

Short Barrel 2-Wire AC Prox Sensors Meet IP67











- Thick nickel-plated brass barrel has wrench flats for easy installation
- Solid potted internal circuitry withstands shocks and water washdown to IP67
- High visibility indicator
- Choose prewired models with or without short-circuit protection and connector models



Ordering Information


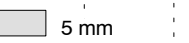



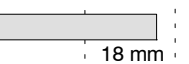
■ PREWIRED SENSORS WITHOUT SHORT-CIRCUIT PROTECTION

WHEN ORDERING, PLEASE NOTE: Omron has added the suffix “-N” to E2E part numbers for ordering purposes only; the suffix “-N” will not appear on the product.



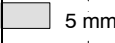
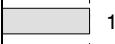

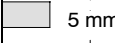

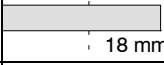


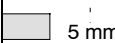


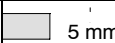


| Type | Size | Sensing distance | Part number | |
|---|------|--|------------------|------------------|
| | | | NO | NC |
| Shielded  | M8 |  1.5 mm | E2E-X1R5Y1-N | E2E-X1R5Y2-N |
| | M12 |  2 mm | E2E-X2Y1-US-N | E2E-X2Y2-US-N |
| | M18 |  5 mm | E2E-X5Y1-US-N* | E2E-X5Y2-US-N |
| | M30 |  10 mm | E2E-X10Y1-US-N* | E2E-X10Y2-US-N |
| Unshielded  | M8 |  2 mm | E2E-X2MY1-US-N* | E2E-X2MY2-US-N |
| | M12 |  5 mm | E2E-X5MY1-US-N* | E2E-X5MY2-US-N* |
| | M18 |  10 mm | E2E-X10MY1-US-N* | E2E-X10MY2-US-N* |
| | M30 |  18 mm | E2E-X18MY1-US-N* | E2E-X18MY2-US-N |

*Note: A different oscillating frequency is available to prevent mutual interference. Add a “5” to the part number (e.g., E2E-X5Y15-US-N).

■ PREWIRED SENSORS WITH SHORT-CIRCUIT PROTECTION

| Type | Size | Sensing distance | Part number | |
|---|------|---|------------------|------------------|
| | | | NO | NC |
| Shielded  | M18 |  5 mm | E2E-X5Y1-53-US | E2E-X5Y2-53-US |
| | M30 |  10 mm | E2E-X10Y1-53-US | E2E-X10Y2-53-US |
| Unshielded  | M18 |  10 mm | E2E-X10MY1-53-US | E2E-X10MY2-53-US |
| | M30 |  18 mm | E2E-X18MY1-53-US | E2E-X18MY2-53-US |

■ SENSORS WITH BUILT-IN CONNECTORS

| Connector | Type | Size | Sensing distance | Part number | |
|--------------------------------------|---|------|---|-----------------|-----------------|
| | | | | NO | NC |
| 4-pin connector (M12) See Note 1. | Shielded  | M12 |  2 mm | E2E-X2Y1-M1-N | E2E-X2Y2-M1-N |
| | | M18 |  5 mm | E2E-X5Y1-M1-N | E2E-X5Y2-M1-N |
| | | M30 |  10 mm | E2E-X10Y1-M1-N | E2E-X10Y2-M1-N |
| | Unshielded  | M12 |  5 mm | E2E-X5MY1-M1-N | E2E-X5MY2-M1-N |
| | | M18 |  10 mm | E2E-X10MY1-M1-N | E2E-X10MY2-M1-N |
| | | M30 |  18 mm | E2E-X18MY1-M1-N | E2E-X18MY2-M1-N |
| 3-pin connector (M12) See Note 2. | Shielded  | M12 |  2 mm | E2E-X2Y1-M4 | E2E-X2Y2-M4 |
| | | M18 |  5 mm | E2E-X5Y1-M4 | E2E-X5Y2-M4 |
| | | M30 |  10 mm | E2E-X10Y1-M4 | E2E-X10Y2-M4 |
| | Unshielded  | M12 |  5 mm | E2E-X5MY1-M4 | E2E-X5MY2-M4 |
| | | M18 |  10 mm | E2E-X10MY1-M4 | E2E-X10MY2-M4 |
| | | M30 |  18 mm | E2E-X18MY1-M4 | E2E-X18MY2-M4 |

Note: 1. Use Omron's Y96E-44□A□ connector cordsets.

2. Use Omron's Y96E-33□A□ connector cordsets.

■ ACCESSORIES

| Description | Part number |
|---|--|
| Mounting brackets | Fits M8 size sensors Fits M12 size sensors Fits M18 size sensors Fits M30 size sensors Y92E-B8 Y92E-B12 Y92E-B18 Y92E-B30 |
| Silicone rubber covers for shielded sensors | Fits M12 size sensors Fits M18 size sensors Fits M30 size sensors Y92E-E12-2 Y92E-E18-2 Y92E-E30-2 |
| Connector cordsets | See Y96E Connector Cordsets data sheet for details |

REPLACEMENT PARTS

| Description | Part number |
|---|---|
| Mounting hardware including one pair of metal nuts and one washer | Fits M8 size sensors Fits M12 size sensors Fits M18 size sensors Fits M30 size sensors |
| | M8-MHWS M12-MHWS M18-MHWS M30-MHWS |

Specifications

SENSORS WITHOUT SHORT-CIRCUIT PROTECTION (E2E-X□Y□)

| Part number | E2E-X1R5Y□-N | E2E-X2MY□-N | E2E-X2Y□ -US-N | E2E-X5MY □-US-N | E2E-X5Y □-US-N | E2E-X10MY □-US-N | E2E-X10Y □-US-N | E2E-X18MY □-US-N |
|---|--|---|--|--|--|--|---|---|
| Size | M8 | | M12 | | M18 | | M30 | |
| Type | Shielded | Unshielded | Shielded | Unshielded | Shielded | Unshielded | Shielded | Unshielded |
| Sensing distance | 1.5 mm (0.06 in) ±10% | 2 mm (0.08 in) ±10% | 2 mm (0.08 in) ±10% | 5 mm (0.20 in) ±10% | 5 mm (0.20 in) ±10% | 10 mm (0.39 in) ±10% | 10 mm (0.39 in) ±10% | 18 mm (0.71 in) ±10% |
| Supply voltage (operating voltage range) (See note 1) | 24 to 240 VAC, 50/60 Hz (20 to 264 VAC) | | | | | | | |
| Current consumption | 1.7 mA max. | | | | | | | |
| Sensing object | Magnetic metals (refer to <i>Engineering Data</i> for non-magnetic metals) | | | | | | | |
| Setting distance | 0 to 1.2 mm (0 to 0.05 in) | 0 to 1.6 mm (0 to 0.06 in) | 0 to 1.6 mm (0 to 0.06 in) | 0 to 4.0 mm (0 to 0.16 in) | 0 to 4.0 mm (0 to 0.16 in) | 0 to 8.0 mm (0 to 0.31 in) | 0 to 8.0 mm (0 to 0.31 in) | 0 to 14.0 mm (0 to 0.55 in) |
| Standard object (mild steel) | 8 x 8 x 1 mm (0.31 x 0.31 x 0.04 in) | 12 x 12 x 1 mm (0.47 x 0.47 x 0.04 in) | 12 x 12 x 1 mm (0.47 x 0.47 x 0.04 in) | 15 x 15 x 1 mm (0.59 x 0.59 x 0.04 in) | 18 x 18 x 1 mm (0.71 x 0.71 x 0.04 in) | 30 x 30 x 1 mm (1.18 x 1.18 x 0.04 in) | 30 x 30 x 1 mm (1.18 x 1.18 x 0.04 in) | 54 x 54 x 1 mm (2.13 x 2.13 x 0.04 in) |
| Differential travel | 10% max. of sensing distance | | | | | | | |
| Response frequency | 25 Hz | | | | | | | |
| Operation (with sensing object approaching) | Y1 models: Load ON Y2 models: Load OFF | | | | | | | |
| Control output (switching capacity) | 5 to 100 mA max. | | 5 to 200 mA max. | | 5 to 300 mA max. | | | |
| Indicator | Operation indicator (red LED) | | | | | | | |
| Ambient temperature (See note 2) | Operating: -25°C to 70°C (-13°F to 158°F) with no icing | | Operating: -40°C to 85°C (-40°F to 185°F) with no icing | | | | | |
| Ambient humidity | Operating: 35% to 95% | | | | | | | |
| Temperature influence | ±15% max. of sensing distance at 23°C in temperature range of -40°C to 85°C (-40°F to 185°F) ±10% max. of sensing distance at 23°C in temperature range of -25°C to 70°C (-13°F to 158°F) | | | | | | | |
| Voltage influence | ±1% max. of sensing distance in rated voltage range ±15% | | | | | | | |
| Residual voltage | Refer to <i>Engineering Data</i> | | | | | | | |
| Insulation resistance | 50 MΩ min. (at 500 VDC) between current carry parts and case | | | | | | | |
| Dielectric strength | 4,000 VAC for 1 min between current carry parts and case (2,000 VAC for M8 types) | | | | | | | |
| Vibration resistance | 10 to 55 Hz, 1.5-mm double amplitude for 2 hrs each in X, Y, and Z directions | | | | | | | |
| Shock resistance | 500 m/s ² (approx. 50G) for 10 times each in X, Y, and Z axes | | 1,000 m/s ² (approx. 50G) for 10 times each in X, Y, and Z axes 500 m/s ² (approx. 50G) for E2E-X5M | | | | | |
| Enclosure rating | IEC | IP67 | | | | | | |
| | NEMA | 1, 4, 6, 12, 13 | | | | | | |

- Note: 1. When using an M18 or M30 size E2E at an ambient temperature between 70°C and 85°C (158°F and 185°F), make sure that the E2E has a control output of 200 mA maximum.
2. When supplying 24 VAC to any of the above models, make sure that the operating ambient temperature range is -25°C to 85°C (-13°F to 185°F).

(This table continues on the next page.)

Specifications Table - continued from previous page

| Part number | E2E-X1R5Y □-N | E2E-X2MY □-N | E2E-X2Y□- US-N | E2E-X5MY□ -US-N | E2E-X5Y□- US-N | E2E-X10MY □-US-N | E2E-X10Y □-US-N | E2E-X18MY □-US-N |
|-------------|------------------|-----------------|-------------------|--------------------------------|-------------------|---------------------|--------------------|---------------------|
| Approvals | UL | - | | Recognized, File Number E76675 | | | | |
| | CSA | - | | Certified, File Number LR45951 | | | | |
| Weight | Prewired | Approx. 45 g | | Approx. 120 g | | Approx. 160 g | | Approx. 270 g |
| | Connector | --- | Approx. 25 g | | Approx. 45 g | | Approx. 125 g | Approx. 124 g |
| Material | Body | Stainless steel | | Brass | | | | |
| | Sensing face | PBT | | | | | | |

■ SENSORS WITH SHORT-CIRCUIT PROTECTION (E2E-X□Y□-53-US)

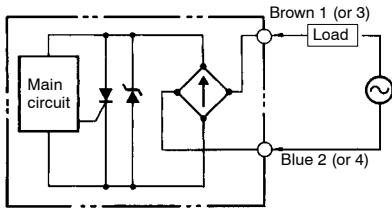
| Part number | E2E-X5Y□-53-US | | E2E-X10MY□-53-US | | E2E-X10Y□-53-US | | E2E-X18MY□-53-US | |
|---|----------------------|--|---|--|--|----------|--|------------|
| Body | Size | M18 | | | M30 | | | |
| | Type | Shielded | | Unshielded | | Shielded | | Unshielded |
| Supply voltage | | 90 to 140 VAC, 50/60 Hz | | | | | | |
| Effective maximum detecting distance (with standard target) | | 5 mm (0.20 in) ±10% | | 10 mm (0.40 in) ±10% | | | 18 mm (0.71 in) ±10% | |
| Usable detecting range (with standard target) | | 0 to 4 mm (0 to 0.16 in) | | 0 to 8 mm (0 to 0.31 in) | | | 0 to 14 mm (0 to 0.55 in) | |
| Standard target size (mild steel, L x W x H) | | 18 x 18 x 1 mm (0.71 x 0.71 x 0.04 in) | | 30 x 30 x 1 mm (1.18 x 1.18 x 0.04 in) | | | 54 x 54 x 1 mm (2.13 x 2.13 x 0.04 in) | |
| Differential travel | | 10% max. of effective detecting distance | | | | | | |
| Control output | AC solid state | Type | SCR-NO (E2E-X□□□Y1-□□-□□) SCR-NC (E2E-X□□□Y2-□□-□□) | | | | | |
| | | Max. load | 300 mA | | | | | |
| | | Min. load | 5 mA | | | | | |
| | | Max. offstate leakage current | 1.5 mA (See "Leakage Current Characteristics" graph in <i>Engineering Data</i> .) | | | | | |
| | | Max. on-state voltage drop | (See "Leakage Current Characteristics" graph in <i>Engineering Data</i> .) | | | | | |
| Response frequency | | 25 Hz | | | | | | |
| Circuit protection | Output short-circuit | Provided | | | | | | |
| | Weld field immunity | Not provided | | | | | | |
| | RFI immunity | Not provided | | | | | | |
| Indicators | | Target present (red LED) | | | | | | |
| Materials | Housing | Nickel-plated brass | | | | | | |
| | Sensing face | Plastic | | | | | | |
| | Cable sheath | Plastic | | | | | | |
| Mounting | | Two lock washers and M18 nuts included. Bracket Y92E-B18 optional. | | | Two lock washers and M30 nuts included. Bracket Y92E-B30 optional. | | | |
| Connections | Prewired | 2-conductor cable, 2 m (6.56 ft) length | | | | | | |
| Weight with cable | | Approx. 160 g (5.6 oz.) | | | Approx. 270 g (9.5 oz.) | | | |
| Enclosure ratings | UL | 1 | | | | | | |
| | NEMA | 1, 4, 6, 12, 13 | | | | | | |
| | IEC 144 | IP67 | | | | | | |
| Approvals | UL | Recognized, File Number E76675 | | | | | | |
| | CSA | Certified, File Number LR45951 | | | | | | |
| Ambient operating temperature | | -25° to 70°C (-13° to 158°F) | | | | | | |
| Vibration | | 10 to 55 Hz, 1.5 mm (0.06 in) double amplitude | | | | | | |
| Shock | | Approx. 100 G's | | | | | | |

Operation

OUTPUT CIRCUITS

Sensors without Short-Circuit Protection (E2E-X□Y□)

E2E-X□Y□-N AC 2-wire Models

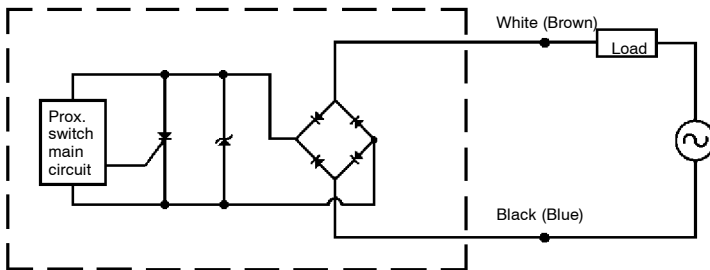


AC 2-wire Models

E2E-X□Y□-N

| | | | |
|----------------|-----|----|----|
| Sensing object | Yes | NO | NC |
| No | | █ | █ |
| Red indicator | Lit | █ | █ |
| Not lit | | | |
| Control output | ON | █ | █ |
| OFF | | | |

Sensors with Short-Circuit Protection (E2E-X□Y□-US-53)

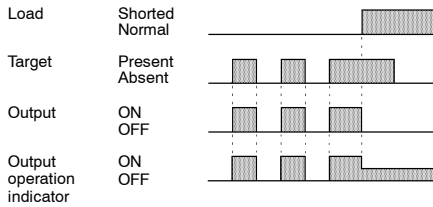


Note: IEC colors are shown in parenthesis

With Short-Circuit Protection

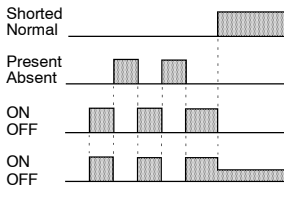
E2E-X□Y1-53

NO



E2E-X□Y2-53

NC



Short-Circuit Indication

The LED dims when the load is shorted and the load output immediately turns off and remains off until the short-circuit protection is reset.

Resetting Short-Circuit Protection

Before the short-circuit protection can be reset, the short must be repaired. We recommend turning the power off before repairing the short. If this approach is taken, no further action is required to reset the short-circuit protection.

If the short must be repaired with power on, the following resetting steps are required:

For NO sensors, the target must be removed to reset the short-circuit protection.

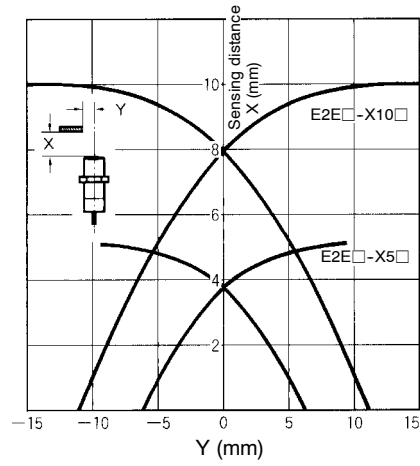
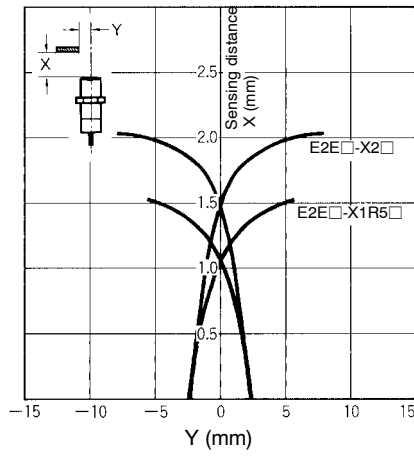
For NC sensors, the target must be presented then removed to reset the short-circuit protection.

Engineering Data

OPERATING RANGE (TYPICAL)

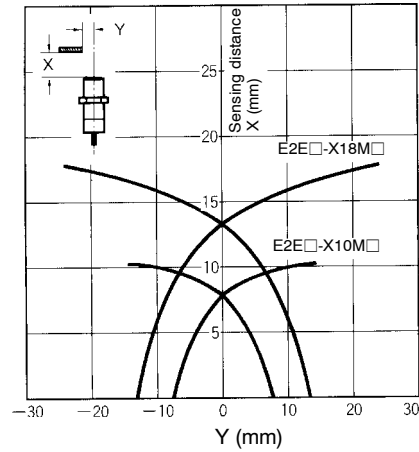
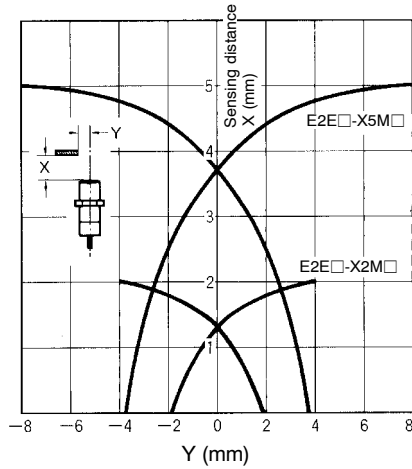
Shielded Models

E2E-X□Y□-N



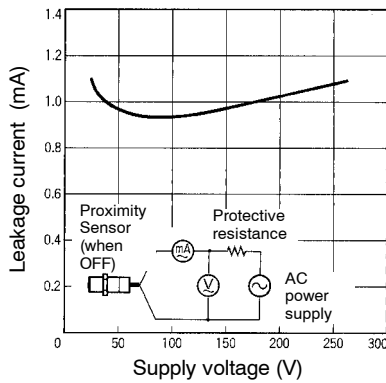
Unshielded Models

E2E-X□MY□-N

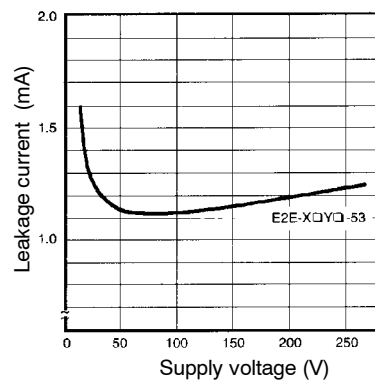


LEAKAGE CURRENT (TYPICAL)

E2E-X□Y□-N

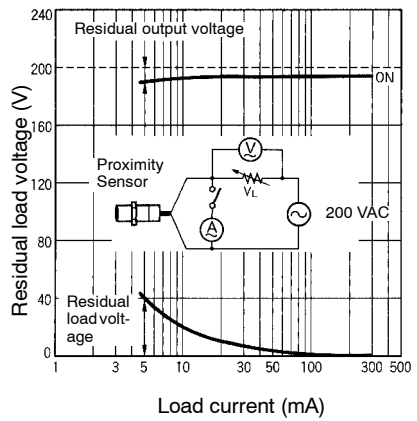
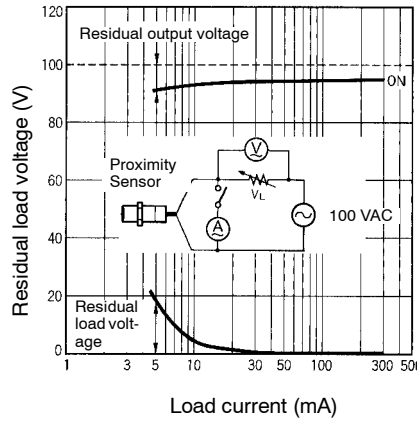
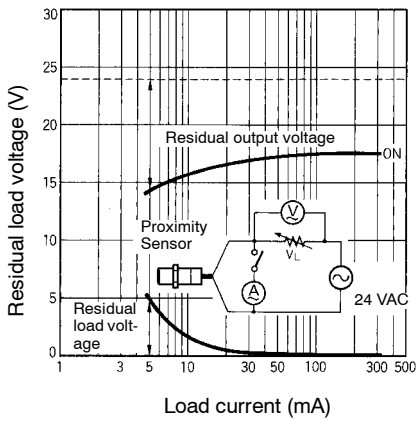


E2E-X□Y□-53-US



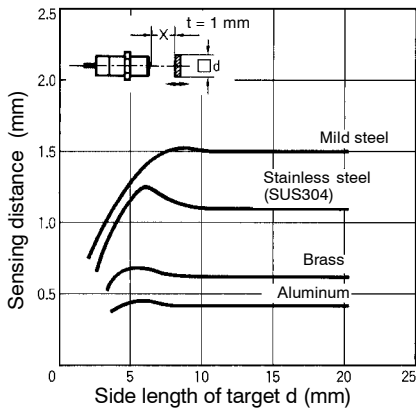
RESIDUAL OUTPUT VOLTAGE (TYPICAL)

E2E-X□Y□-N

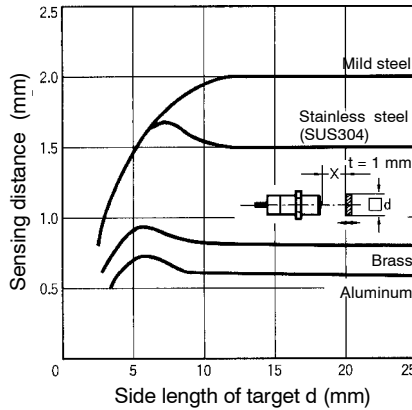


SENSING DISTANCE VS. SENSING OBJECT (TYPICAL)

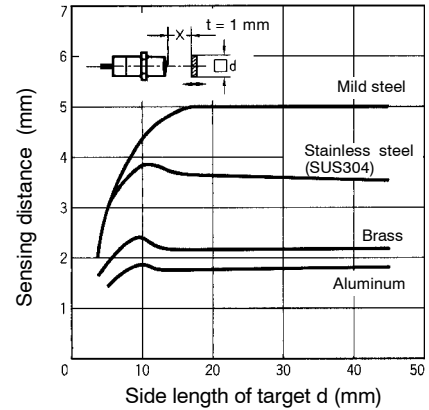
E2E-X1R5Y□-N



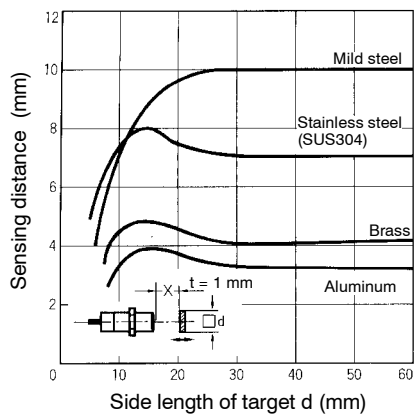
E2E-X2Y□-N



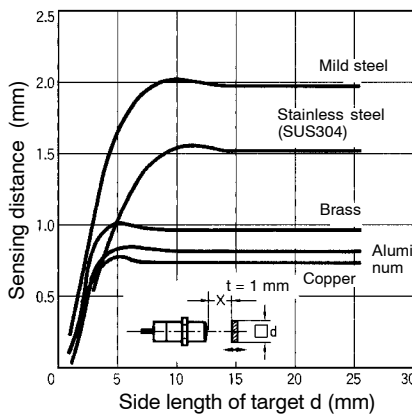
E2E-X5Y□-N



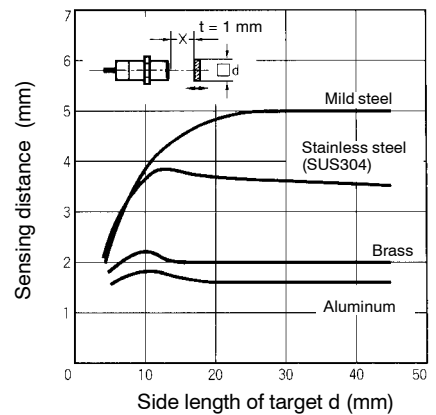
E2E-X10Y□-N



E2E-X2MY□-N

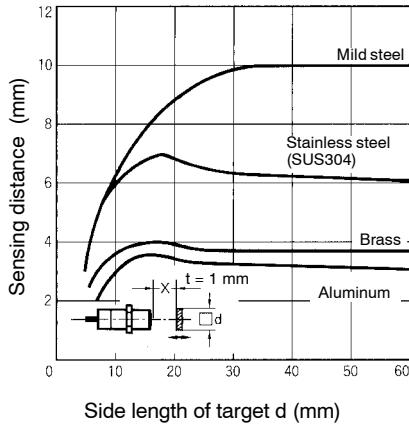


E2E-X5MY□-N

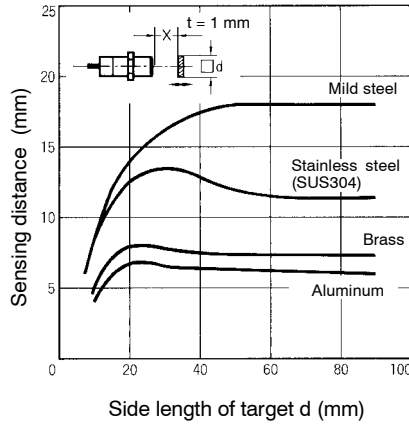


■ SENSING DISTANCE VS. SENSING OBJECT (TYPICAL) - CONTINUED

E2E-X10MY-N

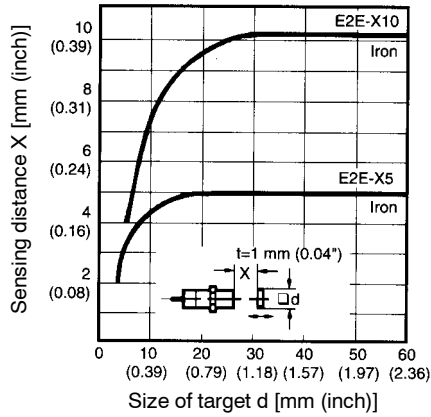


E2E-X18MY-N

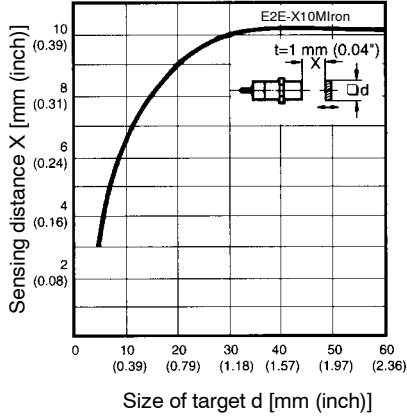


Models with Short Circuit Protection (E2E-X□Y□-53-US)

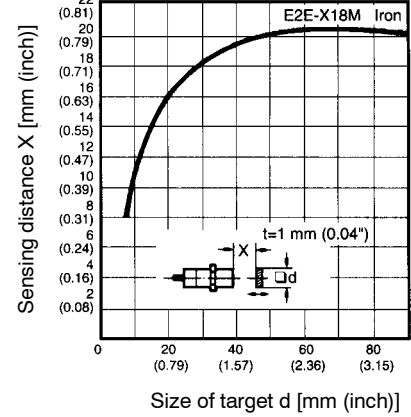
E2E-X5□□, E2E-X10□□



E2E-X10M□□



E2E-X18M□□



Dimensions

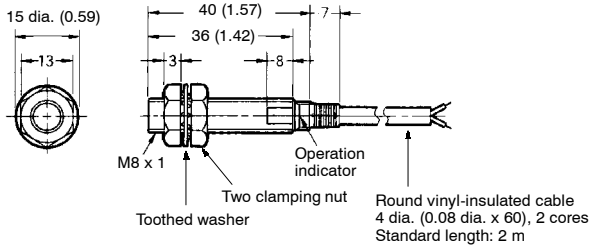
■ DRAWING LOCATOR

| Type | | | Part number | Figure number |
|---|------------|-----|------------------|---------------|
| Prewired without short-circuit protection | Shielded | M8 | E2E-X1R5Y□-N | 1 |
| | | M12 | E2E-X2Y□-N | 3 |
| | | M18 | E2E-X5Y□-N | 5 |
| | | M30 | E2E-X10Y□-N | 7 |
| | Unshielded | M8 | E2E-X2MY□-N | 2 |
| | | M12 | E2E-X5MY□-N | 4 |
| | | M18 | E2E-X10MY□-N | 6 |
| | | M30 | E2E-X18MY□-N | 8 |
| Prewired with short-circuit protection | Shielded | M18 | E2E-X5Y□-53-US | 9 |
| | | M30 | E2E-X10Y□-53-US | 11 |
| | Unshielded | M18 | E2E-X10MY□-53-US | 10 |
| | | M30 | E2E-X18MY□-53-US | 12 |
| 4-pin connector (M12) | Shielded | M12 | E2E-X2Y□-M1-N | 13 |
| | | M18 | E2E-X5Y1-M1-N | 15 |
| | | M30 | E2E-X10Y□-M1-N | 17 |
| | Unshielded | M12 | E2E-X5MY□-M1-N | 14 |
| | | M18 | E2E-X10MY□-M1-N | 16 |
| | | M30 | E2E-X18MY□-M1-N | 18 |
| 3-pin MicroChange connector (M12) | Shielded | M12 | E2E-X2Y□-M4 | 13 |
| | | M18 | E2E-X5Y□-M4 | 15 |
| | | M30 | E2E-X10Y□-M4 | 17 |
| | Unshielded | M12 | E2E-X5MY□-M4 | 14 |
| | | M18 | E2E-X10MY□-M4 | 16 |
| | | M30 | E2E-X18MY□-M4 | 18 |

Unit: mm (inch)

Prewired Models (Shielded)

Fig. 1: E2E-X1R5Y□-N



Prewired Models (Unshielded)

Fig. 2: E2E-X2MY□-N

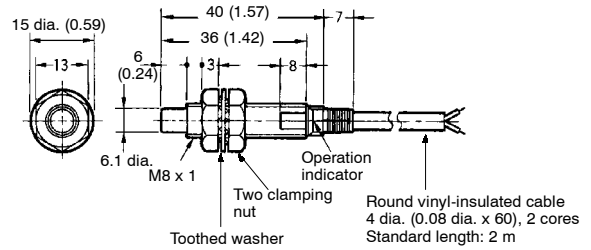


Fig. 3: E2E-X2Y□-N

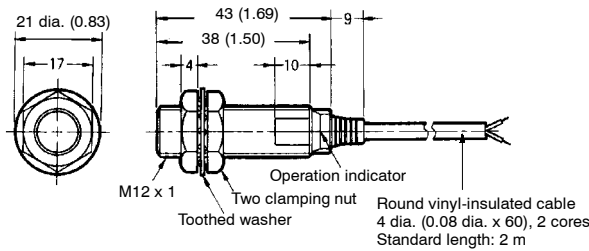


Fig. 4: E2E-X5MY□-N

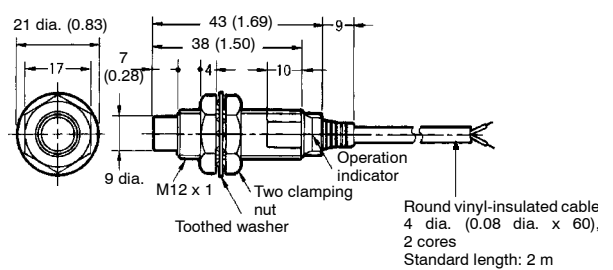


Fig. 5: E2E-X5Y□-N

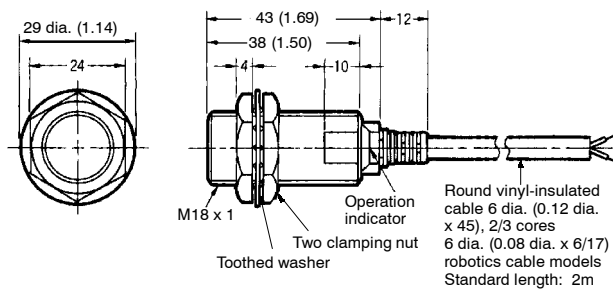


Fig. 6: E2E-X10MY□-N

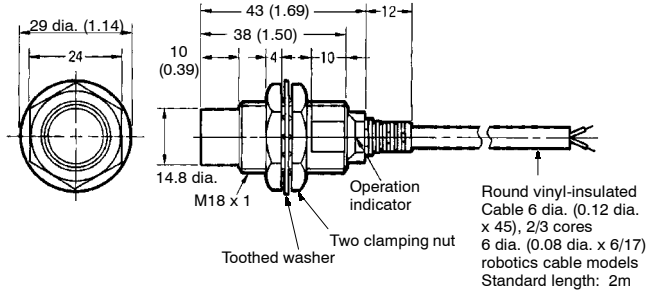


Fig. 7: E2E-X10Y□-N

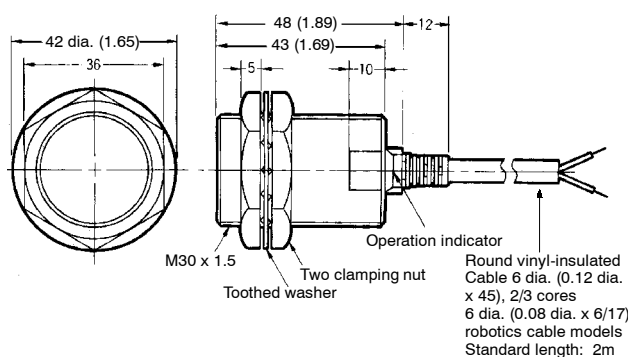
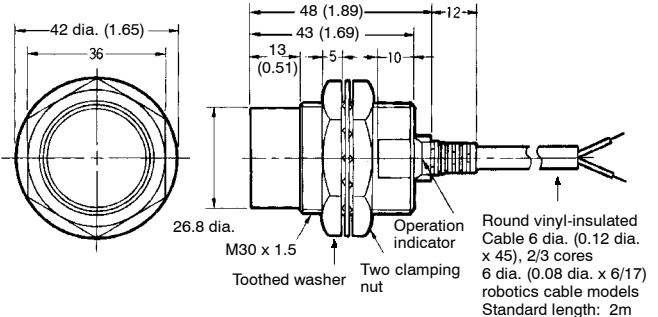


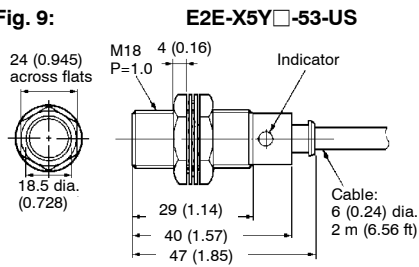
Fig. 8: E2E-X18MY□-N



PRE-WIRED MODELS WITH SHORT-CIRCUIT PROTECTION

Shielded

Fig. 9:



Unshielded

Fig. 10:

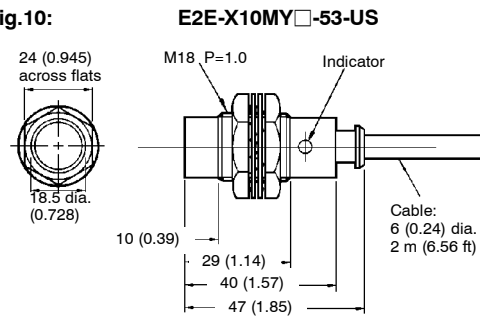


Fig. 11:

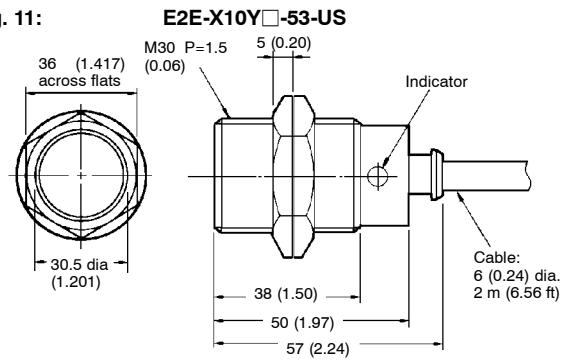
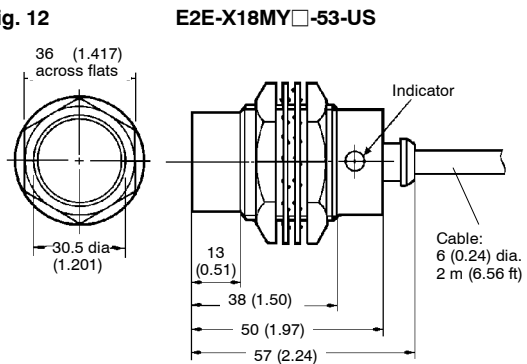


Fig. 12



Connector Models (Shielded)

Fig. 13:

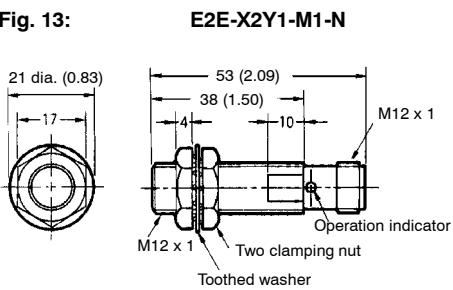


Fig. 14:

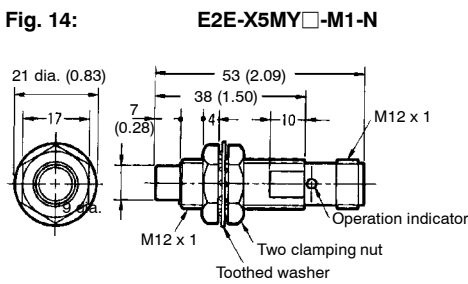


Fig. 15:

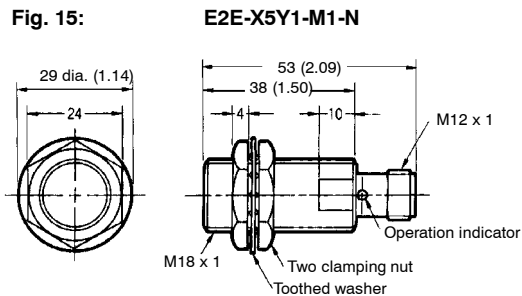
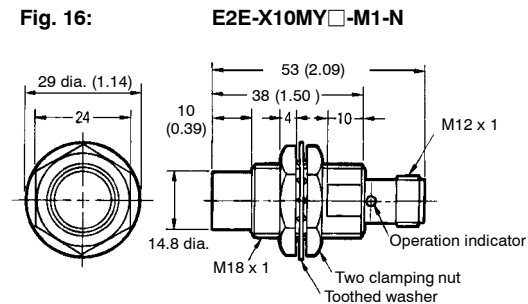


Fig. 16:



Connector Models (Shielded), continued

Connector Models (Unshielded), continued

Fig.17:

E2E-X10Y1-M1-N

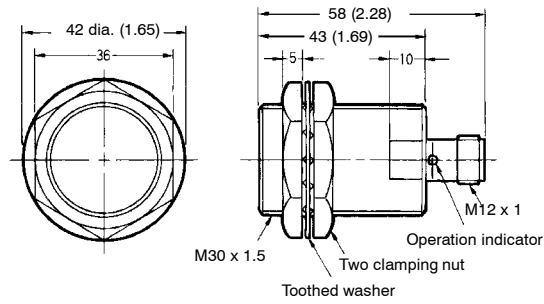
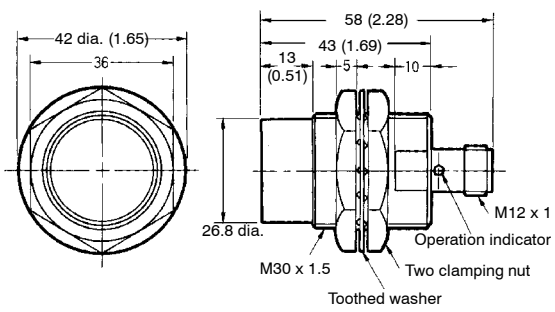
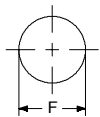


Fig. 18:

E2E-X18MY□-M1-N



■ MOUNTING HOLES



| Dimensions | M8 | M12 | M18 | M30 |
|------------|---|--|--|--|
| F (mm) | 8.5 ^{+0.5} / ₀ dia. | 12.5 ^{+0.5} / ₀ dia. | 18.5 ^{+0.5} / ₀ dia. | 30.5 ^{+0.5} / ₀ dia. |

Installation

■ PIN ARRANGEMENT

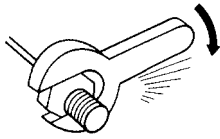
E2E-X□Y□-M1 AC 2-wire Models

| Output configuration | Applicable models | Pin arrangement |
|----------------------|-------------------|--|
| NO | E2E-X□Y1-M1-N | <p>Note: Terminals 1 and 2 are not used.</p> |
| NC | E2E-X□Y2-M1-N | <p>Note: Terminals 3 and 4 are not used.</p> |
| NO, NC | E2E-X□Y□-M4 | |

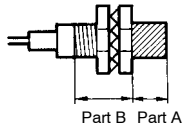
Precautions

■ MOUNTING

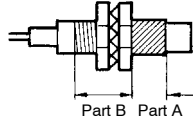
Do not tighten the nut with excessive force. A washer must be used with the nut.



Shielded Model



Unshielded Model

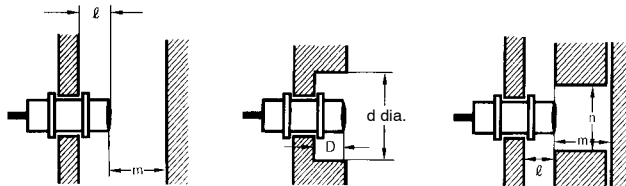


| Type | | Part A | | Part B |
|------|------------|----------------------------|--------------------------|----------------------------|
| | | Length | Torque | Torque |
| M8 | Shielded | 9 mm | 9 N • m (90 kgf • cm) | 12 N • m (120 kgf • cm) |
| | Unshielded | 3 mm | | |
| M12 | | 30 N • m (310 kgf • cm) | | |
| M18 | | 70 N • m (710 kgf • cm) | | |
| M30 | | 180 N • m (1,800 kgf • cm) | | |

Note: The table above right shows the tightening torques for part A and part B nuts. In the previous examples, 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.

■ EFFECTS OF SURROUNDING METAL

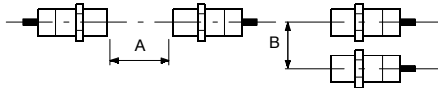
When mounting the E2E within a metal panel, ensure that the clearances given in the following table are maintained. Failure to maintain these distances may cause deterioration in the performance of the sensor.



| Type | | Dimension | M8 | M12 | M18 | M30 |
|-------------------------|------------|-----------|--------|-------|-------|-------|
| E2E-X□Y□-N AC 2-wire | Shielded | l | 0 mm | 0 mm | 0 mm | 0 mm |
| | | d | 8 mm | 12 mm | 18 mm | 30 mm |
| | | D | 0 mm | 0 mm | 0 mm | 0 mm |
| | | m | 4.5 mm | 8 mm | 20 mm | 40 mm |
| | | n | 12 mm | 18 mm | 27 mm | 45 mm |
| | Unshielded | l | 6 mm | 15 mm | 22 mm | 30 mm |
| | | d | 24 mm | 40 mm | 55 mm | 90 mm |
| | | D | 6 mm | 15 mm | 22 mm | 30 mm |
| | | m | 8 mm | 20 mm | 40 mm | 70 mm |
| | | n | 24 mm | 36 mm | 54 mm | 90 mm |

■ 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.



| Type | | Dimension | M8 | M12 | M18 | M30 |
|-------------------------|------------|-----------|-------|-------------|--------------|--------------|
| E2E-X□Y□-N AC 2-wire | Shielded | A | 20 mm | 30 (20) mm | 50 (30) mm | 100 (50) mm |
| | | B | 15 mm | 20 (12) mm | 35 (18) mm | 70 (35) mm |
| | Unshielded | A | 80 mm | 120 (60) mm | 200 (100) mm | 300 (100) mm |
| | | B | 60 mm | 100 (50) mm | 110 (60) mm | 200 (100) mm |

Note: The figures in parentheses refer to Sensors operating at different frequencies.

■ INSTALLATION

Power Reset Time

The Proximity Sensor is ready to operate within 100 ms after power is supplied. If power supplies are connected to the Proximity Sensor and load respectively, be sure to supply power to the Proximity Sensor before supplying power to the load.

Power OFF

The Proximity Sensor may output a pulse signal when it is turned off. Therefore, it is recommended to turn off the load before turning off the Proximity Sensor.

Power Supply Transformer

When using a DC power supply, make sure that the DC power supply has an insulated transformer. Do not use a DC power supply with an auto-transformer.

Sensing Target

Metal Coating:

The sensing distances of the Proximity Sensor vary with the metal coating on sensing targets.

■ WIRING

High-tension Lines

Wiring through Metal Conduit

If there is a power or high-tension line near the cord of the Proximity Sensor, wire the cord through an independent metal conduit to prevent against Proximity Sensor damage or malfunctioning.

Cable Tractive Force

Do not pull cable with the tractive forces exceeding the following.

| Diameter | Tractive force |
|----------------|----------------|
| 4 mm dia. max. | 30 N max. |
| 4 mm dia. min. | 50 N max. |

■ MOUNTING

The Proximity Sensor must not be subjected to excessive shock with a hammer when it is installed, or the Proximity Sensor may be damaged or lose its water-resistance.

■ ENVIRONMENT

Water Resistance

Do not use the Proximity Sensor underwater, outdoors, or in the rain.

Operating Environment

Be sure to use the Proximity Sensor within its operating ambient temperature range and do not use the Proximity Sensor outdoors to maintain its reliability and life expectancy. Although the Proximity Sensor is water resistant, a cover to protect the Proximity Sensor from water or water soluble machining oil is recommended so that its reliability and life expectancy can be maintained.

Do not use the Proximity Sensor in an environment with chemical gas (e.g., strong alkaline or acid gasses including nitric, chromic, and concentrated sulfuric acid gases).

CONNECTING LOAD TO AC 2-WIRE SENSOR

Refer to the following before using AC or DC 2-wire Proximity Sensors.

Surge Protection

Although the Proximity Sensor has a surge absorption circuit, if there is any machine that has a large surge current (e.g., a motor or welding machine) near the Proximity Sensor, connect a surge absorber to the machine.

Leakage Current

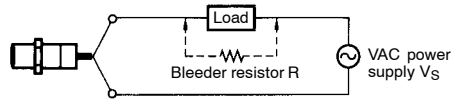
When it is OFF, the Proximity Sensor has leakage current. Refer to Leakage Current Characteristics. In this case, the load is imposed with a small voltage and the load may not be reset. Before using the Proximity Sensor, make sure that this voltage is less than the load reset voltage. The AC 2-wire Proximity Sensor cannot be connected to any card-lift-off relay (e.g., the G2A) because contact vibration of the relay will be caused by the leakage current and the life of the relay will be shortened.

Countermeasures Against Leakage Current

AC 2-wire Models

Connect a bleeder resistor as the bypass for the leakage current so that the current flowing into the load will be less than the load reset current.

As shown in the following diagram, connect the bleeder resistor so that the current flowing into the Proximity Sensor will be 10 mA minimum and the residual voltage imposed on the load will be less than the load reset voltage.



Refer to the following to calculate the bleeder resistance and the allowable power of the bleeder resistor.

$$R \cong V_S / (10 - I) \text{ (k}\Omega\text{)}$$

$$P > V_S^2 / R \text{ (mW)}$$

P: The allowable power of the bleeder resistor. (The actual power capacity of the bleeder resistor must be at least a few times as large as the allowable power of the bleeder resistor.)

I: Load current (mA)

The following resistors are recommended.

100 VAC (supply voltage): A resistor with a resistance of 10 kΩ maximum and an allowable power of 3 W minimum

200 VAC (supply voltage): A resistor with a resistance of 20 kΩ maximum and an allowable power of 10 W minimum

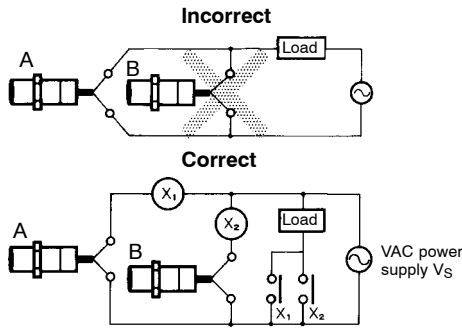
If these resistors generate excessive heat, use a resistor with a resistance of 10 kΩ maximum and an allowable power of 5 W minimum at 100 VAC and a resistor with a resistance of 20 kΩ maximum and an allowable power of 10 W minimum at 200 VAC instead.

PRECAUTIONS FOR AC 2-WIRE PROXIMITY SENSORS IN OPERATION

Connector

| Model | Connection type | Method | Description |
|-----------|-------------------------|--------|---|
| AC 2-wire | AND (serial connection) | | <p>If 100 or 200 VAC is imposed on the Proximity Sensors, V_L (i.e., the voltage imposed on the load) will be obtained from the following.</p> $V_L = V_S - (\text{residual voltage} \times \text{no. of Proximity Sensors}) \text{ (V)}$ <p>Therefore, if V_L is lower than the load operating voltage, the load will not operate.</p> <p>A maximum of three Proximity Sensors can be connected in series provided that the supply voltage is 100 V minimum.</p> |

■ PRECAUTIONS FOR AC 2-WIRE PROXIMITY SENSORS IN OPERATION, CONTINUED

| Model | Connection type | Method | Description |
|--------------|-----------------------------|---|---|
| AC 2-wire | OR (parallel connection) |  <p>The 'Incorrect' diagram shows two proximity sensors, A and B, connected in parallel to a load. A shaded area is drawn over the load and sensor B, indicating a problem. The 'Correct' diagram shows sensor A connected to a load through a relay (X1) and sensor B connected to the load through another relay (X2). A VAC power supply Vs is shown.</p> | <p>In principle, more than two Proximity Sensors cannot be connected in parallel.</p> <p>Provided that Proximity Sensor A does not operate with Proximity Sensor B simultaneously and there is no need to keep the load operating continuously, the Proximity Sensors can be connected in parallel. In this case, however, due to the total leakage current of the Proximity Sensors, the load may not reset properly.</p> <p>It is not possible to keep the load operating continuously with Proximity Sensors A and B in simultaneous operation to sense sensing objects due to the following reason.</p> <p>When Proximity Sensor A is ON, the voltage imposed on Proximity Sensor A will drop to approximately 10 V and the load current flows into Proximity Sensor A, and when one of the sensing objects is close to Proximity Sensor B, Proximity Sensor B will not operate because the voltage imposed on Proximity Sensor B is 10 V, which is too low. When Proximity Sensor A is OFF, the voltage imposed on Proximity Sensor B will reach the supply voltage and Proximity Sensor B will be ON. Then, Proximity Sensor A as well as Proximity Sensor B will be OFF for approximately 10 ms, which resets the load for an instant. To prevent the instantaneous resetting of the load, use a relay as shown on the left.</p> |

NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches divide by 25.4.

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