

Color Fiber Amplifier Unit E3NX-CA

High Color Discrimination Capability with the Same Easy Operation as Previous Fiber Amplifier Units.



- Detects subtle color differences.
- The new white LED optic system increases the light intensity and the low-noise circuit in the Smart Fiber Amplifier Unit provides superb detection capability.
- Handles glossy workpieces.
- Smart Tuning lets you set the optimum sensitivity for detection with one simple operation.
- IoT compatible.
- The detected RGB data can be displayed on the Amplifier Unit, and the Amplifier Unit for communications can transfer this data to the host in realtime.
- Connect an existing E32-Series general-purpose fiber unit, over 100 to choose from.







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

 Refer to *Safety Precautions* on page 30.

Ordering Information



Fiber Amplifier Units (Refer to *Dimensions* on pages 31 and 32.)

| Type | Appearance | Connecting method | Inputs/outputs | Model | |
|--|---|--|---------------------|---------------------|---------------------|
| | | | | NPN output | PNP output |
| Standard models |  | Pre-wired (2 m) | 1 output | E3NX-CA11 2M | E3NX-CA41 2M |
| |  | Wire-saving Connector | 1 output | E3NX-CA6 | E3NX-CA8 |
| Advanced models |  | Pre-wired (2 m) | 2 outputs + 1 input | E3NX-CA21 2M | E3NX-CA51 2M |
| Model for Sensor Communications Unit * |  | Connector for Sensor Communications Unit | --- | E3NX-CA0 | |

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

Note: Refer to your OMRON website for details on models with wire-saving connectors.

Fiber Units (Refer to *Dimensions* on page 32.)



| Sensing method | Appearance | Sensing direction | Size | Model |
|-----------------------------|---|-------------------|-------|--------------------|
| Reflective |  | Right-angle | M6 | E32-C91N 2M |
| Through-beam (Grooved type) |  | Array | 10 mm | E32-G16 2M |

Note: Refer to *Fiber Units* on your OMRON website or to the *Fiber Sensor Best Selection Catalog* (Cat. No. E418-E1) for details on Fiber Units.

Accessories (Sold Separately)

Wire-saving Connectors (Required for models for Wire-saving Connectors.) (Refer to Dimensions on page 33.)


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 | 3 | E3X-CN11 | E3NX-CA6 E3NX-CA8 |
| Slave Connector |  | | 1 | E3X-CN12 | |

Note: Models are also available with a 5-m cable. The model names have the suffix 5M. Ask your OMRON representative for delivery times.


Mounting Bracket (Refer to Dimensions on page 33.)

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 Tracks (Refer to Dimensions on page 34.)

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 | |

Note: Refer to PFP-□ on your OMRON website for details.

End Plate (Refer to Dimensions on page 34.)

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 |

Note: Refer to PFP-M on your OMRON website for details.

Related Products

Sensor Communications Units

| Type | Appearance | Model |
|---|---|----------|
| Sensor Communications Unit for EtherCAT |  | E3NW-ECT |
| Distributed Sensor Unit * |  | E3NW-DS |

Note: Refer to your OMRON website for details.

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

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Ratings and Specifications

| Item | Type | Standard models | | Advanced models | Model for Sensor Communications Unit *1 | |
|--|--------------------------------|---|-----------|--|---|----------|
| | | NPN output | E3NX-CA11 | E3NX-CA6 | E3NX-CA21 | E3NX-CA0 |
| | | PNP output | E3NX-CA41 | E3NX-CA8 | E3NX-CA51 | |
| Connecting method | Pre-wired | Wire-saving Connector | Pre-wired | Connector for Sensor Communications Unit | | |
| I/O | Outputs | 1 output | | 2 outputs | --- *3 | |
| | External input | --- | | 1 input *2 | | |
| Light source (wavelength) | | White LED (420 to 700 nm) | | | | |
| Supply voltage | | 10 to 30 VDC, including 10% ripple (p-p) | | | Supplied from the connector through the Sensor Communications Unit. | |
| Power consumption *4 | | At Power Supply Voltage of 24 VDC Normal mode: 960 mW max. (Current consumption: 65 mA max.) Eco function ON: 720 mW max. (Current consumption: 30 mA max.) Eco function LO: 800 mW max. (Current consumption: 33 mA max.) | | | | |
| Control output | | Load power supply voltage: 30 VDC max., open-collector output Load current: Groups of 1 to 3 Amplifiers: 100 mA max., Groups of 4 to 30 Amplifiers: 20 mA max. (Residual voltage: At load current of less than 10 mA: 1 V max. At load current of 10 to 100 mA: 2 V max.) OFF current: 0.1 mA max. | | | --- | |
| Indications | | 7-segment displays (Sub digital display: green, Main digital display: white) Display direction: Switchable between normal and reversed. OUT indicator (orange), NO/NC indicator (orange), Smart Tuning indicator (blue), and OUT selection indicator (orange, only on models with 2 outputs) | | | | |
| Protection circuits | | Power supply reverse polarity protection, output short-circuit protection, and output reverse polarity protection | | | Power supply reverse polarity protection | |
| Sensing method | | Contrast Mode: Light intensity discrimination for RGB (initial state/after 2-point tuning) (R+G+B light intensity discrimination for 1-point tuning) Color Mode: RGB ratio discrimination | | | | |
| Response time | Super-high-speed Mode (SHS) *5 | Operate or reset: 50 μs (only in Contrast Mode) | | | | |
| | 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 autotuning, or 1-point tuning (1% to 99%)) or manual adjustment | | | | |
| Maximum connectable Units | | 30 Units | | | 30 Units (When connected to OMRON NJ-series Unit) | |
| No. of Units for mutual interference prevention *6 | Super-high-speed Mode (SHS) *5 | --- | | | | |
| | High-speed Mode (HS) | 10 Units | | | | |
| | Standard Mode (Std) | 10 Units | | | | |
| | Giga-power Mode (GIGA) | 10 Units | | | | |

*1. The E3NW-ECT Sensor Communications Unit can be used, but the E3NW-CRT/CCL, E3X-DRT21-S, and E3X-CRT/ECT Sensor Communications Units cannot be used.

*2. The following details apply to the input.

| | Contact input (relay or switch) | Non-contact input (transistor) |
|-----|--|--|
| NPN | ON: Shorted to 0 V (Sourcing current: 2 mA max.) OFF: Open or shorted to Vcc. | ON: 1.5 V max. (Sourcing current: 2 mA max.) OFF: Vcc - 1.5 V to Vcc (Leakage current: 0.1 mA max.) |
| PNP | ON: Shorted to Vcc (Sinking current: 3 mA max.) OFF: Open or shorted to 0 V. | ON: Vcc - 1.5 V to Vcc (sinking current: 3 mA max.) OFF: 1.5 V max. (Leakage current: 0.1 mA max.) |

*3. 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.

*4. Power consumption

At Power Supply Voltage of 10 to 30 VDC

Normal mode: 1,080 mW max. (Current consumption: 36 mA max. at 30 VDC, 74 mA max. at 10 VDC)

Eco function ON: 840 mW max. (Current consumption: 28 mA max. at 30 VDC, 50 mA max. at 10 VDC)

Eco function LO: 930 mW max. (Current consumption: 31 mA max. at 30 VDC, 55 mA max. at 10 VDC)

*5. The mutual interference prevention function is disabled if the detection mode is set to Super-high-speed Mode.

*6. The tuning will not change the number of units.

The least unit count among the mutual interference prevention units of E3NX and E3NC.

Check the mutual interference prevention unit count and response speed of each model.


| Item | Type | Standard models | | Advanced models | Model for Sensor Communications Unit *1 |
|--------------------------------------|--|---|---|--|---|
| | NPN output | E3NX-CA11 | E3NX-CA6 | E3NX-CA21 | E3NX-CA0 |
| | PNP output | E3NX-CA41 | E3NX-CA8 | E3NX-CA51 | |
| Connecting method | Pre-wired | Wire-saving Connector | Pre-wired | Connector for Sensor Communications Unit | |
| Functions | Operation mode | Contrast Mode: NO (Light-ON) or NC (Dark-ON) Color Mode: NO (ON for match: ON for same color as registered color) or NC (ON for mismatch: ON for different color from registered color) | | | |
| | Timer | Select from timer disabled, OFF-delay, ON-delay, one-shot, or ON-delay + OFF-delay timer (Counted by 0.1 s in a range of 0.1 to 0.5 ms, by 0.5 ms for 0.5 to 5 ms, and by 1 ms for 5 to 9999 ms. Default: 10 ms, Error: 0.1 ms) | | | |
| | Zero reset | Contrast Mode only Negative values can be displayed. (Threshold level is shifted.) | | | |
| | Resetting settings *7 | Select from initial reset (factory defaults), user reset (saved settings), or bank reset. | | | |
| | Eco mode | 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 8. | | | |
| | Power tuning level | Set from 100 to 9,999. (The RGB maximum incident level at Smart Tuning is adjusted to the power tuning level.) | | | |
| | Output 2 | --- | Normal, error output, AND output, or OR output | | --- |
| | External input | --- | Select from input OFF, tuning, full-auto tuning, emission OFF, bank 1 and 2 switching, bank 1 through 8 switching, or zero reset. | | --- |
| | Changing the displays | Threshold level and incident level, channel number and incident level, RGB display and incident level, or bank display and incident level | | | |
| Ambient illumination (Receiver side) | Incandescent lamp: 20,000 lx max., Sunlight: 30,000 lx max. | | | | |
| Ambient temperature range | Operating: Groups of 1 or 2 Amplifier Units: -25 to 55°C, Groups of 3 to 10 Amplifier Units: -25 to 50°C, Groups of 11 to 16 Amplifier Units: -25 to 45°C, Groups of 17 to 30 Amplifier Units: -25 to 40°C Storage: -30 to 70°C (with no icing or condensation) | | | Operating: Groups of 1 or 2 Amplifier Units: 0 to 55°C, Groups of 3 to 10 Amplifier Units: 0 to 50°C, Groups of 11 to 16 Amplifier Units: 0 to 45°C, Groups of 17 to 30 Amplifier Units: 0 to 40°C Storage: -30 to 70°C (with no icing or condensation) | |
| Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) within the surrounding air temperature range shown above | | | | |
| 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 minute | | | | |
| Vibration resistance | 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/s ² for 3 times each in X, Y, and Z directions | | | 150 m/s ² for 3 times each in X, Y, and Z directions | |
| Weight (packed state/Sensor only) | Approx. 115 g/ approx. 75 g | Approx. 60g/ approx. 20g | Approx. 115 g/approx. 75 g | | Approx. 65 g/approx. 25 g |
| Materials | Case | Polycarbonate (PC) | | | |
| | Cover | Polycarbonate (PC) | | | |
| | Cable covering | Polyvinyl chloride (PVC) | | | --- |
| Accessories | Instruction manual | | | | |

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


Sensing Distances

Specifications

Hex-shaped Models

| Type | | | Appearance (mm) | Bending radius of cable (mm) | Sensing distance (mm) | | | | | | | | Optical axis diameter (minimum sensing object) (mm) | Model |
|----------------|------|----------------|---|------------------------------|-----------------------|----|----|-----|-------------------------|----|----|-----|---|-------------|
| Sensing method | Size | Aperture angle | | | White paper | | | | 12-color discrimination | | | | | |
| | | | | | GIGA | ST | HS | SHS | GIGA | ST | HS | SHS | | |
| Reflective | M6 | 60° |  | Flexible, R4 | 90 | 45 | 30 | 13 | 18 | 9 | 6 | 4 | (0.05 dia.) | E32-C91N 2M |

Through-beam Models (Grooved Type)

| Type | Sensing width | Appearance (mm) | Bending radius of cable (mm) | Sensing distance (mm) | | | | | | | | Model |
|-------|---------------|---|------------------------------|-----------------------|----|----|-----|--------------------|----|----|-----|------------|
| | | | | Opaque object | | | | Translucent object | | | | |
| | | | | GIGA | ST | HS | SHS | GIGA | ST | HS | SHS | |
| Array | 10 mm |  | R5 | 10 | | | | | | | | E32-G16 2M |

Installation Information

| Model | Installation | | | Cable | | | | | | | Weight (packed state) |
|-------------|---------------------|-------------------|--------------------------|---------------------|------------------------|------------------|-----------------|---------------|----------------------------------|------|-----------------------|
| | Ambient temperature | Tightening torque | Mounting hole | Bending radius (mm) | Unbendable length (mm) | Tensile strength | Sheath material | Core material | Emitter/receiver differentiation | | |
| E32-C91N 2M | -40 to 70°C | 0.98 N·m | 6.2 ^{+0.5} dia. | R4 | 0 | 29.4 N | Polyethylene | Plastic | White line on emitter cable | 36 g | |
| E32-G16 2M | -40 to 70°C | 0.53 N·m | --- | R5 | 0 * | 29.4 N | Polyethylene | Plastic | --- | 51 g | |

* The bending radius of the protective cover (PVC, 25 mm) is 10 mm min.

Hex-shaped Models

| Sensing method | Size | Aperture angle | Model | Sensing distance (mm) | | | | | | | |
|---|------|----------------|--|--|-------------|------------|------------------|--|----------|------------|---------------------|
| | | | | Reflective: White paper, Through-beam: Opaque object | | | | Reflective: 12-color discrimination, Through-beam: Translucent object *1 | | | |
| | | | | GIGA | Standard | High-speed | Super-high-speed | GIGA | Standard | High-speed | Super-high-speed *2 |
| Through-beam | M4 | 15° | E32-LT11N 2M (Built-in Lens) | 980 | 510 | 350 | 140 | 190 | 100 | 70 | 44 |
| | | | E32-T11N 2M | 300 | 150 | 100 | 45 | 60 | 31 | 21 | 13 |
| Reflective | M3 | 60° | E32-C21N 2M | 54 | 27 | 18 | 7 | 10 | 5 | 3.6 | 2.6 |
| | | | E32-D21N 2M | 90 | 45 | 30 | 13 | 18 | 9 | 6 | 4 |
| | M6 | 15° | E32-LD11N 2M (Built-in Lens) | 88 | 44 | 29 | 13 | 17 | 8 | 5 | 4 |
| | | | M3 | 60° | E32-C31N 2M | 12 | 6 | 4 | 1.8 | 2.4 | 1.2 |
| | | | | | E32-C11N 2M | 90 | 45 | 30 | 13 | 18 | 9 |
| Retro-reflective for transparent object detection | M6 | 15° | E32-LR11NP 2M (Built-in Lens) + E39-RP1 (Reflector, sold separately) | 370 | 180 | 120 | 55 | 75 | 37 | 25 | 16 |

*1. These sensing distances are recommended to make the most of the detection capabilities of the Sensor.

*2. The Super-high-speed Mode for 12-color discrimination with a Reflective Sensor or for detection of translucent objects with a Through-beam Sensor can be set only in Contrast Mode. The Super-high-speed Mode can not be set in Color Mode.

Threaded Models

| Sensing method | Size | Aperture angle | Model | Sensing distance (mm) | | | | | | | |
|------------------------------|------|----------------|-----------------------------|---|----------|------------|------------------|---|----------|------------|---------------------|
| | | | | Reflective: White paper, Through-beam: Opaque object | | | | Reflective: 12-color discrimination, Through-beam: Translucent object *1 | | | |
| | | | | GIGA | Standard | High-speed | Super-high-speed | GIGA | Standard | High-speed | Super-high-speed *2 |
| Through-beam | M4 | 60° | E32-T11R 2M | 300 | 150 | 100 | 45 | 60 | 31 | 21 | 13 |
| | | 15° | E32-LT11 2M (Built-in Lens) | 1,150 | 600 | 410 | 170 | 230 | 120 | 82 | 52 |
| E32-LT11R 2M (Built-in Lens) | 980 | | 510 | 350 | 140 | 190 | 100 | 70 | 44 | | |
| E32-LD11 2M (Built-in Lens) | 92 | | 46 | 30 | 13 | 18 | 9 | 6 | 4 | | |
| E32-LD11R 2M (Built-in Lens) | 88 | | 44 | 29 | 13 | 17 | 8 | 5 | 4 | | |
| Reflective | M6 | 60° | E32-C31 2M | 37 | 18 | 12 | 5 | 7 | 3.8 | 2.5 | 1.8 |
| | M3 | | E32-D11R 2M | 90 | 45 | 30 | 13 | 18 | 9 | 6 | 4 |
| | M6 | | E32-CC200 2M | 150 | 75 | 50 | 22 | 30 | 15 | 10 | 7 |

Cylindrical Models

| Sensing method | Sensing direction | Size | Model | Sensing distance (mm) | | | | | | | |
|----------------|-------------------|----------|--------------|---|----------|------------|------------------|---|----------|------------|---------------------|
| | | | | Reflective: White paper, Through-beam: Opaque object | | | | Reflective: 12-color discrimination, Through-beam: Translucent object *1 | | | |
| | | | | GIGA | Standard | High-speed | Super-high-speed | GIGA | Standard | High-speed | Super-high-speed *2 |
| Through-beam | Top-view | 1.5 dia. | E32-T22B 2M | 110 | 64 | 37 | 16 | 22 | 12 | 7 | 5 |
| | Side-view | 3 dia. | E32-T12R 2M | 300 | 150 | 100 | 45 | 60 | 31 | 21 | 13 |
| | | | E32-T14LR 2M | 190 | 100 | 68 | 29 | 38 | 20 | 13 | 8 |
| Reflective | Top-view | 1.5 dia. | E32-D22B 2M | 17 | 8 | 6 | 2.4 | 3 | 2 | 1.2 | 0.7 |
| | | 3 dia. | E32-D221B 2M | 38 | 20 | 13 | 5 | 7 | 4 | 3 | 1.7 |
| | | | E32-D32L 2M | 85 | 44 | 30 | 12 | 17 | 8 | 6 | 3.7 |

Flat Models

| Sensing method | Sensing direction | Model | Sensing distance (mm) | | | | | | | |
|----------------|-------------------|------------------------------|---|----------|------------|------------------|---|----------|------------|---------------------|
| | | | Reflective: White paper, Through-beam: Opaque object | | | | Reflective: 12-color discrimination, Through-beam: Translucent object *1 | | | |
| | | | GIGA | Standard | High-speed | Super-high-speed | GIGA | Standard | High-speed | Super-high-speed *2 |
| Through-beam | Flat-view | E32-LT35Z 2M (Built-in Lens) | 360 | 190 | 130 | 55 | 73 | 38 | 26 | 16 |
| | Top-view | E32-T15XR 2M | 300 | 150 | 100 | 45 | 60 | 31 | 21 | 13 |
| | Side-view | E32-T15YR 2M | 190 | 100 | 68 | 29 | 38 | 20 | 13 | 8 |
| | Flat-view | E32-T15ZR 2M | 190 | 100 | 68 | 29 | 38 | 20 | 13 | 8 |
| Reflective | Top-view | E32-D15XR 2M | 90 | 45 | 30 | 13 | 18 | 9 | 6 | 4 |
| | Side-view | E32-D15YR 2M | 21 | 10 | 7 | 3.1 | 4.2 | 2.1 | 1.4 | 1 |
| | Flat-view | E32-D15ZR 2M | 21 | 10 | 7 | 3.1 | 4.2 | 2.1 | 1.4 | 1 |

Sleeve Models

| Sensing method | Sensing direction | Model | Sensing distance (mm) | | | | | | | |
|----------------|-------------------|----------------|---|----------|------------|------------------|---|----------|------------|---------------------|
| | | | Reflective: White paper, Through-beam: Opaque object | | | | Reflective: 12-color discrimination, Through-beam: Translucent object *1 | | | |
| | | | GIGA | Standard | High-speed | Super-high-speed | GIGA | Standard | High-speed | Super-high-speed *2 |
| Through-beam | Top-view | E32-TC200BR 2M | 300 | 150 | 100 | 45 | 60 | 31 | 21 | 13 |
| Reflective | | E32-DC200BR 2M | 90 | 45 | 30 | 13 | 18 | 9 | 6 | 4 |

*1. These sensing distances are recommended to make the most of the detection capabilities of the Sensor.

*2. The Super-high-speed Mode for 12-color discrimination with a Reflective Sensor or for detection of translucent objects with a Through-beam Sensor can be set only in Contrast Mode. The Super-high-speed Mode can not be set in Color Mode.

Small-spot, Reflective Models

| Sensing method | Type | Spot diameter | Center distance (mm) | Model | Sensing distance (mm) | | | | | | | |
|----------------|--|---------------|----------------------|------------------------|---|----------|------------|------------------|--|----------|--|---------------------|
| | | | | | Reflective: White paper, Through-beam: Opaque object | | | | Reflective: 12-color discrimination, Through-beam: Translucent object *1 | | | |
| | | | | | GIGA | Standard | High-speed | Super-high-speed | GIGA | Standard | High-speed | Super-high-speed *2 |
| Reflective | Integrated lens, long-distance, small-spot | 6 dia. | 50 | E32-L15 2M | Spot diameter of 6 mm at 50 mm. Sensing distance of 40 to 100 mm. | | | | Spot diameter of 6 mm at 50 mm. Sensing distance of 40 to 85 mm. | | Spot diameter of 6 mm at 50 mm. Sensing distance of 40 to 60 mm. | |
| | Parallel light | 4 dia. | 0 to 20 | E32-C31 2M + E39-F3C | Spot diameter of 4 mm at 0 to 20 mm. | | | | Spot diameter of 4 mm at 1 to 9 mm. *3 | | | |
| | Small-spot | 0.5 dia. | 7 | E32-C31 2M + E39-F3A-5 | Spot diameter of 0.5 mm at 7 mm. | | --- | | Spot diameter of 0.5 mm at 7 mm. *3 | | --- | |
| | | | 17 | E32-C31 2M + E39-F3B | Spot diameter of 0.5 mm at 17 mm. | | --- | | --- | | --- | |
| | | 3 dia. | 50 | E32-CC200 2M + E39-F18 | Spot diameter of 3 mm at 50 mm. | | --- | | Spot diameter of 3 mm at 50 mm. *3 | | --- | |

High-power Beam Models

| Sensing method | Sensing direction | Aperture angle | Model | Sensing distance (mm) | | | | | | | |
|----------------|-------------------|----------------|----------------------|--|----------|------------|------------------|--|----------|------------|---------------------|
| | | | | Reflective: White paper, Through-beam: Opaque object | | | | Reflective: 12-color discrimination, Through-beam: Translucent object *1 | | | |
| | | | | GIGA | Standard | High-speed | Super-high-speed | GIGA | Standard | High-speed | Super-high-speed *2 |
| Through-beam | Top-view | 10° | E32-T17L 10M | 8,570 | 200 | 130 | 59 | 1,710 | 40 | 27 | 17 |
| | Side-view | 30° | E32-T14 2M | 1,910 | 990 | 680 | 290 | 380 | 190 | 130 | 87 |
| | Right-angle | 12° | E32-T11N 2M +E39-F1 | 1,470 | 760 | 520 | 220 | 290 | 150 | 100 | 66 |
| | Top-view | 12° | E32-T11R 2M +E39-F1 | 1,470 | 760 | 520 | 220 | 290 | 150 | 100 | 66 |
| | Side-view | 60° | E32-T11R 2M +E39-F2 | 180 | 98 | 67 | 28 | 37 | 19 | 13 | 8 |
| | Top-view | 12° | E32-T11 2M +E39-F1 | 2,430 | 1,260 | 860 | 360 | 480 | 250 | 170 | 110 |
| | Side-view | 60° | E32-T11 2M +E39-F2 | 310 | 160 | 110 | 47 | 62 | 32 | 22 | 14 |
| | Top-view | 12° | E32-T61-S 2M +E39-F1 | 1,080 | 560 | 380 | 160 | 210 | 110 | 76 | 49 |
| | Side-view | 60° | E32-T61-S 2M +E39-F2 | 130 | 72 | 49 | 21 | 27 | 14 | 9 | 6 |

Narrow View Models

| Sensing method | Sensing direction | Aperture angle | Model | Sensing distance (mm) | | | | | | | |
|----------------|-------------------|----------------|-------------|--|----------|------------|------------------|--|----------|------------|---------------------|
| | | | | Reflective: White paper, Through-beam: Opaque object | | | | Reflective: 12-color discrimination, Through-beam: Translucent object *1 | | | |
| | | | | GIGA | Standard | High-speed | Super-high-speed | GIGA | Standard | High-speed | Super-high-speed *2 |
| Through-beam | Side-view | 4° | E32-T24S 2M | 750 | 380 | 260 | 110 | 150 | 77 | 53 | 34 |
| | | | E32-T22S 2M | 1,070 | 550 | 380 | 160 | 210 | 110 | 76 | 48 |

Chemical-resistant, Oil-resistant Models

| Sensing method | Type | Sensing direction | Model | Sensing distance (mm) | | | | | | | |
|----------------|---------------------------------|-------------------|-------------|--|----------|------------|------------------|--|----------|------------|---------------------|
| | | | | Reflective: White paper, Through-beam: Opaque object | | | | Reflective: 12-color discrimination, Through-beam: Translucent object *1 | | | |
| | | | | GIGA | Standard | High-speed | Super-high-speed | GIGA | Standard | High-speed | Super-high-speed *2 |
| Through-beam | Chemical/oil resistant | Top-view | E32-T12F 2M | 1,710 | 880 | 600 | 260 | 340 | 170 | 120 | 78 |
| | | | E32-T11F 2M | 250 | 130 | 91 | 39 | 51 | 26 | 18 | 11 |
| | | Side-view | E32-T14F 2M | 210 | 110 | 76 | 32 | 42 | 22 | 15 | 9 |
| | Chemical/oil-resistant at 150°C | Top-view | E32-T51F 2M | 770 | 400 | 270 | 110 | 150 | 80 | 54 | 35 |
| Reflective | Chemical/oil resistant | Top-view | E32-D12F 2M | 49 | 24 | 16 | 7 | 9 | 5 | 3 | 2.4 |
| | Chemical-resistant cable | | E32-D11U 2M | 90 | 45 | 30 | 13 | 18 | 9 | 6 | 4 |

*1. These sensing distances are recommended to make the most of the detection capabilities of the Sensor.

*2. The Super-high-speed Mode for 12-color discrimination with a Reflective Sensor or for detection of translucent objects with a Through-beam Sensor can be set only in Contrast Mode. The Super-high-speed Mode can not be set in Color Mode.

*3. The sensing distances are given for Contrast Mode. The sensing distance cannot be set in Color Mode.

Bending-resistant Models

| Sensing method | Size | Model | Sensing distance (mm) | | | | | | | |
|----------------|----------|--------------|---|----------|------------|------------------|---|----------|------------|---------------------|
| | | | Reflective: White paper, Through-beam: Opaque object | | | | Reflective: 12-color discrimination, Through-beam: Translucent object *1 | | | |
| | | | GIGA | Standard | High-speed | Super-high-speed | GIGA | Standard | High-speed | Super-high-speed *2 |
| Through-beam | 1.5 dia. | E32-T22B 2M | 110 | 64 | 37 | 16 | 22 | 12 | 7 | 5 |
| | M3 | E32-T21 2M | 100 | 57 | 33 | 14 | 20 | 11 | 6 | 4 |
| | M4 | E32-T11 2M | 380 | 200 | 130 | 58 | 77 | 40 | 27 | 17 |
| | Square | E32-T25XB 2M | 77 | 43 | 25 | 10 | 15 | 8 | 5 | 3.3 |
| Reflective | 1.5 dia. | E32-D22B 2M | 17 | 8 | 6 | 2.4 | 3 | 2 | 1.2 | 0.7 |
| | M3 | E32-D21 2M | 17 | 8 | 6 | 2.4 | 3.4 | 1.8 | 1.2 | 0.7 |
| | 3 dia. | E32-D221B 2M | 38 | 20 | 13 | 5 | 7 | 4 | 3 | 1.7 |
| | M4 | E32-D21B 2M | 38 | 20 | 13 | 5 | 7 | 4 | 2.7 | 1.7 |
| | M6 | E32-D11 2M | 90 | 45 | 30 | 13 | 18 | 9 | 6 | 4 |
| | Square | E32-D25XB 2M | 27 | 14 | 9 | 3.9 | 5 | 3 | 2 | 1.2 |

Heat-resistant Models

| Sensing method | Heat-resistant temperature | Model | Sensing distance (mm) | | | | | | | |
|----------------|----------------------------|---------------|---|----------|------------|------------------|---|----------|------------|---------------------|
| | | | Reflective: White paper, Through-beam: Opaque object | | | | Reflective: 12-color discrimination, Through-beam: Translucent object *1 | | | |
| | | | GIGA | Standard | High-speed | Super-high-speed | GIGA | Standard | High-speed | Super-high-speed *2 |
| Through-beam | 150° | E32-T51 2M | 420 | 220 | 150 | 65 | 85 | 44 | 30 | 19 |
| | 200° | E32-T81R-S 2M | 150 | 80 | 54 | 23 | 30 | 16 | 10 | 7 |
| | 350° | E32-T61-S 2M | 250 | 130 | 91 | 39 | 51 | 26 | 18 | 11 |
| Reflective | 150° | E32-D51 2M | 120 | 60 | 40 | 17 | 24 | 12 | 8 | 5 |
| | 200° | E32-D81R-S 2M | 42 | 21 | 14 | 6 | 8 | 4.3 | 2.9 | 1.9 |
| | 350° | E32-D61-S 2M | 42 | 21 | 14 | 6 | 8 | 4 | 2.9 | 1.9 |
| | 400° | E32-D73-S 2M | 28 | 14 | 9 | 4 | 5 | 2.9 | 1.9 | 1.3 |

Area Detection Models

| Sensing method | Type | Sensing width | Model | Sensing distance (mm) | | | | | | | |
|----------------|-------|---------------|--------------|---|----------|------------|------------------|---|----------|------------|---------------------|
| | | | | Reflective: White paper, Through-beam: Opaque object | | | | Reflective: 12-color discrimination, Through-beam: Translucent object *1 | | | |
| | | | | GIGA | Standard | High-speed | Super-high-speed | GIGA | Standard | High-speed | Super-high-speed *2 |
| Through-beam | Area | 11 mm | E32-T16PR 2M | 480 | 250 | 170 | 73 | 96 | 50 | 34 | 21 |
| | | | E32-T16JR 2M | 410 | 210 | 140 | 63 | 83 | 43 | 29 | 19 |
| | | 30 mm | E32-T16WR 2M | 730 | 210 | 140 | 63 | 140 | 43 | 29 | 19 |
| Reflective | Array | 11 mm | E32-D36P1 2M | 75 | 37 | 25 | 11 | 15 | 7 | 5 | 3.3 |

Vacuum-resistant Models

| Sensing method | Type | Heat-resistant temperature | Model | Sensing distance (mm) | | | | | | | |
|----------------|-------------|----------------------------|---------------------|---|----------|------------|------------------|---|----------|------------|---------------------|
| | | | | Reflective: White paper, Through-beam: Opaque object | | | | Reflective: 12-color discrimination, Through-beam: Translucent object *1 | | | |
| | | | | GIGA | Standard | High-speed | Super-high-speed | GIGA | Standard | High-speed | Super-high-speed *2 |
| Through-beam | Vacuum side | 120° | E32-T51V 1M | 110 | 57 | 39 | 16 | 22 | 11 | 7 | 5 |
| | | | E32-T51V 1M+E39-F1V | 170 | 90 | 61 | 26 | 34 | 18 | 12 | 7 |
| | | 200° | E32-T84SV 1M | 270 | 140 | 97 | 41 | 54 | 28 | 19 | 12 |

*1. These sensing distances are recommended to make the most of the detection capabilities of the Sensor.

*2. The Super-high-speed Mode for 12-color discrimination with a Reflective Sensor or for detection of translucent objects with a Through-beam Sensor can be set only in Contrast Mode. The Super-high-speed Mode can not be set in Color Mode.

Engineering Data (Reference Value)

Color vs. Detection Capability

E3NX-CA□□ + E32-CC200

| | White | Red | Yellow/red | Yellow | Yellow/green | Green | Blue/green | Blue | Blue/purple | Purple | Red/purple | Black* |
|--------------|-------|-----|------------|--------|--------------|-------|------------|------|-------------|--------|------------|--------|
| White | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | (○) |
| Red | ○ | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Yellow/red | ○ | ○ | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Yellow | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Yellow/green | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Green | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | ○ | ○ |
| Blue/green | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | ○ |
| Blue | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ |
| Blue/purple | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ |
| Purple | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | ○ |
| Red/purple | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ○ |
| Black* | (○) | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |

High-speed Mode

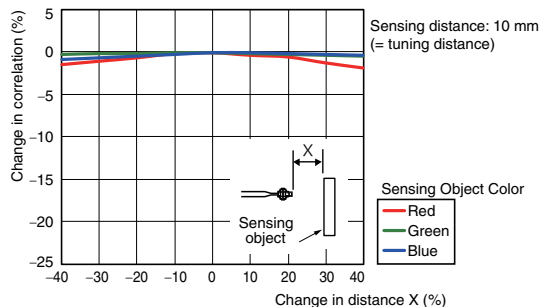
Sensing distance: 10 mm (i.e., tuning distance)

○: Detection possible, ×: Detection not possible.

* Use Contrast Mode to distinguish between white and black.

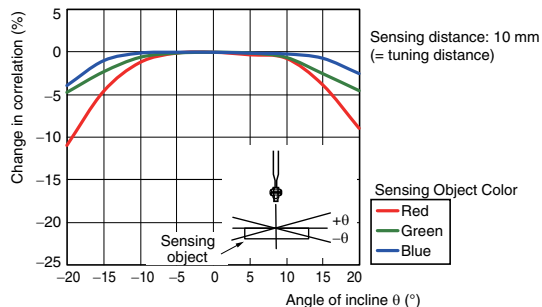
Correlation vs. Distance

E3NX-CA + E32-CC200



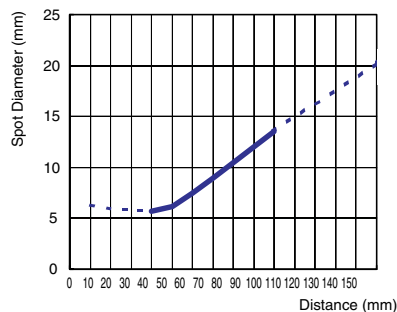
Correlation vs. Angle

E3NX-CA + E32-CC200



Spot Diameter vs. Sensing Distance

E3NX-CA + E32-L15



I/O Circuit Diagrams

NPN Output

| Model | Operation mode | Timing chart | NO/NC indicator | Output circuit |
|------------------------------------|----------------|---|-----------------|----------------|
| E3NX-CA11 E3NX-CA21 E3NX-CA6 | NO (Light-ON) | Incident light: ON No incident light: OFF Operation indicator ON (orange): OFF Output transistor: ON Load Operate (e.g., relay): ON Reset (Between brown and black): OFF | NO/ON | |
| | NC (Dark-ON) | Incident light: ON No incident light: OFF Operation indicator ON (orange): OFF Output transistor: ON Load Operate (e.g., relay): ON Reset (Between brown and black): OFF | NC/ON | |

* The CA11 and CA6 have only control output 1. These models do not have control output 2 or an external input, so they do not have the OUT2 indicator.

PNP Output

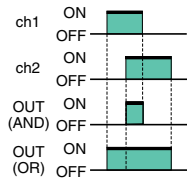
| Model | Operation mode | Timing chart | NO/NC indicator | Output circuit |
|------------------------------------|----------------|--|-----------------|----------------|
| E3NX-CA41 E3NX-CA51 E3NX-CA8 | NO (Light-ON) | Incident light: ON No incident light: OFF Operation indicator ON (orange): OFF Output transistor: ON Load Operate (e.g., relay): ON Reset (Between blue and black): OFF | NO/ON | |
| | NC (Dark-ON) | Incident light: ON No incident light: OFF Operation indicator ON (orange): OFF Output transistor: ON Load Operate (e.g., relay): ON Reset (Between blue and black): OFF | NC/ON | |

* The CA41 and CA8 have only control output 1. These models do not have control output 2 or an external input, so they do not have the OUT2 indicator.

Note: 1. Timing Charts for Timer Function Settings (T: Set Time)

| ON-delay Timer | OFF-delay Timer | One-shot Timer | ON/OFF-delay Timer |
|---------------------------------------|--|---|---|
| Delays the output ON after detection. | Holds the output ON for detection by PLC when the detection time is too short. | Keeps the output ON for a specified time regardless of the workpiece size variations. | Sets both OFF-delay Timer and ON-delay Timer. |
| | | | |

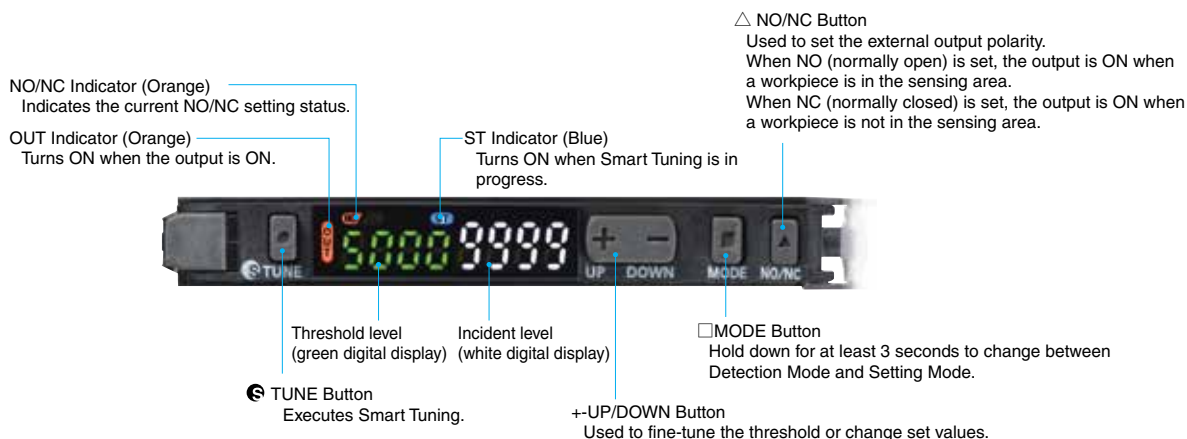
2. Timing Chart for Control Output (AND or OR) (T: Set Time)



Nomenclature

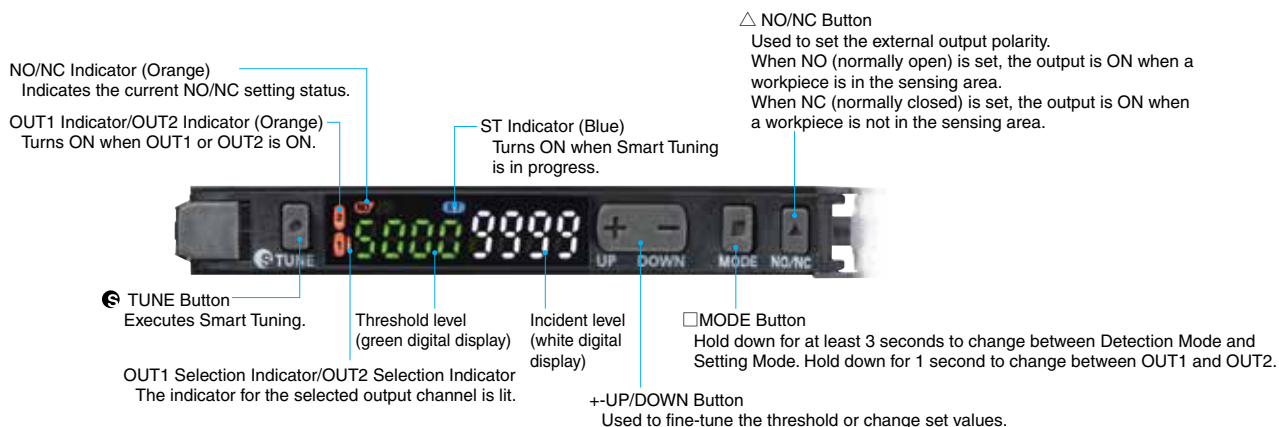
Standard Models

E3NX-CA11/CA41/CA6/CA8



Advanced Models and Model for Sensor Communications Unit


E3NX-CA21/CA51/CA0






Safety Precautions

Be sure to read the precautions for all models in the website at: <http://www.ia.omron.com/>.

Warning Indications

| | |
|--|---|
|  WARNING | Warning level Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally, there may be significant property damage. |
| Precautions for Safe Use | Supplementary comments on what to do or avoid doing, to use the product safely. |
| Precautions for Correct Use | Supplementary comments on what to do or avoid doing, to prevent failure to operate, malfunction or undesirable effect on product performance. |

Meaning of Product Safety Symbols

| | |
|---|--|
|  | General prohibition Indicates the instructions of unspecified prohibited action. |
|  | Caution, explosion Indicates the possibility of explosion under specific conditions. |
|  | Caution, fire Indicates the possibility of fire under specific conditions. |

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 product. 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 steam
 - Locations subject 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 this 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, rain, or outdoors.
- UL Standard Certification

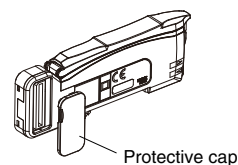
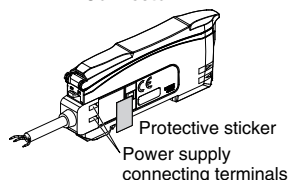
Only the Sensors with the Enhanced UL Certification Mark are certified by UL. They are intended to be supplied by a "Class 2 circuit". When used in United States and Canada, please use the same Class 2 source for input and output. The overcurrent protection current rating is 2 A max. They were evaluated as Open type and shall be installed within an 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 Amplifier Units with Connectors for Communications Units, attach the protective caps (provided with E3NW-series Sensor Communications Units).

Amplifier Unit with Wire-saving Connector

Amplifier Unit with Connector for Communications Unit



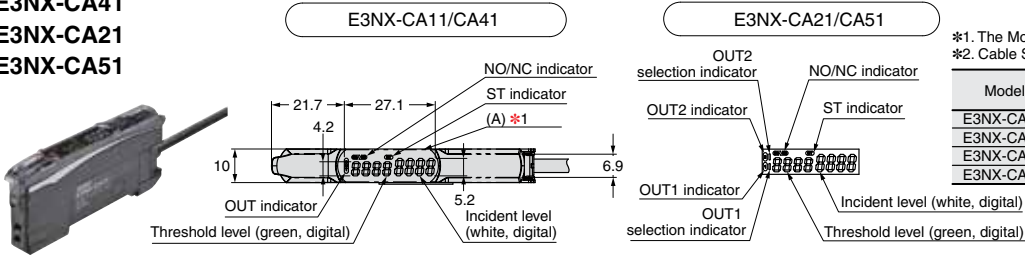
- Use an extension cable with a maximum length of 30 m. Be sure to use a cable of at least 0.3 mm² for extension. The power voltage must be 24 to 30 V when connecting Amplifier Units with extension cable and wire-saving connector.
- Do not apply the forces on the cable exceeding the following limits:
Pull: 40 N; torque: 0.1 N·m; pressure: 20 N; bending: 29.4 N
- Use the E32-□□ Fiber Unit.
- Do not apply excessive force such as tension, compression or torsion to the Fiber Amplifier Unit with the Fiber Unit fixed to the Fiber Amplifier Unit.
- Always keep the protective cover in place when using the product. Not doing so may cause malfunction.
- It may take time until the incident level and measurement 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.
- Excessive incident light cannot be sufficiently handled by the mutual interference prevention function and may cause malfunction. To prevent this, set a higher threshold level.
- The Communication Unit E3X-DRT21-S, E3X-CRT, E3X-ECT and E3NW 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

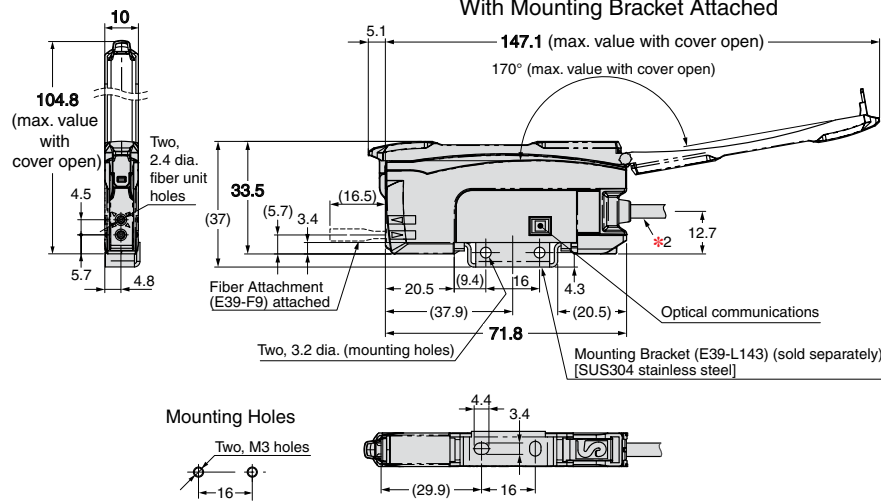
Pre-wired Amplifier Units

- E3NX-CA11
- E3NX-CA41
- E3NX-CA21
- E3NX-CA51

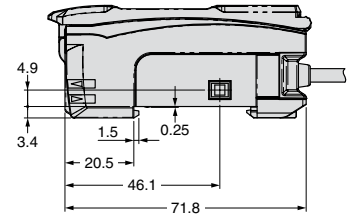


*1. The Mounting Bracket can also be used on side A.
*2. Cable Specifications

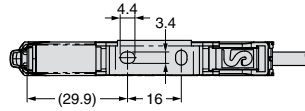
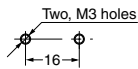
| Model | Outer diameter | No. of conductors | Others |
|-----------|----------------|-------------------|--|
| E3NX-CA11 | 4.0 dia. | 3 | Conductor cross-section: 0.2 mm ² Insulator dia.: 0.9 mm |
| E3NX-CA41 | | 3 | |
| E3NX-CA21 | | 5 | |
| E3NX-CA51 | 5 | | |



Standalone Product Diagram

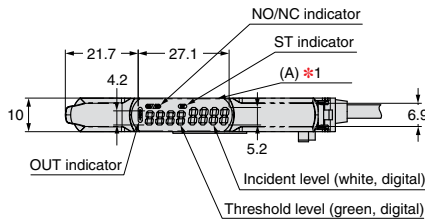


Mounting Holes



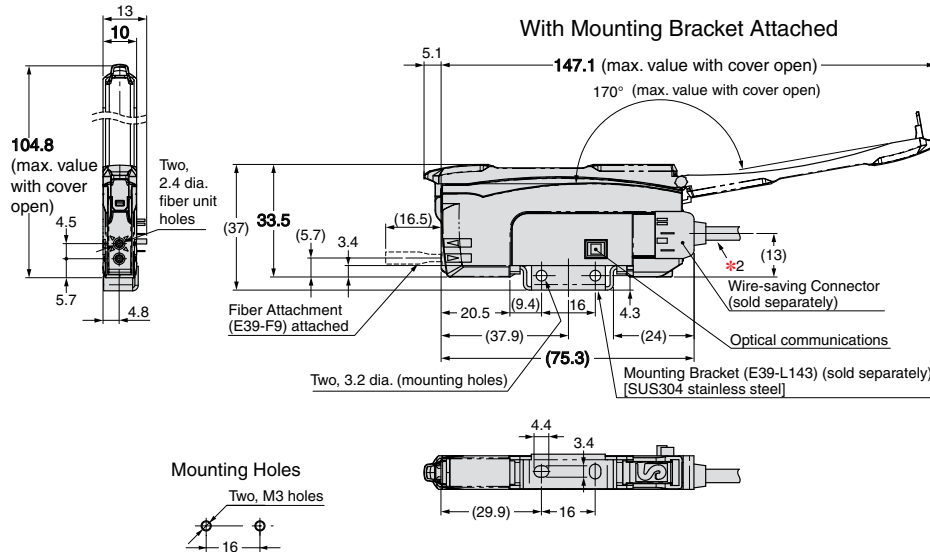
Amplifier Units with Wire-saving Connectors

- E3NX-CA6
- E3NX-CA8

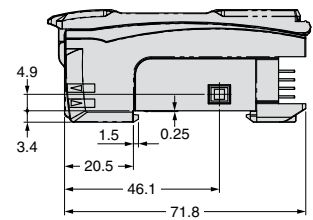


*1. The Mounting Bracket can also be used on side A.
*2. Cable Specifications

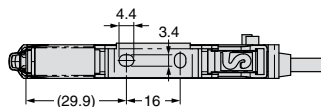
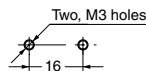
| Model | Outer diameter | No. of conductors |
|----------|----------------|-------------------|
| E3X-CN12 | 2.6 dia. | 1 |
| E3X-CN22 | 4.0 dia. | 2 |
| E3X-CN11 | | 3 |



Standalone Product Diagram

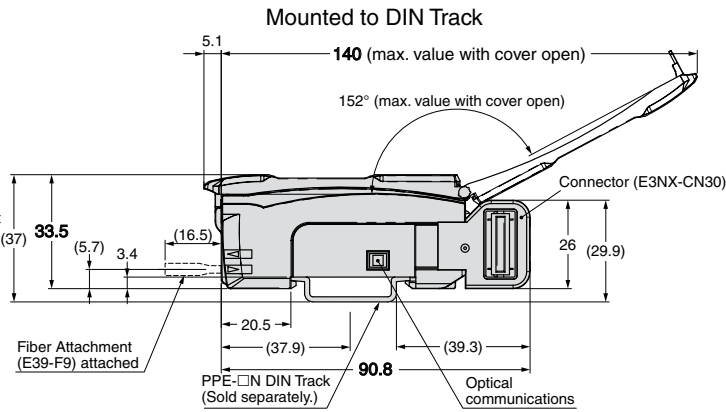
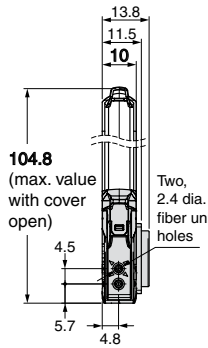
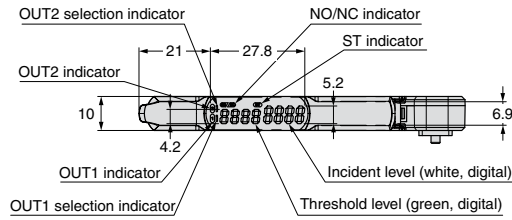


Mounting Holes

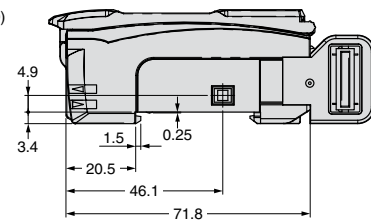


E3NX-CA

Amplifier Unit with Connector for Sensor Communications Unit E3NX-CA0

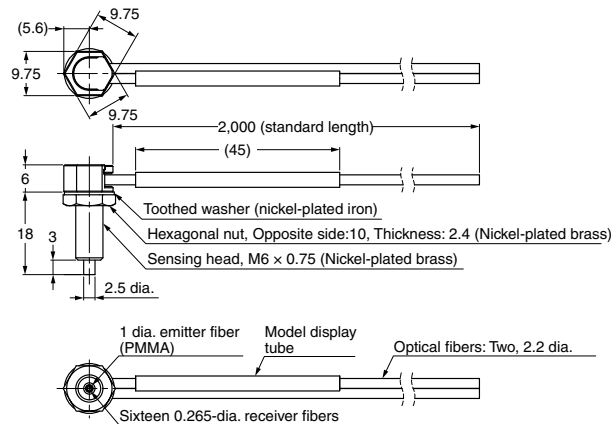


Standalone Product Diagram

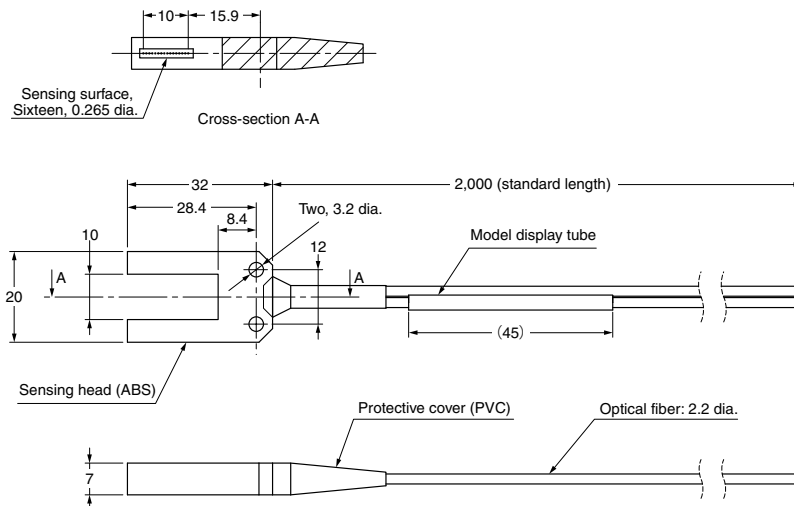


Fiber Units

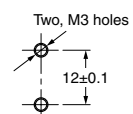
Reflective Models E32-C91N



Through-beam Models (Grooved Type) E32-G16



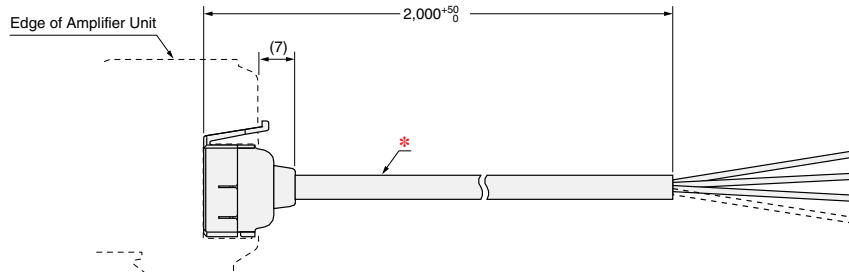
Mounting Holes



Accessories (Sold Separately)

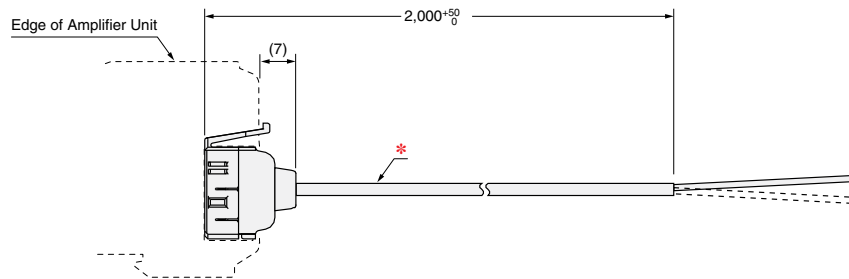
Wire-saving Connectors

Master Connector E3X-CN11



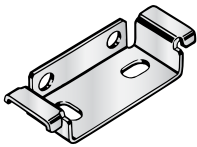
* 4-dia. cable with 3 conductors, Standard cable length: 2 m (Conductor cross-section: 0.2 mm² (AWG24), Insulator diameter: 1.1 mm)

Slave Connector E3X-CN12

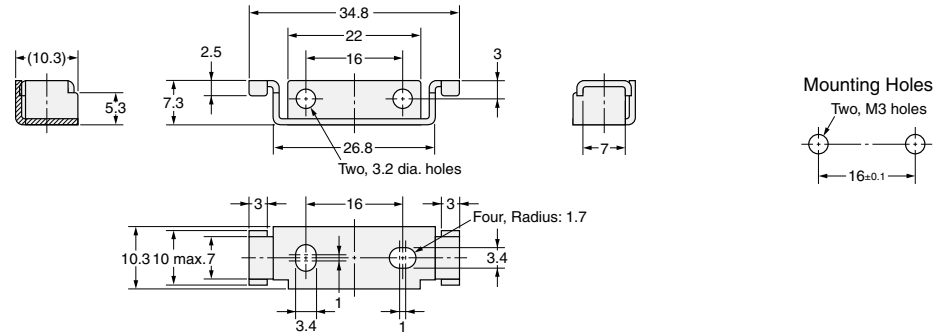


* 2.6-dia. cable with 1 conductor, Standard cable length: 2 m (Conductor cross-section: 0.2 mm² (AWG24), Insulator diameter: 1.1 mm)

Mounting Bracket E39-L143



Material: Stainless steel (SUS304)

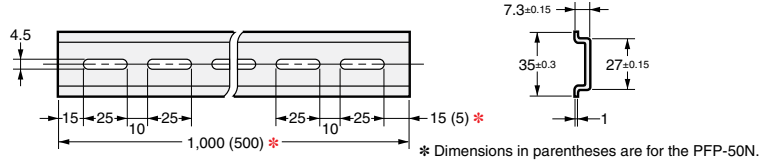
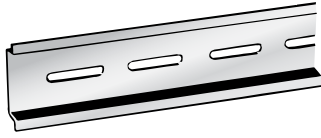


E3NX-CA

DIN Tracks

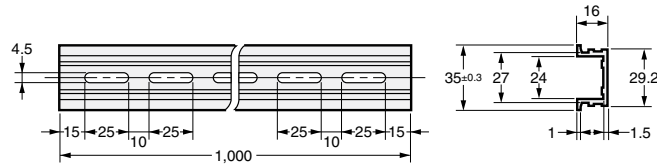
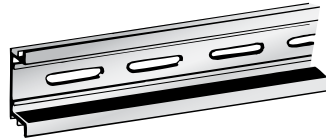
PFP-100N

PFP-50N



Material: Aluminum

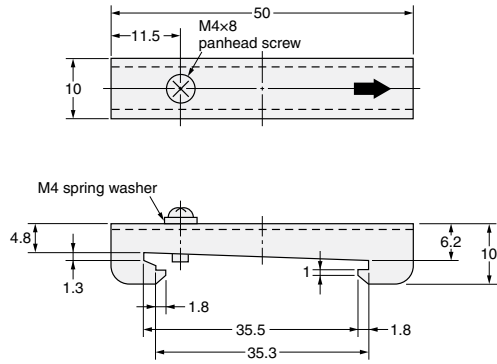
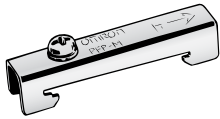
PFP-100N2



Material: Aluminum

End Plate

PFP-M



Materials: Iron, zinc plating

Terms and Conditions Agreement

Read and understand this catalog.

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