sensor  |
| AC 2-WIFE            | NC E2F-X1R5Y2<br>E2F-X2Y2<br>E2F-X5Y2<br>E2F-X10Y2 |   | Sensing object Present Not present Load Operate Reset Operation indicator ON (red) OFF   | main circuit Blue   |

# **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.



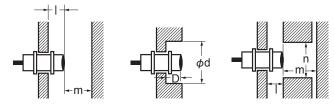
#### **Precautions for Correct Use**

Do not use 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.



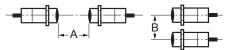
### **Influence of Surrounding Metal**

|  | mm) |
|--|-----|
|  |     |

| Model            | Item | ı | d  | D | m   | n  |
|------------------|------|---|----|---|-----|----|
| E2F-X1R5□□       |      |   | 8  |   | 4.5 | 12 |
| E2F-X2□□         |      | 0 | 12 | 0 | 8   | 18 |
| <b>E2F-X5</b> □□ |      | U | 18 | U | 20  | 27 |
| E2F-X10□□        |      |   | 30 |   | 40  | 45 |

## **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       |
|------------|----------|---------|
| E2F-X1R5   | 20       | 15      |
| E2F-X2     | 30 (20)  | 20 (12) |
| E2F-X5□□   | 50 (30)  | 35 (18) |
| E2F-X10□□  | 100 (50) | 70 (35) |

Note: Values in parentheses apply to Sensors operating at different frequencies. Models numbers for Sensors with different frequencies are E2F-X□□□5.

#### Mounting

Do not tighten the nut with excessive force.



| Model      | Torque     |
|------------|------------|
| E2F-X1R5□□ | 0.78 N·m   |
| E2F-X2     | 0.76 11111 |
| E2F-X5     | 2 N·m      |
| E2F-X10    | Z IN*111   |

#### Maintenance and Inspection

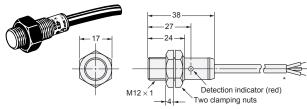
Do not use AC 2-Wire Models in water or in locations subject to water if the sensing surface or any other part of the Sensor is damaged, e.g., from contact with the sensing object. Electric shock may result.

#### **DC 3-Wire Models**

## E2F-X1R5E 30 -22 Detection indicator (red) M8× Two clamping nuts Two washers

\* 3.5-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.14 mm², Insulator diameter: 1 mm), Standard length: 2 m The cable can be extended up to 200 m (separate metal conduit).

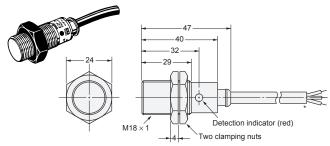
#### E2F-X2E



\* 6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm², Insulator diameter: 1.9 mm), Standard length: 2 m

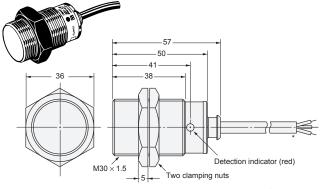
The cable can be extended up to 200 m (separate metal conduit).

#### E2F-X5E



 $^{\ast}$  6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm², Insulator diameter: 1.9 mm), Standard length: 2 m The cable can be extended up to 200 m (separate metal conduit).

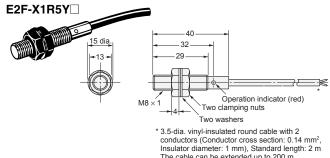
## E2F-X10E



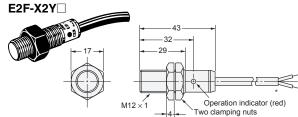
\* 6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm², Insulator diameter: 1.9 mm), Standard

length: 2 m The cable can be extended up to 200 m (separate metal conduit).

#### **AC 2-Wire Models**



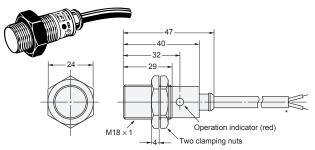
conductors (Conductor cross section: 0.14 mm², Insulator diameter: 1 mm), Standard length: 2 m The cable can be extended up to 200 m (separate metal conduit).



\* 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm², Insulator diameter: 1.9 mm), Standard

The cable can be extended up to 200 m (separate metal conduit).

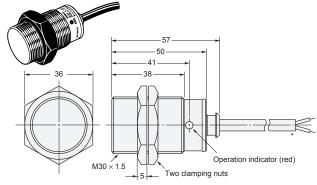
#### E2F-X5Y



\* 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm², Insulator diameter: 1.9 mm), Standard

The cable can be extended up to 200 m (separate metal conduit).

## E2F-X10Y



\* 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm², Insulator diameter: 1.9 mm), Standard

length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

#### **Mounting Hole Dimensions**



| Model  | E2F-X1R5□□                            | E2F-X2□□                               | E2F-X5□□                               | <b>E2F-X10</b> □□                      |
|--------|---------------------------------------|--|--|--|
| F (mm) | 8.5 <sub>0</sub> <sup>+0.5</sup> dia. | 12.5 <sub>0</sub> <sup>+0.5</sup> dia. | 18.5 <sub>0</sub> <sup>+0.5</sup> dia. | 30.5 <sub>0</sub> <sup>+0.5</sup> dia. |

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

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- - except in "break down" situations.
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  - c. All sales and shipments of Products shall be FOB shipping point (unless oth-
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   d. Delivery and shipping dates are estimates only; and
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