

All Metals and Long-distance Types

E2V

CSM_E2V_DS_E_3_3

Aluminum and Iron Both Detectable from Long Distances



2 times the aluminum detection distance of previous models



Equipped with a function to prevent the detection of aluminum chips



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

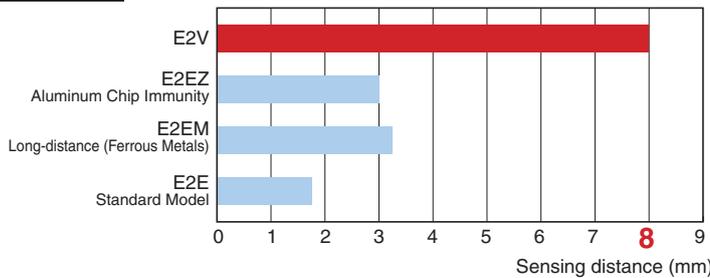
⚠ Refer to Safety Precautions on page 8.

Features

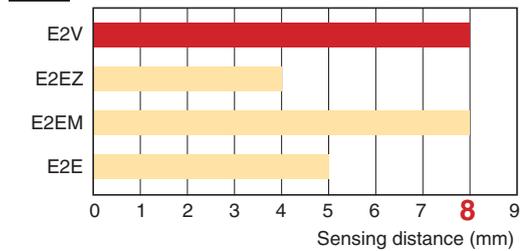
Aluminum Detection Distance: 2 Times Previous Models *

Immunity against aluminum chips has enabled achieving long-distance detection of aluminum workpieces. The same detection distance has also been achieved for iron, allowing the E2V-X□ to be separated from workpieces made of either metal farther than any other Proximity Sensor.

Aluminum Excellent Performance, with Aluminum Chip Immunity!



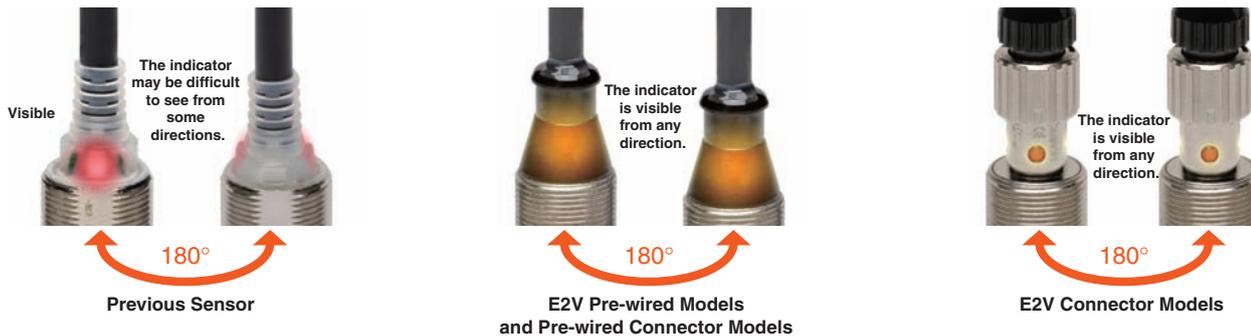
Iron Also Detects Iron at Long Distances!



* In-house comparison of M18 Shielded Long-distance Models

Detection Made Visible

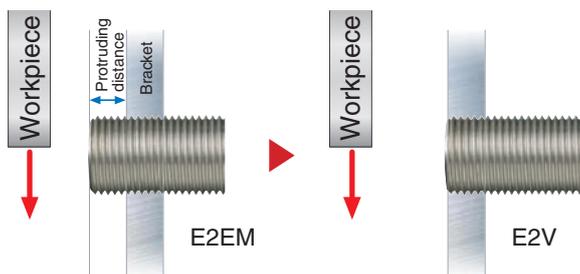
An operation indicator that is visible from any direction is provided as a standard feature. This indicator flashes under unstable conditions for easy installation condition verification at a glance.



Embeddable in Metal.

The first Long-distance Sensor that is shielded. Possible to be completely embedded in metal.

Embedded Mounting in Metal

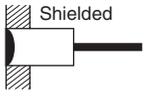


Ordering Information

Sensors (Dimensions → page 9)

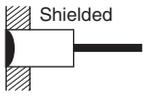
Standard-distance type

DC 3-wire, Pre-wired Models (Standard Cable Length: 2 m)

| Appearance | Sensing distance | Output | Model | |
|-----------------------------------------------------------------------------------|------------------|--------|-------------------|-------------------|
| | | | Operation mode NO | Operation mode NC |
|  | M12 2 mm | PNP | E2V-X2B1 2M | E2V-X2B2 2M |
| | | NPN | E2V-X2C1 2M | E2V-X2C2 2M |
| | M18 5 mm | PNP | E2V-X5B1 2M | E2V-X5B2 2M |
| | | NPN | E2V-X5C1 2M | E2V-X5C2 2M |
| | M30 10 mm | PNP | E2V-X10B1 2M | E2V-X10B2 2M |
| | | NPN | E2V-X10C1 2M | E2V-X10C2 2M |

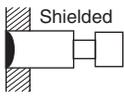
Long-distance type

DC 3-wire, Pre-wired Models (Standard Cable Length: 2 m)

| Appearance | Sensing distance | Output | Model | |
|-----------------------------------------------------------------------------------|------------------|--------|-------------------|-------------------|
| | | | Operation mode NO | Operation mode NC |
|  | M12 4 mm | PNP | E2V-X4B1 2M | E2V-X4B2 2M |
| | | NPN | E2V-X4C1 2M | E2V-X4C2 2M |
| | M18 8 mm | PNP | E2V-X8B1 2M | E2V-X8B2 2M |
| | | NPN | E2V-X8C1 2M | E2V-X8C2 2M |
| | M30 15 mm | PNP | E2V-X15B1 2M | E2V-X15B2 2M |
| | | NPN | E2V-X15C1 2M | E2V-X15C2 2M |

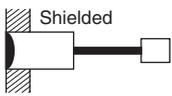
Long-distance type

DC 3-wire, Connector Models

| Appearance | Sensing distance | Output | Model | |
|-------------------------------------------------------------------------------------|------------------|--------|-------------------|-------------------|
| | | | Operation mode NO | Operation mode NC |
|  | M12 4 mm | PNP | E2V-X4B1-M1 | E2V-X4B2-M1 |
| | | NPN | E2V-X4C1-M1 | E2V-X4C2-M1 |
| | M18 8 mm | PNP | E2V-X8B1-M1 | E2V-X8B2-M1 |
| | | NPN | E2V-X8C1-M1 | E2V-X8C2-M1 |
| | M30 15 mm | PNP | E2V-X15B1-M1 | E2V-X15B2-M1 |
| | | NPN | E2V-X15C1-M1 | E2V-X15C2-M1 |

Long-distance type

DC 3-wire, Smartclick Pre-wired Connector (M12) Models

| Appearance | Sensing distance | Output | Model |
|-------------------------------------------------------------------------------------|------------------|--------|---------------------|
| | | | Operation mode NO |
|  | M12 4 mm | PNP | E2V-X4B1-M1TJ 0.3M |
| | | NPN | E2V-X4C1-M1TJ 0.3M |
| | M18 8 mm | PNP | E2V-X8B1-M1TJ 0.3M |
| | | NPN | E2V-X8C1-M1TJ 0.3M |
| | M30 15 mm | PNP | E2V-X15B1-M1TJ 0.3M |
| | | NPN | E2V-X15C1-M1TJ 0.3M |

Accessories (Order Separately)

Sensor I/O Connectors (M12, Sockets on One Cable End)  Smartclick (Required for models with Pre-wired Connectors.) A Connector is not provided with the Sensor. Be sure to order a Connector separately.

(Dimensions → XS5)

| Appearance | Type | Cable length | Model | Applicable Proximity Sensor Models |
|---------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------|-----------------|------------------------------------|
| Smartclick Connector, Straight  | Standard cable | 2 m | XS5F-D421-D80-F | E2V-X□B1-M1TJ E2V-X□C1-M1TJ |
| | | 5 m | XS5F-D421-G80-F | |
| | Oil-resistant polyurethane cable | 2 m | XS5F-D421-D80-P | |
| | | 5 m | XS5F-D421-G80-P | |

Sensor I/O Connectors (M12, Sockets on One Cable End) Standard type (Required for models for Connectors.) A Connector is not provided with the Sensor. Be sure to order a Connector separately.

(Dimensions → XS2)

| Appearance | Cable length | Sensor I/O Connector model number | Applicable Proximity Sensor Models |
|-----------------------------------------------------------------------------------------------|--------------|-----------------------------------|------------------------------------|
| Straight  | 2 m | XS2F-D421-DC0-F | E2V-X□C1-M1 E2V-X□B1-M1 |
| | 5 m | XS2F-D421-GC0-F | |
| | 2 m | XS2F-D421-D80-F | E2V-X□C□-M1 E2V-X□B□-M1 |
| | 5 m | XS2F-D421-G80-F | |
| L-shape  | 2 m | XS2F-D422-DC0-F | E2V-X□C1-M1 E2V-X□B1-M1 |
| | 5 m | XS2F-D422-GC0-F | |
| | 2 m | XS2F-D422-D80-F | E2V-X□C□-M1 E2V-X□B□-M1 |
| | 5 m | XS2F-D422-G80-F | |

Ratings and Specifications

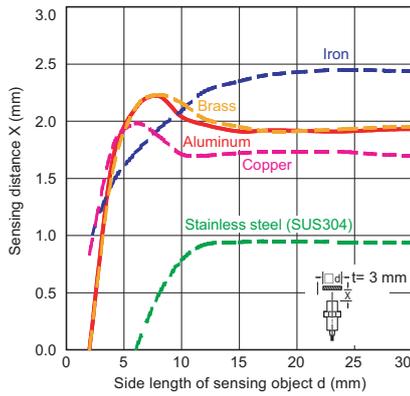
| Size | | M12 | | M18 | | M30 | |
|-------------------------------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Item | Model | E2V-X2□□ | E2V-X4□□ | E2V-X5□□ | E2V-X8□□ | E2V-X10□□ | E2V-X15□□ |
| Sensing distance | | 2 mm±10% | 4 mm±10% | 5 mm±10% | 8 mm±10% | 10 mm±10% | 15 mm±10% |
| Set distance | | 0 to 1.6 mm | 0 to 3.2 mm | 0 to 4.0 mm | 0 to 6.4 mm | 0 to 8.0 mm | 0 to 12.0 mm |
| Differential travel | | 10% max. of sensing distance | | | | | |
| Detectable object | | Ferrous metals and non-ferrous metals (The sensing distance depends on the material of the sensing object. Refer to <i>Engineering Data (Reference value)</i> .) | | | | | |
| Standard sensing object | | Aluminum: 12 × 12 × 3 mm | Aluminum: 12 × 12 × 3 mm | Aluminum: 18 × 18 × 3 mm | Aluminum: 24 × 24 × 3 mm | Aluminum: 30 × 30 × 3 mm | Aluminum: 45 × 45 × 3 mm |
| Response frequency * | | 150 Hz | 40 Hz | 70 Hz | 40 Hz | 70 Hz | 30 Hz |
| Power supply voltage (operating voltage range) | | 12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max. | | | | | |
| Current consumption | | 450 mW max. (Current consumption: 15 mA max. at power supply voltage of 30 V) | | | | | |
| Control output | Load current | Open-collector output, 100 mA max. | | | | | |
| | Residual voltage | 2 V max. (Load current: 100 mA, Cable length: 2 m) | | | | | |
| Indicators | | NO Models: Operation indicator (yellow) (flashing), Setting indicator (yellow) (lit); NC Models: Operation indicator (yellow) (lit) | | | | | |
| Operation mode | | B1/C1 Models: NO B2/C2 Models: NC (Refer to the timing charts under <i>I/O Circuit Diagrams</i> for details.) | | | | | |
| Protection circuits | | Power supply reverse polarity protection, reversed output polarity protection, load short-circuit protection, surge suppressor | | | | | |
| Ambient temperature | | Operating/Storage: -25 to 70°C (with no icing or condensation) | | | | | |
| Ambient humidity | | Operating/Storage: 35% to 95% (with no condensation) | | | | | |
| Temperature influence | | Based on the sensing distance at 23°C in the temperature range of -25 to 70°C | | | | | |
| | | ±10% max. | ±15% max. | ±10% max. | ±15% max. | ±10% max. | ±15% max. |
| Voltage influence | | ±1.5% max. of sensing distance at rated voltage in the rated voltage ±15% range | | | | | |
| Insulation resistance | | 50 MΩ min. (at 500 VDC) between current-carrying parts and case | | | | | |
| Dielectric strength | | 1,000 VAC, 50/60 Hz for 1 minute between current-carrying parts and case | | | | | |
| Vibration resistance | | Destruction: 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 ² 10 times each in X, Y, and Z directions | | | | | |
| Degree of protection | | IEC IP67 (Pre-wired Models and Pre-wired Connector Models are oil-resistant to the OMRON in-house standard.) | | | | | |
| Connection method | | Pre-wired Models (Standard cable length: 2 m), Connector Models, Pre-wired Connector Models (Standard cable length: 300 mm) | | | | | |
| Weight (packed state) | Cable | Approx. 120 g | | Approx. 150 g | | Approx. 200 g | |
| | Connector | Approx. 30 g | | Approx. 45 g | | Approx. 120 g | |
| | Pre-wired Connector Models | Approx. 50 g | | Approx. 70 g | | Approx. 140 g | |
| Materials | Case | Nickel-plated brass | | | | | |
| | Sensing surface | Heat-resistant ABS | | | | | |
| | Clamping nuts | Nickel-plated brass | | | | | |
| | Toothed washer | Zinc-plated iron | | | | | |
| Accessories | | Instruction manual | | | | | |

* The response frequency is an average value.
Measurement conditions are as follows: Standard sensing object, a distance between target objects of twice the size of the standard sensing object, and a set distance of half the sensing distance.

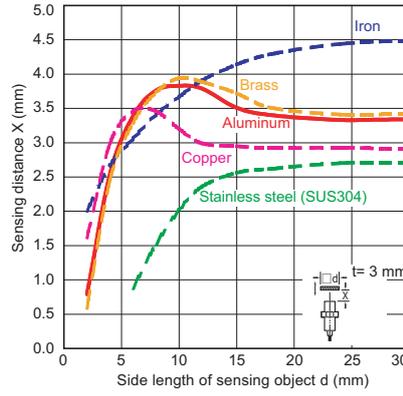
Engineering Data (Reference Value)

Influence of Sensing Object Size and Material

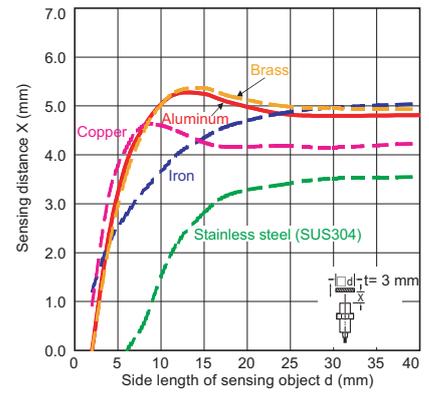
E2V-X2



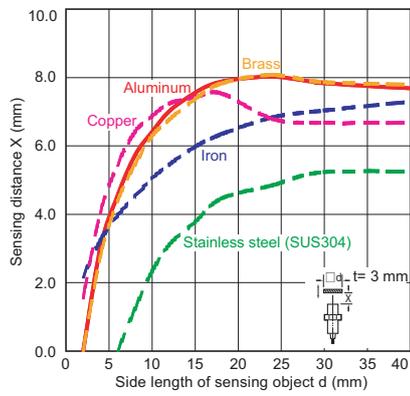
E2V-X4



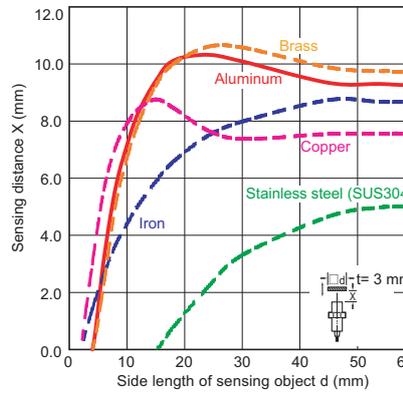
E2V-X5



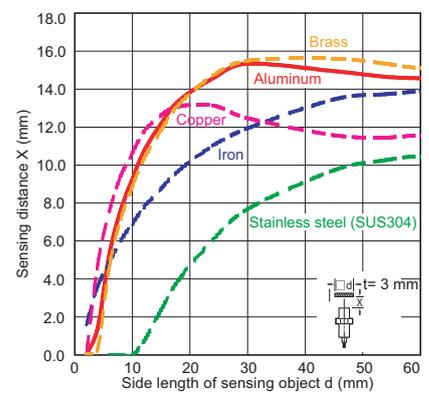
E2V-X8



E2V-X10

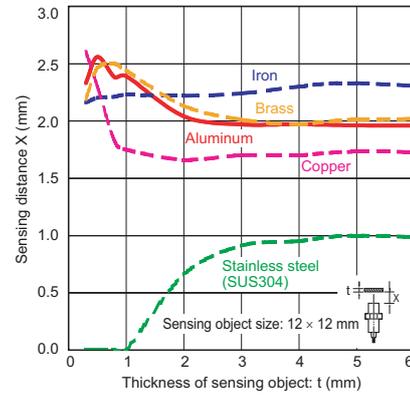


E2V-X15

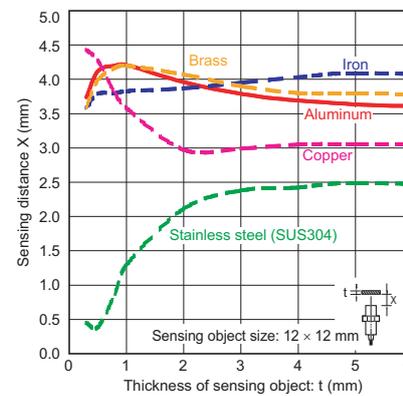


Influence of Sensing Object Size and Material

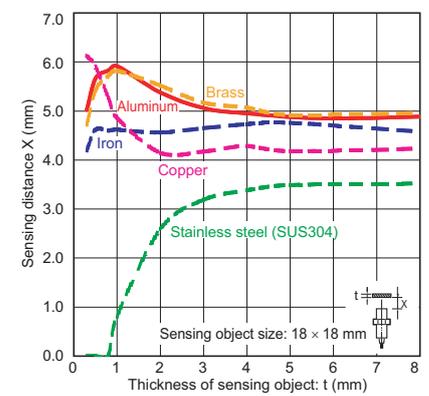
E2V-X2



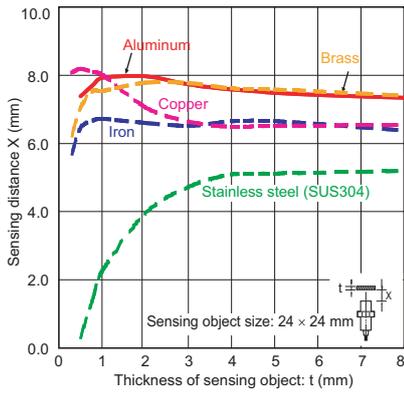
E2V-X4



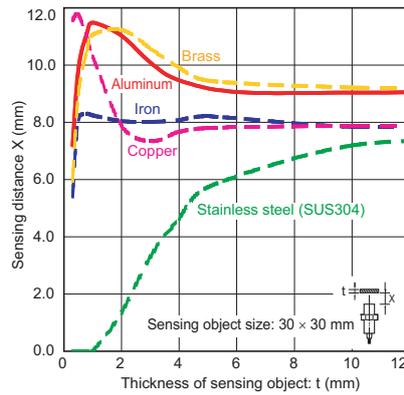
E2V-X5



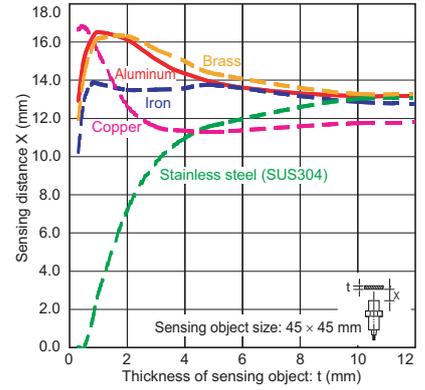
E2V-X8



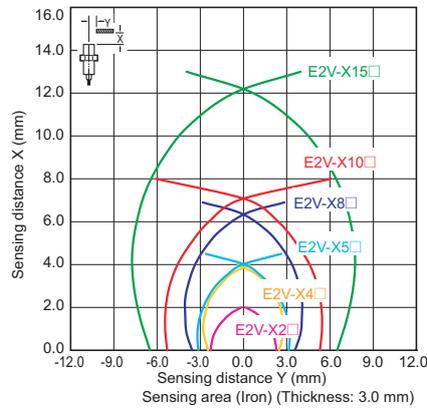
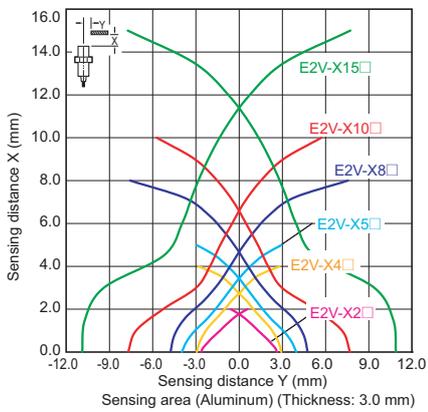
E2V-X10



E2V-X15



Sensing Area



I/O Circuit Diagrams

NPN Output

| Model | Operation mode | Timing charts | Output circuit |
|-------------------------|----------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E2V-X□C□ (-M1/-M1TJ) | NO | | <p>Note: Connector Models NO Models: ①④③ NC Models: ①②③</p> <p>M1: ② ① M1TJ: ③ ④</p> <p>Compatible Connector Cables: XS5F Series XS2F Series</p> |
| | NC | | |

PNP Output

| Model | Operation mode | Timing charts | Output circuit |
|-------------------------|----------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E2V-X□B□ (-M1/-M1TJ) | NO | | <p>Note: Connector Models NO Models: ①④③ NC Models: ①②③</p> <p>M1: ② ① M1TJ: ③ ④</p> <p>Compatible Connector Cables: XS5F Series XS2F Series</p> |
| | NC | | |

Connections for Sensor I/O Connectors

| Proximity Sensor | | | Sensor I/O Connector model number | Connections |
|------------------|----------------|----------------------------|-----------------------------------|-------------|
| Type | Operation mode | Model | | |
| DC 3-wire | NO | E2V-X□C1-M1 E2V-X□B1-M1 | | |
| | NC | E2V-X□C2-M1 E2V-X□B2-M1 | | |

Refer to *Introduction to Sensor I/O Connectors/Sensor Controllers* for details.

Safety Precautions

Refer to the *Proximity Sensors Technical Guide*.

⚠ WARNING

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



Never use the product with an AC power supply. Otherwise, explosion may result.



Precautions for Correct Use

Do not use the product in atmospheres or environments that exceed product ratings.

Designing

Influence of Surrounding Metal

When embedding the Sensor in metal, be sure that the clearances given in the following table are maintained.

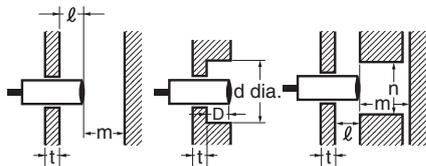


Table 1. Influence of Surrounding Metal (Unit: mm)

| Item | Model | E2V-X2 | E2V-X5 | E2V-X10 |
|--------|-------|--------|--------|---------|
| ℓ | | 0 | 0 | 0 |
| d dia. | | 12 | 18 | 30 |
| D | | 0 | 0 | 0 |
| m | | 12 | 24 | 45 |
| n | | 18 | 27 | 45 |

| Item | Model | E2V-X4 | E2V-X8 | E2V-X15 |
|--------|-------|--------|--------|---------|
| ℓ | | 0 | 0 | 0 * |
| d dia. | | 12 | 18 | 30 * |
| D | | 0 | 0 | 0 * |
| m | | 12 | 24 | 45 |
| n | | 18 | 27 | 45 |

* If the thickness of the mounting bracket (t) exceeds 5 mm, be sure to install the Sensor so that ℓ ≥ 2, d (dia.) ≥ 45, and D ≥ 2.

Mutual Interference

When installing Sensors face-to-face or side-by-side, be sure that the minimum distances given in table 2 are maintained.

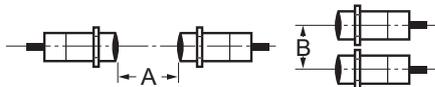


Chart 2. Mutual Interference (Unit: mm)

| Item | Model | E2V-X2 | E2V-X5 | E2V-X10 |
|------|-------|--------|--------|---------|
| A | | 30 | 50 | 100 |
| B | | 20 | 30 | 50 |

| Item | Model | E2V-X4 | E2V-X8 | E2V-X15 |
|------|-------|--------|--------|---------|
| A | | 35 | 60 | 120 |
| B | | 25 | 35 | 70 |

Sensing Distance

- The sensing distance depends on the sensing object size, material, and thickness.
- If the sensing object has a thickness of less than 1 mm, the sensing distance will decrease.
- In some cases, it may not be possible to detect stainless steel. Use the following graph and the *Influence of Sensing Object Size and Material* information in *Engineering Data (Reference Value)* as a reference.

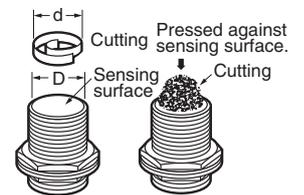
Aluminum and Iron Cuttings

Normally aluminum or iron cuttings will not be detected even if they adhere to or accumulate on the sensing surface. Detection signals may be output for the following. If this occurs, remove the cuttings from the sensing surface.

Diameter of cutting = d and diameter of sensing surface = D
Cuttings in center of sensing surface with $d \geq 2/3D$

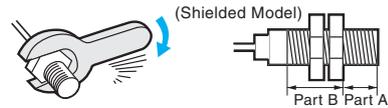
(Unit: mm)

| Mode | Size | D |
|-----------------|------|----|
| E2V-X2 □/X4 □ | | 10 |
| E2V-X5 □/X8 □ | | 16 |
| E2V-X10 □/X15 □ | | 28 |



Tightening Torque

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



| Tightening Torque Model | Part A | | Part B |
|-------------------------|----------------|---------|---------|
| | Dimension (mm) | Torque | Torque |
| E2V-X2/X4 | 17 | 5.9 N·m | 9.8 N·m |
| E2V-X5/X8 | 22 | 15 N·m | 45 N·m |
| E2V-X10/X15 | 26 | 39 N·m | 78 N·m |

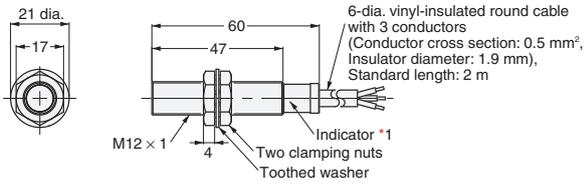
Dimensions

Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

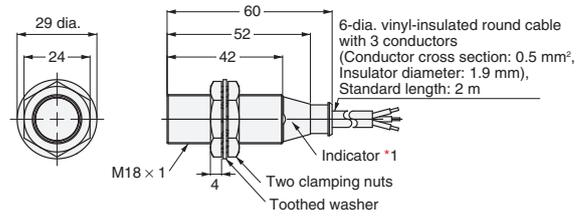
Sensors

Pre-wired Models

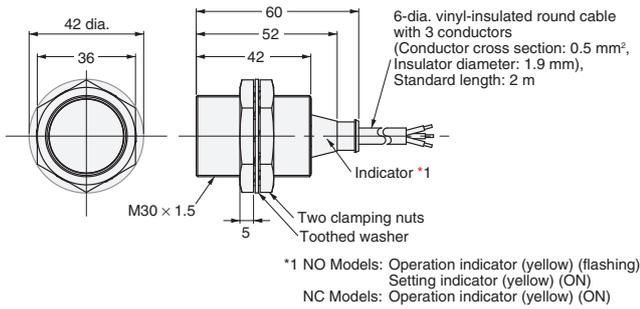
E2V-X2/X4



E2V-X5/X8

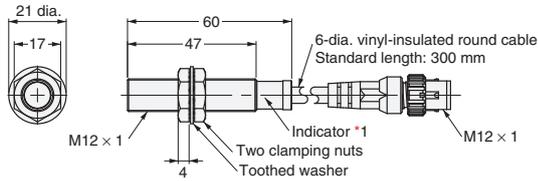


E2V-X10/X15

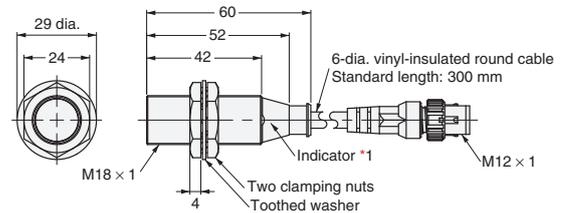


Pre-wired Connector Models

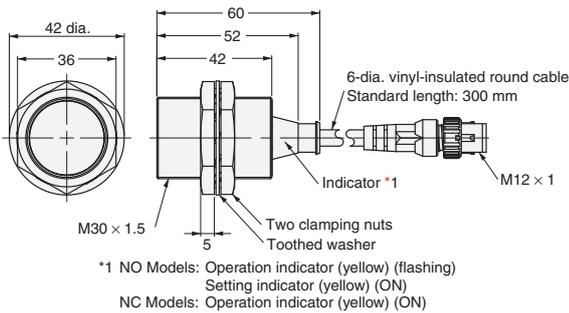
E2V-X4-M1TJ



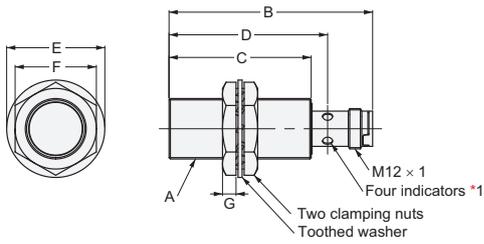
E2V-X8-M1TJ



E2V-X15-M1TJ



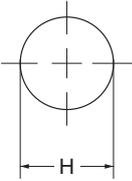
Connector Models



*1 NO Models: Operation indicator (yellow) (flashing)
 Setting indicator (yellow) (ON)
 NC Models: Operation indicator (yellow) (ON)

| Model | E2V-X4□-M1 | E2V-X8□-M1 | E2V-X15□-M1 |
|-------|------------|------------|-------------|
| Item | | | |
| A | M12 × 1 | M18 × 1 | M30 × 1.5 |
| B | 65 | 60 | 63 |
| C | 47 | 42 | 42 |
| D | 52 | 47 | 49 |
| E | 21 dia. | 29 dia. | 42 dia. |
| F | 17 | 24 | 36 |
| G | 4 | 4 | 5 |

Mounting Hole Dimensions



| Proximity Sensor dimensions | M12 | M18 | M30 |
|-----------------------------|----------------------------------------|----------------------------------------|----------------------------------------|
| Dimension H (mm) | 12.5 ^{+0.5} ₀ dia. | 18.5 ^{+0.5} ₀ dia. | 30.5 ^{+0.5} ₀ dia. |

Terms and Conditions Agreement

Read and understand this catalog.

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