

# Smart Fiber Amplifier Units

# E3NX-FA

CSM\_E3NX-FA\_DS\_E\_14\_1

## A Smart Fiber Amplifier Unit with Ultra-stable Detection and Ultra-easy Setup



- Improved basic performance with 1.5 times the sensing distance and approx. 1/10th the minimum sensing object.\*
- Ultra-easy setup with Smart Tuning with a light intensity adjustment range expanded 20 times to 40,000:1. Optimum stable detection achieved with light intensity adjustment even for saturated incident light.
- White on black display characters for high visibility.
- Solution Viewer that shows the passing time and difference in incident levels and Change Finder that allows you to see display values even for fast workpieces.

\* Compared to the E3X-HD.



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

 Refer to the **Safety Precautions** on page 12.

## Ordering Information

### Fiber Amplifier Units (Dimensions → pages 13 and 15)

| Type                                   | Connecting method                        | Appearance                                                                          | Inputs/outputs      | Model               |                     |
|----------------------------------------|------------------------------------------|-------------------------------------------------------------------------------------|---------------------|---------------------|---------------------|
|                                        |                                          |                                                                                     |                     | NPN output          | PNP output          |
| Standard models                        | Pre-wired (2 m)                          |  | 1 output            | <b>E3NX-FA11 2M</b> | <b>E3NX-FA41 2M</b> |
|                                        | Wire-saving Connector                    |  | 1 output            | <b>E3NX-FA6</b>     | <b>E3NX-FA8</b>     |
| Advanced models                        | Pre-wired (2 m)                          |  | 2 outputs + 1 input | <b>E3NX-FA21 2M</b> | <b>E3NX-FA51 2M</b> |
|                                        | Wire-saving Connector                    |  | 1 output + 1 input  | <b>E3NX-FA7</b>     | <b>E3NX-FA9</b>     |
|                                        |                                          |                                                                                     | 2 outputs           | <b>E3NX-FA7TW</b>   | <b>E3NX-FA9TW</b>   |
|                                        | M8 Connector                             |  | 1 output + 1 input  | <b>E3NX-FA24</b>    | <b>E3NX-FA54</b>    |
|                                        |                                          |                                                                                     | 2 outputs           | ---                 | <b>E3NX-FA54TW</b>  |
| Model for Sensor Communications Unit * | Connector for Sensor Communications Unit |  | ---                 | <b>E3NX-FA0</b>     |                     |

\* A Sensor Communications Unit is required if you want to use the Fiber Amplifier Unit on a network.

## Accessories (Sold Separately)

### Wire-saving Connectors (Required for models for Wire-saving Connectors.) (Dimensions → page 15)

Connectors are not provided with the Fiber Amplifier Unit and must be ordered separately. \*Protective stickers are provided.

| Type             | Appearance                                                                        | Cable length | No. of conductors | Model    | Applicable Fiber Amplifier Units                 |
|------------------|-----------------------------------------------------------------------------------|--------------|-------------------|----------|--------------------------------------------------|
| Master Connector |  | 2 m          | 4                 | E3X-CN21 | E3NX-FA7<br>E3NX-FA7TW<br>E3NX-FA9<br>E3NX-FA9TW |
| Slave Connector  |  |              | 2                 | E3X-CN22 |                                                  |
| Master Connector |  |              | 3                 | E3X-CN11 | E3NX-FA6<br>E3NX-FA8                             |
| Slave Connector  |  |              | 1                 | E3X-CN12 |                                                  |

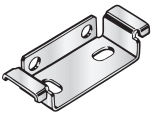
### Sensor I/O Connectors (Required for models for M8 Connectors.) (Dimensions → page 15)

Connectors are not provided with the Fiber Amplifier Unit and must be ordered separately.

| Size | Cable          | Appearance                                                                                 | Cable type | Model           |
|------|----------------|--------------------------------------------------------------------------------------------|------------|-----------------|
| M8   | Standard cable | Straight  | 2m         | XS3F-M421-402-A |
|      |                |                                                                                            | 5m         |                 |
|      |                | L-shaped  | 2m         | XS3F-M422-402-A |
|      |                |                                                                                            | 5m         | XS3F-M422-405-A |

### Mounting Bracket (Dimensions → page 16)

A Mounting Bracket is not provided with the Fiber Amplifier Unit. It must be ordered separately as required.

| Appearance                                                                          | Model    | Quantity |
|-------------------------------------------------------------------------------------|----------|----------|
|  | E39-L143 | 1        |

### DIN Track (Dimensions → page 16)

A DIN Track is not provided with the Fiber Amplifier Unit. It must be ordered separately as required.

| Appearance                                                                          | Type                              | Model     | Quantity |
|-------------------------------------------------------------------------------------|-----------------------------------|-----------|----------|
|  | Shallow type, total length: 1 m   | PFP-100N  | 1        |
|                                                                                     | Shallow type, total length: 0.5 m | PFP-50N   |          |
|                                                                                     | Deep type, total length: 1 m      | PFP-100N2 |          |

### End Plate (Dimensions → page 16)

Two End Plates are provided with the Sensor Communications Unit. End Plates are not provided with the Fiber Amplifier Unit. They must be ordered separately as required.

| Appearance                                                                          | Model | Quantity |
|-------------------------------------------------------------------------------------|-------|----------|
|  | PFP-M | 1        |

## Related Products

### Sensor Communications Units

| Type                                    | Appearance                                                                            | Model    |
|-----------------------------------------|---------------------------------------------------------------------------------------|----------|
| Sensor Communications Unit for EtherCAT |  | E3NW-ECT |
| Sensor Communications Unit for CompoNet |  | E3NW-CRT |
| Sensor Communications Unit for CC-Link  |  | E3NW-CCL |
| Distributed Sensor Unit *               |  | E3NW-DS  |

Refer to your OMRON website for details.

\* The Distributed Sensor Unit can be connected to any of the Sensor Communications Units.

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.  
CompoNet is a registered trademark of the ODVA.  
CC-Link is a registered trademark of Mitsubishi Electric Corporation. The trademark is managed by the CC-Link Partner Association.

## Ratings and Specifications

| Item                                            |                               | Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Standard models                                                              |                       | Advanced models |                       |              |              |             | Model for Sensor Communications Unit                                             |
|-------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-----------------------|-----------------|-----------------------|--------------|--------------|-------------|----------------------------------------------------------------------------------|
|                                                 |                               | NPN output                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | E3NX-FA11                                                                    | E3NX-FA6              | E3NX-FA21       | E3NX-FA7              | E3NX-FA7TW   | E3NX-FA24    | ---         | E3NX-FA0                                                                         |
|                                                 |                               | PNP output                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | E3NX-FA41                                                                    | E3NX-FA8              | E3NX-FA51       | E3NX-FA9              | E3NX-FA9TW   | E3NX-FA54    | E3NX-FA54TW |                                                                                  |
|                                                 |                               | Connecting method                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Pre-wired                                                                    | Wire-saving Connector | Pre-wired       | Wire-saving Connector |              | M8 Connector |             | Connector for Sensor Communications Unit                                         |
| Inputs/ outputs                                 | Outputs                       | 1 output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                              | 2 outputs             | 1 output        | 2 outputs             | 1 output     | 2 outputs    | --- *1      |                                                                                  |
|                                                 | External inputs               | ---                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                              | 1 input               | 1 input         | ---                   | 1 input      | ---          |             |                                                                                  |
| Light source (wavelength)                       |                               | Red, 4-element LED (625 nm)                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                              |                       |                 |                       |              |              |             |                                                                                  |
| Power supply voltage                            |                               | 10 to 30 VDC, including 10% ripple (p-p)                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                              |                       |                 |                       |              |              |             | Supplied from the connector through the Sensor Communications Unit               |
| Power consumption*2                             |                               | At Power Supply Voltage of 24 VDC<br>Standard Models or Model for Sensor Communications Unit:<br>Normal mode: 960 mW max. (Current consumption: 40 mA max.),<br>Eco ON: 720 mW max. (Current consumption: 30 mA max.),<br>Eco LO: 840 mW max. (Current consumption: 35 mA max.)<br>Advanced Models:<br>Normal mode: 1,080 mW max. (Current consumption: 45 mA max.),<br>Eco ON: 840 mW max. (Current consumption: 35 mA max.),<br>Eco LO: 960 mW max. (Current consumption: 40 mA max.) |                                                                              |                       |                 |                       |              |              |             |                                                                                  |
| Control output                                  |                               | Load power supply voltage: 30 VDC max., open-collector output<br>Load current: Groups of 1 to 3 Amplifier Units: 100 mA max., Groups of 4 to 30 Amplifier Units: 20 mA max.<br><div><div>Residual voltage:</div><div>At load current of less than 10 mA: 1 V max.<br/>At load current of 10 to 100 mA: 2 V max.</div></div><br>OFF current: 0.1 mA max.                                                                                                                                 |                                                                              |                       |                 |                       |              |              |             | ---                                                                              |
| External inputs                                 |                               | ---                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Refer to *3.                                                                 |                       |                 | ---                   | Refer to *3. | ---          |             |                                                                                  |
| Indicators                                      |                               | 7-segment displays (Sub digital display: green, Main digital display: white)<br>Display direction: Switchable between normal and reversed.<br>OUT indicator (orange), L/D indicator (orange), ST indicator (blue), DPC indicator (green), and OUT selection indicator (orange, only on models with 2 outputs)                                                                                                                                                                           |                                                                              |                       |                 |                       |              |              |             |                                                                                  |
| Protection circuits                             |                               | Power supply reverse polarity protection, output short-circuit protection, and output reve rse polarity protection                                                                                                                                                                                                                                                                                                                                                                      |                                                                              |                       |                 |                       |              |              |             | Power supply reverse polarity protection and output short-circuit protection     |
| Response time                                   | Super-high-speed mode (SHS)*4 | Operate or reset for model with 1 output: 30 μs, with 2 outputs: 32 μs                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                              |                       |                 |                       |              |              |             |                                                                                  |
|                                                 | High-speed mode (HS)          | Operate or reset: 250 μs                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                              |                       |                 |                       |              |              |             |                                                                                  |
|                                                 | Standard mode (Std)           | Operate or reset: 1 ms                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                              |                       |                 |                       |              |              |             |                                                                                  |
|                                                 | Giga-power mode (GIGA)        | Operate or reset: 16 ms                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                              |                       |                 |                       |              |              |             |                                                                                  |
| Sensitivity adjustment                          |                               | Smart Tuning (2-point tuning, full auto tuning, position tuning, maximum sensitivity tuning, power tuning, or percentage tuning (–99% to 99%)) or manual adjustment                                                                                                                                                                                                                                                                                                                     |                                                                              |                       |                 |                       |              |              |             |                                                                                  |
| Maximum connectable Units                       |                               | 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                              |                       |                 |                       |              |              |             | With E3NW-ECT: 30 units *5<br>With E3NW-CRT: 16 units<br>With E3NW-CCL: 16 units |
| No. of Units for mutual interference prevention | Super-high-speed mode (SHS)*4 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                              |                       |                 |                       |              |              |             |                                                                                  |
|                                                 | High-speed mode (HS)          | 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                              |                       |                 |                       |              |              |             |                                                                                  |
|                                                 | Standard mode (Std)           | 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                              |                       |                 |                       |              |              |             |                                                                                  |
|                                                 | Giga-power mode (GIGA)        | 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                              |                       |                 |                       |              |              |             |                                                                                  |
| Functions                                       | Automatic power control (APC) | Always enabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                              |                       |                 |                       |              |              |             |                                                                                  |
|                                                 | Dynamic power control (DPC)   | Provided                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                              |                       |                 |                       |              |              |             |                                                                                  |
|                                                 | Timer                         | Select from timer disabled, OFF-delay, ON-delay, one-shot, or ON-delay + OFF-delay timer: 1 to 9,999 ms                                                                                                                                                                                                                                                                                                                                                                                 |                                                                              |                       |                 |                       |              |              |             |                                                                                  |
|                                                 | Zero reset                    | Negative values can be displayed. (Threshold value is shifted.)                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                              |                       |                 |                       |              |              |             |                                                                                  |
|                                                 |                               | Resetting settings*6                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Select from initial reset (factory defaults) or user reset (saved settings). |                       |                 |                       |              |              |             |                                                                                  |

\*1. Two sensor outputs are allocated in the programmable logic controller PLC I/O table.

PLC operation via Communications Unit enables reading detected values and changing settings.

\*2. At Power Supply Voltage of 10 to 30 VDC.

Standard Models or Model for Sensor Communications Unit:

Normal mode: 1,080 mW max. (Current consumption: 36 mA max. at 30 VDC, 108 mA max. at 10 VDC)

Eco ON: 880 mW max. (Current consumption: 28 mA max. at 30 VDC, 88 mA max. at 10 VDC)

Eco LO: 980 mW max. (Current consumption: 32 mA max. at 30 VDC, 98 mA max. at 10 VDC)

Advanced Models:

Normal mode: 1,230 mW max. (Current consumption: 41 mA max. at 30 VDC, 123 mA max. at 10 VDC)

Eco ON: 1,030 mW max. (Current consumption: 33 mA max. at 30 VDC, 103 mA max. at 10 VDC)

Eco LO: 1,130 mW max. (Current consumption: 37 mA max. at 30 VDC, 113 mA max. at 10 VDC)

\*3. The following details apply to the input.

|     | Contact input (relay or switch)                                                   | Non-contact input (transistor)                                                                         | Input time *3-1                  |
|-----|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------|
| NPN | ON: Shorted to 0 V (Sourcing current: 1 mA max.).<br>OFF: Open or shorted to Vcc. | ON: 1.5 V max. (Sourcing current: 1 mA max.)<br>OFF: Vcc – 1.5 V to Vcc (Leakage current: 0.1 mA max.) | ON: 9 ms min.<br>OFF: 20 ms min. |
| PNP | ON: Shorted to Vcc (Sinking current: 3 mA max.).<br>OFF: Open or shorted to 0 V.  | ON: Vcc – 1.5 V to Vcc (Sinking current: 3 mA max.)<br>OFF: 1.5 V max. (Leakage current: 0.1 mA max.)  |                                  |

\*3-1. Input time is 25 ms (ON)/(OFF) only when (in tUnE) or (in PtUn) input is selected.

\*4. The mutual interference prevention function is disabled if the detection mode is set to super-high-speed mode.

\*5. When connected to an OMRON NJ-series Controller.

\*6. The bank is not reset by the user reset function or saved by the user save function.

| Item                                 |                  | Type                                                                                                                                                                                                                                                                           | Standard models             |                                                                                           | Advanced models         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        | Model for Sensor Communications Unit |
|--------------------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-------------------------------------------------------------------------------------------|-------------------------|-------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
|                                      |                  | NPN output                                                                                                                                                                                                                                                                     | E3NX-FA11                   | E3NX-FA6                                                                                  | E3NX-FA21               | E3NX-FA7                                                                                  | E3NX-FA7TW                    | E3NX-FA24                                                                   | ---                                                                                                                                                                                                                                                                    | E3NX-FA0                             |
|                                      |                  | PNP output                                                                                                                                                                                                                                                                     | E3NX-FA41                   | E3NX-FA8                                                                                  | E3NX-FA51               | E3NX-FA9                                                                                  | E3NX-FA9TW                    | E3NX-FA54                                                                   | E3NX-FA54TW                                                                                                                                                                                                                                                            |                                      |
|                                      |                  | Connecting method                                                                                                                                                                                                                                                              | Pre-wired                   | Wire-saving Connector                                                                     | Pre-wired               | Wire-saving Connector                                                                     | M8 Connector                  |                                                                             | Connector for Sensor Communications Unit                                                                                                                                                                                                                               |                                      |
| Functions                            | Eco mode 7       | Select from OFF (digital display lit), Eco ON (digital display not lit), and Eco LO (digital display dimmed).                                                                                                                                                                  |                             |                                                                                           |                         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
|                                      | Bank switching   | Select from banks 1 to 4.                                                                                                                                                                                                                                                      |                             |                                                                                           |                         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
|                                      | Power tuning     | Select from ON or OFF.                                                                                                                                                                                                                                                         |                             |                                                                                           |                         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
|                                      | Output 1         | Select from normal detection mode or area detection mode.                                                                                                                                                                                                                      |                             |                                                                                           |                         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
|                                      | Output 2         | ---                                                                                                                                                                                                                                                                            |                             | Select from normal detection mode, alarm output mode, or error output mode.               | ---                     | Select from normal detection mode, alarm output mode, or error output mode.               | ---                           | Select from normal detection mode, alarm output mode, or error output mode. |                                                                                                                                                                                                                                                                        |                                      |
|                                      | External input   | ---                                                                                                                                                                                                                                                                            |                             | Select from input OFF, tuning, power tuning, emission OFF, zero reset, or bank switching. | ---                     | Select from input OFF, tuning, power tuning, emission OFF, zero reset, or bank switching. | ---                           |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
|                                      | Hysteresis width | Select from standard setting or user setting. For a user setting, the hysteresis width can be set from 0 to 9,999.                                                                                                                                                             |                             |                                                                                           |                         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
| Ambient illumination (Receiver side) |                  | Incandescent lamp: 20,000 lx max., Sunlight: 30,000 lx max.                                                                                                                                                                                                                    |                             |                                                                                           |                         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
| Ambient temperature range 8          |                  | Operating:<br>Groups of 1 or 2 Amplifier Units: -25 to 55°C,<br>Groups of 3 to 10 Amplifier Units: -25 to 50°C,<br>Groups of 11 to 16 Amplifier Units: -25 to 45°C,<br>Groups of 17 to 30 Amplifier Units: -25 to 40°C<br>Storage: -30 to 70°C (with no icing or condensation) |                             |                                                                                           |                         |                                                                                           |                               |                                                                             | Operating:<br>Groups of 1 or 2 Amplifier Units: 0 to 55°C,<br>Groups of 3 to 10 Amplifier Units: 0 to 50°C,<br>Groups of 11 to 16 Amplifier Units: 0 to 45°C,<br>Groups of 17 to 30 Amplifier Units: 0 to 40°C<br>Storage: -30 to 70°C (with no icing or condensation) |                                      |
| Ambient humidity range               |                  | Operating and storage: 35% to 85% (with no condensation)                                                                                                                                                                                                                       |                             |                                                                                           |                         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
| Altitude                             |                  | 2,000 m max.                                                                                                                                                                                                                                                                   |                             |                                                                                           |                         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
| Installation environment             |                  | Pollution degree 3 (as per IEC 60947-1)                                                                                                                                                                                                                                        |                             |                                                                                           |                         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
| Insulation resistance                |                  | 20 MΩ min. (at 500 VDC)                                                                                                                                                                                                                                                        |                             |                                                                                           |                         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
| Dielectric strength                  |                  | 1,000 VAC at 50/60 Hz for 1 min                                                                                                                                                                                                                                                |                             |                                                                                           |                         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
| Vibration resistance (destruction)   |                  | 10 to 55 Hz with a 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions                                                                                                                                                                                          |                             |                                                                                           |                         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
| Shock resistance (destruction)       |                  | 500 m/s² for 3 times each in X, Y, and Z directions                                                                                                                                                                                                                            |                             |                                                                                           |                         |                                                                                           |                               |                                                                             | 150 m/s² for 3 times each in X, Y, and Z directions                                                                                                                                                                                                                    |                                      |
| Weight (packed state/Sensor only)    |                  | Approx. 115 g/<br>approx. 75 g                                                                                                                                                                                                                                                 | Approx. 60g/<br>approx. 20g | Approx. 115 g/<br>approx. 75 g                                                            | Approx. 60g/approx. 20g |                                                                                           | Approx. 65 g/<br>approx. 25 g |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
| Materials                            | Case             | Polycarbonate (PC)                                                                                                                                                                                                                                                             |                             |                                                                                           |                         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
|                                      | Cover            | Polycarbonate (PC)                                                                                                                                                                                                                                                             |                             |                                                                                           |                         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
|                                      | Cable            | PVC                                                                                                                                                                                                                                                                            |                             |                                                                                           |                         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        |                                      |
| Accessories                          |                  | Instruction Manual                                                                                                                                                                                                                                                             |                             |                                                                                           |                         |                                                                                           |                               |                                                                             |                                                                                                                                                                                                                                                                        |                                      |

\*7. Eco LO is supported for Amplifier Units manufactured in July 2014 or later.

\*8. When the number of connected units is 11 or more, the ambient temperature is less than 50°C.

## Sensing Distances

### Threaded Models

| Sensing method | Sensing direction | Size | Model        | Sensing distance (mm) |               |                 |                       |
|----------------|-------------------|------|--------------|-----------------------|---------------|-----------------|-----------------------|
|                |                   |      |              | Giga mode             | Standard mode | High-speed mode | Super-high-speed mode |
| Through-beam   | Right-angle       | M4   | E32-T11N 2M  | 3,000                 | 1,500         | 1,050           | 280                   |
|                |                   |      | E32-LT11N 2M | 4,000*1               | 4,000*1       | 3,450           | 920                   |
|                | Straight          |      | E32-T11R 2M  | 3,000                 | 1,500         | 1,050           | 280                   |
|                |                   |      | E32-LT11 2M  | 4,000*1               | 4,000*1       | 4,000*1         | 1,080                 |
|                |                   |      | E32-LT11R 2M | 4,000*1               | 4,000*1       | 3,450           | 920                   |
| Reflective     | Right-angle       | M3   | E32-C31N 2M  | 160                   | 75            | 69              | 14                    |
|                |                   |      | E32-C21N 2M  | 440                   | 190           | 130             | 39                    |
|                |                   | M4   | E32-D21N 2M  | 1,260                 | 520           | 360             | 100                   |
|                |                   |      | E32-C11N 2M  | 1,170                 | 520           | 480             | 100                   |
|                |                   | M6   | E32-LD11N 2M | 1,260                 | 520           | 360             | 100                   |
|                |                   |      | E32-D21R 2M  | 210                   | 90            | 60              | 16                    |
|                | Straight          | M3   | E32-C31 2M   | 490                   | 220           | 150             | 44                    |
|                |                   |      | E32-C31M 1M  |                       |               |                 |                       |
|                |                   |      | M4           | E32-D211R 2M          | 210           | 90              | 60                    |
|                |                   | M6   | E32-D11R 2M  | 1,260                 | 520           | 360             | 100                   |
|                |                   |      | E32-CC200 2M | 2,100                 | 900           | 600             | 180                   |
|                |                   |      | E32-LD11 2M  | 1,290                 | 540           | 370             | 110                   |
|                |                   |      | E32-LD11R 2M | 1,260                 | 520           | 360             | 100                   |

\*1. The fiber length is 2 m on each side, so the sensing distance is given as 4,000 mm.

### Cylindrical Models

| Sensing method | Size                | Sensing direction | Model        | Sensing distance (mm) |               |                 |                       |
|----------------|---------------------|-------------------|--------------|-----------------------|---------------|-----------------|-----------------------|
|                |                     |                   |              | Giga mode             | Standard mode | High-speed mode | Super-high-speed mode |
| Through-beam   | 1 dia.              | Top-view          | E32-T223R 2M | 670                   | 370           | 220             | 60                    |
|                | 1.5 dia.            |                   | E32-T22B 2M  | 1,020                 | 600           | 330             | 90                    |
|                | 3 dia.              |                   | E32-T12R 2M  | 3,000                 | 1,500         | 1,050           | 280                   |
|                |                     | Side-view         | E32-T14LR 2M | 1,120                 | 670           | 390             | 100                   |
| Reflective     | 1.5 dia.            | Top-view          | E32-D22B 2M  | 210                   | 90            | 60              | 16                    |
|                | 1.5 dia. + 0.5 dia. |                   | E32-D43M 1M  | 42                    | 18            | 12              | 4                     |
|                |                     |                   | 3 dia.       | E32-D22R 2M           | 210           | 90              | 60                    |
|                | E32-D221B 2M        |                   |              | 450                   | 210           | 130             | 40                    |
|                | E32-D32L 2M         |                   |              | 1,050                 | 450           | 300             | 90                    |
|                | 3 dia. + 0.8 dia.   |                   | E32-D33 2M   | 100                   | 45            | 30              | 8                     |

### Flat Models

| Sensing method | Sensing direction | Model        | Sensing distance (mm) |               |                 |                       |
|----------------|-------------------|--------------|-----------------------|---------------|-----------------|-----------------------|
|                |                   |              | Giga mode             | Standard mode | High-speed mode | Super-high-speed mode |
| Through-beam   | Top-view          | E32-T15XR 2M | 3,000                 | 1,500         | 1,050           | 280                   |
|                | Side-view         | E32-T15YR 2M | 1,120                 | 670           | 390             | 100                   |
|                | Flat-view         | E32-T15ZR 2M |                       |               |                 |                       |
| Reflective     | Top-view          | E32-D15XR 2M | 1,260                 | 520           | 360             | 100                   |
|                | Side-view         | E32-D15YR 2M | 300                   | 150           | 78              | 24                    |
|                | Flat-view         | E32-D15ZR 2M |                       |               |                 |                       |

### Sleeve Models

| Sensing method | Sensing direction | Model           | Sensing distance (mm) |               |                 |                       |
|----------------|-------------------|-----------------|-----------------------|---------------|-----------------|-----------------------|
|                |                   |                 | Giga mode             | Standard mode | High-speed mode | Super-high-speed mode |
| Through-beam   | Side-view         | E32-T24R 2M     | 250                   | 150           | 75              | 20                    |
|                |                   | E32-T24E 2M     | 670                   | 370           | 220             | 60                    |
|                | Top-view          | E32-T33 1M      | 220                   | 130           | 75              | 20                    |
|                |                   | E32-T21-S1 2M   | 760                   | 450           | 250             | 68                    |
|                |                   | E32-TC200BR 2M  | 3,000                 | 1,500         | 1,050           | 280                   |
| Reflective     | Side-view         | E32-D24R 2M     | 100                   | 45            | 30              | 8                     |
|                |                   | E32-D24-S2 2M   | 180                   | 79            | 67              | 14                    |
|                | Top-view          | E32-D43M 1M     | 42                    | 18            | 12              | 4                     |
|                |                   | E32-D331 2M     | 21                    | 9             | 6               | 2                     |
|                |                   | E32-D33 2M      | 100                   | 45            | 30              | 8                     |
|                |                   | E32-D32-S1 0.5M | 94                    | 40            | 27              | 7                     |
|                |                   | E32-D31-S1 0.5M |                       |               |                 |                       |
|                |                   | E32-DC200F4R 2M | 210                   | 90            | 60              | 16                    |
|                |                   | E32-D22-S1 2M   | 370                   | 160           | 100             | 30                    |
|                |                   | E32-D21-S3 2M   |                       |               |                 |                       |
|                |                   | E32-DC200BR 2M  | 1,260                 | 520           | 360             | 100                   |
|                |                   | E32-D25-S3 2M   | 370                   | 160           | 100             | 30                    |
|                |                   |                 |                       |               |                 |                       |
|                |                   |                 |                       |               |                 |                       |

## Small-spot, Reflective Models

| Type                  | Spot diameter   | Center distance (mm) | Models                  | Sensing distance (mm)                          |               |                 |                       |
|-----------------------|-----------------|----------------------|-------------------------|------------------------------------------------|---------------|-----------------|-----------------------|
|                       |                 |                      |                         | Giga mode                                      | Standard mode | High-speed mode | Super-high-speed mode |
| Variable spot         | 0.1 to 0.6 dia. | 6 to 15              | E32-C42 1M + E39-F3A    | Spot diameter of 0.1 to 0.6 mm at 6 to 15 mm.  |               |                 |                       |
|                       | 0.3 to 1.6 dia. | 10 to 30             | E32-C42 1M + E39-F17    | Spot diameter of 0.3 to 1.6 mm at 10 to 30 mm. |               |                 |                       |
| Parallel light        | 4 dia.          | 0 to 20              | E32-C31 2M + E39-F3C    | Spot diameter of 4 mm max. at 0 to 20 mm.      |               |                 |                       |
|                       |                 |                      | E32-C31N 2M + E39-F3C   |                                                |               |                 |                       |
| Integrated lens       | 0.1 dia.        | 5                    | E32-C42S 1M             | Spot diameter of 0.1 mm at 5 mm.               |               |                 |                       |
|                       | 6 dia.          | 50                   | E32-L15 2M              | Spot diameter of 6 mm at 50 mm.                |               |                 |                       |
| Small-spot            | 0.1 dia.        | 7                    | E32-C41 1M + E39-F3A-5  | Spot diameter of 0.1 mm at 7 mm.               |               |                 |                       |
|                       | 0.5 dia.        |                      | E32-C31 2M + E39-F3A-5  | Spot diameter of 0.5 mm at 7 mm.               |               |                 |                       |
|                       |                 |                      | E32-C31N 2M + E39-F3A-5 |                                                |               |                 |                       |
|                       | 0.2 dia.        | 17                   | E32-C41 1M + E39-F3B    | Spot diameter of 0.2 mm at 17 mm.              |               |                 |                       |
|                       | 0.5 dia.        |                      | E32-C31 2M + E39-F3B    | Spot diameter of 0.5 mm at 17 mm.              |               |                 |                       |
|                       |                 |                      | E32-C31N 2M + E39-F3B   |                                                |               |                 |                       |
|                       | 3 dia.          | 50                   | E32-CC200 2M + E39-F18  | Spot diameter of 3 mm at 50 mm.                |               |                 |                       |
| E32-C11N 2M + E39-F18 |                 |                      |                         |                                                |               |                 |                       |

## High-power Beam Models

| Type                                     | Sensing direction | Aperture angle | Models                  | Sensing distance (mm) |               |                 |                       |
|------------------------------------------|-------------------|----------------|-------------------------|-----------------------|---------------|-----------------|-----------------------|
|                                          |                   |                |                         | Giga mode             | Standard mode | High-speed mode | Super-high-speed mode |
| Through-beam models with integrated lens | Right-angle       | 15°            | E32-LT11N 2M            | 4,000*2               | 4,000*2       | 3,450           | 920                   |
|                                          | Top-view          | 10°            | E32-T17L 10M            | 20,000*1              | 20,000*1      | 20,000*1        | 8,000                 |
|                                          |                   | 15°            | E32-LT11 2M             | 4,000*2               | 4,000*2       | 4,000*2         | 1,080                 |
|                                          |                   |                | E32-LT11R 2M            | 4,000*2               | 4,000*2       | 3,450           | 920                   |
|                                          | Side-view         | 30°            | E32-T14 2M              | 4,000*2               | 4,000*2       | 4,000*2         | 1,800                 |
| Through-beam models with lenses          | Right-angle       | 12°            | E32-T11N 2M + E39-F1    | 4,000*2               | 4,000*2       | 4,000*2         | 2,000                 |
|                                          |                   | 6°             | E32-T11N 2M + E39-F16   | 4,000*2               | 4,000*2       | 4,000*2         | 3,600                 |
|                                          | Top-view          | 12°            | E32-T11R 2M + E39-F1    | 4,000*2               | 4,000*2       | 4,000*2         | 2,000                 |
|                                          |                   | 6°             | E32-T11R 2M + E39-F16   | 4,000*2               | 4,000*2       | 4,000*2         | 3,600                 |
|                                          | Side-view         | 60°            | E32-T11R 2M + E39-F2    | 2,170                 | 1,200         | 750             | 200                   |
|                                          | Top-view          | 12°            | E32-T11 2M + E39-F1     | 4,000*2               | 4,000*2       | 4,000*2         | 1,860                 |
|                                          |                   | 6°             | E32-T11 2M + E39-F16    | 4,000*2               | 4,000*2       | 4,000*2         | 4,000*2               |
|                                          | Side-view         | 60°            | E32-T11 2M + E39-F2     | 3,450                 | 1,980         | 1,290           | 320                   |
|                                          | Top-view          | 12°            | E32-T51R 2M + E39-F1    | 4,000*2               | 4,000*2       | 4,000*2         | 1,500                 |
|                                          |                   | 6°             | E32-T51R 2M + E39-F16   | 4,000*2               | 4,000*2       | 4,000*2         | 4,000*2               |
|                                          | Side-view         | 60°            | E32-T51R 2M + E39-F2    | 2,100                 | 1,080         | 750             | 200                   |
|                                          | Top-view          | 12°            | E32-T81R-S 2M + E39-F1  | 4,000*2               | 4,000*2       | 4,000*2         | 1,000                 |
|                                          |                   | 6°             | E32-T81R-S 2M + E39-F16 | 4,000*2               | 4,000*2       | 4,000*2         | 1,800                 |
|                                          | Side-view         | 60°            | E32-T81R-S 2M + E39-F2  | 1,500                 | 820           | 540             | 140                   |
|                                          | Top-view          | 12°            | E32-T61-S 2M + E39-F1   | 4,000*2               | 4,000*2       | 4,000*2         | 1,800                 |
|                                          |                   | 6°             | E32-T61-S 2M + E39-F16  | 4,000*2               | 4,000*2       | 4,000*2         | 3,100                 |
|                                          | Side-view         | 60°            | E32-T61-S 2M + E39-F2   | 2,520                 | 1,350         | 900             | 240                   |
|                                          | Top-view          | 12°            | E32-T51 2M + E39-F1-33  | 4,000*2               | 4,000*2       | 3,450           | 1,400                 |
|                                          |                   | 6°             | E32-T51 2M + E39-F16    | 4,000*2               | 4,000*2       | 4,000*2         | 4,000*2               |
| Reflective models with integrated lens   | Top-view          | 4°             | E32-D16 2M              | 40 to 4,000 *2        | 40 to 2,100   | 40 to 1,350     | 40 to 480             |

\*1. The fiber length is 10 m on each side, so the sensing distance is given as 20,000 mm.

\*2. The fiber length is 2 m on each side, so the sensing distance is given as 4,000 mm.

## Narrow View Models

| Sensing method | Sensing direction | Aperture angle | Models       | Sensing distance (mm) |               |                 |                       |
|----------------|-------------------|----------------|--------------|-----------------------|---------------|-----------------|-----------------------|
|                |                   |                |              | Giga mode             | Standard mode | High-speed mode | Super-high-speed mode |
| Through-beam   | Side-view         | 1.5°           | E32-A03 2M   | 4,000*1               | 2,670         | 1,800           | 500                   |
|                |                   |                | E32-A03-1 2M |                       |               |                 |                       |
|                |                   | 3.4°           | E32-A04 2M   | 1,920                 | 1,020         | 670             | 200                   |
|                |                   | 4°             | E32-T24SR 2M | 4,000*1               | 3,300         | 2,190           | 580                   |
|                |                   |                | E32-T24S 2M  | 4,000*1               | 3,900         | 2,610           | 700                   |
|                |                   |                | E32-T22S 2M  | 4,000*1               | 4,000*1       | 3,750           | 1,000                 |

\*1. The fiber length is 2 m on each side, so the sensing distance is given as 4,000 mm.

## Models for Detection without Background Interference

| Sensing method     | Sensing direction | Model        | Sensing distance (mm) |               |                 |                       |
|--------------------|-------------------|--------------|-----------------------|---------------|-----------------|-----------------------|
|                    |                   |              | Giga mode             | Standard mode | High-speed mode | Super-high-speed mode |
| Limited-reflective | Flat-view         | E32-L16-N 2M | 0 to 15               |               |                 | 0 to 12               |
|                    |                   | E32-L24S 2M  | 0 to 4                |               |                 |                       |
|                    | Side-view         | E32-L25L 2M  | 5.4 to 9 (center 7.2) |               |                 |                       |

## Transparent Object Detection (Retro-reflective Models)

| Sensing method   | Feature        | Size | Models                                | Sensing distance (mm) |               |                 |                       |
|------------------|----------------|------|---------------------------------------|-----------------------|---------------|-----------------|-----------------------|
|                  |                |      |                                       | Giga mode             | Standard mode | High-speed mode | Super-high-speed mode |
| Retro-reflective | Film detection | M3   | E32-C31 2M +<br>E39-F3R +<br>E39-RP37 | 370                   |               | 300             | ---                   |
|                  | Square         | ---  | E32-R16 5M                            | 150 to 1,500          |               |                 |                       |
|                  | Threaded       | M6   | E32-R21 2M                            | 10 to 370             |               |                 | 10 to 250             |
|                  | Hex-shaped     |      | E32-LR11NP 2M +<br>E39-RP1            | 2,020                 | 1,800         | 1,500           | 550                   |

## Transparent Object Detection (Limited-reflective Models)

| Sensing method     | Feature                         | Sensing direction | Model        | Sensing distance (mm) |               |                 |                       |
|--------------------|---------------------------------|-------------------|--------------|-----------------------|---------------|-----------------|-----------------------|
|                    |                                 |                   |              | Giga mode             | Standard mode | High-speed mode | Super-high-speed mode |
| Limited-reflective | Small size                      | Flat-view         | E32-L24S 2M  | 0 to 4                |               |                 |                       |
|                    | Standard                        |                   | E32-L16-N 2M | 0 to 15               |               |                 | 0 to 12               |
|                    | Glass substrate alignment, 70°C |                   | E32-A08 2M   | 10 to 20              |               |                 | ---                   |
|                    | Standard/long-distance          |                   | E32-A12 2M   | 12 to 30              |               |                 | ---                   |
|                    | Side-view form                  | Side-view         | E32-L25L 2M  | 5.4 to 9 (center 7.2) |               |                 |                       |
|                    | Glass substrate mapping, 70°C   | Top-view          | E32-A09 2M   | 15 to 38              |               |                 | ---                   |

## Chemical-resistant, Oil-resistant Models

| Sensing method | Type                                                    | Sensing direction | Model        | Sensing distance (mm)                                                                                                                                  |               |                 |                       |
|----------------|---------------------------------------------------------|-------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------|-----------------------|
|                |                                                         |                   |              | Giga mode                                                                                                                                              | Standard mode | High-speed mode | Super-high-speed mode |
| Through-beam   | Oil-resistant                                           | Right-angle       | E32-T11NF 2M | 4,000*1                                                                                                                                                | 4,000*1       | 4,000*1         | 2,200                 |
|                | Chemical/oil-resistant                                  | Top-view          | E32-T12F 2M  | 4,000*1                                                                                                                                                | 4,000*1       | 4,000*1         | 1,600                 |
|                |                                                         |                   | E32-T11F 2M  | 4,000*1                                                                                                                                                | 4,000*1       | 3,900           | 1,000                 |
|                |                                                         | Side-view         | E32-T14F 2M  | 2,100                                                                                                                                                  | 1,200         | 750             | 200                   |
|                | Chemical/oil-resistant at 150°C                         | Top-view          | E32-T51F 2M  | 4,000*1                                                                                                                                                | 4,000*1       | 2,700           | 700                   |
| Reflective     | Semiconductors: Cleaning, developing, and etching; 60°C | Top-view          | E32-L11FP 5M | 8 to 20 mm from tip of lens (Recommended sensing distance: 11 mm),<br>19 to 31 mm from center of mounting hole A (Recommended sensing distance: 22 mm) |               |                 |                       |
|                | Semiconductors: Resist stripping; 85°C                  |                   | E32-L11FS 5M | 8 to 20 mm from tip of lens (Recommended sensing distance: 11 mm),<br>32 to 44 mm from center of mounting hole A (Recommended sensing distance: 35 mm) |               |                 |                       |
|                | Chemical/oil-resistant                                  |                   | E32-D12F 2M  | ---*2                                                                                                                                                  | 280           | 190             | 60                    |
|                | Chemical-resistant cable                                |                   | E32-D11U 2M  | 1,260                                                                                                                                                  | 520           | 360             | 100                   |

\*1. The fiber length is 2 m on each side, so the sensing distance is given as 4,000 mm.

\*2. Even if there is no sensing object, the Sensor will detect light that is reflected by the fluororesin.

## Bending-resistant Models

| Sensing method | Size     | Model        | Sensing distance (mm) |               |                 |                       |
|----------------|----------|--------------|-----------------------|---------------|-----------------|-----------------------|
|                |          |              | Giga mode             | Standard mode | High-speed mode | Super-high-speed mode |
| Through-beam   | 1.5 dia. | E32-T22B 2M  | 1,020                 | 600           | 330             | 90                    |
|                | M3       | E32-T21 2M   |                       |               |                 |                       |
|                | M4       | E32-T11 2M   | 3,750                 | 2,020         | 1,350           | 360                   |
|                | Square   | 32-T25XB 2M  | 750                   | 450           | 250             | 70                    |
| Reflective     | 1.5 dia. | E32-D22B 2M  | 210                   | 90            | 60              | 16                    |
|                | M3       | E32-D21 2M   |                       |               |                 |                       |
|                | 3 dia.   | E32-D221B 2M | 450                   | 210           | 130             | 40                    |
|                | M4       | E32-D21B 2M  |                       |               |                 |                       |
|                | M6       | E32-D11 2M   | 1,260                 | 520           | 360             | 100                   |
|                | Square   | E32-D25XB 2M | 360                   | 150           | 90              | 30                    |

## Heat-resistant Models

| Sensing method | Heat-resistant temperature | Model         | Sensing distance (mm) |               |                 |                       |
|----------------|----------------------------|---------------|-----------------------|---------------|-----------------|-----------------------|
|                |                            |               | Giga mode             | Standard mode | High-speed mode | Super-high-speed mode |
| Through-beam   | 100°C                      | E32-T51R 2M   | 2,400                 | 1,200         | 840             | 225                   |
|                | 150°C                      | E32-T51 2M    | 4,000*1               | 2,250         | 1,500           | 400                   |
|                | 200°C                      | E32-T81R-S 2M | 1,500                 | 820           | 540             | 140                   |
|                | 350°C                      | E32-T61-S 2M  | 2,520                 | 1,350         | 900             | 240                   |
| Reflective     | 100°C                      | E32-D51R 2M   | 1,000                 | 420           | 280             | 80                    |
|                | 150°C                      | E32-D51 2M    | 1,680                 | 670           | 480             | 144                   |
|                | 200°C                      | E32-D81R-S 2M | 630                   | 270           | 180             | 54                    |
|                | 300°C                      | E32-A08H2 2M  | 10 to 20              |               |                 | ---                   |
|                |                            | E32-A09H2 2M  | 20 to 30 (center 25)  |               |                 | ---                   |
|                | 350°C                      | E32-D611-S 2M | 630                   | 270           | 180             | 54                    |
|                |                            | E32-D61-S 2M  |                       |               |                 |                       |
|                | 400°C                      | E32-D73-S 2M  | 420                   | 180           | 120             | 36                    |

\*1. The fiber length is 2 m on each side, so the sensing distance is given as 4,000 mm.

## Area Detection Models

| Sensing method | Type  | Sensing width | Model        | Sensing distance (mm) |               |                 |                       |
|----------------|-------|---------------|--------------|-----------------------|---------------|-----------------|-----------------------|
|                |       |               |              | Giga mode             | Standard mode | High-speed mode | Super-high-speed mode |
| Through-beam   | Area  | 11 mm         | E32-T16PR 2M | 4,000*1               | 2,550         | 1,680           | 440                   |
|                |       |               | E32-T16JR 2M | 4,000*1               | 2,250         | 1,440           | 380                   |
|                |       | 30 mm         | E32-T16WR 2M | 4,000*1               | 3,900         | 2,550           | 680                   |
| Reflective     | Array | 11 mm         | E32-D36P1 2M | 1,050                 | 450           | 300             | 90                    |

\*1. The fiber length is 2 m on each side, so the sensing distance is given as 4,000 mm.

## Liquid-level Detection Models

| Sensing method                              | Tube diameter        | Feature                            | Model        | Sensing distance (mm)                                                                                      |               |                 |                       |
|---------------------------------------------|----------------------|------------------------------------|--------------|------------------------------------------------------------------------------------------------------------|---------------|-----------------|-----------------------|
|                                             |                      |                                    |              | Giga mode                                                                                                  | Standard mode | High-speed mode | Super-high-speed mode |
| Tube-mounting                               | 3.2, 6.4, or 9.5 dia | Stable residual quantity detection | E32-A01 5M   | Applicable tube: Transparent tube with a diameter of 3.2, 6.4, or 9.5 mm, Recommended wall thickness: 1 mm |               |                 |                       |
|                                             | 8 to 10 dia          | Mounting at multiple levels        | E32-L25T 2M  | Applicable tube: Transparent tube with a diameter of 8 to 10 mm, Recommended wall thickness: 1 mm          |               |                 |                       |
|                                             | No restrictions      | Large tubes                        | E32-D36T 5M  | Applicable tube: Transparent tube (no restrictions on diameter)                                            |               |                 |                       |
| Liquid contact (heat-resistant up to 200°C) | ---                  | ---                                | E32-D82F1 4M | Liquid-contact type                                                                                        |               |                 |                       |

## Vacuum-resistant Models

| Sensing method | Heat-resistant temperature | Model                 | Sensing distance (mm) |               |                 |                       |
|----------------|----------------------------|-----------------------|-----------------------|---------------|-----------------|-----------------------|
|                |                            |                       | Giga mode             | Standard mode | High-speed mode | Super-high-speed mode |
| Through-beam   | 120°C                      | E32-T51V 1M           | 1,080                 | 600           | 390             | 100                   |
|                |                            | E32-T51V 1M + E39-F1V | 2,000*1               | 2,000*1       | 2,000*1         | 520                   |
|                | 200°C                      | E32-T84SV 1M          | 2,000*1               | 1,420         | 960             | 260                   |

\*1. The fiber length is 1 m on each side, so the sensing distance is given as 2,000 mm.

## Models for FPD, Semiconductors, and Solar Cells

| Sensing method                | Application                                            | Operating temperature | Model                                                                                                                                                  | Sensing distance (mm)                                                                                                                                  |               |                 |                       |
|-------------------------------|--------------------------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------|-----------------------|
|                               |                                                        |                       |                                                                                                                                                        | Giga mode                                                                                                                                              | Standard mode | High-speed mode | Super-high-speed mode |
| Limited-reflective            | Glass presence detection                               | 70°C                  | E32-L16-N 2M                                                                                                                                           | 0 to 15                                                                                                                                                |               |                 | 0 to 12               |
|                               | Glass substrate alignment                              |                       | E32-A08 2M                                                                                                                                             | 10 to 20                                                                                                                                               |               | ---             |                       |
|                               |                                                        | 300°C                 | E32-A08H2 3M                                                                                                                                           |                                                                                                                                                        |               |                 |                       |
|                               | Glass substrate mapping                                | 70°C                  | E32-A12 2M                                                                                                                                             | 12 to 30                                                                                                                                               |               | ---             |                       |
|                               |                                                        | 300°C                 | E32-A09 2M                                                                                                                                             | 15 to 38                                                                                                                                               |               | ---             |                       |
|                               |                                                        |                       | E32-A09H2 2M                                                                                                                                           | 20 to 30 (center 25)                                                                                                                                   |               | ---             |                       |
|                               | Wet processes: Cleaning, Resist developing and etching | 60°C                  | E32-L11FP 5M                                                                                                                                           | 8 to 20 mm from tip of lens (Recommended sensing distance: 11 mm),<br>19 to 31 mm from center of mounting hole A (Recommended sensing distance: 22 mm) |               |                 |                       |
| Wet process: Resist stripping | 85°C                                                   | E32-L11FS 5M          | 8 to 20 mm from tip of lens (Recommended sensing distance: 11 mm),<br>32 to 44 mm from center of mounting hole A (Recommended sensing distance: 35 mm) |                                                                                                                                                        |               |                 |                       |
| Through-beam                  | Wafer mapping                                          | 70°C                  | E32-A03 2M                                                                                                                                             | 4,000*1                                                                                                                                                | 2,670         | 1,800           | 500                   |
|                               |                                                        |                       | E32-A03-1 2M                                                                                                                                           |                                                                                                                                                        |               |                 |                       |
|                               |                                                        |                       | E32-A04 2M                                                                                                                                             | 1,920                                                                                                                                                  | 1,020         | 670             | 200                   |
|                               |                                                        |                       | E32-T24SR 2M                                                                                                                                           | 4,000*1                                                                                                                                                | 3,300         | 2,190           | 580                   |
|                               |                                                        |                       | E32-T24S 2M                                                                                                                                            | 4,000*1                                                                                                                                                | 3,900         | 2,610           | 700                   |

\*1. The fiber length is 2 m on each side, so the sensing distance is given as 4,000 mm.

I/O Circuit Diagrams

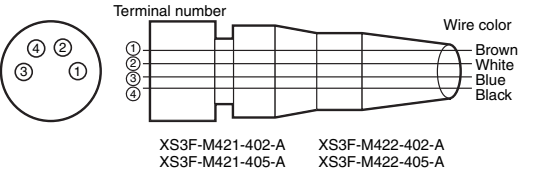
NPN Output

| Model                    | Operation mode | Timing chart | L/D indicator | Output circuit |
|--------------------------|----------------|--------------|---------------|----------------|
| E3NX-FA11<br>E3NX-FA6    | Light-ON       |              |               |                |
|                          | Dark-ON        |              |               |                |
| E3NX-FA21                | Light-ON       |              |               |                |
|                          | Dark-ON        |              |               |                |
| E3NX-FA7<br>E3NX-FA24    | Light-ON       |              |               |                |
|                          | Dark-ON        |              |               |                |
| E3NX-FA7TW<br>E3NX-FA7TW | Light-ON       |              |               |                |
|                          | Dark-ON        |              |               |                |

PNP Output

| Model                     | Operation mode | Timing chart                                                                                                                                                                                                                                                                                                                                                  | L/D indicator                                                                       | Output circuit |
|---------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------|
| E3NX-FA41<br>E3NX-FA8     | Light-ON       | <div>Incident light: [High pulse]</div> <div>No incident light: [Low]</div> <div>OUT indicator Lit (orange): [High pulse]</div> <div>Not lit (orange): [Low]</div> <div>Output ON: [High pulse]</div> <div>transistor OFF: [Low]</div> <div>Load Operate (e.g., relay) Reset: [High pulse]</div> <div>(Between blue and black leads)</div>                    |    |                |
|                           | Dark-ON        | <div>Incident light: [Low]</div> <div>No incident light: [High pulse]</div> <div>OUT indicator Lit (orange): [High pulse]</div> <div>Not lit (orange): [Low]</div> <div>Output ON: [High pulse]</div> <div>transistor OFF: [Low]</div> <div>Load Operate (e.g., relay) Reset: [High pulse]</div> <div>(Between blue and black leads)</div>                    |    |                |
| E3NX-FA51                 | Light-ON       | <div>ch1/ Incident light: [High pulse]</div> <div>ch2 No incident light: [Low]</div> <div>OUT indicator Lit (orange): [High pulse]</div> <div>Not lit (orange): [Low]</div> <div>Output ON: [High pulse]</div> <div>transistor OFF: [Low]</div> <div>Load Operate (e.g., relay) Reset: [High pulse]</div> <div>(Between blue and black (orange) leads)</div>  |    |                |
|                           | Dark-ON        | <div>ch1/ Incident light: [Low]</div> <div>ch2 No incident light: [High pulse]</div> <div>OUT indicator Lit (orange): [High pulse]</div> <div>Not lit (orange): [Low]</div> <div>Outputs ON: [High pulse]</div> <div>transistor OFF: [Low]</div> <div>Load Operate (e.g., relay) Reset: [High pulse]</div> <div>(Between blue and black (orange) leads)</div> |    |                |
| E3NX-FA9<br>E3NX-FA54     | Light-ON       | <div>Incident light: [High pulse]</div> <div>No incident light: [Low]</div> <div>OUT indicator Lit (orange): [High pulse]</div> <div>Not lit (orange): [Low]</div> <div>Output ON: [High pulse]</div> <div>transistor OFF: [Low]</div> <div>Load Operate (e.g., relay) Reset: [High pulse]</div> <div>(Between blue and black leads)</div>                    |  |                |
|                           | Dark-ON        | <div>Incident light: [Low]</div> <div>No incident light: [High pulse]</div> <div>OUT indicator Lit (orange): [High pulse]</div> <div>Not lit (orange): [Low]</div> <div>Output ON: [High pulse]</div> <div>transistor OFF: [Low]</div> <div>Load Operate (e.g., relay) Reset: [High pulse]</div> <div>(Between blue and black leads)</div>                    |  |                |
| E3NX-FA9TW<br>E3NX-FA54TW | Light-ON       | <div>ch1/ Incident light: [High pulse]</div> <div>ch2 No incident light: [Low]</div> <div>OUT indicator Lit (orange): [High pulse]</div> <div>Not lit (orange): [Low]</div> <div>Output ON: [High pulse]</div> <div>transistor OFF: [Low]</div> <div>Load Operate (e.g., relay) Reset: [High pulse]</div> <div>(Between blue and black (orange) leads)</div>  |  |                |
|                           | Dark-ON        | <div>ch1/ Incident light: [Low]</div> <div>ch2 No incident light: [High pulse]</div> <div>OUT indicator Lit (orange): [High pulse]</div> <div>Not lit (orange): [Low]</div> <div>Outputs ON: [High pulse]</div> <div>transistor OFF: [Low]</div> <div>Load Operate (e.g., relay) Reset: [High pulse]</div> <div>(Between blue and black (orange) leads)</div> |  |                |

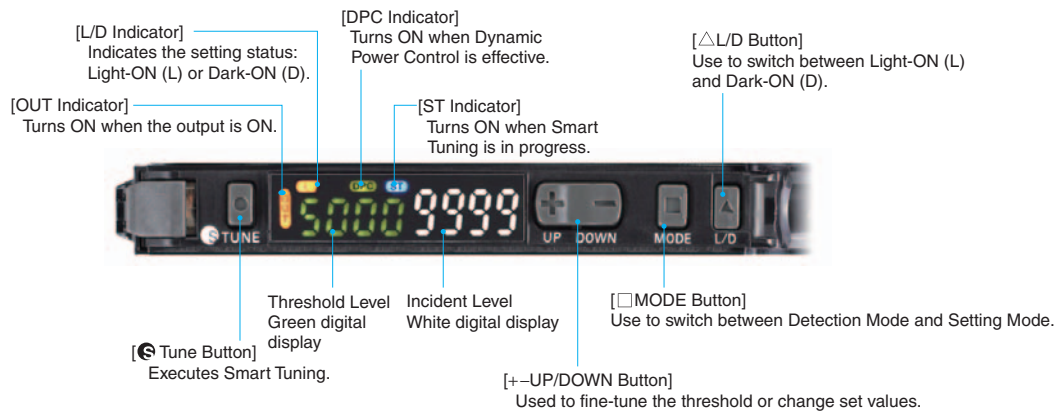
Plug (Sensor I/O Connector)



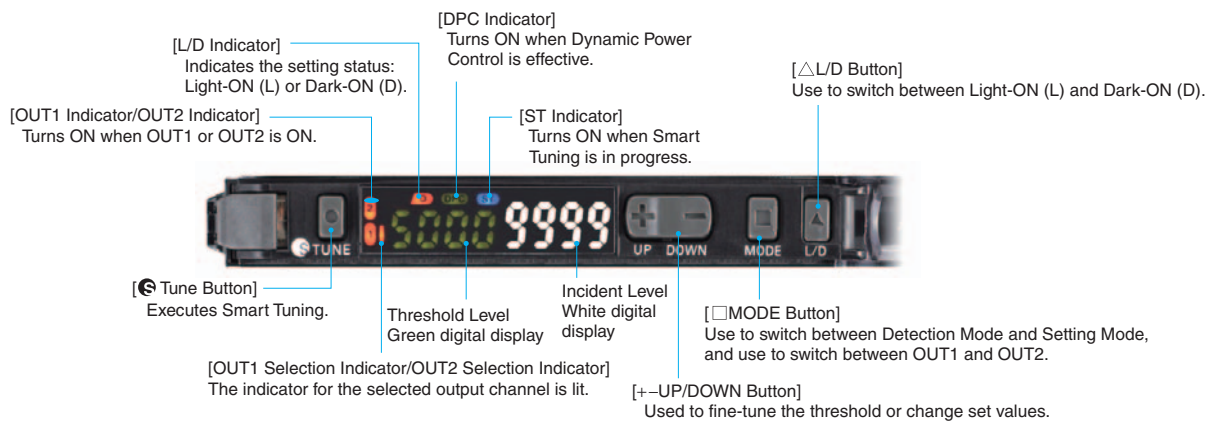
| Wire color | Connection pin | Application             |
|------------|----------------|-------------------------|
| Brown      | 1              | Power supply (+V)       |
| White      | 2              | External input / Output |
| Blue       | 3              | Power supply (0 V)      |
| Black      | 4              | Output                  |

## Nomenclature

### E3NX-FA11/FA41/FA6/FA8/FA7/FA9/FA24/FA54



### E3NX-FA21/FA51/FA7TW/FA9TW/FA54TW/FA0



## Safety Precautions

To ensure safe operation, be sure to read and follow the Instruction Manual provided with the Sensor.

### WARNING

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



Do not use the product with voltage in excess of the rated voltage. Excess voltage may result in malfunction or fire.



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



### Precautions for Safe Use

The following precautions must be observed to ensure safe operation of the Amplifier Unit. Doing so may cause damage or fire.

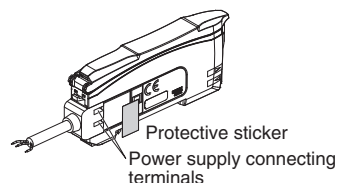
- Do not install the product in the following locations.
  - Locations subject to direct sunlight
  - Locations subject to condensation due to high humidity
  - Locations subject to corrosive gas
  - Locations subject to vibration or mechanical shocks exceeding the rated values
  - Locations subject to exposure to water, oil, chemicals
  - Locations subject to stream
  - Locations subjected to strong magnetic field or electric field
- Do not use the product in environments subject to flammable or explosive gases.
- Do not use the product in any atmosphere or environment that exceeds the ratings.
- To secure the safety of operation and maintenance, do not install the product close to high-voltage devices and power devices.
- High-voltage lines and power lines must be wired separately from the product. Wiring them together or placing them in the same duct may cause induction, resulting in malfunction or damage.
- Do not apply any load exceeding the ratings. Otherwise, damage or fire may result.
- Do not short the load. Otherwise, damage or fire may result.
- Connect the load correctly.
- Do not miswire such as the polarity of the power supply.
- Do not use the product if the case is damaged.
- Burn injury may occur. The product surface temperature rises depending on application conditions, such as the ambient temperature and the power supply voltage. Attention must be paid during operation or cleaning.
- When setting the sensor, be sure to check safety such as by stopping the equipment.
- Be sure to turn off the power supply before connecting or disconnecting wires.
- Do not attempt to disassemble, repair, or modify the product in any way.
- When disposing of the product, treat it as industrial waste.
- Do not use the Sensor in water, rainfall, or outdoors.
- UL Standard Certification (Applicable Models: E3NX-FA11/21/41/51 Only)
 

Only the sensors with Enhanced UL Certification Mark are certified by UL. They are intended to be supplied by a "Class 2 circuit". When used in United States and Canada, Please use the same Class 2 source for input and output. The overcurrent protection current rating is 2A max. They were evaluated as Open type and shall be installed within a enclosure.

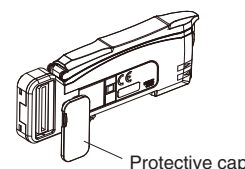
### Precautions for Correct Use

- Be sure to mount the unit to the DIN track until it clicks.
- When using the Amplifier Units with Wire-saving Connectors, attach the protective stickers (provided with E3X-CN-series Connectors) on the unused power pins to prevent electrical shock and short circuiting. When using the Amplifier Units with Connectors for Communications Units, attach the protective caps (provided with E3NW-series Sensor Communications Unit).

Amplifier Unit with Wire-saving Connector



Amplifier Unit with Connector for Communications Unit



- Use an extension cable with a minimum thickness of 0.3 mm<sup>2</sup> and less than 100 m long.
- Do not apply the forces on the cord exceeding the following limits: Pull: 40N; torque: 0.1N·m; pressure: 20N; bending: 29.4N
- Do not apply excessive force such as tension, compression or torsion to the Amplifier Unit with the Fiber Unit fixed to the Amplifier Unit.
- Always keep the protective cover in place when using the Amplifier Unit. Not doing so may cause malfunction.
- It may take time until the received light intensity and measured value become stable immediately after the power is turned on depending on use environment.
- The product is ready to operate 200 ms after the power supply is turned ON.
- The Mobile Console E3X-MC11, E3X-MC11-SV2 and E3X-MC11-S cannot be connected.
- The mutual interference prevention function does not work when in combination with E3C/E2C/E3X.
- If the unit receives excessive sensor light, the mutual interference prevention function may not work properly, resulting in malfunction of the unit. In such case, increase the threshold.
- Standard models and Advanced models  
The Sensor Communication Unit E3X-DRT21-S, E3X-CRT, E3X-ECT and E3NW cannot be connected.  
Model for Sensor Communication Unit (E3NX-FA0)  
The Sensor Communication Unit E3NW can be connected.  
E3X-DRT21-S, E3X-CRT, E3X-ECT cannot be connected.
- If you notice an abnormal condition such as a strange odor, extreme heating of the unit, or smoke immediately stop using the product, turn off the power, and consult your dealer.
- Do not use thinner, benzene, acetone, and lamp oil for cleaning.

## Dimensions

### Fiber Amplifier Units

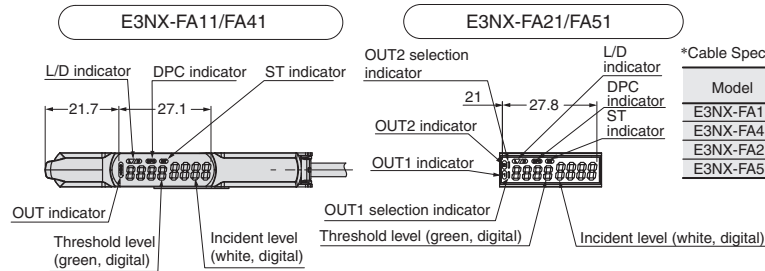
#### Pre-wired Amplifier Units

E3NX-FA11

E3NX-FA21

E3NX-FA41

E3NX-FA51

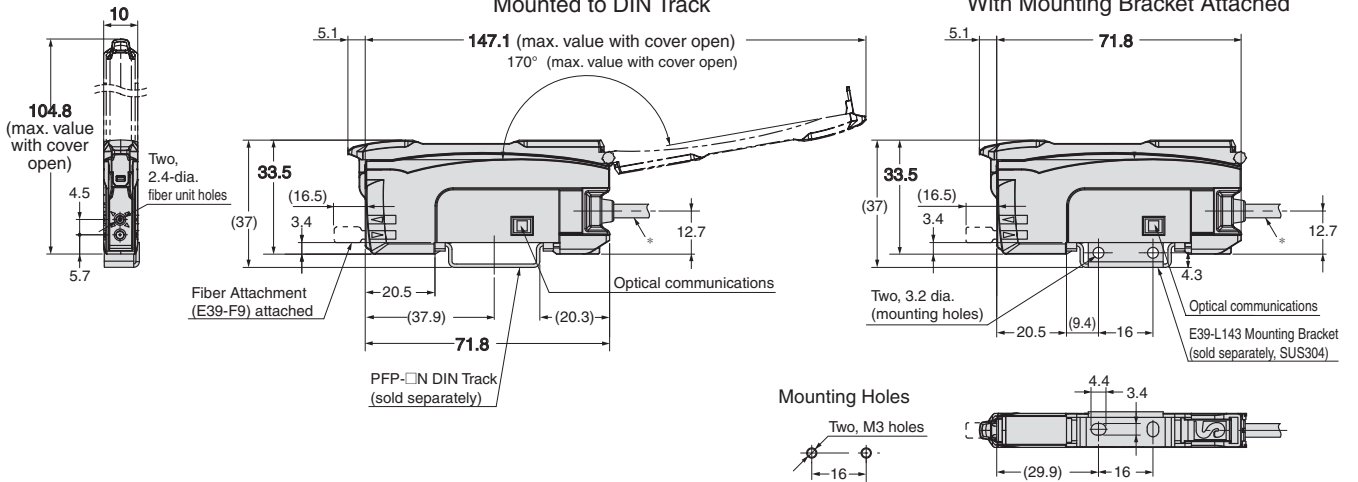


\*Cable Specifications

| Model     | Outer diameter | No. of conductors | Others                                       |
|-----------|----------------|-------------------|----------------------------------------------|
| E3NX-FA11 | 4.0 dia.       | 3                 | Conductor cross-section: 0.2 mm <sup>2</sup> |
| E3NX-FA41 | 4.0 dia.       | 3                 | Insulator dia.: 0.9 mm                       |
| E3NX-FA21 | 4.0 dia.       | 5                 | Standard cable length: 2 m                   |
| E3NX-FA51 | 4.0 dia.       | 5                 | Minimum bending radius: 12 mm                |

Mounted to DIN Track

With Mounting Bracket Attached



#### Amplifier Units with Wire-saving Connectors

E3NX-FA6

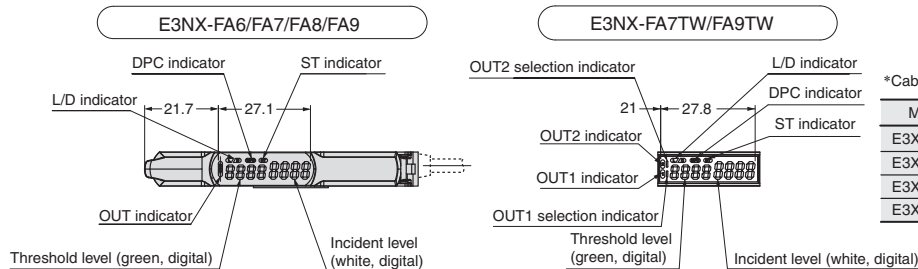
E3NX-FA7

E3NX-FA7TW

E3NX-FA8

E3NX-FA9

E3NX-FA9TW

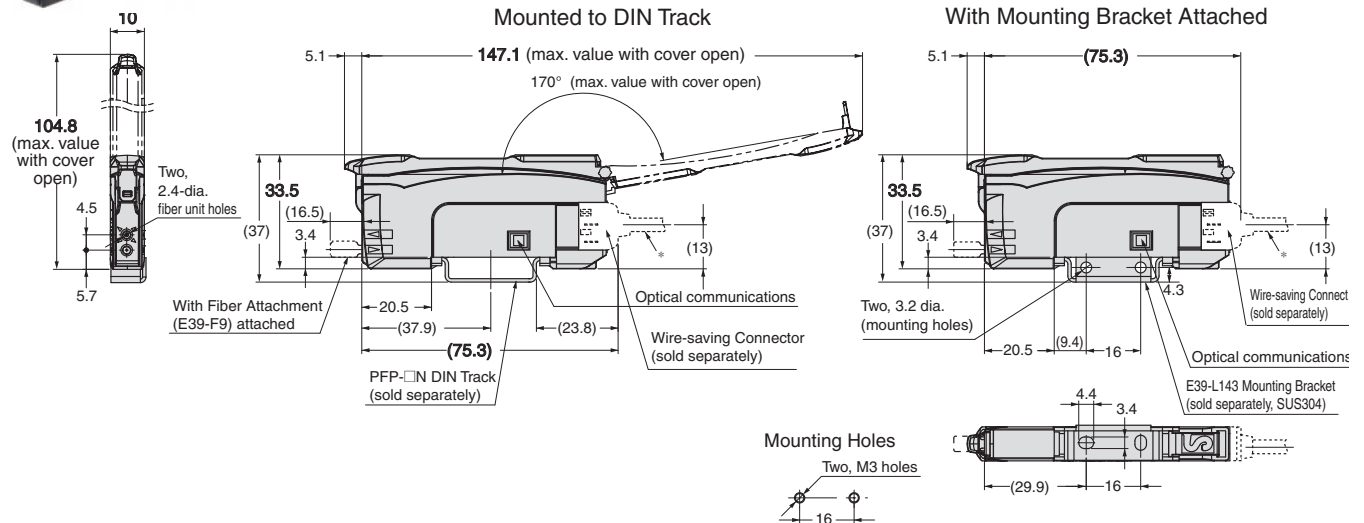


\*Cable Specifications

| Model    | Outer diameter | No. of conductors |
|----------|----------------|-------------------|
| E3X-CN12 | 2.6 dia.       | 1                 |
| E3X-CN22 | 2.6 dia.       | 2                 |
| E3X-CN11 | 4.0 dia.       | 3                 |
| E3X-CN21 | 4.0 dia.       | 4                 |

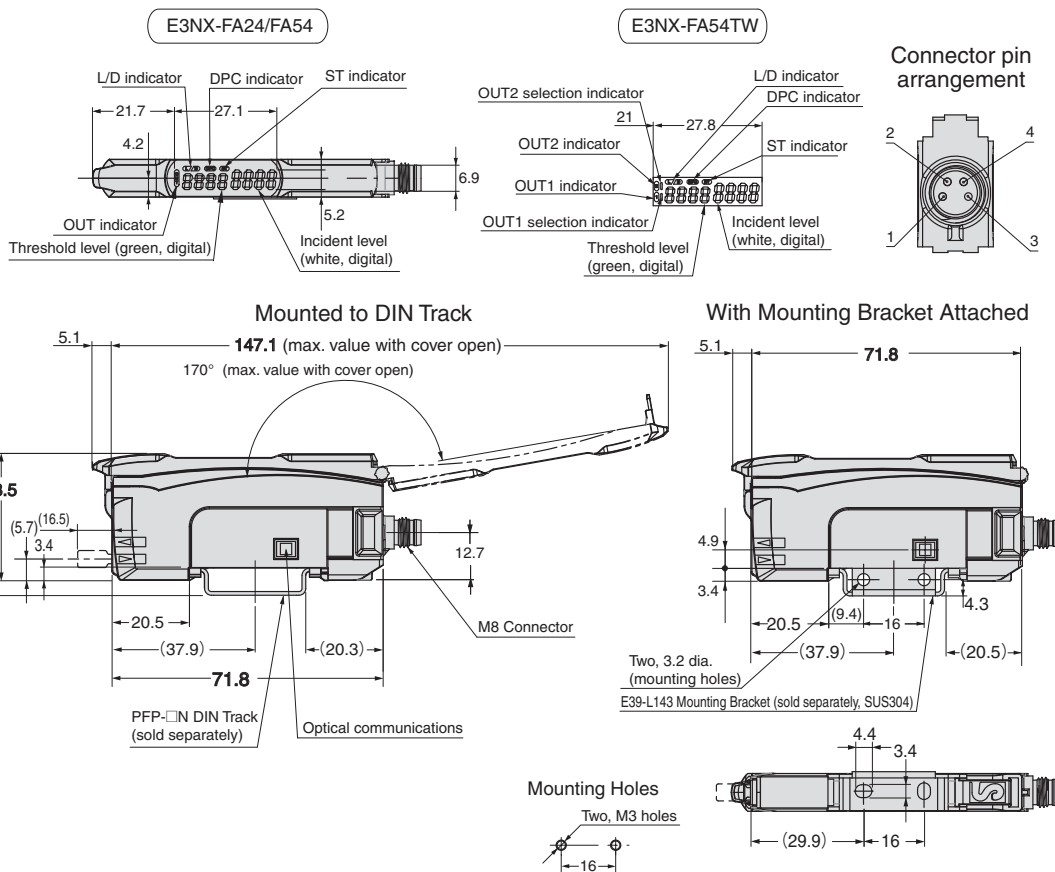
Mounted to DIN Track

With Mounting Bracket Attached



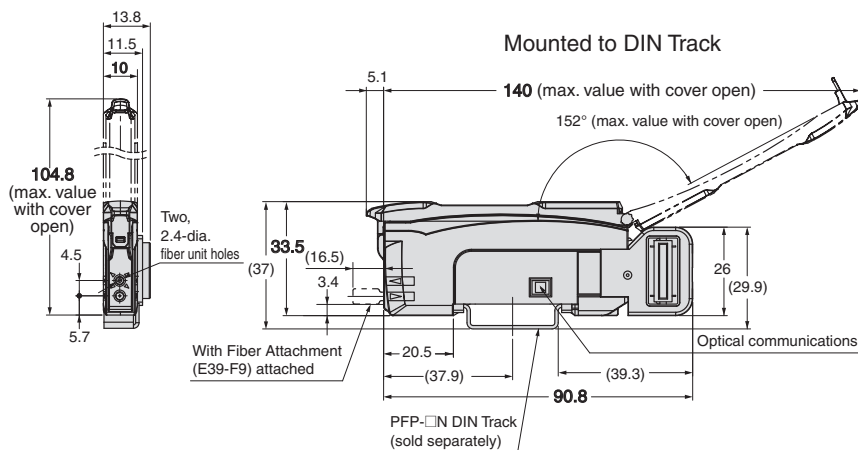
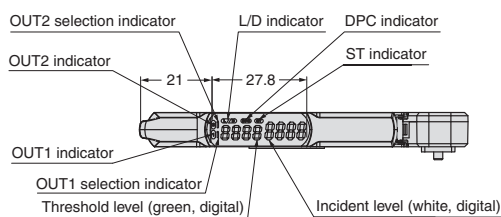
# Amplifier Units with M8 Connectors

E3NX-FA24  
E3NX-FA54  
E3NX-FA54TW



# Amplifier Unit with Connector for Sensor Communications Unit

E3NX-FA0



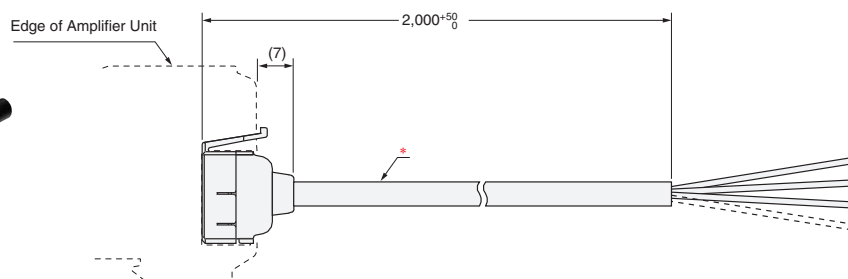
## Accessories (Sold Separately)

### Wire-saving Connectors

#### Master Connector

E3X-CN11

E3X-CN21

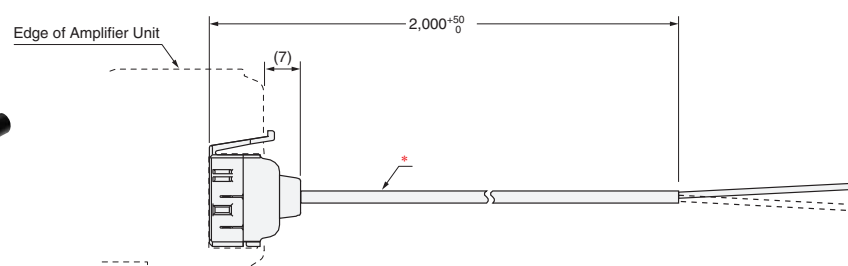


\* E3X-CN11: 4-dia. cable with 3 conductors, Standard cable length: 2 m (Conductor cross-section: 0.2 mm<sup>2</sup> (AWG24), Insulator diameter: 1.1 mm)  
 E3X-CN21: 4-dia. cable with 4 conductors, Standard cable length: 2 m (Conductor cross-section: 0.2 mm<sup>2</sup> (AWG24), Insulator diameter: 1.1 mm)

#### Slave Connector

E3X-CN12

E3X-CN22

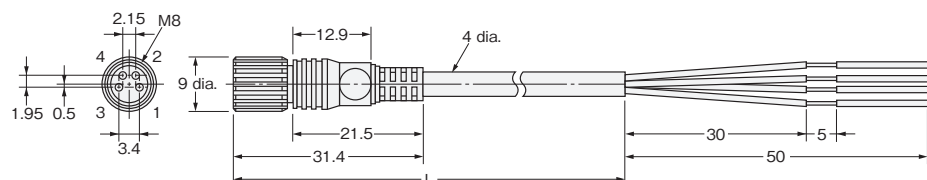


\* E3X-CN12: 2.6-dia. cable with 1 conductor, Standard cable length: 2 m (Conductor cross-section: 0.2 mm<sup>2</sup> (AWG24), Insulator diameter: 1.1 mm)  
 E3X-CN22: 4-dia. cable with 2 conductors, Standard cable length: 2 m (Conductor cross-section: 0.2 mm<sup>2</sup> (AWG24), Insulator diameter: 1.1 mm)

### Sensor I/O Connectors

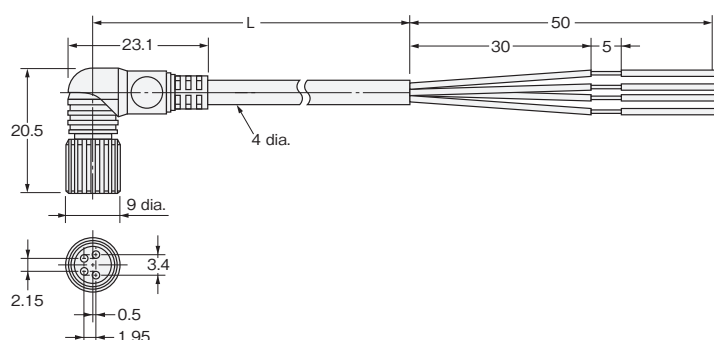
#### Straight

XS3F-M421-40□-A

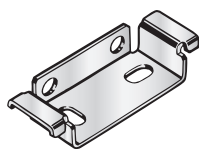


#### L-shaped

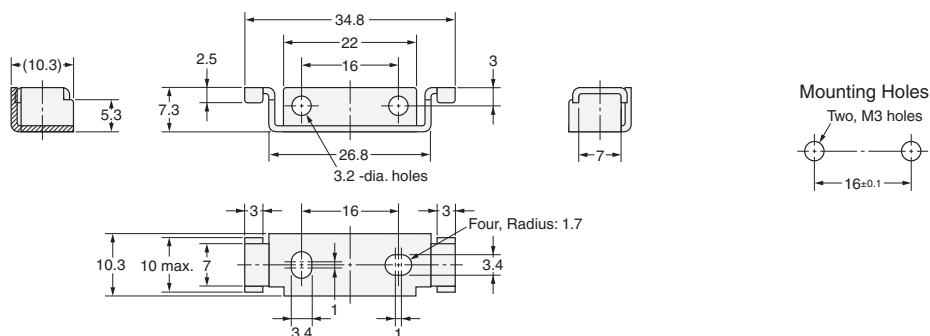
XS3F-M422-40□-A



## Mounting Bracket E39-L143



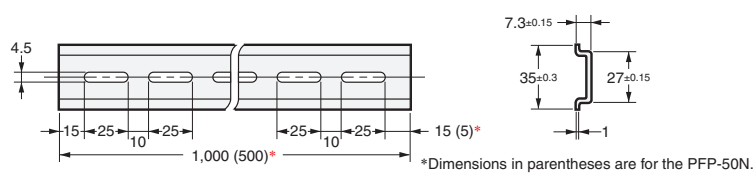
Material: Stainless steel (SUS304)



## DIN Track PFP-100N PFP-50N



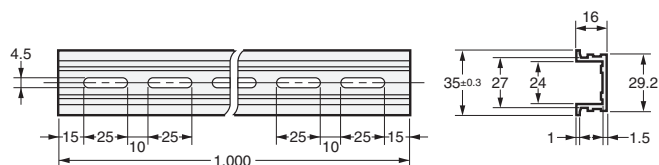
Material: Aluminum



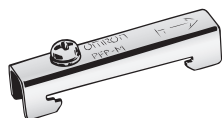
## PFP-100N2



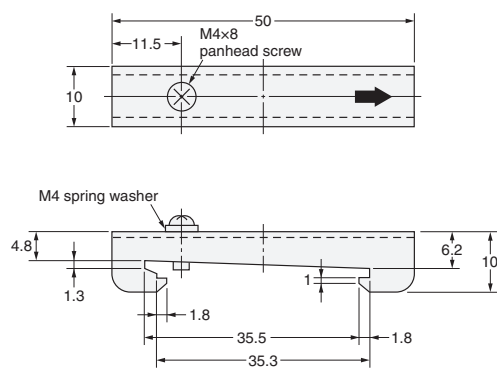
Material: Aluminum



## End Plate PFP-M



Materials: Iron, zinc plating



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