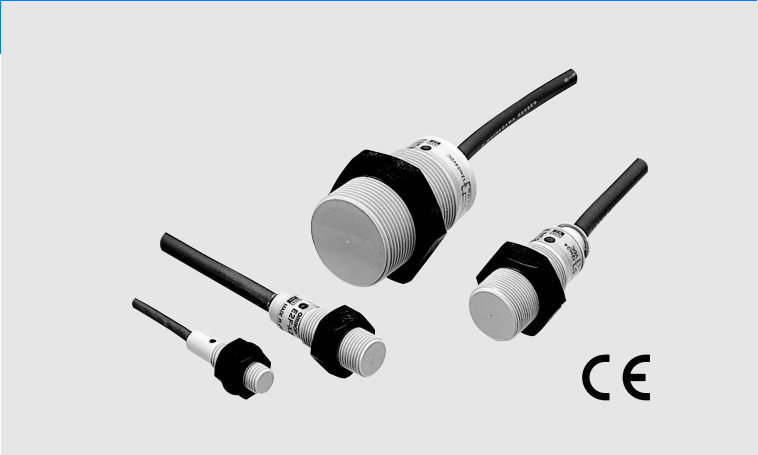


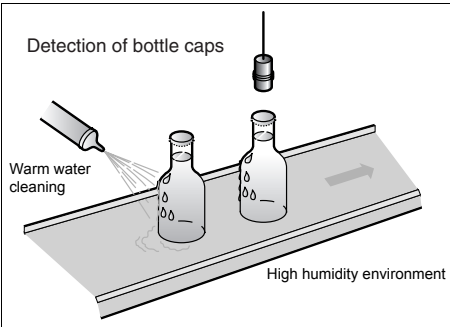
Cylindrical Proximity Sensor in Plastic Housing

# E2F

- High quality full body plastic housing for high water proof requirements
- Polyarylate housing for light chemical resistance




## Applications



## Ordering Information

### Sensors

| Model   | Sensing distance | Output specifications | Model              |                    |
|---|------------------|-----------------------|--------------------|--------------------|
|   |                  |                       | Operating status   |                    |
|   |                  |                       | NO                 | NC                 |
| Shielded<br> | M8<br>1.5mm      | DC 3-wire NPN         | E2F-X1R5E1         | E2F-X1R5E2         |
|   |                  | AC 2-wire Models      | E2F-X1R5Y1         | E2F-X1R5Y2         |
|   | M12<br>2mm       | DC 3-wire NPN         | E2F-X2E1 *1        | E2F-X2E2 *1        |
|   |                  | AC 2-wire Models      | E2F-X2Y1 *1        | E2F-X2Y2 *1        |
|   | M18<br>5mm       | DC 3-wire NPN         | E2F-X5E1 *1        | E2F-X5E2 *1        |
|   |                  | AC 2-wire Models      | E2F-X5Y1 *1<br>*2  | E2F-X5Y2 *1<br>*2  |
|   | M30<br>10mm      | DC 3-wire NPN         | E2F-X10E1 *1       | E2F-X10E2 *1       |
|   |                  | AC 2-wire Models      | E2F-X10Y1 *1<br>*2 | E2F-X10Y2 *1<br>*2 |

\*1. A different frequency type is available. (E2F-X□□5; e.g. E2F-X5E15)

\*2. A short-circuit protection type is available. (E2F-X□Y□-53; e.g. E2F-X5Y1-53) Power supply voltage: 100 to 120 VAC

### Accessories (Order Separately)

E2F

Rating/performance

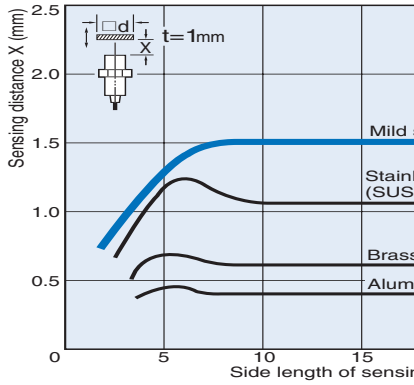
| Model  |                    | E2F-X1R5E□<br>E2F-X1R5Y□  | E2F-X2E□<br>E2F-X2Y□               | E2F-X5E□<br>E2F-X5Y□                        | E2F-X10E□<br>E2F-X10Y□            |
|--|--------------------|---|------------------------------------|---|-----------------------------------|
| Item   |                    |   |                                    |   |                                   |
| Sensing distance                                   |                    | 1.5 mm ±10%   | 2 mm ±10%                          | 5 mm ±10%                                   | 10 mm ±10%                        |
| Setting distance                                   |                    | 0 to 1.2 mm   | 0 to 1.6 mm                        | 0 to 4 mm                                   | 0 to 8 mm                         |
| Differential distance                              |                    | 10% max.  |                                    |   |                                   |
| Sensing object                                     |                    | Ferrous metal (Sensitivity lowers with non-ferrous metals)  |                                    |   |                                   |
| Standard sensing object                            |                    | Iron, 8 × 8 × 1 mm  | Iron, 12 × 12 × 1 mm               | Iron, 18 × 18 × 1 mm                        | Iron, 30 × 30 × 1 mm              |
| Response frequency*1                               |                    | E models: 2 kHz, Y models: 25 Hz  | E models: 1.5 kHz, Y models: 25 Hz | E models: 600 Hz, Y models: 25 Hz           | E models: 400 Hz, Y models: 25 Hz |
| Power supply(Operating voltage range)              |                    | E models: 12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.<br>Y models: 24 to 240 VAC (20 to 264 VAC)  |                                    |   |                                   |
| Current consumption                                |                    | E models: 17 mA max.  |                                    |   |                                   |
| Leakage current                                    |                    | Y models: 1.7 mA at 200 VAC   |                                    |   |                                   |
| Control output                                     | Switching capacity | E models: 200 mA max. Y models: 5 to 100 mA   |                                    | E models: 200 mA max. Y models: 5 to 300 mA |                                   |
|  | Residual voltage   | E models: 2 V max. (load current: 200 mA with cable length: 2 m)<br>Y models: Refer to the Specifications   |                                    |   |                                   |
| Indicator lamp                                     |                    | E models: Detection indicator (red LED) Y models: Operation indicator (red LED)   |                                    |   |                                   |
| Operating status (with sensing object approaching) |                    | E1, Y1 models: ON<br>E2, Y2 models: NC  |                                    |   |                                   |
| Protective circuits                                |                    | E models: Reverse connection protection, load short-circuit protection, surge absorber Y models: None   |                                    |   |                                   |
| Ambient temperature                                |                    | Operating/Storage: -25° C to 70° C (with no icing or condensation)  |                                    |   |                                   |
| Ambient humidity                                   |                    | Operating/Storage: 35% to 95%RH   |                                    |   |                                   |
| Temperature influence                              |                    | A maximum fluctuation of ±10% max. of sensing distance at 23° C in temperature range of -25° C and 70° C  |                                    |   |                                   |
| Voltage influence                                  |                    | E models: ±2.5% max. of sensing distance within a range of ±15% of rated power supply voltage Y models: ±1% max. of sensing distance within a range of ±10% of rated power supply voltage |                                    |   |                                   |
| Insulation resistance                              |                    | 50 MΩ min. (at 500 VDC) between current carry parts and case  |                                    |   |                                   |
| Dielectric strength                                |                    | E models: 1,000 VAC, 50/60 Hz for 1 min between current carry parts and case  |                                    |   |                                   |
| Vibration resistance                               |                    | 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions   |                                    |   |                                   |
| Shock resistance                                   |                    | Destruction: 1,000 m/s <sup>2</sup> for 10 times each in X, Y, and Z directions   |                                    |   |                                   |
| Protective structure                               |                    | IEC IP67  |                                    |   |                                   |
| Connection method                                  |                    | Pre-wired models (standard length: 2 m)   |                                    |   |                                   |
| Weight (Packed state)                              |                    | Approx.40g  | Approx. 50 g                       | Approx. 130 g                               | Approx. 170 g                     |
| Material   | Case               | Polyarylate   |                                    |   |                                   |
|  | Sensing surface    |   |                                    |   |                                   |
|  | Clamping nut       | Polyallylate resin  |                                    |   |                                   |
| Accessories  |                    | Instruction manual  |                                    |   |                                   |

\*1. The response frequencies are average values measured on condition that the distance between each sensing object is twice as large as the size of the sensing object and the sensing distance set is half of the maximum sensing distance.

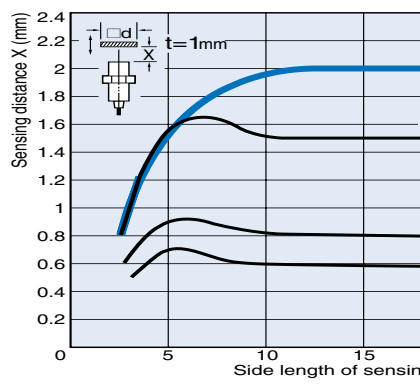
Characteristic data (typical)

Sensing Distance vs. Sensing Object

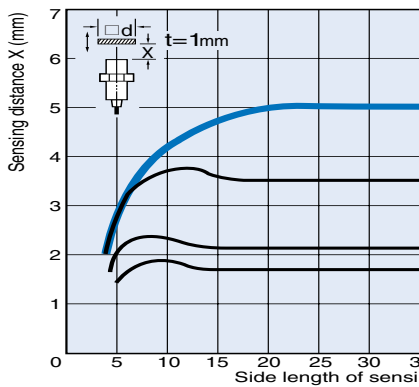
E2F-X1R5□□



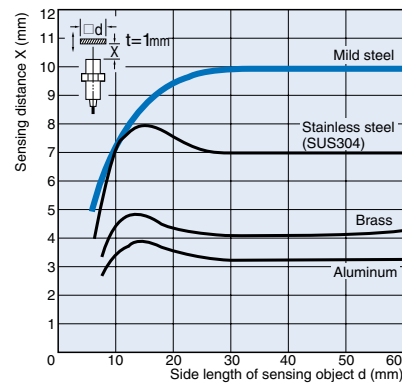
E2F-X2□□



E2F-X5□□



E2F-X10□□



Output Circuit Diagram

| Output           | Operating status | Model   | Timing chart | Output circuit   |
|------------------|------------------|---|--------------|--|
| DC 3-wire        | NO               | E2F-X1R5E1<br>E2F-X2E1<br>E2F-X5E1<br>E2F-X10E1 |              | <p>*1. 200 mA max. (source current)<br/>*2. When connecting to the transistor circuit.</p> |
|                  | NC               | E2F-X1R5E2<br>E2F-X2E2<br>E2F-X5E2<br>E2F-X10E2 |              |  |
| AC 2-wire Models | NO               | E2F-X1R5Y1<br>E2F-X2Y1<br>E2F-X5Y1<br>E2F-X10Y1 |              |  |
|                  | NC               | E2F-X1R5Y2<br>E2F-X2Y2<br>E2F-X5Y2<br>E2F-X10Y2 |              |  |

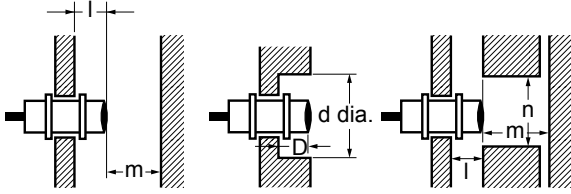
Precautions

Correct Use

Design

Effects of Surrounding Metal

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

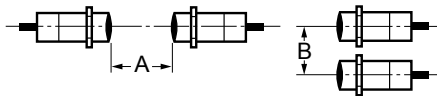


Effects of Surrounding Metal(Unit: mm)

| Model      | Item | l | d  | D | m   | n  |
|------------|------|---|----|---|-----|----|
| E2F-X1R5□□ | 0    | 0 | 8  | 0 | 4.5 | 12 |
| E2F-X2□□   |      |   | 12 |   | 8   | 18 |
| E2F-X5□□   |      |   | 18 |   | 20  | 27 |
| E2F-X10□□  |      |   | 30 |   | 40  | 45 |

Mutual Interference

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



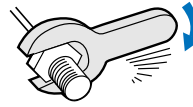
Mutual Interference (Unit: mm)

| Model      | Item | A       | B       |
|------------|------|---------|---------|
| E2F-X1R5□□ |      | 20      | 15      |
| E2F-X2□□   |      | 30 (20) | 20(12)  |
| E2F-X5□□   |      | 50 (30) | 35 (18) |
| E2F-X10□□  |      | 100(50) | 70(35)  |

Note: Figures in parentheses are for an E2F used in combination with an E2F (i.e., E2F-X□□□5) that is operating at a different frequency.

Mounting

Do not apply excessive torque when tightening any nuts.



| Model      | Tensile strength (torque) |
|------------|---------------------------|
| E2F-X1R5□□ | 0.78 N•m                  |
| E2F-X2□□   |                           |
| E2F-X5□□   | 2 N•m                     |
| E2F-X10□□  |                           |

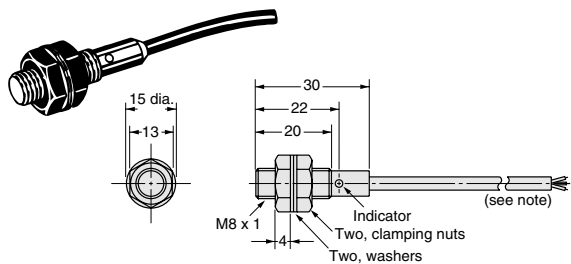
● Maintenance and Inspection

Do not use the AC 2-wire models (sensing surface is broken), where directly exposed to water. There is fear of an electric shock.

Dimensions (Unit: mm)

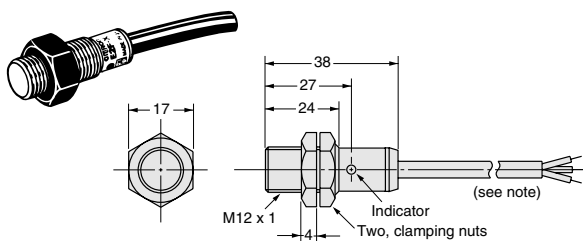
DC 3-wire Models

E2F-X1R5E



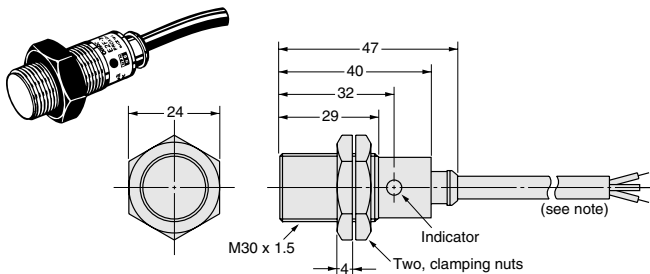
Note:  
Vinyl-insulated round cord, 3.5 dia.,  
3 cores (0.12 dia. x 13); Standard length: 2m

E2F-X2E



Note:  
Oil-and vibration-resistant,  
vinyl-insulated round cord, 6 dia.,  
0.5 dia. x 3 cores; Standard length: 2m  
The cord can be extended up to 200 m  
in an independent metal conduit.

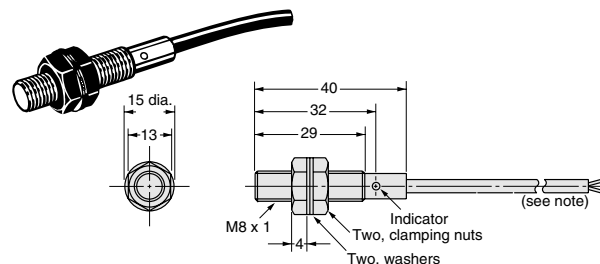
E2F-X5E



Note:  
Oil-and vibration-resistant,  
vinyl-insulated round cord, 6 dia.,  
0.5 dia. x 2 cores; Standard length: 2m  
The cord can be extended up to 200 m  
in an independent metal conduit.

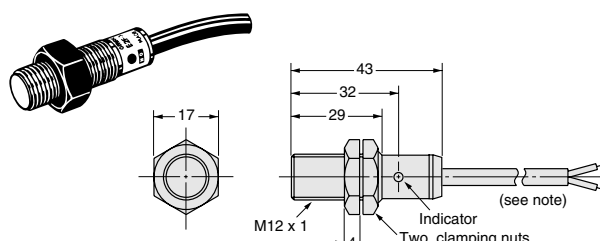
AC 2-wire Models

E2F-X1R5Y



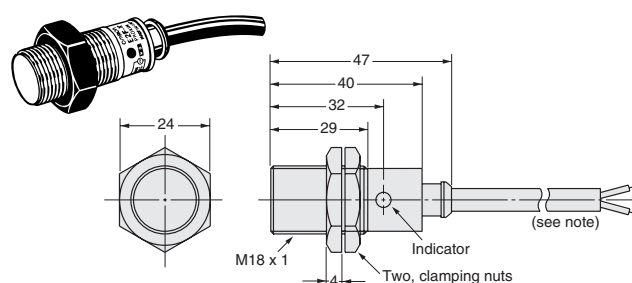
Note:  
Vinyl-insulated round cord, 3.5 dia.,  
3 cores (0.12 dia. x 13); Standard length: 2m

E2F-X2Y



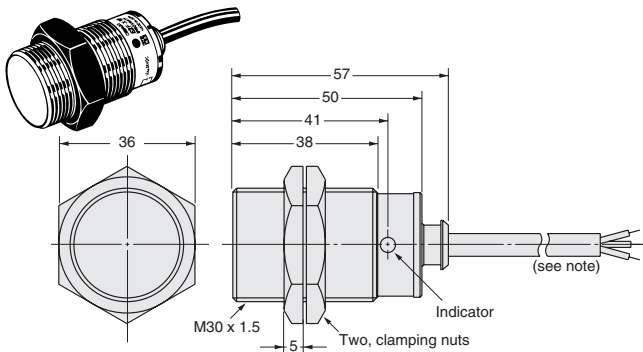
Note:  
Oil-and vibration-resistant,  
vinyl-insulated round cord, 6 dia.,  
0.5 dia. x 2 cores; Standard length: 2m  
The cord can be extended up to 200 m  
in an independent metal conduit.

E2F-X5Y



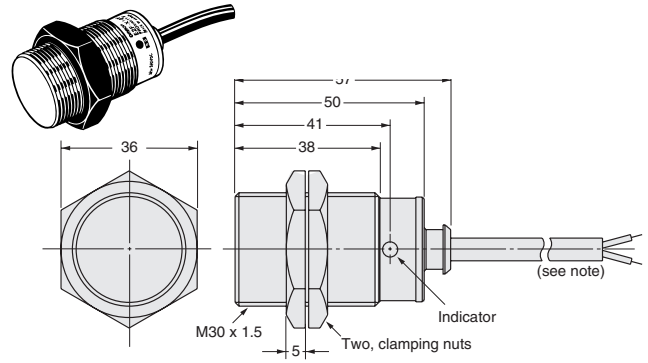
Note:  
Oil-and vibration-resistant,  
vinyl-insulated round cord, 6 dia.,  
0.5 dia. x 2 cores; Standard length: 2m  
The cord can be extended up to 200 m  
in an independent metal conduit.

**E2F-X10E**



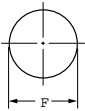
Note:  
Oil-and vibration-resistant,  
vinyl-insulated round cord, 6 dia.,  
0.5 dia. x 3 cores; Standard length: 2m  
The cord can be extended up to 200 m  
in an independent metal conduit.

**E2F-X10Y**



Note:  
Oil-and vibration-resistant,  
vinyl-insulated round cord, 6 dia.,  
0.5 dia. x 2 cores; Standard length: 2m  
The cord can be extended up to 200 m  
in an independent metal conduit.

**Mounting Hole Dimension**



| Model  | E2F-X1R5       | E2F-X2          | E2F-X5          | E2F-X10         |
|--------|----------------|-----------------|-----------------|-----------------|
| F (mm) | 8.5-mm dia. +0 | 12.5-mm dia. +0 | 18.5-mm dia. +0 | 30.5-mm dia. +0 |

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.  
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.