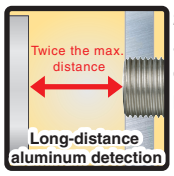
Aluminum and Iron Both Detectable from Long Distances



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.

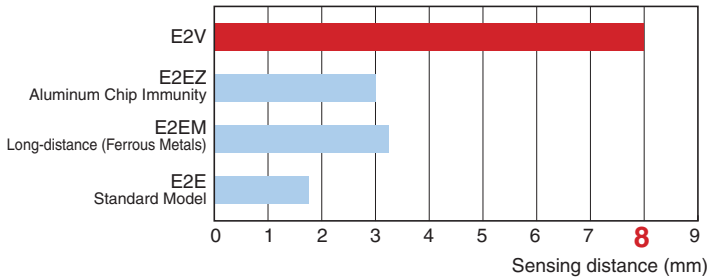
Refer to *Safety Precautions* on page 8.

Features

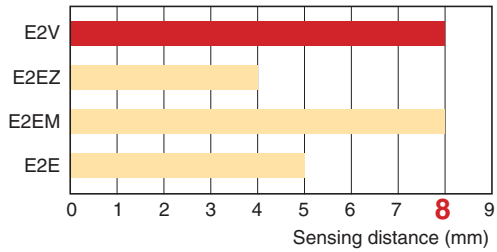
Aluminum Detection Distance: 2 Times Previous Models *

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!



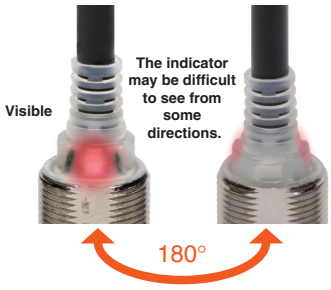
Iron Also Detects Iron at Long Distances!



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

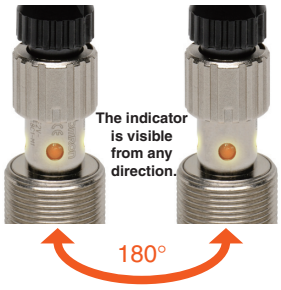
Detection Made Visible

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.



Previous Sensor

E2V Pre-wired Models and Pre-wired Connector Models

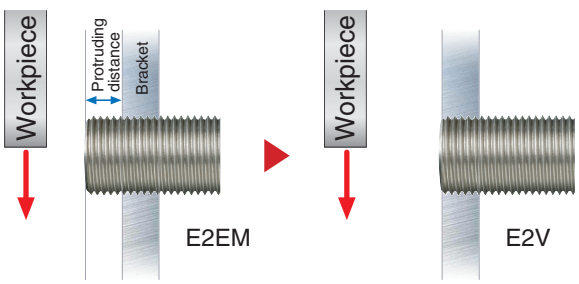


E2V Connector Models

Embeddable in Metal.

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

Embedded Mounting in Metal

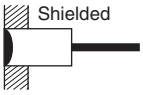


Ordering Information

Sensors (Dimensions ➜ page 9)

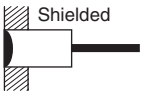
Standard-distance type

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

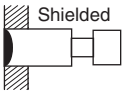
Long-distance type

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

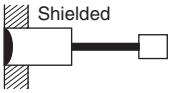
Long-distance type

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

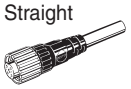
Long-distance type

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

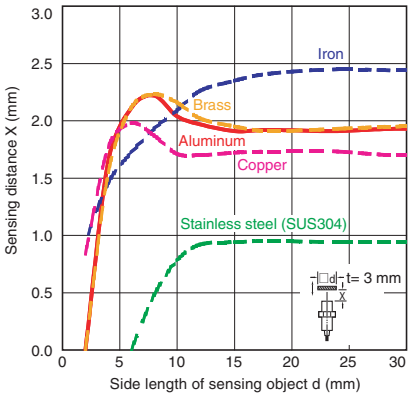
Size		M12		M18		M30	
Item	Model	E2V-X2□□	E2V-X4□□	E2V-X5□□	E2V-X8□□	E2V-X10□□	E2V-X15□□
Sensing distance		2 mm±10%	4 mm±10%	5 mm±10%	8 mm±10%	10 mm±10%	15 mm±10%
Set distance		0 to 1.6 mm	0 to 3.2 mm	0 to 4.0 mm	0 to 6.4 mm	0 to 8.0 mm	0 to 12.0 mm
Differential travel		10% max. of sensing distance					
Detectable object		Ferrous metals and non-ferrous metals (The sensing distance depends on the material of the sensing object. Refer to *Engineering Data (Reference value)*.)					
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/O Circuit Diagrams* 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.

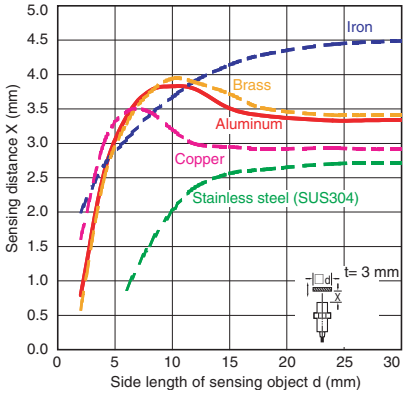
Engineering Data (Reference Value)

Influence of Sensing Object Size and Material

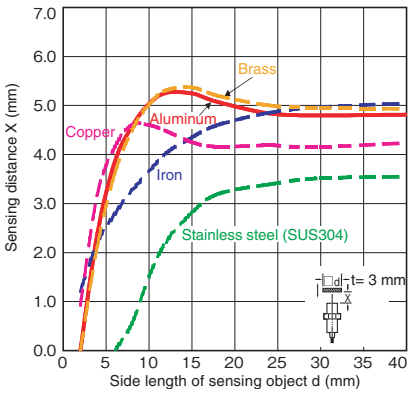
E2V-X2



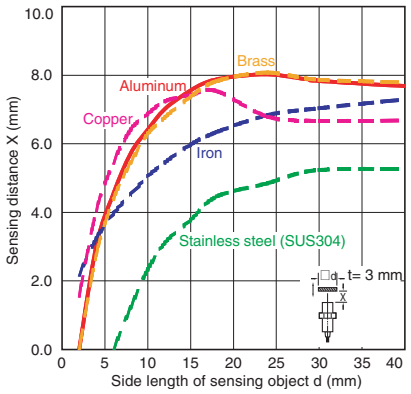
E2V-X4



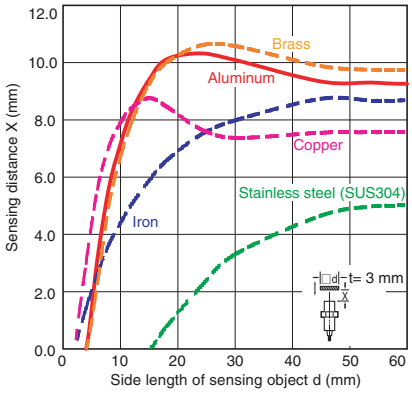
E2V-X5



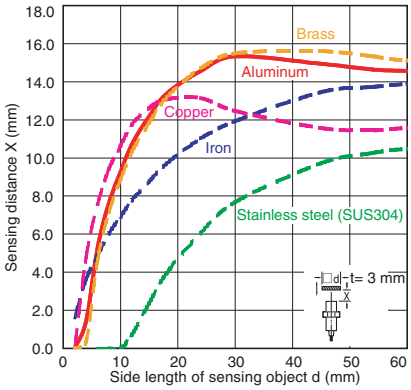
E2V-X8



E2V-X10

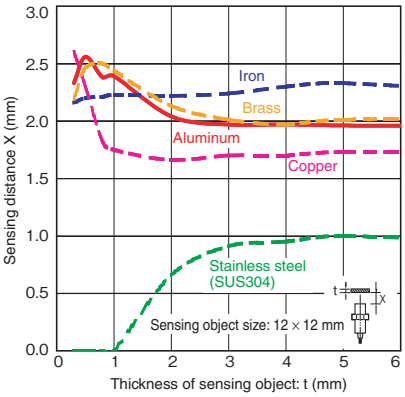


E2V-X15

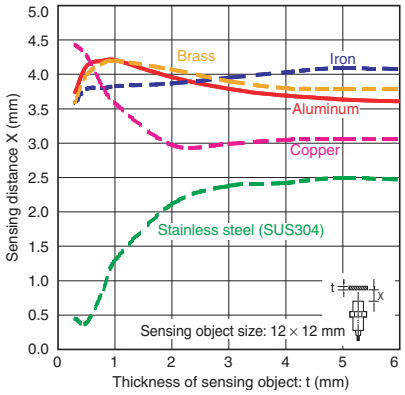


Influence of Sensing Object Size and Material

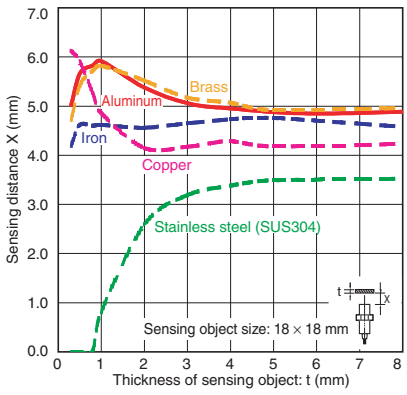
E2V-X2



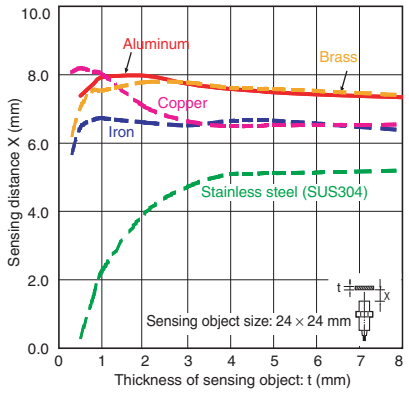
E2V-X4



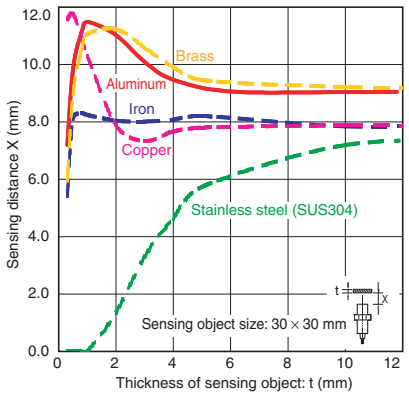
E2V-X5



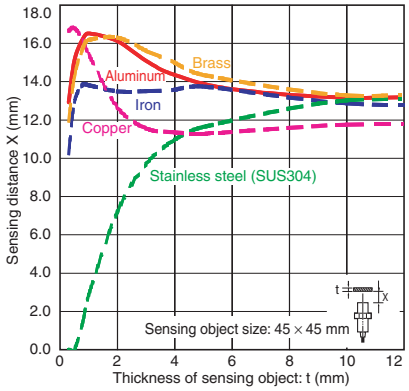
E2V-X8



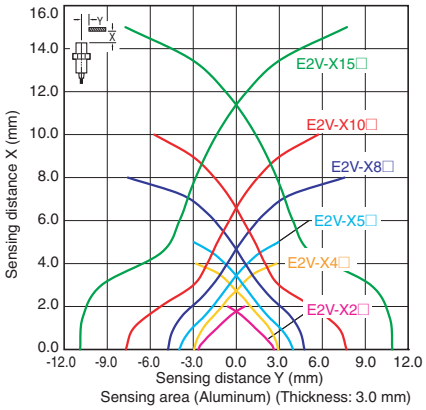
E2V-X10

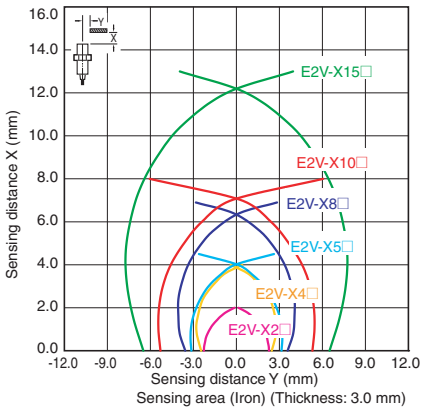


E2V-X15



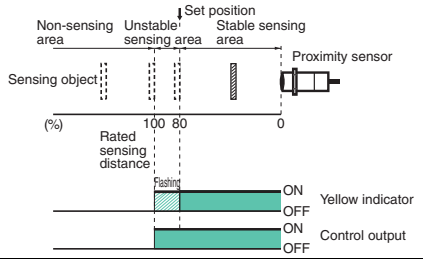
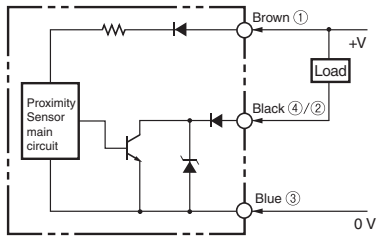
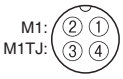
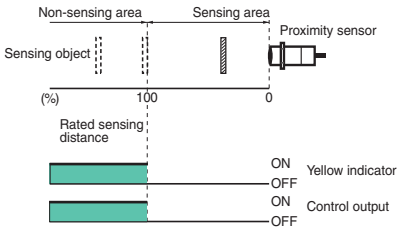
Sensing Area



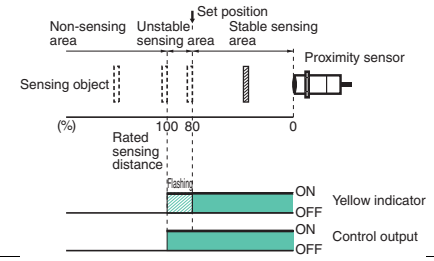
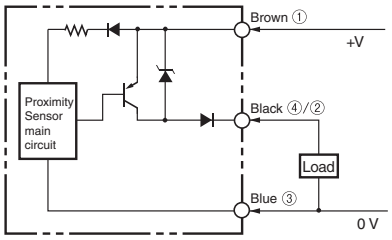
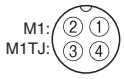
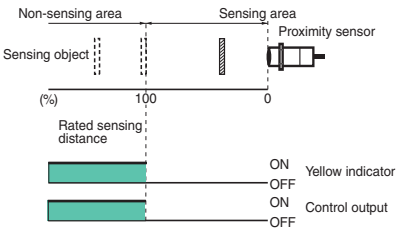


I/O Circuit Diagrams

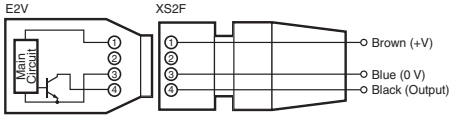
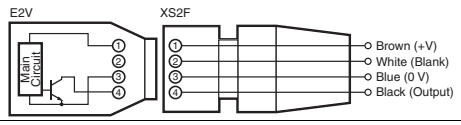
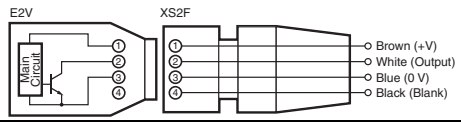
NPN Output

Model	Operation mode	Timing charts	Output circuit
E2V-X□C□ (-M1/-M1TJ)	NO		 Note: Connector Models NO Models: ①④③ NC Models: ①②③  Compatible Connector Cables: XS5F Series XS2F Series
	NC		

PNP Output

Model	Operation mode	Timing charts	Output circuit
E2V-X□B□ (-M1/-M1TJ)	NO		 Note: Connector Models NO Models: ①④③ NC Models: ①②③  Compatible Connector Cables: XS5F Series XS2F Series
	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	1: Straight 2: L-shape XS2F-D42□-□C0-F D: 2-m cable G: 5-m cable	
			1: Straight 2: L-shape XS2F-D42□-□80-F D: 2-m cable G: 5-m cable	
	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.

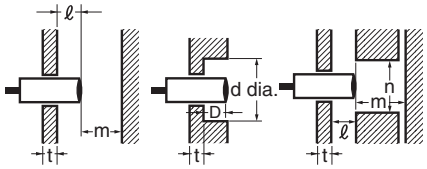


Table 1. Influence of Surrounding Metal **(Unit: mm)**

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.

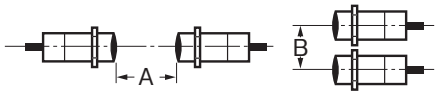


Chart 2. Mutual Interference **(Unit: mm)**

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.

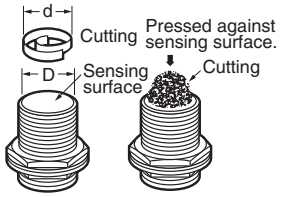
Diameter of cutting = d and diameter of sensing surface = D

Cuttings in center of sensing surface

with d ≥ 2/3D

(Unit: mm)

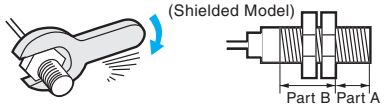
Mode / Size	D
E2V-X2□/X4□	10
E2V-X5□/X8□	16
E2V-X10□/X15□	28



Tightening Torque

Do not tighten the nut with excessive force.

A washer must be used with the nut.



Tightening Torque	Part A		Part B
Model	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

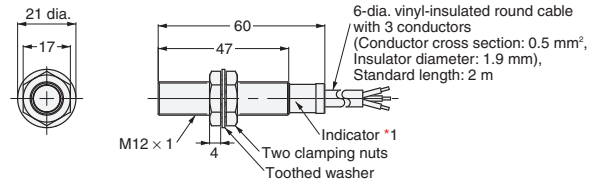
(Unit: mm)

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

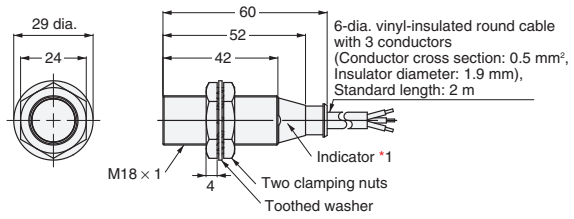
Sensors

Pre-wired Models

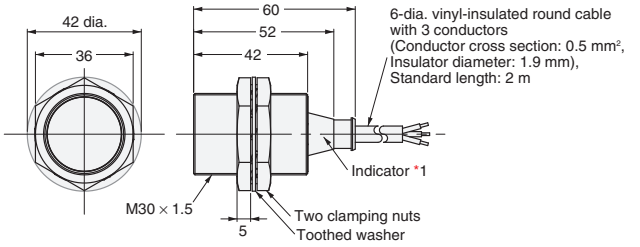
E2V-X2/X4



E2V-X5/X8



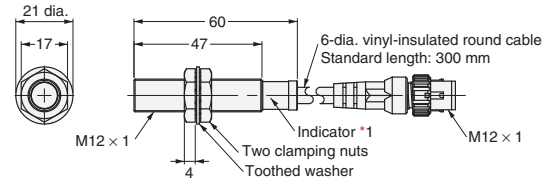
E2V-X10/X15



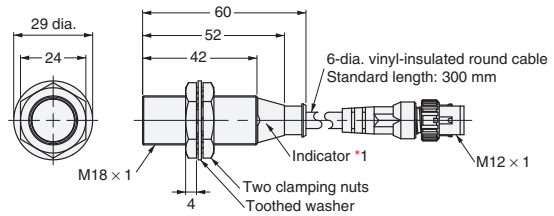
*1 NO Models: Operation indicator (yellow) (flashing)
Setting indicator (yellow) (ON)
NC Models: Operation indicator (yellow) (ON)

Pre-wired Connector Models

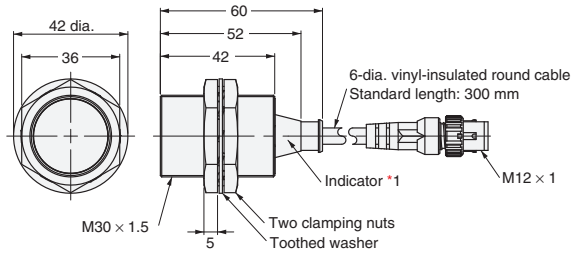
E2V-X4-M1TJ



E2V-X8-M1TJ

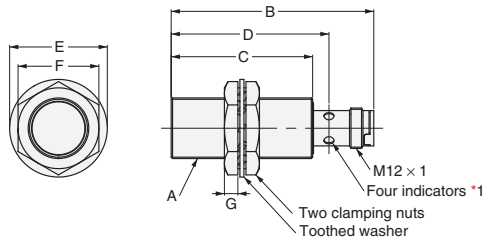


E2V-X15-M1TJ



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

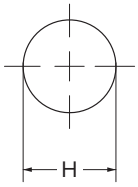
Connector Models



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

Item \ Model	E2V-X4□-M1	E2V-X8□-M1	E2V-X15□-M1
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.

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