

### Short Barrel Metal Body Inductive Proximity Sensors in a Wide Range of Configurations

- Available in prewired or quick-disconnect versions
- Quick-disconnect versions feature metal connectors for durability
- Easy-to-see LED indicator
- Flats for wrench tightening
- Ideal for a wide variety of applications



## Ordering Information

### ■ SENSORS

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.

#### DC 2-wire/Pre-wired Models

| Self-diagnostic Output Function | Type       | Size | Sensing Distance | Part Number                       |               |
|---------------------------------|------------|------|------------------|-----------------------------------|---------------|
|                                 |            |      |                  | NO                                | NC            |
| Yes                             | Shielded   | M12  | 3 mm             | E2E-X3D1S-N (see note 1)          | ---           |
|                                 |            | M18  | 7 mm             | E2E-X7D1S-N (see note 1)          | ---           |
|                                 |            | M30  | 10 mm            | E2E-X10D1S-N (see note 1)         | ---           |
|                                 | Unshielded | M12  | 8 mm             | E2E-X8MD1S-N (see note 1)         | ---           |
|                                 |            | M18  | 14 mm            | E2E-X14MD1S-N (see note 1)        | ---           |
|                                 |            | M30  | 20 mm            | E2E-X20MD1S-N (see note 1)        | ---           |
| No                              | Shielded   | M8   | 2 mm             | E2E-X2D1-N-N (see notes 1 and 2)  | E2E-X2D2-N-N  |
|                                 |            | M12  | 3 mm             | E2E-X3D1-N-N (see notes 1 and 2)  | E2E-X3D2-N-N  |
|                                 |            | M18  | 7 mm             | E2E-X7D1-N-N (see notes 1 and 2)  | E2E-X7D2-N-N  |
|                                 |            | M30  | 10 mm            | E2E-X10D1-N-N (see notes 1 and 2) | E2E-X10D2-N-N |
|                                 | Unshielded | M8   | 4 mm             | E2E-X4MD1-N (see notes 1 and 2)   | E2E-X4MD2-N   |
|                                 |            | M12  | 8 mm             | E2E-X8MD1-N (see notes 1 and 2)   | E2E-X8MD2-N   |
|                                 |            | M18  | 14 mm            | E2E-X14MD1-N (see notes 1 and 2)  | E2E-X14MD2-N  |
|                                 |            | M30  | 20 mm            | E2E-X20MD1-N (see notes 1 and 2)  | E2E-X20MD2-N  |
|                                 |            |      |                  |                                   |               |

Note: 1. A different oscillating frequency is available to reduce mutual interference and allow closer mounting. Add a "5" to the part number (e.g. E2E-X3D15-N-N). Consult OMRON for availability.

2. E2E models with a robotics cable are available as well. The model number of a model with a robotics cable has the suffix "-R" (e.g. E2E-X3D1-R-N).

## DC 2-wire/Plug-in Models

| Connector Size    | Self-diagnostic Output Function | Type       | Size | Sensing Distance | Part Number                   |                  |
|-------------------|---------------------------------|------------|------|------------------|-------------------------------|------------------|
|                   |                                 |            |      |                  | NO                            | NC               |
| M12/Micro Change® | Yes                             | Shielded   | M12  | 3 mm             | E2E-X3D1S-M1-N                | ---              |
|                   |                                 |            | M18  | 7 mm             | E2E-X7D1S-M1-N                | ---              |
|                   |                                 |            | M30  | 10 mm            | E2E-X10D1S-M1-N               | ---              |
|                   |                                 | Unshielded | M12  | 8 mm             | E2E-X8MD1S-M1-N               | ---              |
|                   |                                 |            | M18  | 14 mm            | E2E-X14MD1S-M1-N              | ---              |
|                   |                                 |            | M30  | 20 mm            | E2E-X20MD1S-M1-N              | ---              |
|                   | No                              | Shielded   | M8   | 2 mm             | E2E-X2D1-M1G-N                | E2E-X2D2-M1G-N   |
|                   |                                 |            | M12  | 3 mm             | E2E-X3D1-M1G-N (see note 1)   | E2E-X3D2-M1G-N   |
|                   |                                 |            | M18  | 7 mm             | E2E-X7D1-M1G-N (see note 1)   | E2E-X7D2-M1G-N   |
|                   |                                 |            | M30  | 10 mm            | E2E-X10D1-M1G-N (see note 1)  | E2E-X10D2-M1G-N  |
|                   |                                 | Unshielded | M8   | 4 mm             | E2E-X4MD1-M1G-N               | E2E-X4MD2-M1G-N  |
|                   |                                 |            | M12  | 8 mm             | E2E-X8MD1-M1G-N (see note 1)  | E2E-X8MD2-M1G-N  |
|                   |                                 |            | M18  | 14 mm            | E2E-X14MD1-M1G-N (see note 1) | E2E-X14MD2-M1G-N |
|                   |                                 |            | M30  | 20 mm            | E2E-X20MD1-M1G-N (see note 1) | E2E-X20MD2-M1G-N |
| M8/Nano Change®   |                                 | Shielded   | M8   | 2 mm             | E2E-X2D1-M3G                  | E2E-X2D2-M3G     |
|                   |                                 | Unshielded |      | 4 mm             | E2E-X4MD1-M3G                 | E2E-X4MD2-M3G    |

- Note: 1. A different oscillating frequency is available to reduce mutual interference and allow closer mounting. Add a "5" to the part number (e.g., E2E-X3D15-M1G-N). Consult OMRON for availability.
2. Connector cordsets: For Micro Change® use OMRON Y96E-44□D□ or equivalent.  
For Nano Change®, use OMRON XS3F-M42□-40□-R Brad Harrison 45410-001 or equivalent.

## DC 2-wire/Connector Extension Models

| Type       | Size | Sensing Distance | Output Configuration | Polarity          | Part Number       |
|------------|------|------------------|----------------------|-------------------|-------------------|
| Shielded   | M12  | 3 mm             | NO                   | Yes               | E2E-X3D1-M1GJ-N   |
|            |      |                  |                      | No                | E2E-X3D1-M1J-T-N  |
|            | M18  | 7 mm             |                      | Yes               | E2E-X7D1-M1GJ-N   |
|            |      |                  |                      | No                | E2E-X7D1-M1J-T-N  |
|            | M30  | 10 mm            |                      | Yes               | E2E-X10D1-M1GJ-N  |
|            |      |                  |                      | No                | E2E-X10D1-M1J-T-N |
| Unshielded | M12  | 8 mm             | Yes                  | E2E-X8MD1-M1GJ-N  |                   |
|            | M18  | 14 mm            |                      | E2E-X14MD1-M1GJ-N |                   |
|            | M30  | 20 mm            |                      | E2E-X20MD1-M1GJ-N |                   |
|            |      |                  |                      |                   |                   |

- Note: 1. A model with no polarity has a residual voltage of 5 V, which must be taken into consideration together with the interface condition (the PLC's ON voltage, for example) when connecting the Proximity Sensor to a load.
2. The standard cord length is 30 cm. 50-cm and 1-m models are also available.
3. Connector cordsets: Use OMRON Y96E-44□D□ or equivalent.

## DC 2-wire Model/Connector Pin Assignments

The connector pin assignments of each new E2E DC 2-wire conforms to IEC947-5-2 Table III.

| Type     | Size | Output Configuration | Part Number    | Sensing Head |     | Output Configuration | Part Number     |
|----------|------|----------------------|----------------|--------------|-----|----------------------|-----------------|
| Shielded | M8   | NO                   | E2E-X2D1-M1-N  | Unshielded   | M8  | NO                   | E2E-X4MD1-M1-N  |
|          |      | NC                   | E2E-X2D2-M1-N  |              |     | NC                   | E2E-X4MD2-M1-N  |
|          | M12  | NO                   | E2E-X3D1-M1-N  |              | M12 | NO                   | E2E-X8MD1-M1-N  |
|          |      | NC                   | E2E-X3D2-M1-N  |              |     | NC                   | E2E-X8MD2-M1-N  |
|          | M18  | NO                   | E2E-X7D1-M1-N  |              | M18 | NO                   | E2E-X14MD1-M1-N |
|          |      | NC                   | E2E-X7D2-M1-N  |              |     | NC                   | E2E-X14MD2-M1-N |
|          | M30  | NO                   | E2E-X10D1-M1-N |              | M30 | NO                   | E2E-X20MD1-M1-N |
|          |      | NC                   | E2E-X10D2-M1-N |              |     | NC                   | E2E-X20MD2-M1-N |

- Note: Connector cordsets: Use OMRON Y96E-44□D□ or equivalent.

## DC 3-wire/Pre-wired Models

| Type       | Size | Sensing Distance | Output Configuration | Part Number  |
|------------|------|------------------|----------------------|--------------|
| Shielded   | M8   | 1.5 mm           | NPN NO               | E2E-X1R5E1-N |
|            |      |                  | NPN NC               | E2E-X1R5E2-N |
|            |      |                  | PNP NO               | E2E-X1R5F1-N |
|            |      |                  | PNP NC               | E2E-X1R5F2-N |
|            | M12  | 2 mm             | NPN NO               | E2E-X2E1-N   |
|            |      |                  | NPN NC               | E2E-X2E2-N   |
|            |      |                  | PNP NO               | E2E-X2F1-N   |
|            |      |                  | PNP NC               | E2E-X2F2-N   |
|            | M18  | 5 mm             | NPN NO               | E2E-X5E1-N   |
|            |      |                  | NPN NC               | E2E-X5E2-N   |
|            |      |                  | PNP NO               | E2E-X5F1-N   |
|            |      |                  | PNP NC               | E2E-X5F2-N   |
|            | M30  | 10 mm            | NPN NO               | E2E-X10E1-N  |
|            |      |                  | NPN NC               | E2E-X10E2-N  |
|            |      |                  | PNP NO               | E2E-X10F1-N  |
|            |      |                  | PNP NC               | E2E-X10F2-N  |
| Unshielded | M8   | 2 mm             | NPN NO               | E2E-X2ME1-N  |
|            |      |                  | NPN NC               | E2E-X2ME2-N  |
|            |      |                  | PNP NO               | E2E-X2MF1-N  |
|            |      |                  | PNP NC               | E2E-X2MF2-N  |
|            | M12  | 5 mm             | NPN NO               | E2E-X5ME1-N  |
|            |      |                  | NPN NC               | E2E-X5ME2-N  |
|            |      |                  | PNP NO               | E2E-X5MF1-N  |
|            |      |                  | PNP NC               | E2E-X5MF2-N  |
|            | M18  | 10 mm            | NPN NO               | E2E-X10ME1-N |
|            |      |                  | NPN NC               | E2E-X10ME2-N |
|            |      |                  | PNP NO               | E2E-X10MF1-N |
|            |      |                  | PNP NC               | E2E-X10MF2-N |
|            | M30  | 18 mm            | NPN NO               | E2E-X18ME1-N |
|            |      |                  | NPN NC               | E2E-X18ME2-N |
|            |      |                  | PNP NO               | E2E-X18MF1-N |
|            |      |                  | PNP NC               | E2E-X18MF2-N |

Note: A different oscillating frequency is available to reduce mutual interference and allow closer mounting. Add a "5" to the part number (e.g., E2E-X5E15-N) Consult OMRON for availability.  
 E2E DC 3-wire with a robotics cable are available as well. The model number of a model with a robotics cable has the suffix "-R" (e.g, E2E-X5E1-R-N).

## DC 3-wire/Plug-in Models

| Connector Size    | Type       | Size | Sensing Distance | Output Configuration | Part Number     |
|-------------------|------------|------|------------------|----------------------|-----------------|
| M12/Micro Change® | Shielded   | M8   | 1.5 mm           | NPN NO               | E2E-X1R5E1-M1-N |
|                   |            |      |                  | NPN NC               | E2E-X1R5E2-M1-N |
|                   |            |      |                  | PNP NO               | E2E-X1R5F1-M1-N |
|                   |            |      |                  | PNP NC               | E2E-X1R5F2-M1-N |
|                   |            | M12  | 2 mm             | NPN NO               | E2E-X2E1-M1-N   |
|                   |            |      |                  | NPN NC               | E2E-X2E2-M1-N   |
|                   |            |      |                  | PNP NO               | E2E-X2F1-M1-N   |
|                   |            |      |                  | PNP NC               | E2E-X2F2-M1-N   |
|                   |            | M18  | 5 mm             | NPN NO               | E2E-X5E1-M1-N   |
|                   |            |      |                  | NPN NC               | E2E-X5E2-M1-N   |
|                   |            |      |                  | PNP NO               | E2E-X5F1-M1-N   |
|                   |            |      |                  | PNP NC               | E2E-X5F2-M1-N   |
|                   |            | M30  | 10 mm            | NPN NO               | E2E-X10E1-M1-N  |
|                   |            |      |                  | NPN NC               | E2E-X10E2-M1-N  |
|                   |            |      |                  | PNP NO               | E2E-X10F1-M1-N  |
|                   |            |      |                  | PNP NC               | E2E-X10F2-M1-N  |
|                   | Unshielded | M8   | 2 mm             | NPN NO               | E2E-X2ME1-M1-N  |
|                   |            |      |                  | NPN NC               | E2E-X2ME2-M1-N  |
|                   |            |      |                  | PNP NO               | E2E-X2MF1-M1-N  |
|                   |            |      |                  | PNP NC               | E2E-X2MF2-M1-N  |
|                   |            | M12  | 5 mm             | NPN NO               | E2E-X5ME1-M1-N  |
|                   |            |      |                  | NPN NC               | E2E-X5ME2-M1-N  |
|                   |            |      |                  | PNP NO               | E2E-X5MF1-M1-N  |
|                   |            |      |                  | PNP NC               | E2E-X5MF2-M1-N  |
|                   |            | M18  | 10 mm            | NPN NO               | E2E-X10ME1-M1-N |
|                   |            |      |                  | NPN NC               | E2E-X10ME2-M1-N |
|                   |            |      |                  | PNP NO               | E2E-X10MF1-M1-N |
|                   |            |      |                  | PNP NC               | E2E-X10MF2-M1-N |
|                   |            | M30  | 18 mm            | NPN NO               | E2E-X18ME1-M1-N |
|                   |            |      |                  | NPN NC               | E2E-X18ME2-M1-N |
|                   |            |      |                  | PNP NO               | E2E-X18MF1-M1-N |
|                   |            |      |                  | PNP NC               | E2E-X18MF2-M1-N |
| M8/Nano Change®   | Shielded   | M8   | 1.5 mm           | NPN NO               | E2E-X1R5E1-M3   |
|                   |            |      |                  | NPN NC               | E2E-X1R5E2-M3   |
|                   |            |      |                  | PNP NO               | E2E-X1R5F1-M3   |
|                   |            |      |                  | PNP NC               | E2E-X1R5F2-M3   |
|                   | Unshielded | M8   | 2 mm             | NPN NO               | E2E-X2ME1-M3    |
|                   |            |      |                  | NPN NC               | E2E-X2ME2-M3    |
|                   |            |      |                  | PNP NO               | E2E-X2MF1-M3    |
|                   |            |      |                  | PNP NC               | E2E-X2MF2-M3    |

Note: Connector cordsets: For Micro Change® use OMRON Y96E-44□□D□ or equivalent.  
 For Nano Change®, use OMRON XS3F-M42□-40□-R, Brad Harrison [45410-001](#) or equivalent.

## AC 2-wire/Pre-wired Models

| Type       | Size | Sensing Distance | Output Configuration | Part Number                |
|------------|------|------------------|----------------------|----------------------------|
| Shielded   | M8   | 1.5 mm           | NO                   | E2E-X1R5Y1-N               |
|            |      |                  | NC                   | E2E-X1R5Y2-N               |
|            | M12  | 2 mm             | NO                   | E2E-X2Y1-US-N              |
|            |      |                  | NC                   | E2E-X2Y2-US-N              |
|            | M18  | 5 mm             | NO                   | E2E-X5Y1-US-N (see note)   |
|            |      |                  | NC                   | E2E-X5Y2-US-N              |
|            | M30  | 10 mm            | NO                   | E2E-X10Y1-US-N (see note)  |
|            |      |                  | NC                   | E2E-X10Y2-US-N             |
| Unshielded | M8   | 2 mm             | NO                   | E2E-X2MY1-N (see note)     |
|            |      |                  | NC                   | E2E-X2MY2-N                |
|            | M12  | 5 mm             | NO                   | E2E-X5MY1-US-N (see note)  |
|            |      |                  | NC                   | E2E-X5MY2-US-N             |
|            | M18  | 10 mm            | NO                   | E2E-X10MY1-US-N (see note) |
|            |      |                  | NC                   | E2E-X10MY2-US-N            |
|            | M30  | 18 mm            | NO                   | E2E-X18MY1-US-N (see note) |
|            |      |                  | NC                   | E2E-X18MY2-US-N            |

Note: A different oscillating frequency is available to reduce mutual interference and allow closer mounting. Add a "5" to the part number (e.g., E2E-X5Y15-US-N). Consult OMRON for availability.

## Sensors with Short-Circuit Protection

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

## AC 2-wire/Plug-in Models

| Type       | Size | Sensing Distance | Output Configuration | Part Number     |
|------------|------|------------------|----------------------|-----------------|
| Shielded   | M12  | 2 mm             | NO                   | E2E-X2Y1-M1-N   |
|            |      |                  | NC                   | E2E-X2Y2-M1-N   |
|            | M18  | 5 mm             | NO                   | E2E-X5Y1-M1-N   |
|            |      |                  | NC                   | E2E-X5Y2-M1-N   |
|            | M30  | 10 mm            | NO                   | E2E-X10Y1-M1-N  |
|            |      |                  | NC                   | E2E-X10Y2-M1-N  |
| Unshielded | M12  | 5 mm             | NO                   | E2E-X5MY1-M1-N  |
|            |      |                  | NC                   | E2E-X5MY2-M1-N  |
|            | M18  | 10 mm            | NO                   | E2E-X10MY1-M1-N |
|            |      |                  | NC                   | E2E-X10MY2-M1-N |
|            | M30  | 18 mm            | NO                   | E2E-X18MY1-M1-N |
|            |      |                  | NC                   | E2E-X18MY2-M1-N |

Note: Connector cordsets: Use OMRON Y96E-44□A□ or equivalent.

## ■ ACCESSORIES

| Description                                 | Part Number                                                                                                       |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Mounting brackets                           | Fits M12 size sensors<br>Fits M18 size sensors<br>Fits M30 size sensors<br>Y92E-B12<br>Y92E-B18<br>Y92E-B30       |
| Silicone rubber covers for shielded sensors | Fits M12 size sensors<br>Fits M18 size sensors<br>Fits M30 size sensors<br>Y92E-E12-2<br>Y92E-E18-2<br>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 M12 size sensors | <b>M12-MHWS</b> |
|                                                                   | Fits M18 size sensors | <b>M18-MHWS</b> |
|                                                                   | Fits M30 size sensors | <b>M30-MHWS</b> |

## Specifications

## ■ RATINGS/CHARACTERISTICS

## E2E-X□D□ DC 2-wire Models

| Part number                                 | E2E-X2D□<br>-N                                                                                                            | E2E-X4MD<br>□-N                        | E2E-X3D□<br>-N                                                                               | E2E-X8MD<br>□-N                        | E2E-X7D□<br>-N                         | E2E-X14M<br>D□-N                       | E2E-X10D<br>□-N                        | E2E-X20M<br>D□-N                       |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------|
| Size                                        | M8                                                                                                                        |                                        | M12                                                                                          |                                        | M18                                    |                                        | M30                                    |                                        |
| Type                                        | Shielded                                                                                                                  | Unshielded                             | Shielded                                                                                     | Unshielded                             | Shielded                               | Unshielded                             | Shielded                               | Unshielded                             |
| Sensing distance                            | 2 mm (0.08 in) ±10%                                                                                                       | 4 mm (0.16 in) ±10%                    | 3 mm (0.12 in) ±10%                                                                          | 8 mm (0.31 in) ±10%                    | 7 mm (0.28 in) ±10%                    | 14 mm (0.55 in) ±10%                   | 10 mm (0.39 in) ±10%                   | 20 mm (0.79 in) ±10%                   |
| Supply voltage (operating voltage range)    | 12 to 24 VDC, ripple (p-p): 10% max., (10 to 30 VDC)                                                                      |                                        |                                                                                              |                                        |                                        |                                        |                                        |                                        |
| Leakage current                             | 0.8 mA max.                                                                                                               |                                        |                                                                                              |                                        |                                        |                                        |                                        |                                        |
| Sensing object                              | Magnetic metals (refer to <i>Engineering Data</i> for non-magnetic metals)                                                |                                        |                                                                                              |                                        |                                        |                                        |                                        |                                        |
| Setting distance                            | 0 to 1.6 mm (0 to 0.06 in)                                                                                                | 0 to 3.2 mm (0 to 0.13 in)             | 0 to 2.4 mm (0 to 0.09 in)                                                                   | 0 to 6.4 mm (0 to 0.25 in)             | 0 to 5.6 mm (0 to 0.22 in)             | 0 to 11.2 mm (0 to 0.44 in)            | 0 to 8.0 mm (0 to 0.31 in)             | 0 to 16.0 mm (0 to 0.63 in)            |
| Standard object (mild steel)                | 8 x 8 x 1 mm (0.31 x 0.31 x 0.04 in)                                                                                      | 20 x 20 x 1 mm (0.79 x 0.79 x 0.04 in) | 12 x 12 x 1 mm (0.47 x 0.47 x 0.04 in)                                                       | 30 x 30 x 1 mm (1.18 x 1.18 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                         | 15% max. of sensing distance                                                                                              |                                        | 10% max. of sensing distance                                                                 |                                        |                                        |                                        |                                        |                                        |
| Response frequency                          | 1.5 kHz                                                                                                                   | 1.0 kHz                                | 1.0 kHz                                                                                      | 0.8 kHz                                | 0.5 kHz                                | 0.4 kHz                                | 0.4 kHz                                | 0.1 kHz                                |
| Operation (with sensing object approaching) | D1 models: Load ON<br>D2 models: Load OFF                                                                                 |                                        |                                                                                              |                                        |                                        |                                        |                                        |                                        |
| Control output (switching capacity)         | 3 to 100 mA (5 to 100 mA for -M1J-T models)<br>Diagnostic output: 50 mA for -D1S models                                   |                                        |                                                                                              |                                        |                                        |                                        |                                        |                                        |
| Diagnostic output delay                     | 0.3 to 1 s                                                                                                                |                                        |                                                                                              |                                        |                                        |                                        |                                        |                                        |
| Circuit protection                          | Surge absorber, load short-circuit protection (for control and diagnostic output)                                         |                                        |                                                                                              |                                        |                                        |                                        |                                        |                                        |
| Indicator                                   | D1 models: Operation indicator (red LED), operation set indicator (green LED)<br>D2 models: Operation indicator (red LED) |                                        |                                                                                              |                                        |                                        |                                        |                                        |                                        |
| Ambient temperature                         | Operating: -25°C to 70°C with no icing (-13°F to 158°F)                                                                   |                                        |                                                                                              |                                        |                                        |                                        |                                        |                                        |
| Ambient humidity                            | Operating: 35% to 95%                                                                                                     |                                        |                                                                                              |                                        |                                        |                                        |                                        |                                        |
| Temperature influence                       | ±15% max. of sensing distance at 23°C in temperature range of -25°C to 70°C (-13°F to 158°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 (see note)                 | 3.0 V max. (under load current of 100 mA with cable length of 2 m)<br>5.0 V min. for -M1J-T models                        |                                        |                                                                                              |                                        |                                        |                                        |                                        |                                        |
| Insulation resistance                       | 50 MΩ min. (at 500 VDC) between current carry parts and case                                                              |                                        |                                                                                              |                                        |                                        |                                        |                                        |                                        |
| Dielectric strength                         | 1,000 VAC for 1 min between current carry parts and case                                                                  |                                        |                                                                                              |                                        |                                        |                                        |                                        |                                        |
| Vibration resistance                        | Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 10 times each in X, Y, and Z directions                             |                                        |                                                                                              |                                        |                                        |                                        |                                        |                                        |

| Part number      |              | E2E-X2D□<br>-N                                                                              | E2E-X4MD<br>□-N | E2E-X3D□<br>-N                                                                                 | E2E-X8MD<br>□-N | E2E-X7D□<br>-N | E2E-X14M<br>D□-N | E2E-X10D<br>□-N | E2E-X20M<br>D□-N |
|------------------|--------------|---------------------------------------------------------------------------------------------|-----------------|------------------------------------------------------------------------------------------------|-----------------|----------------|------------------|-----------------|------------------|
| Shock resistance |              | Destruction: 500 m/s <sup>2</sup> (approx. 50G) for 10 times each in X, Y, and Z directions |                 | Destruction: 1,000 m/s <sup>2</sup> (approx. 100G) for 10 times each in X, Y, and Z directions |                 |                |                  |                 |                  |
| Enclosure rating | IEC          | IP67                                                                                        |                 |                                                                                                |                 |                |                  |                 |                  |
|                  | NEMA         | 1, 4, 6, 12, 13                                                                             |                 |                                                                                                |                 |                |                  |                 |                  |
| Weight           |              | Approx. 45 g                                                                                |                 | Approx. 120 g                                                                                  |                 | Approx. 160 g  |                  | Approx. 220 g   |                  |
| Material         | Body         | Stainless steel                                                                             |                 | Brass                                                                                          |                 |                |                  |                 |                  |
|                  | Sensing face | PBT                                                                                         |                 |                                                                                                |                 |                |                  |                 |                  |

Note: The residual voltage of each E2E model with the model number suffix “-M1J-T” is 5 V. When connecting an E2E model with the suffix “-M1J-T” to a device, make sure that the device can withstand the residual voltage.

### E2E-X□E□/F□ DC 3-wire Models

| Part number                                           | E2E-X1R5<br>E□/F□-N                                                                                                                                                                          | E2E-X2ME<br>□/ F□-N                    | E2E-X2E□<br>/ F□-N                                                                                                                              | E2E-X5ME<br>□/F□-N                     | E2E-X5E□<br>/ F□-N                     | E2E-X10M<br>E□/F□-N                    | E2E-X10E<br>□/ F□-N                    | E2E-X18M<br>E□/ F□-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) | 12 to 24 VDC, ripple (p-p): 10% max., (10 to 40 VDC)                                                                                                                                         |                                        |                                                                                                                                                 |                                        |                                        |                                        |                                        |                                        |
| Current consumption                                   | 13 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                                    | 2.0 kHz                                                                                                                                                                                      | 0.8 kHz                                | 1.5 kHz                                                                                                                                         | 0.4 kHz                                | 0.6 kHz                                | 0.2 kHz                                | 0.4 kHz                                | 0.1 kHz                                |
| Operation (with sensing object approaching)           | E1 models: Load ON<br>E2 models: Load OFF                                                                                                                                                    |                                        |                                                                                                                                                 |                                        |                                        |                                        |                                        |                                        |
| Control output (switching capacity)                   | 200 mA max.                                                                                                                                                                                  |                                        |                                                                                                                                                 |                                        |                                        |                                        |                                        |                                        |
| Circuit protection                                    | Reverse connection protection, surge absorber, load short-circuit protection                                                                                                                 |                                        |                                                                                                                                                 |                                        |                                        |                                        |                                        |                                        |
| Indicator                                             | Operation indicator (red LED)                                                                                                                                                                |                                        |                                                                                                                                                 |                                        |                                        |                                        |                                        |                                        |
| Ambient temperature (see note 2)                      | Operating: -40°C to 85°C with no icing (-40°F to 185°F)                                                                                                                                      |                                        |                                                                                                                                                 |                                        |                                        |                                        |                                        |                                        |
| 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)<br>±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                                      | 2.0 V max. (under load current of 200 mA with cable length of 2 m)                                                                                                                           |                                        |                                                                                                                                                 |                                        |                                        |                                        |                                        |                                        |
| Insulation resistance                                 | 50 MΩ min. (at 500 VDC) between current carry parts and case                                                                                                                                 |                                        |                                                                                                                                                 |                                        |                                        |                                        |                                        |                                        |
| Dielectric strength                                   | 1,000 VAC for 1 min between current carry parts and case                                                                                                                                     |                                        |                                                                                                                                                 |                                        |                                        |                                        |                                        |                                        |
| Vibration resistance                                  | Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hrs each in X, Y, and Z directions                                                                                                   |                                        |                                                                                                                                                 |                                        |                                        |                                        |                                        |                                        |
| Shock resistance                                      | Destruction: 500 m/s <sup>2</sup> (approx. 50G) for 10 times each in X, Y, and Z directions                                                                                                  |                                        | Destruction: 1,000 m/s <sup>2</sup> (approx. 50G) for 10 times each in X, Y, and Z directions<br>500 m/s <sup>2</sup> (approx. 50G) for E2E-X5M |                                        |                                        |                                        |                                        |                                        |

## E2E-X□E□/F□ DC 3-wire Models, Continued

| Part number         |                 | E2E-X1R5<br>E□/F□-N | E2E-X2ME<br>□/ F□-N | E2E-X2E□<br>/ F□-N | E2E-X5ME<br>□/F□-N | E2E-X5E□<br>/ F□-N | E2E-X10M<br>E□/F□-N | E2E-X10E<br>□/ F□-N | E2E-X18M<br>E□/ F□-N |
|---------------------|-----------------|---------------------|---------------------|--------------------|--------------------|--------------------|---------------------|---------------------|----------------------|
| Enclosure<br>rating | IEC             | IP67                |                     |                    |                    |                    |                     |                     |                      |
|                     | NEMA            | 1, 4, 6, 12, 13     |                     |                    |                    |                    |                     |                     |                      |
| Weight              | Pre-wired       | Approx. 45 g        |                     | Approx. 120 g      |                    | Approx. 160 g      |                     | Approx. 270 g       |                      |
|                     | Connector       | ---                 | Approx. 25 g        |                    |                    | Approx. 45 g       |                     | Approx.<br>125 g    | Approx.<br>124 g     |
| Material            | Body            | Stainless steel     |                     | Brass              |                    |                    |                     |                     |                      |
|                     | Sensing<br>face | PBT                 |                     |                    |                    |                    |                     |                     |                      |

Note: 1. E2E models with an M18 or M30 connector operate at a non-smoothed, all-wave rectified, mean voltage range of 24 VDC  $\pm 20\%$ .

2. When using an E2E with an M8 connector at an ambient temperature range between 70°C and 85°C (158°F and 185°F), supply 10 to 30 VDC to the E2E and make sure that the E2E has a control output of 100 mA maximum.

## E2E-X□Y□ AC 2-wire Models

| Part number                                                 | E2E-X1R5<br>Y□-N                                                                                                                                                                             | E2E-X2MY<br>□-N                                 | E2E-X2Y□<br>-US-N                                       | E2E-X5MY<br>□-US-N                              | E2E-X5Y□<br>-US-N                               | E2E-X10M<br>Y□-US-N                             | E2E-X10Y<br>□-US-N                              | E2E-X18<br>MY□-US<br>-N                            |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|----------------------------------------------------|
| Size                                                        | M8                                                                                                                                                                                           |                                                 | M12                                                     |                                                 | M18                                             |                                                 | M30                                             |                                                    |
| Type                                                        | Shielded                                                                                                                                                                                     | Unshielded                                      | Shielded                                                | Unshielded                                      | Shielded                                        | Unshielded                                      | Shielded                                        | Unshield<br>ed                                     |
| Sensing distance                                            | 1.5 mm<br>(0.06 in)<br>±10%                                                                                                                                                                  | 2 mm (0.08<br>in) ±10%                          | 2 mm (0.08<br>in) ±10%                                  | 5 mm (0.20<br>in) ±10%                          | 5 mm (0.20<br>in) ±10%                          | 10 mm<br>(0.39 in)<br>±10%                      | 10 mm<br>(0.39 in)<br>±10%                      | 18 mm<br>(0.71 in)<br>±10%                         |
| Supply voltage<br>(operating voltage<br>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<br>(0 to 0.05<br>in)                                                                                                                                                             | 0 to 1.6 mm<br>(0 to 0.06<br>in)                | 0 to 1.6 mm<br>(0 to 0.06<br>in)                        | 0 to 4.0 mm<br>(0 to 0.16<br>in)                | 0 to 4.0 mm<br>(0 to 0.16<br>in)                | 0 to 8.0 mm<br>(0 to 0.31<br>in)                | 0 to 8.0 mm<br>(0 to 0.31<br>in)                | 0 to 14.0<br>mm (0 to<br>0.55 in)                  |
| Standard object<br>(mild steel)                             | 8 x 8 x<br>1 mm (0.31<br>x 0.31 x<br>0.04 in)                                                                                                                                                | 12 x 12 x<br>1 mm (0.47<br>x 0.47 x<br>0.04 in) | 12 x 12 x<br>1 mm (0.47<br>x 0.47 x<br>0.04 in)         | 15 x 15 x<br>1 mm (0.59<br>x 0.59 x<br>0.04 in) | 18 x 18 x<br>1 mm (0.71<br>x 0.71 x<br>0.04 in) | 30 x 30 x<br>1 mm (1.18<br>x 1.18 x<br>0.04 in) | 30 x 30 x<br>1 mm (1.18<br>x 1.18 x<br>0.04 in) | 54 x 54 x<br>1 mm<br>(2.13 x<br>2.13 x<br>0.04 in) |
| Differential travel                                         | 10% max. of sensing distance                                                                                                                                                                 |                                                 |                                                         |                                                 |                                                 |                                                 |                                                 |                                                    |
| Response frequency                                          | 25 Hz                                                                                                                                                                                        |                                                 |                                                         |                                                 |                                                 |                                                 |                                                 |                                                    |
| Operation (with<br>sensing object<br>approaching)           | Y1 models: Load ON<br>Y2 models: Load OFF                                                                                                                                                    |                                                 |                                                         |                                                 |                                                 |                                                 |                                                 |                                                    |
| Control output<br>(switching capacity)                      | 5 to 100 mA max.                                                                                                                                                                             |                                                 | 5 to 200 mA max.                                        |                                                 | 5 to 300 mA max.                                |                                                 |                                                 |                                                    |
| Indicator                                                   | Operation indicator (red LED)                                                                                                                                                                |                                                 |                                                         |                                                 |                                                 |                                                 |                                                 |                                                    |
| Ambient temperature<br>(see note 2)                         | Operating: -25°C to 70°C<br>with no icing (-13°F to<br>158°F)                                                                                                                                |                                                 | Operating: -40°C to 85°C with no icing (-40°F to 185°F) |                                                 |                                                 |                                                 |                                                 |                                                    |
| 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)<br>±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)                                                                                                            |                                                 |                                                         |                                                 |                                                 |                                                 |                                                 |                                                    |

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).



|                      |                 |                                                                                                      |                 |                                                                                                                                                 |                    |                   |                     |                    |                         |
|----------------------|-----------------|------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|---------------------|--------------------|-------------------------|
| Part number          |                 | E2E-X1R5<br>Y□-N                                                                                     | E2E-X2MY<br>□-N | E2E-X2Y□<br>-US-N                                                                                                                               | E2E-X5MY<br>□-US-N | E2E-X5Y□<br>-US-N | E2E-X10M<br>Y□-US-N | E2E-X10Y<br>□-US-N | E2E-X18<br>MY□-US<br>-N |
| Vibration resistance |                 | Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hrs each in X, Y, and Z directions           |                 |                                                                                                                                                 |                    |                   |                     |                    |                         |
| Shock resistance     |                 | Destruction: 500 m/s <sup>2</sup><br>(approx. 50G) for 10<br>times each in X, Y, and Z<br>directions |                 | Destruction: 1,000 m/s <sup>2</sup> (approx. 50G) for 10 times each in X, Y, and Z directions<br>500 m/s <sup>2</sup> (approx. 50G) for E2E-X5M |                    |                   |                     |                    |                         |
| Enclosure<br>rating  | IEC             | IP67                                                                                                 |                 |                                                                                                                                                 |                    |                   |                     |                    |                         |
|                      | NEMA            | 1, 4, 6, 12, 13                                                                                      |                 |                                                                                                                                                 |                    |                   |                     |                    |                         |
| Approvals            | UL              | -                                                                                                    |                 | Recognized, File Number E76675                                                                                                                  |                    |                   |                     |                    |                         |
|                      | CSA             | -                                                                                                    |                 | Certified, File Number LR45951                                                                                                                  |                    |                   |                     |                    |                         |
| Weight               | Pre-wired       | Approx. 45 g                                                                                         |                 | Approx. 120 g                                                                                                                                   |                    | Approx. 160 g     |                     | Approx. 270 g      |                         |
|                      | Connector       | ---                                                                                                  | Approx. 25 g    |                                                                                                                                                 |                    | Approx. 45 g      |                     | Approx.<br>125 g   | Approx.<br>124 g        |
| Material             | Body            | Stainless steel                                                                                      |                 | Brass                                                                                                                                           |                    |                   |                     |                    |                         |
|                      | Sensing<br>face | PBT                                                                                                  |                 |                                                                                                                                                 |                    |                   |                     |                    |                         |

- 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).

### E2E-X□Y□ AC 2-wire Models with Short Circuit Protection

|                                                             |                |                                         |                                                                                   |                                        |                                                                    |                                        |
|-------------------------------------------------------------|----------------|-----------------------------------------|-----------------------------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------|----------------------------------------|
| 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-□□-□□)<br>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.)                                            |                                        |

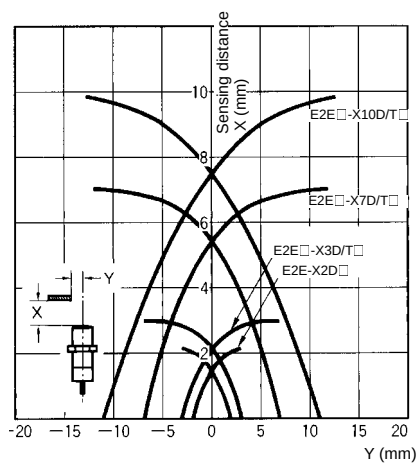
|                               |         |                                                |                  |                 |                  |
|-------------------------------|---------|------------------------------------------------|------------------|-----------------|------------------|
| Part number                   |         | E2E-X5Y□-53-US                                 | E2E-X10MY□-53-US | E2E-X10Y□-53-US | E2E-X18MY□-53-US |
| 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                                |                  |                 |                  |

## Engineering Data

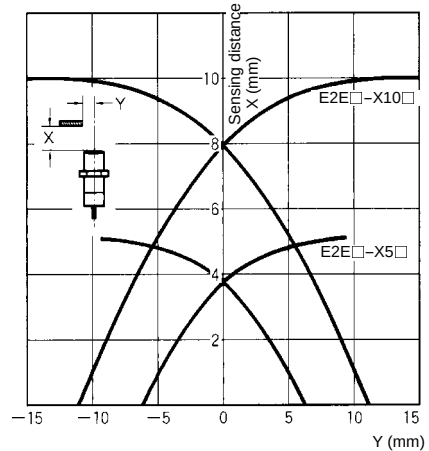
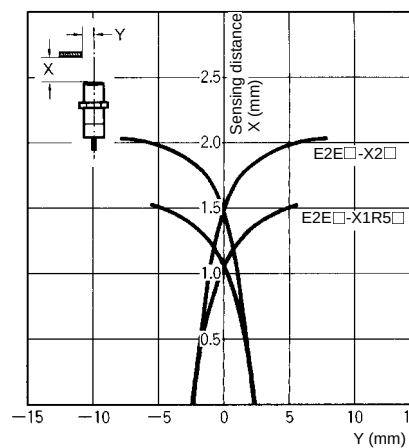
### ■ OPERATING RANGE (TYPICAL)

#### Shielded Models

##### E2E-X□D□-N

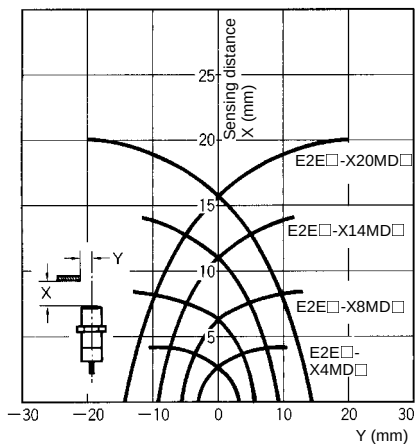


##### E2E-X□E□/F□-N E2E-X□Y□-N

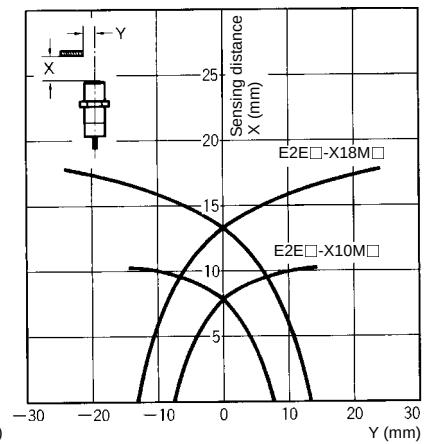
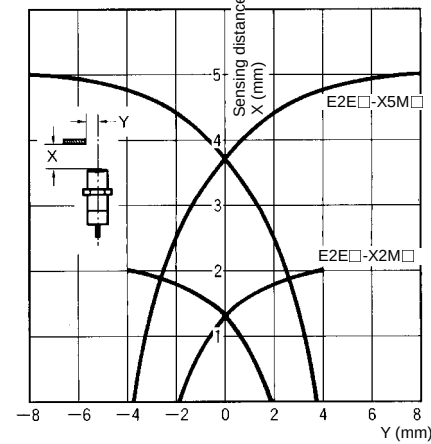


#### Unshielded Models

##### E2E-X□MD□-N

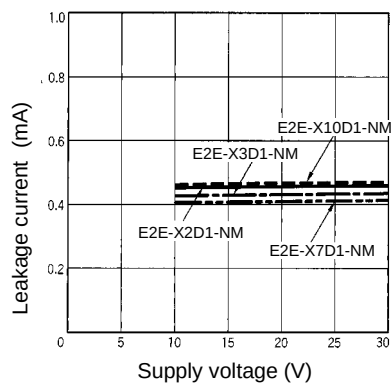


##### E2E-X□ME□/F□-N E2E-X□MY□-N

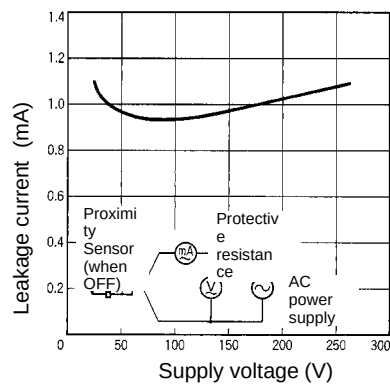


## LEAKAGE CURRENT (TYPICAL)

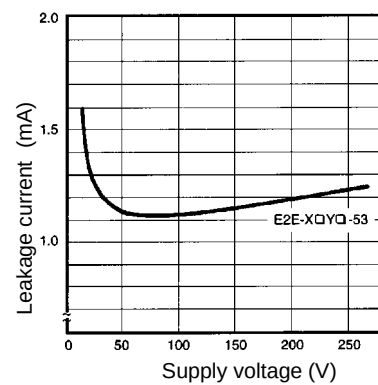
E2E-X□D□-N



E2E-X□Y□-N

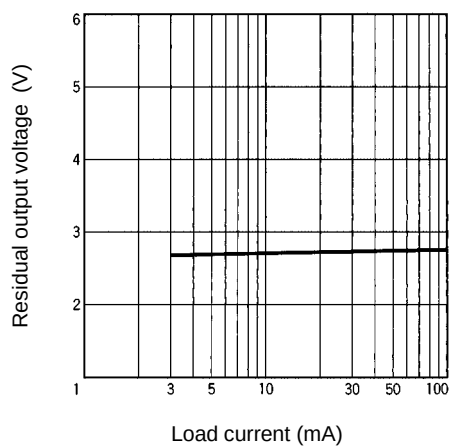


E2E-X□Y□-53-US

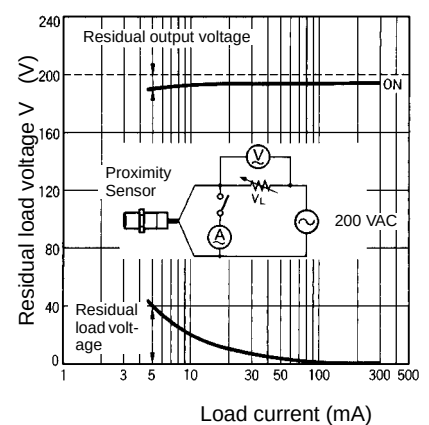
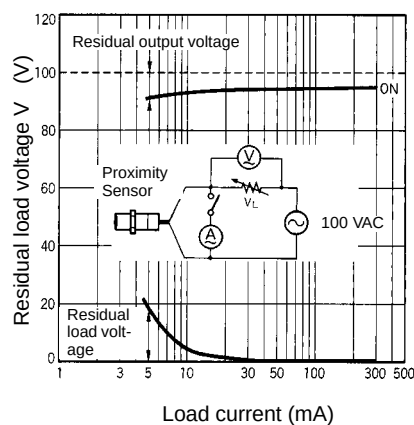
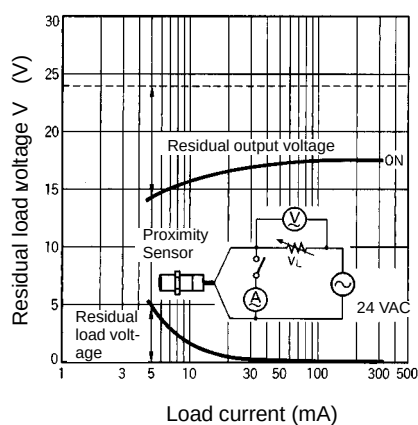


## RESIDUAL OUTPUT VOLTAGE (TYPICAL)

E2E-X□D□-N

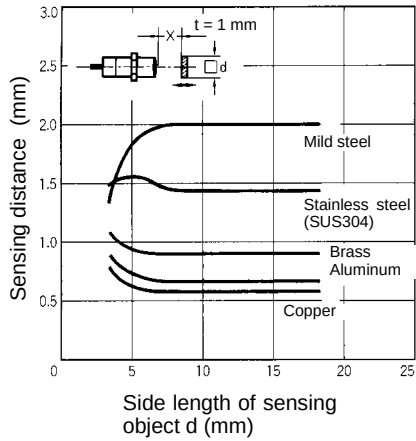


E2E-X□Y□-N

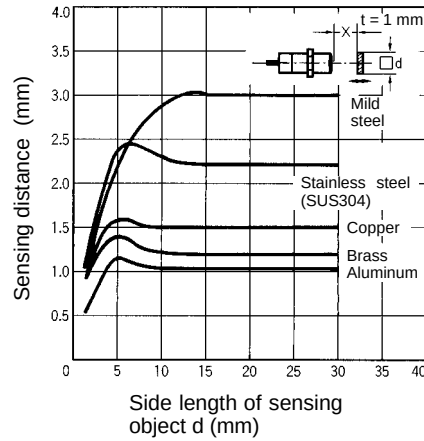


# ■ SENSING DISTANCE VS. SENSING OBJECT (TYPICAL)

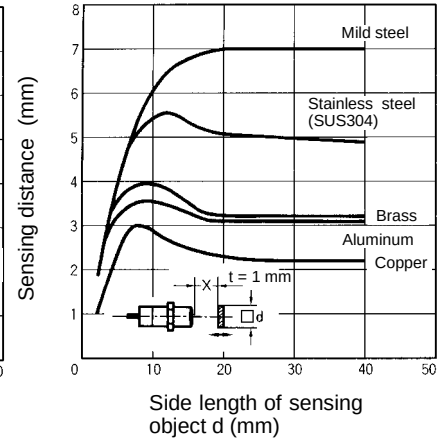
E2E-X2D□-N



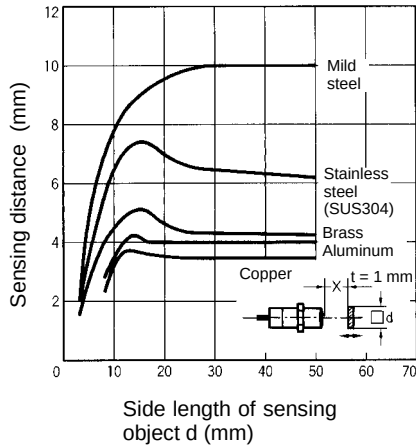
E2E-X3D□-N



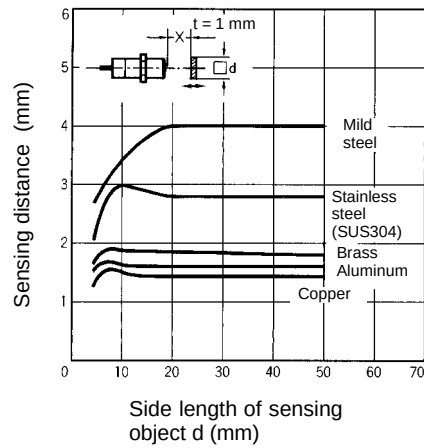
E2E-X7D□-N



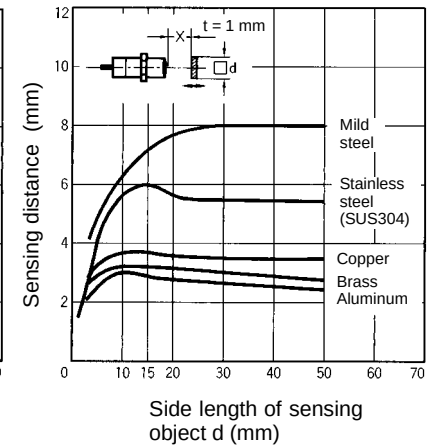
E2E-X10D□-N



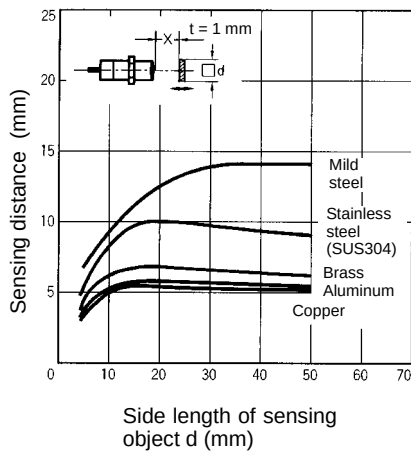
E2E-X4MD□-N



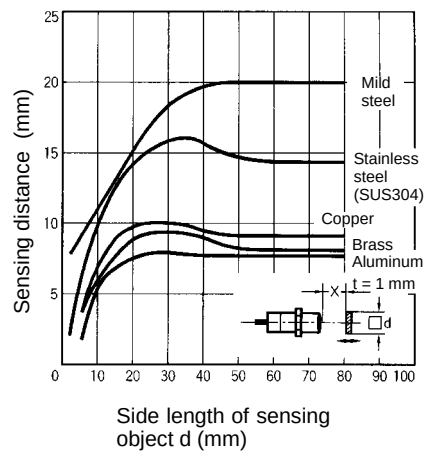
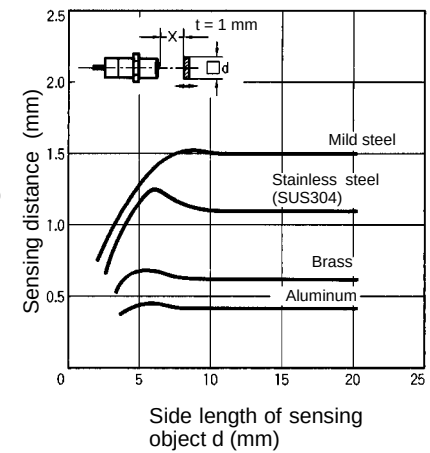
E2E-X8MD□-N



E2E-X14MD□-N

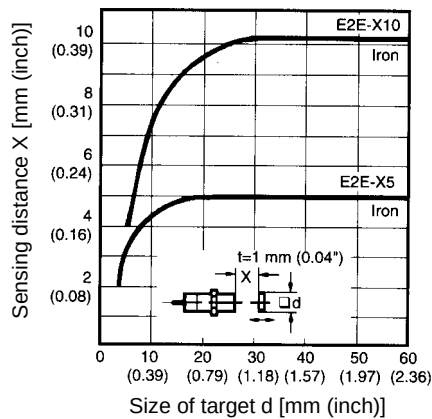


E2E-X20MD□-N

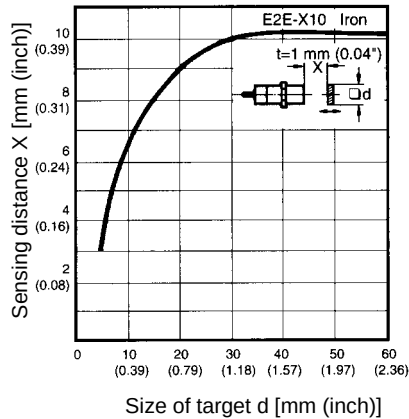
E2E-X1R5E□/F□-N  
E2E-X1R5Y□-N

# E2E-X□Y□-53-US AC 2-Wire Models with Short Circuit Protection

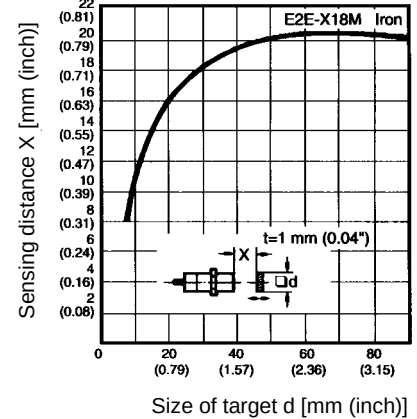
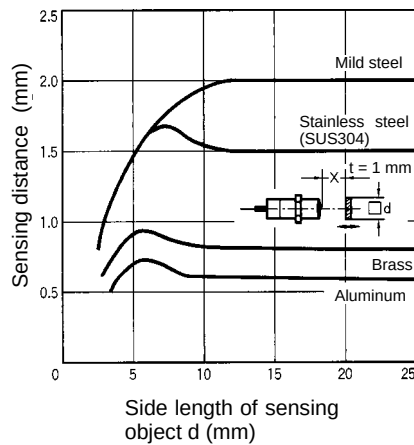
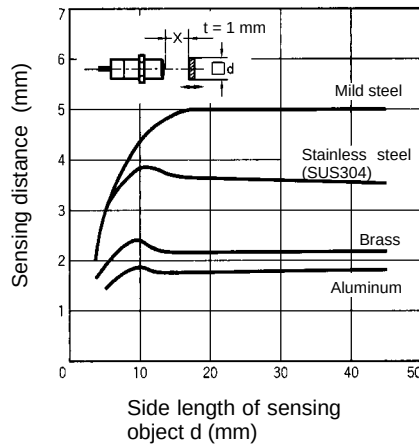
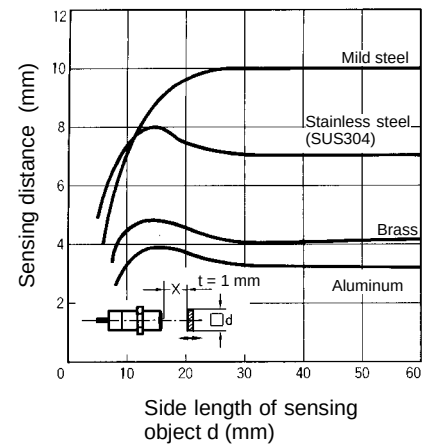
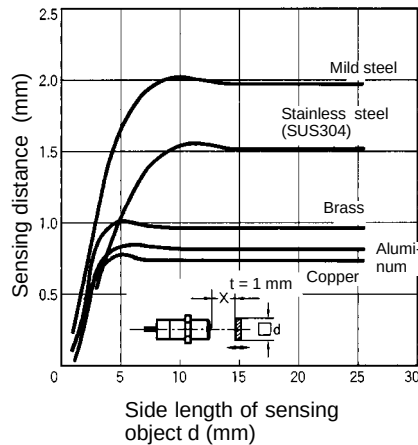
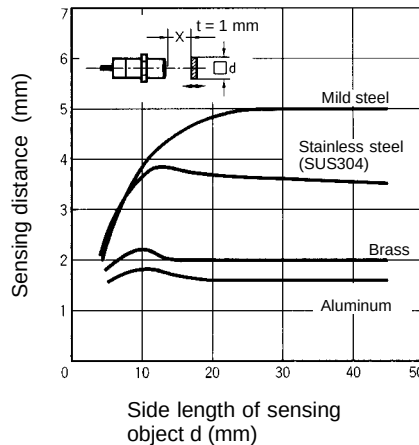
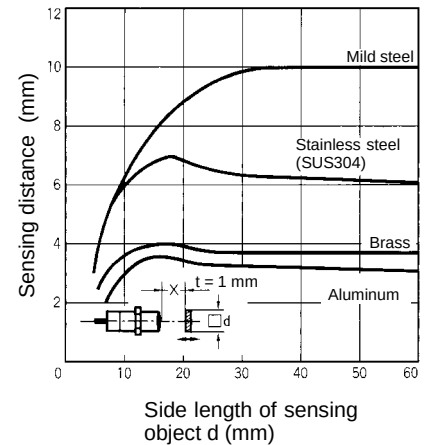
E2E-X5□□, E2E-X10□□

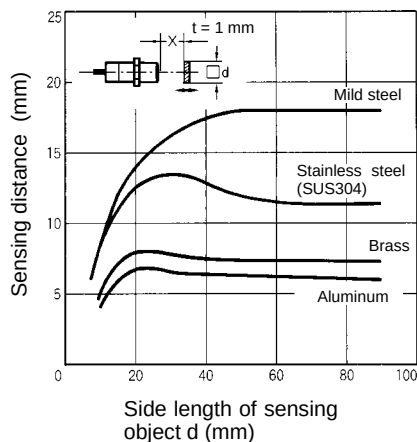
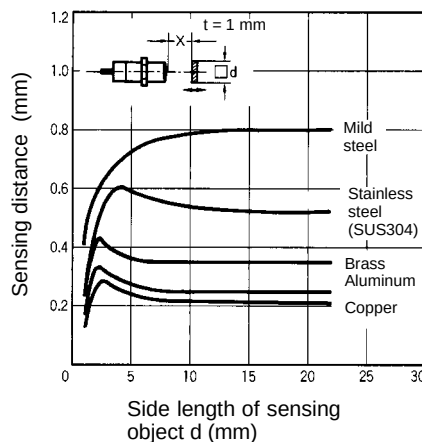
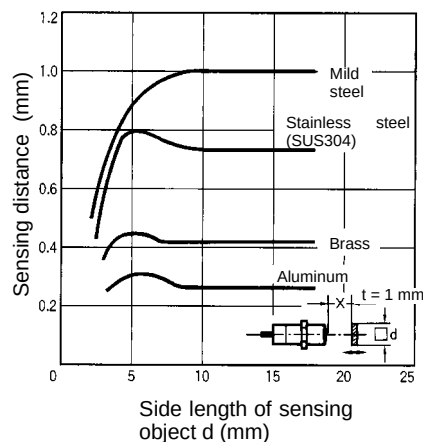


E2E-X10M□□



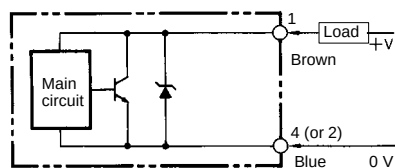
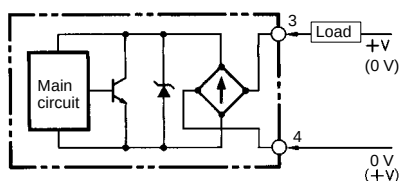
E2E-X18□□

E2E-X2E□/F□-N  
E2E-X2Y□-NE2E-X5E□/F□-N  
E2E-X5Y□-NE2E-X10E□/F□-N  
E2E-X10Y□-NE2E-X2ME□/F□-N  
E2E-X2MY□-NE2E-X5ME□/F□-N  
E2E-X5MY□-NE2E-X10ME□/F□-N  
E2E-X10MY□-N

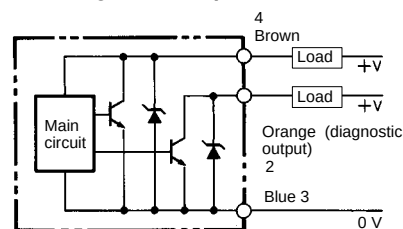
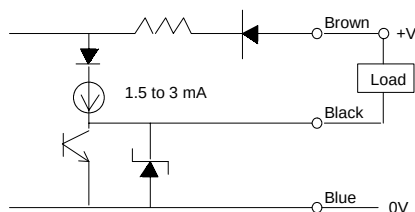
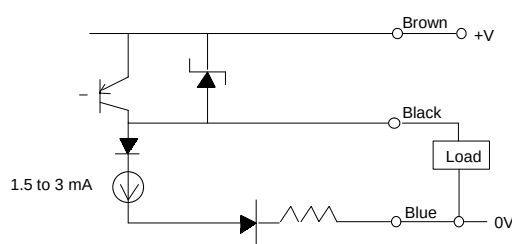
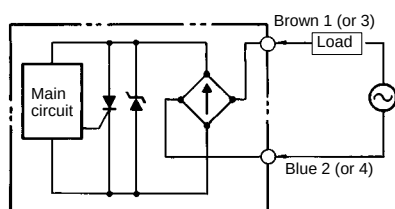
**E2E-X18ME□/F□-N**  
**E2E-X18MY□-N**

**E2E-CR8□□-N**

**E2E-X1□□-N**  
**E2E-C1□□-N**


## Operation

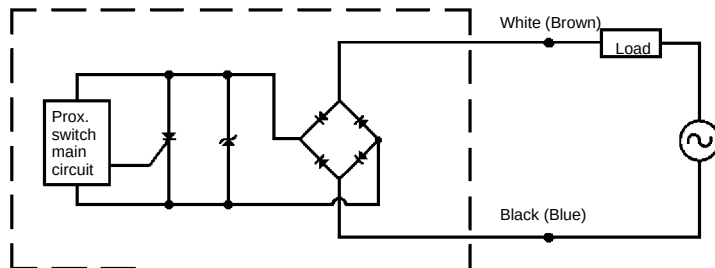
### ■ OUTPUT CIRCUITS

**E2E-X□D□-N DC 2-wire Models**
**E2E-X□D□-N**
**Without Diagnostic Output**

**E2E-X□D1-M1J-T-N**
**No Polarity**


- Note:
1. The load can be connected to either the +V or 0-V side.
  2. The E2E-X□D1-M1J-T has no polarity. Therefore, terminals 3 and 4 have no polarity.

**E2E-X□D1S-N**
**With Diagnostic Output**

**DC 3-wire Models**
**E2E-X□E□-N**
**NPN Output**

**E2E-X□F□-N**
**PNP Output**

**E2E-X□Y□-N AC 2-wire Models**


## E2E-X□Y□ AC 2-wire Models with Short Circuit Protection

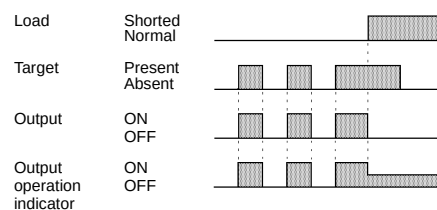


Note: IEC colors are shown in parenthesis

### With Short-Circuit Protection

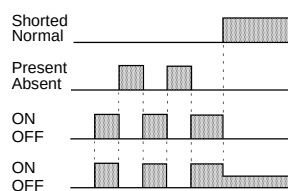
#### E2E-X□Y1-53

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.

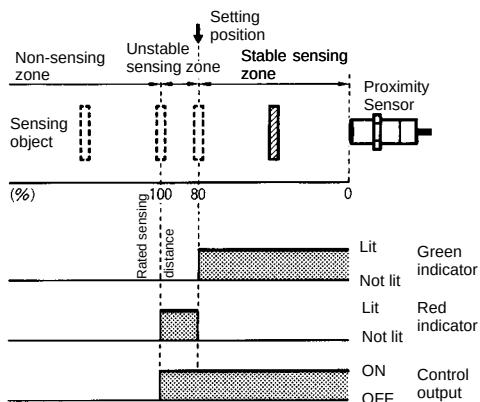
For NC sensors, the target must be presented then removed to reset the short-circuit protection.

## ■ OPERATING CHARTS

### E2E-X□D□-N DC 2-wire Models

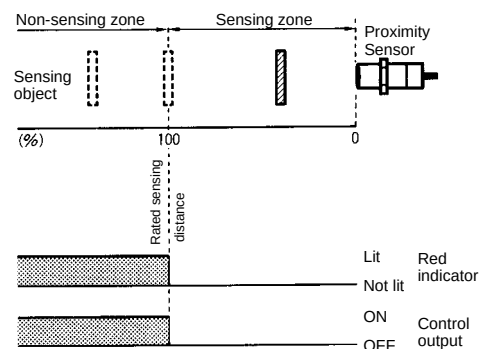
#### E2E-X□D1-N

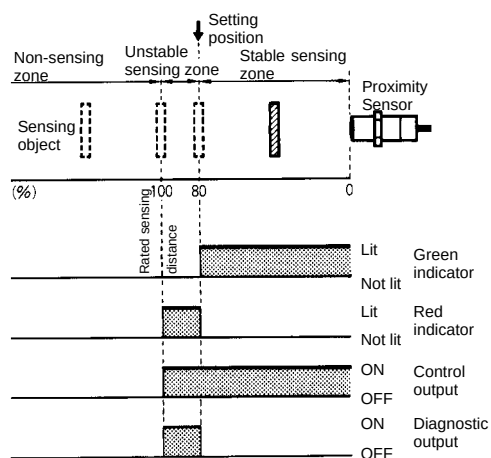
NO Type



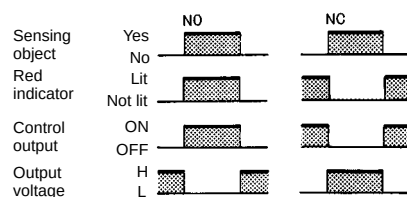
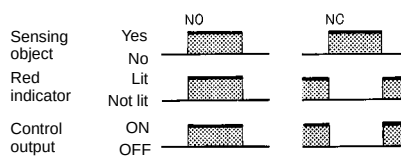
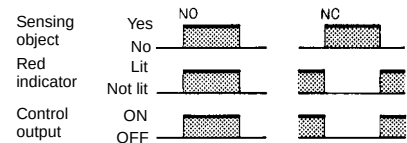
#### E2E-X□D2-N

NC Type



**E2E-X□D1S-N**

Note: The diagnostic output of the E2E-X□D1S-N is ON when there is a coil burnout or the sensing object is located in the unstable sensing range for 0.3 s or more.

**DC 3-Wire Models****E2E-X□E□-N****NPN Output****E2E-X□F□-N****PNP Output****AC 2-wire Models****E2E-X□Y□-N**



# Dimensions

Unit: mm (inch)

| Type            |            |     | DC 2-wire        |            | DC 3-wire             |            | AC 2-wire       |            |
|-----------------|------------|-----|------------------|------------|-----------------------|------------|-----------------|------------|
|                 |            |     | Part Number      | Figure No. | Part Number           | Figure No. | Part Number     | Figure No. |
| Pre-wired       | Shielded   | M8  | E2E-X2D□-N-N     | 1          | E2E-X1R5E□/F□-N       | 1          | E2E-X1R5Y□-N    | 3          |
|                 |            | M12 | E2E-X3D□-N-N     | 5          | E2E-X2E□/F□-N         | 5          | E2E-X2Y□-N      | 7          |
|                 |            | M18 | E2E-X7D□-N-N     | 9          | E2E-X5E□/F□-N         | 9          | E2E-X5Y□-N      | 9          |
|                 |            | M30 | E2E-X10D□-N-N    | 11         | E2E-X10E□/F□-N        | 11         | E2E-X10Y12-N    | 11         |
|                 | Unshielded | M8  | E2E-X4MD□-N      | 2          | E2E-X2ME□/F□-N        | 2          | E2E-X2MY□-N     | 4          |
|                 |            | M12 | E2E-X8MD□-N      | 6          | E2E-X5ME□/F□-N        | 6          | E2E-X5MY□-N     | 8          |
|                 |            | M18 | E2E-X14MD□-N     | 10         | E2E-X10ME□/F□-N       | 10         | E2E-X10MY□-N    | 10         |
|                 |            | M30 | E2E-X20MD□-N     | 12         | E2E-X18ME□/F□-N       | 12         | E2E-X18MY□-N    | 12         |
| Connector (M12) | Shielded   | M8  | E2E-X2D□-M1G-N   | 13         | E2E-X1R5EM1/F□-M1-N   | 13         | ---             | ---        |
|                 |            | M12 | E2E-X3D□-M1G-N   | 15         | E2E-X2E□-M1/F□-M1-N   | 15         | E2E-X2Y1-M1-N   | 17         |
|                 |            | M18 | E2E-X7D□-M1G-N   | 19         | E2E-X5E□-M1/F□-M1-N   | 19         | E2E-X5Y1-M1-N   | 19         |
|                 |            | M30 | E2E-X10D□-M1G-N  | 21         | E2E-X10E□-M1/F□-M1-N  | 21         | E2E-X10Y1-M1-N  | 21         |
|                 | Unshielded | M8  | E2E-X4MD□-M1G-N  | 14         | E2E-X2ME□-M1/F□-M1-N  | 14         | ---             | ---        |
|                 |            | M12 | E2E-X8MD□-M1G-N  | 16         | E2E-X5ME□-M1/F□-M1-N  | 16         | E2E-X5MY□-M1-N  | 18         |
|                 |            | M18 | E2E-X14MD□-M1G-N | 20         | E2E-X10ME□-M1/F□-M1-N | 20         | E2E-X10MY□-M1-N | 20         |
|                 |            | M30 | E2E-X20MD□-M1G-N | 22         | E2E-X18ME□-M1/F□-M1-N | 22         | E2E-X18MY□-M1-N | 22         |

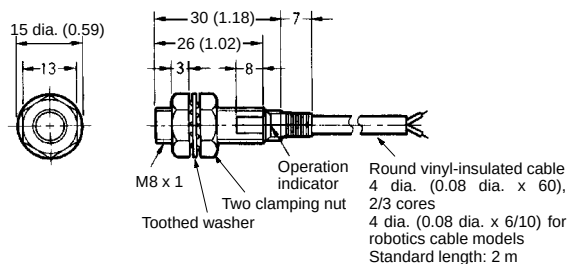
| Type                              |            |     | DC 2-wire         |               | DC 3-wire             |               |
|-----------------------------------|------------|-----|-------------------|---------------|-----------------------|---------------|
|                                   |            |     | Part Number       | Figure Number | Part Number           | Figure Number |
| Connector (M8)                    | Shielded   | M8  | E2E-X2D□-M3G-N    | 23            | E2E-X1R5E□-M3/F□-M3-N | 23            |
|                                   | Unshielded |     | E2E-X4MD□-M3G-N   | 24            | E2E-X2ME□-M3/F□-M3-N  | 24            |
| Connector extension               | Shielded   | M12 | E2E-X3D1-M1GJ-N   | 25            | ---                   | ---           |
|                                   |            | M18 | E2E-X7D1-M1GJ-N   | 27            |                       |               |
|                                   |            | M30 | E2E-X10D1-M1GJ-N  | 29            |                       |               |
|                                   | Unshielded | M12 | E2E-X8MD1-M1GJ-N  | 26            | ---                   | ---           |
|                                   |            | M18 | E2E-X14MD1-M1GJ-N | 28            |                       |               |
|                                   |            | M30 | E2E-X20MD1-M1GJ-N | 30            |                       |               |
| Connector extension (no polarity) | Shielded   | M12 | E2E-X3D1-M1J-T-N  | 25            | ---                   | ---           |
|                                   |            | M18 | E2E-X7D1-M1J-T-N  | 27            |                       |               |
|                                   |            | M30 | E2E-X10D1-M1J-T-N | 29            |                       |               |

| Type      |            |     | AC 2-wire with Short-circuit protection |               |
|-----------|------------|-----|-----------------------------------------|---------------|
|           |            |     | Part Number                             | Figure Number |
| Pre-wired | Shielded   | M18 | E2E-X5Y□-53-US                          | 31            |
|           | Unshielded | M30 | E2E-X10Y□-53-US                         | 33            |
|           | Shielded   | M18 | E2E-X10MY□-53-US                        | 32            |
|           | Unshielded | M30 | E2E-X18MY□-53-US                        | 34            |

### Pre-wired Models (Shielded)

Fig. 1:

**E2E-X2D□-N**  
**E2E-X1R5E□/F□-N**



### Pre-wired Models (Unshielded)

Fig. 2:

**E2E-X4MD□-N**  
**E2E-X2ME□/F□-N**

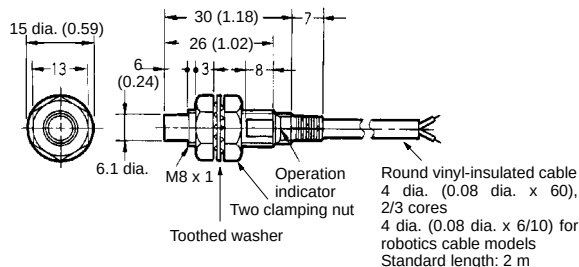


Fig. 3:

**E2E-1R5Y□-N**

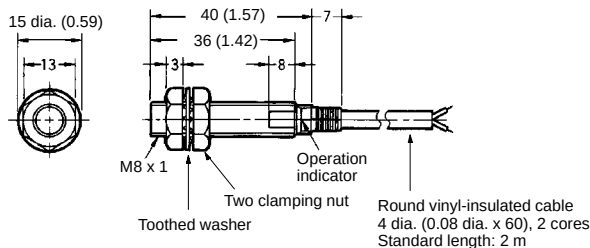


Fig. 4:

**E2E-X2MY□-N**

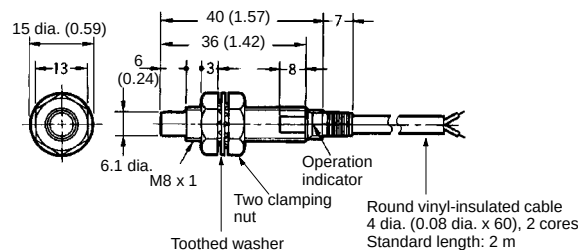


Fig. 5:

**E2E-X3D□-N**  
**E2E-X2E□/F□-N**

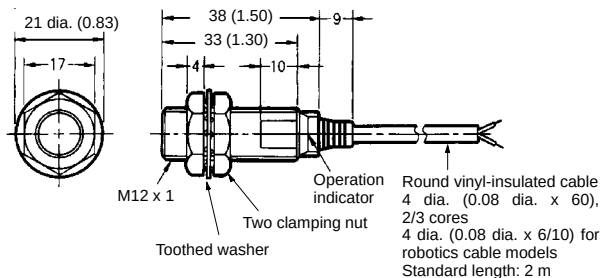


Fig. 6:

**E2E-X8MD□-N**  
**E2E-X5ME□/F□-N**

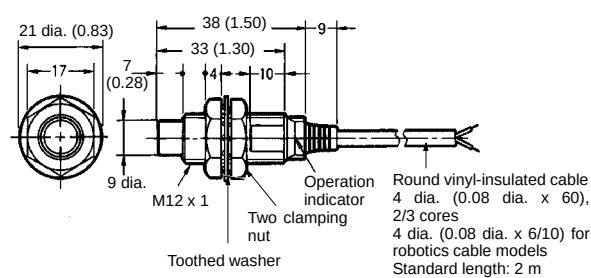


Fig. 7:

**E2E-X2Y□-N**

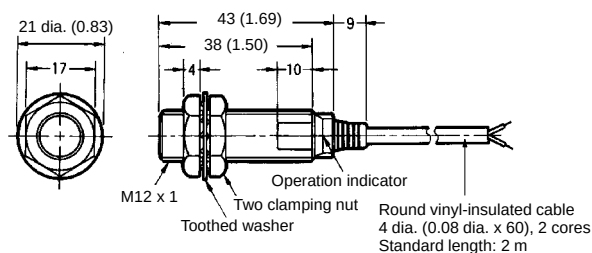
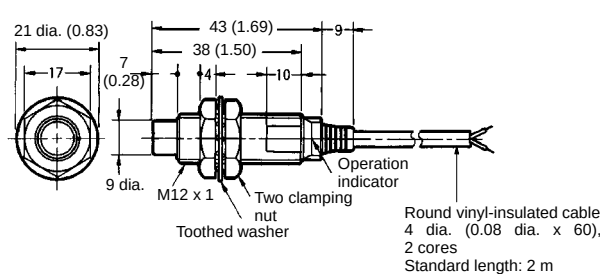


Fig. 8:

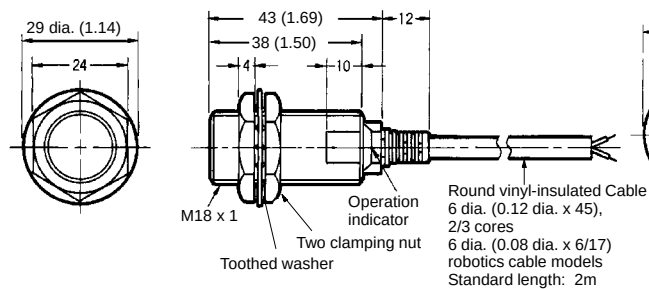
**E2E-X5MY□-N**



### Pre-wired Models (Shielded)

Fig. 9:

E2E-X7D□-N/E2E-X5E□/F□-N  
E2E-X5Y□-N



### Pre-wired Models (Unshielded)

Fig. 10:

E2E-X14MD□/E2E-X10ME□/F□-N  
E2E-X10MY□-N

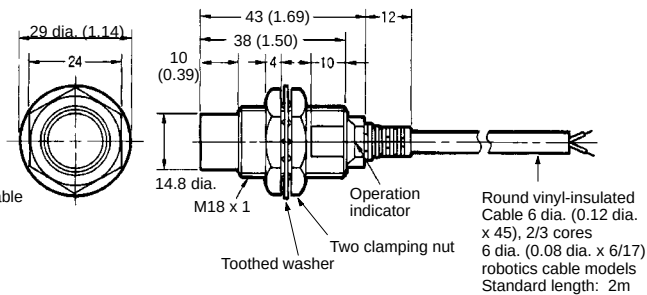


Fig. 11:

E2E-X10D□-N/E2E-X10E□/F□-N  
E2E-X10Y□-N

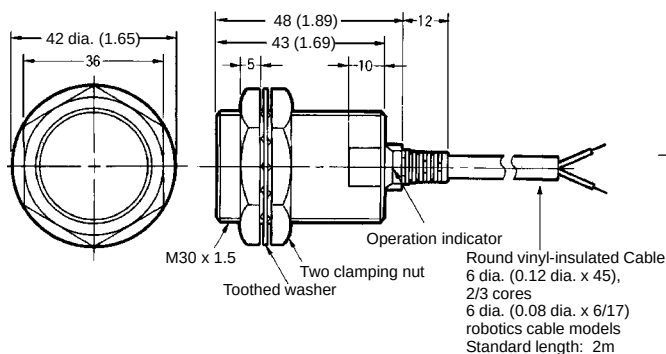
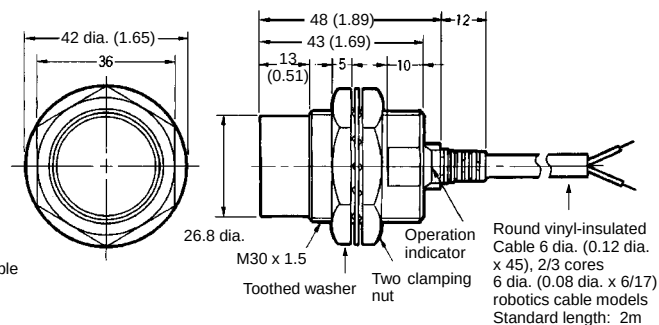


Fig. 12:

E2E-X20MD□/E2E-X18ME□/F□-N  
E2E-X18MY□-N



### Connector Models (Shielded)

Fig. 13:

E2E-X2D□-M1G-N  
E2E-X1R5E□-M1/F□-M1-N

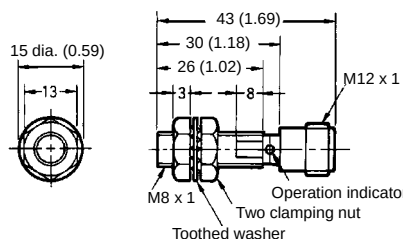


Fig. 14:

E2E-X4MD□-M1G-N  
E2E-X2ME□-M1/F□-M1-N

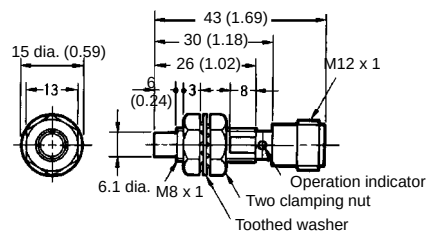


Fig. 15:

E2E-X3D□-M1G-N  
E2E-X2E□-M1/F□-M1-N

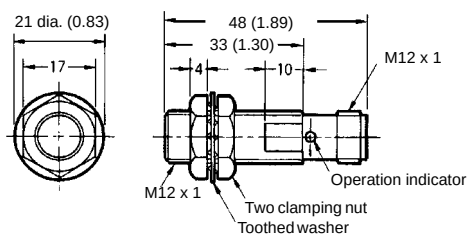
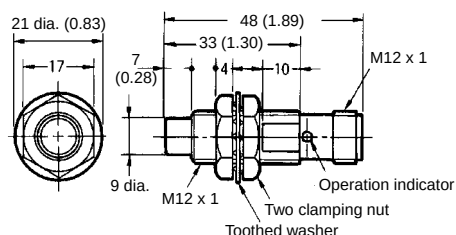


Fig. 16:

E2E-X8MD□-M1G-N  
E2E-X5ME□-M1/F□-M1-N



### Connector Models (Shielded), continued

Fig. 17: E2E-X2Y1-M1-N

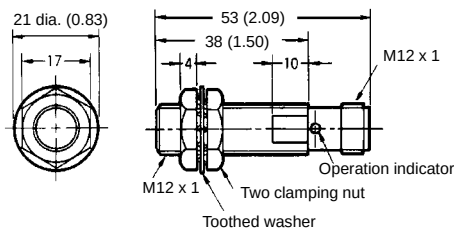


Fig. 18: E2E-X5MY□-M1-N

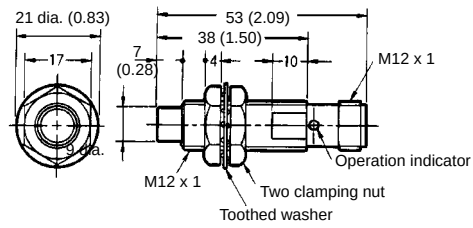


Fig. 19: E2E-X7D□-M1G/E2E-X5E□-M1/  
F□-M1-N  
E2E-X5Y1-M1-N

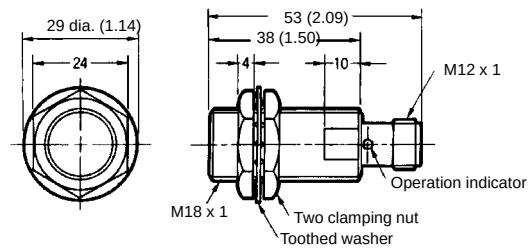


Fig. 20: E2E-X14MD□-M1G/E2E-X10ME□-M1/F□-M1-N  
E2E-X10MY□-M1-N

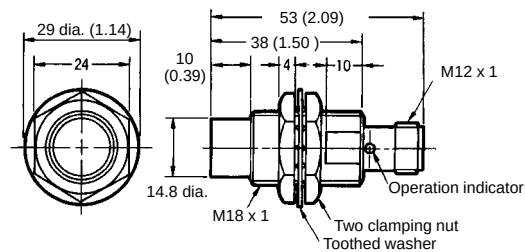


Fig. 21: E2E-X10D□-M1G/E2E-X10E□-M1/  
F□-M1-N  
E2E-X10Y1-M1-N

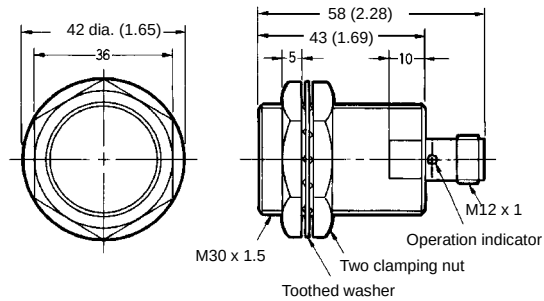
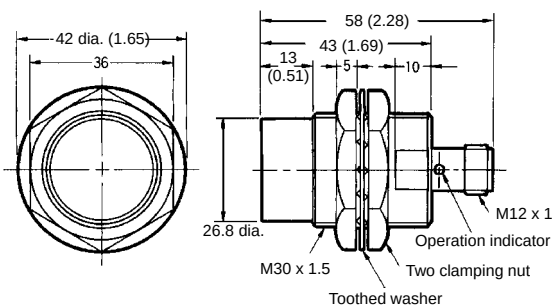
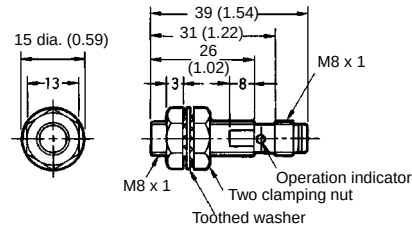


Fig. 22: E2E-X20MD□-M1G/E2E-X18ME□-M1/  
F□-M1-N  
E2E-X18MY□-M1-N



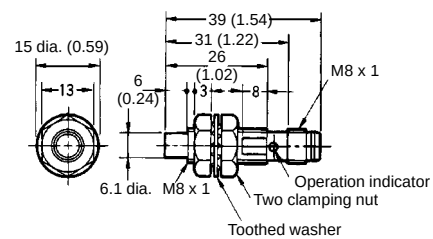
### M8 Connector Models (Shielded)

Fig. 23: E2E-X2D□-M3G/E2E-X1R5E□-M3/  
F□-M3-N



### M8 Connector Models (Unshielded)

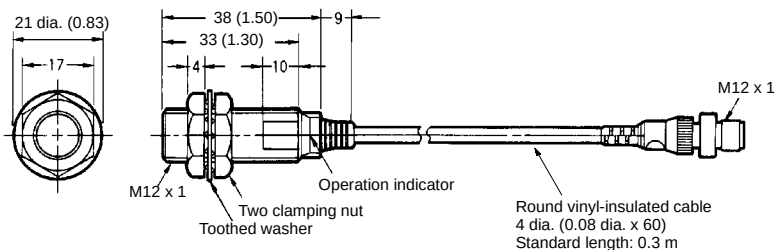
Fig. 24: E2E-X4MD□-M3G/E2E-X2ME□-M3/  
F□-M3-N



## Connector Extension Models

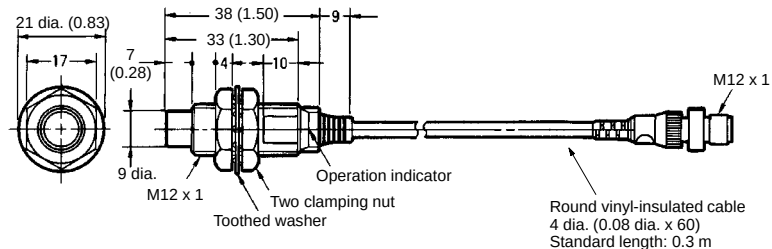
**Fig. 25:**

E2E-X3D1-M1GJ-N  
E2E-X3D1-M1J-T-N



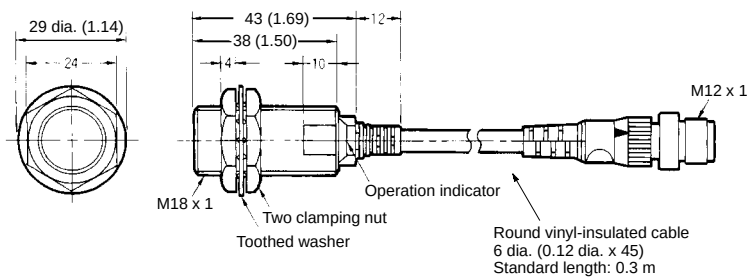
**Fig. 26:**

**E2E-X8MD1-M1GJ-N**



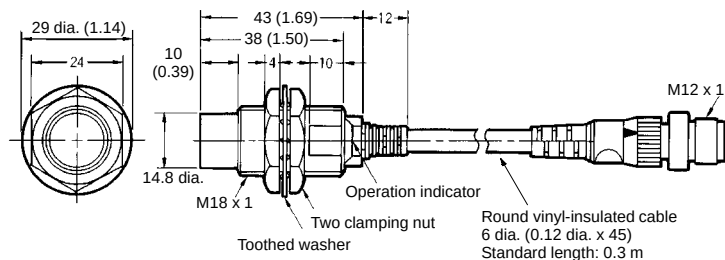
**Fig. 27:**

E2E-X7D1-M1GJ-N  
E2E-X7D1-M1J-T-N



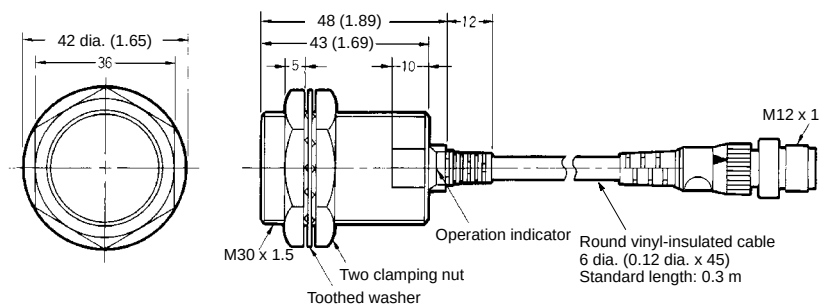
**Fig. 28:**

**E2E-X14MD1-M1GJ-N**

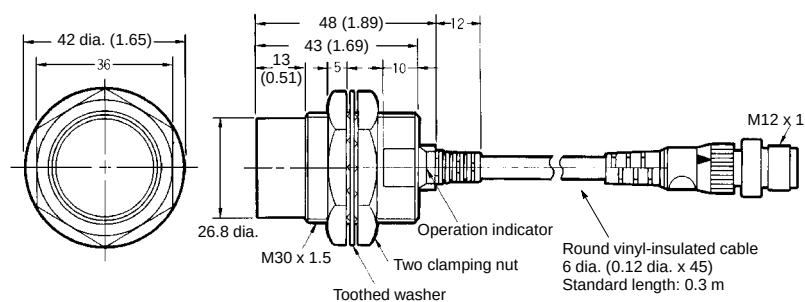


## Connector Extension Models, continued

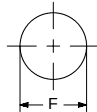
**Fig. 29:** E2E-X10D1-M1GJ-N  
E2E-X10D1-M1J-T-N



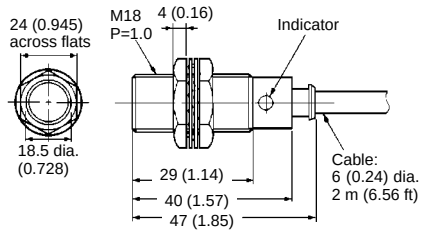
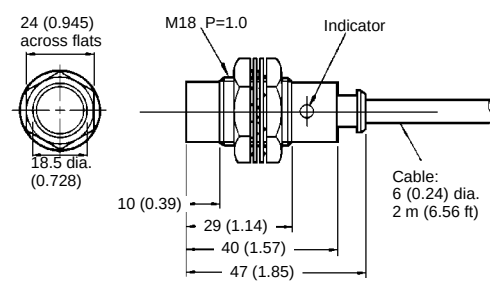
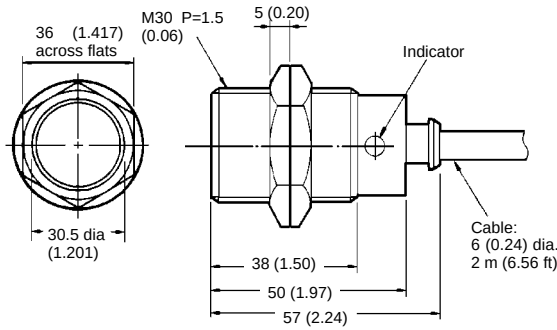
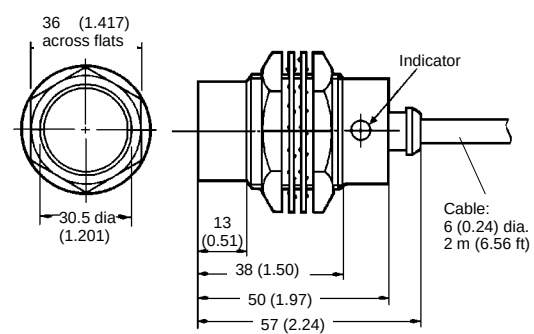
**Fig. 30:** E2E-X20MD1-M1GJ-N



## Mounting Holes



| Dimensions | 4 dia.              | M5                  | 5.4 dia.            | M8                  | M12                  | M18                  | M30                  |
|------------|---------------------|---------------------|---------------------|---------------------|----------------------|----------------------|----------------------|
| F (mm)     | $4.2^{+0.5/0}$ dia. | $5.5^{+0.5/0}$ dia. | $5.7^{+0.5/0}$ dia. | $8.5^{+0.5/0}$ dia. | $12.5^{+0.5/0}$ dia. | $18.5^{+0.5/0}$ dia. | $30.5^{+0.5/0}$ dia. |

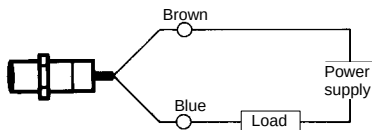
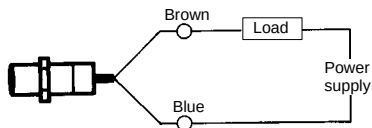
**AC Shielded M18****Fig. 31: E2E-X5Y□-53-US****AC Unshielded M18****Fig. 32: E2E-X10MY□-53-US****AC Shielded M30 Size****Fig. 33: E2E-X10Y□-53-US****AC Unshielded M30 Size****Fig. 34: E2E-X18MY□-53-US**

# Installation

## ■ CONNECTION

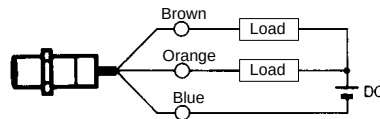
**E2E-X□D□-N**  
**DC 2-wire Models**  
**(Without Diagnostic Output)**

**E2E-X□Y□-N**  
**AC 2-wire Models**



Note: The load can be connected as shown above.

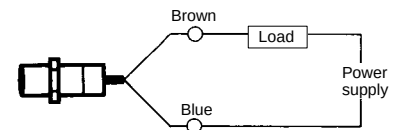
**E2E-X□D1S-N**  
**DC 3-wire Models**  
**(With Diagnostic Output)**



Note: The control output and diagnostic output share the negative common terminal. Therefore, the loads must be connected to the positive sides of the control output and diagnostic output.

**E2E-X□D1-M1J-1-T-N**  
**DC 2-wire Models**  
**(No Polarity)**

**E2E-X□Y□-N**  
**AC 2-wire Models**

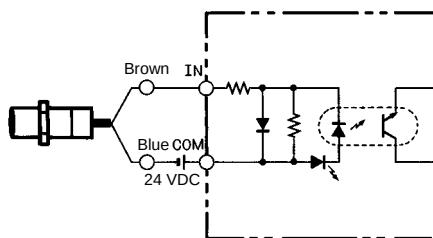


Note: There is no need to be concerned about the polarity (Brown/Blue) of the Proximity Sensor.

## Connected to PC

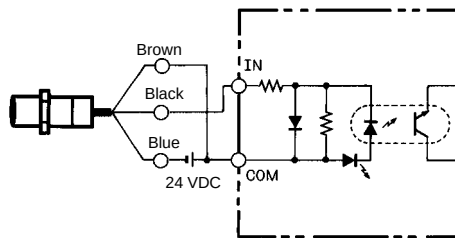
E2E-X□D□-N

DC 2-wire Models



E2E-X□E□-N

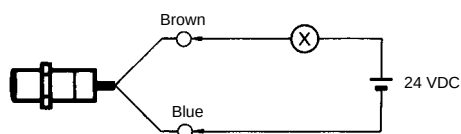
DC 3-wire Models



## Connected to Relay Load

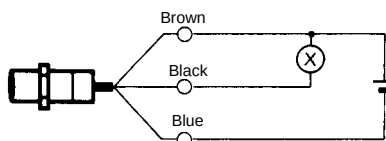
E2E-X□D□-N

DC 2-wire Models



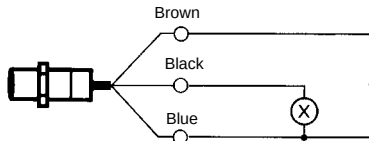
E2E-X□E□-N

DC 3-wire Models



E2E-X□F□-N

DC 3-wire Models



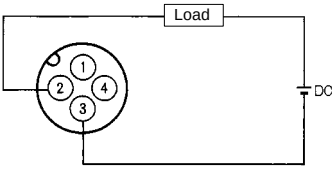
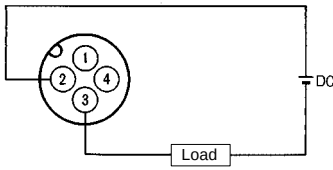
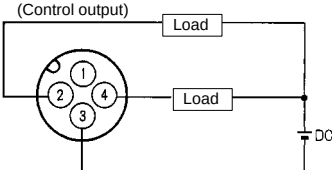
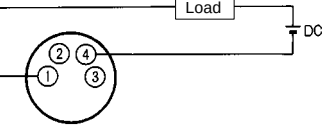
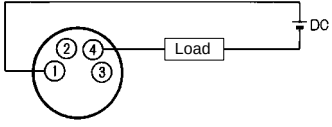
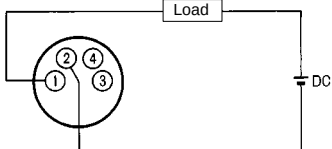
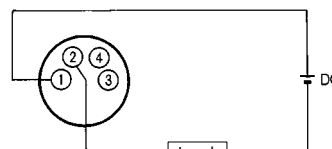
## ■ PIN ARRANGEMENT

## E2E-X□D□-M□-N DC 2-wire Models

| Connector         | Self-diagnostic Output | Output Configuration | Applicable Models          | Pin Arrangement                                                                            |
|-------------------|------------------------|----------------------|----------------------------|--------------------------------------------------------------------------------------------|
| M12 Micro Change® | No                     | NO                   | E2E-X□D1-M1G□-N (see note) | <br><br>Note: Terminals 2 and 3 are not used.                                              |
|                   |                        |                      | E2E-X□D1-M1J-T-N           | <br><br>Note: 1. Terminals 1 and 2 are not used.<br>2. Terminals 3 and 4 have no polarity. |
|                   |                        |                      | E2E-X□D1-M1-N              | <br><br>Note: Terminals 1 and 2 are not used.                                              |
|                   | No                     | NC                   | E2E-X□D2-M1G-N (see note)  | <br><br>Note: Terminals 3 and 4 are not used.                                              |

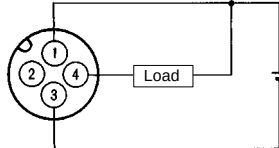
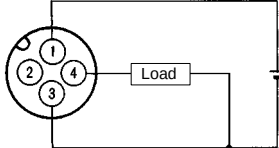
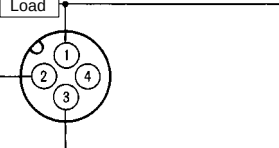
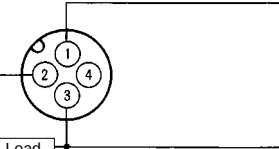
Note: The above pin arrangements conform to IEC standards.

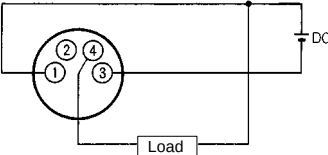
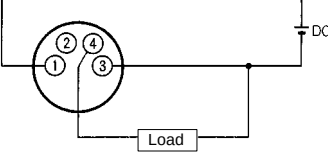
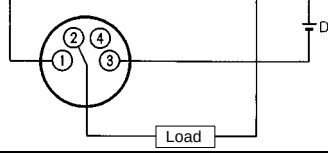
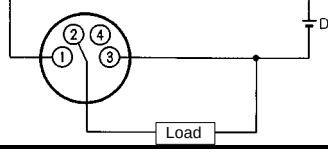


| Connector         | Self-diagnostic Output | Output Configuration | Applicable Models | Pin Arrangement                                                                                                                                                                                                       |
|-------------------|------------------------|----------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M12 Micro Change® | No                     | NC                   | E2E-X□D2-M1-N     |   <p>Note: Terminals 1 and 4 are not used.</p>   |
|                   | Yes                    | NO                   | E2E-X□D1S-M1-N    | <p>(Control output)</p>  <p>Note: Terminal 1 is not used.</p>                                                                       |
| M8 Nano Change®   | No                     | NO                   | E2E-X□D1-M3G-N    |   <p>Note: Terminals 2 and 3 are not used.</p>   |
|                   |                        | NC                   | E2E-X□D2-M3G-N    |   <p>Note: Terminals 3 and 4 are not used.</p> |

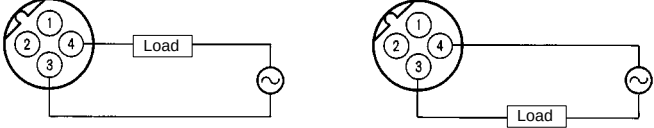
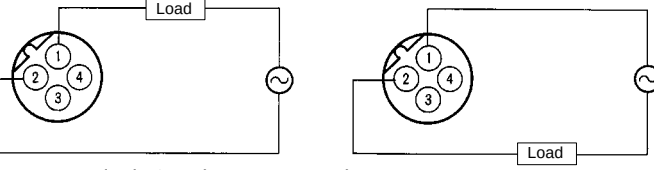
Note: The above pin arrangements conform to IEC standards.

### E2E-X□E□-M1 DC 3-wire Models

| Connector         | Output Configuration | Applicable Models | Pin Arrangement                                                                                                           |
|-------------------|----------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------|
| M12 Micro Change® | NO                   | E2E-X□E1-M1-N     |  <p>Note: Terminal 2 is not used.</p> |
|                   |                      | E2E-X□F1-M1-N     |  <p>Note: Terminal 2 is not used.</p> |
|                   | NC                   | E2E-X□E2-M1-N     |  <p>Note: Terminal 4 is not used.</p> |
|                   |                      | E2E-X□F2-M1-N     |  <p>Note: Terminal 4 is not used.</p> |

| Connector       | Output Configuration | Applicable Models | Pin Arrangement                                                                                                         |
|-----------------|----------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------|
| M8 Nano Change® | NO                   | E2E-X□E1-M3-N     |  <p>Note: Terminal 2 is not used.</p> |
|                 |                      | E2E-X□F1-M3-N     |  <p>Note: Terminal 2 is not used.</p> |
|                 | NC                   | E2E-X□E2-M3-N     |  <p>Note: Terminal 4 is not used.</p> |
|                 |                      | E2E-X□F2-M3-N     |  <p>Note: Terminal 4 is not used.</p> |

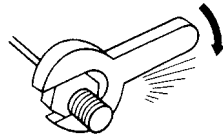
### E2E-X□Y□-M1 AC 2-wire Models

| 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> |

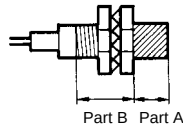
# Precautions

## ■ MOUNTING

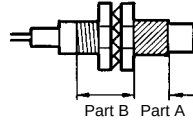
Do not tighten the nut with excessive force. A washer must be used with the nut.



Shielded Model



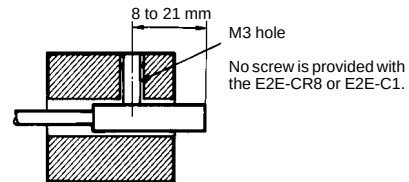
Unshielded Model



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.

| Type |            | Part A                     |                          | Part B                     |
|------|------------|----------------------------|--------------------------|----------------------------|
|      |            | Length                     | Torque                   | Torque                     |
| M8   | Shielded   | 9 mm                       | 9 N • m<br>(90 kgf • cm) | 12 N • m<br>(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) |                          |                            |

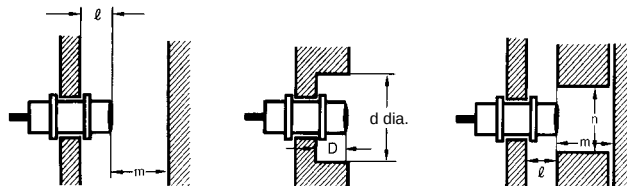
Refer to the following to mount the E2E-CR8 and E2E-C1 non-screw models.



Tighten the screw to a torque of 0.20 N • m (2 kgf • cm) maximum to secure the E2E-CR8 and a torque of 0.39 N • m (4 kgf • cm) maximum to secure the E2E-C1.

## 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                                                             |            | Item | M8     | M12   | M18   | M30   |
|------------------------------------------------------------------|------------|------|--------|-------|-------|-------|
| E2E-X□D□-N<br>DC 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    | 12 mm  | 15 mm | 22 mm | 30 mm |
|                                                                  |            | d    | 24 mm  | 40 mm | 70 mm | 90 mm |
|                                                                  |            | D    | 12 mm  | 15 mm | 22 mm | 30 mm |
|                                                                  |            | m    | 8 mm   | 20 mm | 40 mm | 70 mm |
|                                                                  |            | n    | 24 mm  | 40 mm | 70 mm | 90 mm |
| E2E-X□E□-N<br>E2E-X□F□-N<br>DC 3-wire<br>E2E-X□Y□-N<br>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 |



# Precautions

## ■ 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 Object

Metal Coating:

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

## ■ 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.

## ■ CONNECTING LOAD TO AC OR DC 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 mini-

### Cord Tractive Force

Do not pull cords 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, otherwise the Proximity Sensor may be damaged or lose its water-resistance.

## ■ ENVIRONMENT

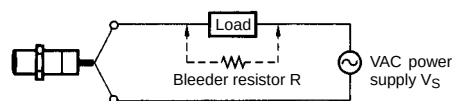
### Water Resistance

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 so that its reliability and life expectancy can be maintained. 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 gasses).

mum 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.

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

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

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.

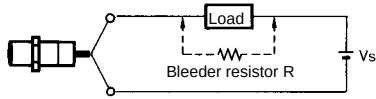
100 VAC (supply voltage): A resistor with a resistance of 10 k $\Omega$  maximum and an allowable power of 3 W minimum

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

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

### DC 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.



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

$$R \leq V_S / (i_R - i_{OFF}) \text{ (k}\Omega\text{)}$$

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

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.)

$i_R$ : Leakage current of Sensors (mA)

$i_{OFF}$ : Release current of load (mA)

The following resistors are recommended.

12 VDC (supply voltage): A resistor with a resistance of 15 k $\Omega$  maximum and an allowable power of 450 mW minimum

24 VDC (supply voltage): A resistor with a resistance of 30 k $\Omega$  maximum and an allowable power of 0.1 W minimum

### Inrush Current

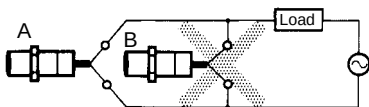
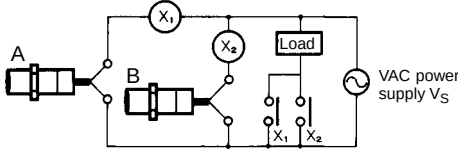
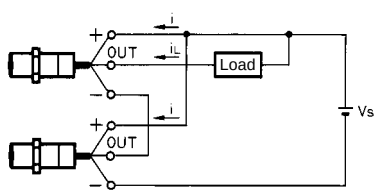
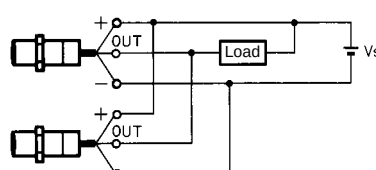
A load that has a large inrush current (e.g., a lamp or motor) will damage the Proximity Sensor, in which case connect the load to the Proximity Sensor through a relay.

## ■ PRECAUTIONS FOR AC OR DC 2-WIRE PROXIMITY SENSORS IN OPERATION

### Connection

| Model     | Connection Type          | Method                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------|--------------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DC 2-wire | AND (serial connection)  | <p><b>Correct</b></p>   | <p>The Sensors connected together must satisfy the following conditions.</p> $V_S - N \times V_R \geq \text{Load operating voltage}$ <p>N: No. of Sensors<br/> <math>V_R</math>: Residual voltage of each Sensor<br/> <math>V_S</math>: Supply voltage</p> <p>If each Proximity Sensor is not supplied with the rated voltage and current, the indicator will not be lit properly or unnecessary pulses may be output for approximately 1 ms.</p>                                           |
|           | OR (parallel connection) | <p><b>Correct</b></p>   | <p>The Sensors connected together must satisfy the following conditions.</p> $N \times i \leq \text{Load operating voltage}$ <p>N: No. of Sensors<br/> <math>i</math>: Leakage current of each Sensor</p> <p>If the MY Relay, which operates at 24 VDC, is used as a load for example, a maximum of four Proximity Sensors can be connected to the load.</p>                                                                                                                                |
| AC 2-wire | AND (serial connection)  | <p><b>Incorrect</b></p> | <p>If 100 or 200 VAC is imposed on the Proximity Sensors, <math>V_L</math> (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 <math>V_L</math> 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> |
|           |                          | <p><b>Correct</b></p>   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

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

| Model        | Connection Type             | Method                                                                                                                                                                                                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC<br>2-wire | OR<br>(parallel connection) | <p><b>Incorrect</b></p>  <p><b>Correct</b></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> |
|              | AND<br>(serial connection)  | <p><b>Correct</b></p>                                                                                                          | <p>The Sensors connected together must satisfy the following conditions.</p> $i_L + (N - 1) \times i \leq \text{Upper-limit of control output of each Sensor}$ $V_S - N \times V_R \geq \text{Load operating voltage}$ <p>N: No. of Sensors<br/> <math>V_R</math>: Residual voltage of each Sensor<br/> <math>V_S</math>: Supply voltage<br/> <math>i</math>: Current consumption of the Sensor<br/> <math>i_L</math>: Load current</p> <p>If the MY Relay, which operates at 24 VDC, is used as a load for example, a maximum of two Proximity Sensors can be connected to the load.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| DC<br>3-wire | OR<br>(parallel connection) | <p><b>Correct</b></p>                                                                                                          | <p>A minimum of three Sensors with current outputs can be connected in parallel. The number of Sensors connected in parallel varies with the Proximity Sensor model.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

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

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