NEW

OMRON

N-Smart
Presence Detection Measurement

Smart Fiber Amplifier Units
E3NX-FA

## Industry-leading Levels* of Performance

# Highly Stable Detection

Easy Setup for Any Workpiece by Any Operator


realizing

EtherCAT
CompoNet
CC-Link V2

* For performance (sensing distance and minimum sensing object) based on November 2013 OMRON investigation.

Ultra-stable

# The No. 1 Performance Worldwide*1 for Even More Applications

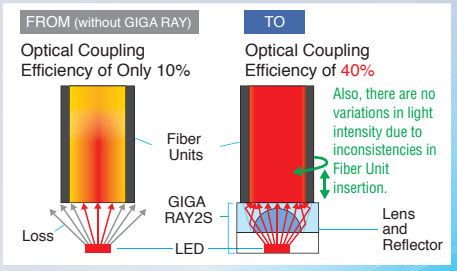
## Best Performance in the World*1

| 1.5 Times the Sensing Distance*2 | 1/10th the Minimum Sensing Object*2 |
|---|---|
| **6 m** | **0.3 μm dia.** |
| For E32-LT11 Fiber Unit with a fiber length of 3.5 m | Typical example of actual measurements with E32-D11R Fiber Unit |

## Three Technologies That Support High Performance

### Optical Coupling Efficiency of 40%

The lens and reflector eliminate lost light to emit powerful, uniform emission.




### High Power to Achieve Stable Detection

HIGH-EFFECIENCY COUPLING ELEMENT*3
**GIGA RAY2S**

PAT

### Low Noise to Accurately Capture Signals

LIGHT RECEPTION ALGORITHM
**Smart Noise Reduction**

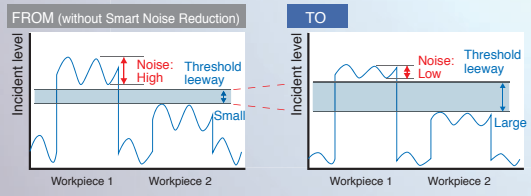
### High-speed, High-precision Signal Processing

HIGH-SPEED, HIGH-PRECISION IC
**N-Core**

**Twice** the Processing Speed*4

### Signal-to-Noise Ratio Improved 2.5 Times

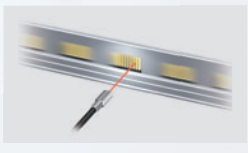
The influences of noise are reduced to achieve stable incident light levels by increasing the number of samples taken. This increases the margin for threshold values to achieve stable detection.




**Point**

**Response Time of 30 μs in High-speed Mode*5**

You can adjust the light intensity to detect fast-moving workpieces more accurately.*2



*1. For performance (sensing distance and minimum sensing object) based on November 2013 OMRON investigation. *2. Compared with E3X-HD.
*3. Infrared models (E3NX-FAH) are not equipped with GIGA RAY2S. *4. Compared with E3X-HD for normal operation processing. *5. Model with 1 output: 30 μs, model with 2 outputs: 32 μs.

Ultra-easy

# Easily Handle a Wide Range of Applications with the Press of a Single Button

## Consistent Settings for All Users **Smart Tuning Settings** PAT

Conventional Models*1

1st Step

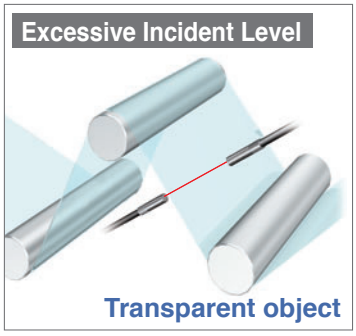
Adjust light intensity.

2nd Step

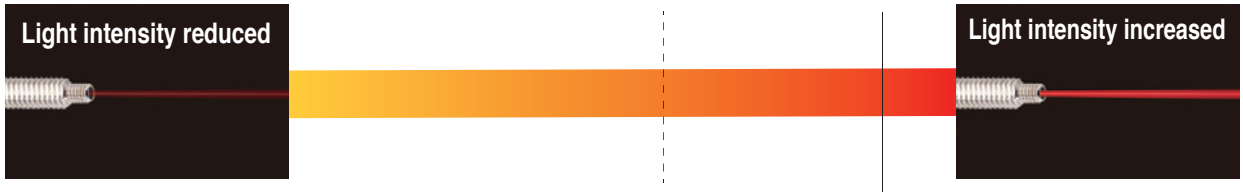
Set threshold.

*1. Fiber Amplifier Unit without Smart Tuning.


## Automatic Adjustment to Optimum Incident Level — **Wide Light Intensity Adjustment Range from Transparent Objects to Black Workpieces**








Conventional Models*2 (×1/100)

×1/2000 ← (Light intensity adjustment range) → ×20 (×1)

Wider light intensity adjustment range of 40,000 times (Conventional models*2: 2,000 times)
You can automatically adjust the light intensity to an optimum value for stable detection even with saturated or insufficient incident light.

*2. E3X-HD

Ultra-reliable

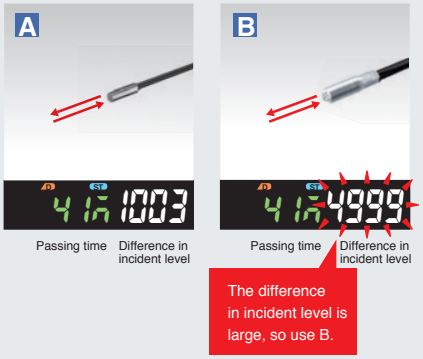
# Two Decision Support Functions to Help You

## Visual Displays of the Passing Time and Difference in Incident Levels. Solution Viewer PAT

Passing time Difference in incident level

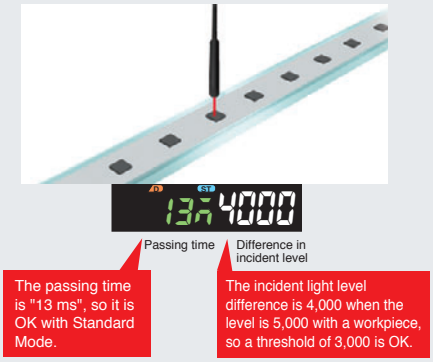
### Selecting Fiber Units

Just about anyone can make a quantitative decision without special skills.



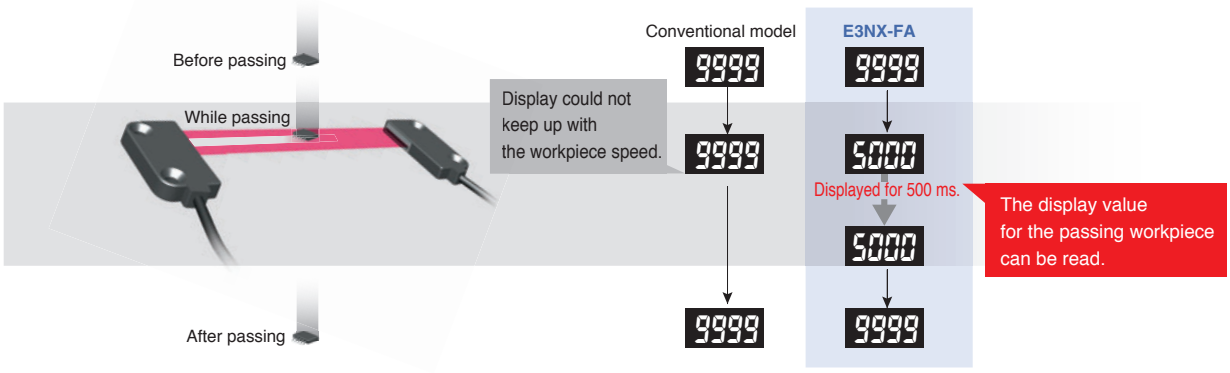

### Setting Optimum Thresholds and Modes

You can see the passing time and difference in incident levels to facilitate manual setup.




## Visual Information for Fast Workpieces Change Finder PAT

You can confirm changes in displayed values for fast workpieces to accurately set the threshold.



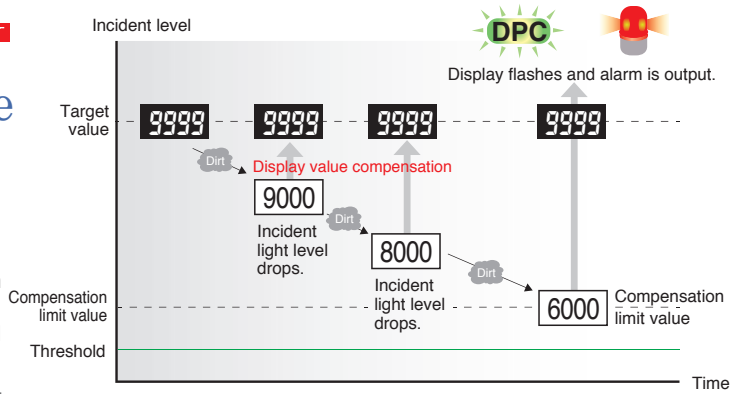

Point

### Advanced DPC (Dynamic Power Control) PAT

## Predictive Maintenance to Reduce Downtime

An alarm output* has been added to the DPC that automatically compensates differences in the incident level. A maintenance signal is output when the incident level drops due to dirt or vibration for use in predictive maintenance. (We recommend DPC for through-beam or retro-reflective models.)

*An alarm output is supported only on models with two outputs.



# N-Smart Introduction to the N-Smart Series

## The IoT platform that enables you to see, complete a lineup, and deliver

Winner of the Good Design Award


## Common Features and Models in the N-Smart Series

Common Buttons

### Intuitive Operation and Easy Setup.

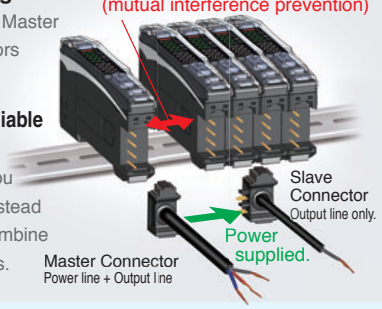
White Characters on a Black background

### High-contrast displays for easy visibility from a distance.

Models with Wire-saving Connectors Popular

### No Master/Slave Distinctions in Amplifier Units

- **Reduce model numbers in stock**
  You do not need to stock both master and slave amplifier units.
- **Greatly reduced wiring work**
  Power is supplied from the Master Connector. Slave Connectors have only output lines.
- **Expansion is easy and reliable**
  Mutual interference prevention works even if you use a Master Connector instead of a Slave Connector or combine them with pre-wired models.




Model for Sensor Communications Unit

### Data Management and Time Reduction with Network Communications

- **Three communications methods are supported**
- **Use Distributed Sensor Units to reduce equipment production costs and commissioning time**


EtherCAT
CompoNet
CC-Link V2

E3NW Cat.No.E428

# Ordering Information

## Fiber Amplifier Units (Dimensions ➜ pages 10 and 11)

| Type | Connecting method | Appearance | Inputs/outputs | Model | |
|---|---|---|---|---|---|
| | | | | NPN output | PNP output |
| Standard models | Pre-wired (2 m) |  | 1 output | **E3NX-FA11 2M** | **E3NX-FA41 2M** |
| | | | | **E3NX-FA11-5 2M** ✻1 | --- |
| | Wire-saving Connector |  | 1 output | **E3NX-FA6** | **E3NX-FA8** |
| Advanced models | Pre-wired (2 m) |  | 2 outputs + 1 input | **E3NX-FA21 2M** | **E3NX-FA51 2M** |
| | Wire-saving Connector |  | 1 output + 1 input | **E3NX-FA7** | **E3NX-FA9** |
| | | | 2 outputs | **E3NX-FA7TW** | **E3NX-FA9TW** |
| | M8 Connector |  | 1 output + 1 input | **E3NX-FA24** | **E3NX-FA54** |
| | | | 2 outputs | --- | **E3NX-FA54TW** |
| Infrared models | Pre-wired (2 m) |  | 1 output | **E3NX-FAH11 2M** | **E3NX-FAH41 2M** |
| | Wire-saving Connector |  | 1 output | **E3NX-FAH6** | **E3NX-FAH8** |
| Analog output models | Pre-wired (2 m) |  | 2 outputs | **E3NX-FA11AN 2M** | **E3NX-FA41AN 2M** |
| Model for Sensor Communications Unit ✻2 | Connector for Sensor Communications Unit |  | --- | **E3NX-FA0** | |
| | | | | **E3NX-FAH0** | |

✻1. This type can prevent mutual interference for two units in the SHS2 mode.
✻2. 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.)

**Connectors are not provided with the Fiber Amplifier Unit and must be ordered separately. Note: 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** | |

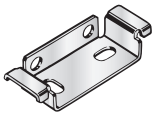
## Sensor I/O Connectors (Required for models for M8 Connectors.)

**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** | **4-wire** | **XS3F-M421-402-A** |
| | | | | **5m** | | **XS3F-M421-405-A** |
| | | **L-shaped** |  | **2m** | | **XS3F-M422-402-A** |
| | | | | **5m** | | **XS3F-M422-405-A** |

## Mounting Bracket

**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

**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** | |

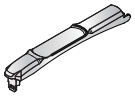
## End Plate

**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 |

## Cover

**Attach these Covers to Amplifier Units.**
**Order a Cover when required, e.g., if you lose the covers.**

| Appearance | Model | Quantity |
|---|---|---|
|  | **E39-G25 FOR E3NX-FA** | 1 |

# Related Products

## Sensor Communications Units

| Type | Appearance | Model |
|---|---|---|
| Sensor Communications Unit for EtherCAT |  | **E3NW-ECT** |
| Sensor Communications Unit for CompoNet |  | **E3NW-CRT ✻1** |
| Sensor Communications Unit for CC-Link |  | **E3NW-CCL** |
| Distributed Sensor Unit ✻2 |  | **E3NW-DS** |

Refer to your OMRON website for details.
**✻1.** Only E3NX-FA0 can be connected to E3NW-CRT.
**✻2.** The Distributed Sensor Unit can be connected to any of the Sensor Communications Units.

# Ratings and Specifications

## Standard models/ Advanced models/ Infrared models

| Item | | Type | Standard models | | | Advanced models | | | | | Infrared models | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NPN output | E3NX-FA11 | E3NX-FA6 | E3NX-FA11-5*1 | E3NX-FA21 | E3NX-FA7 | E3NX-FA7TW | E3NX-FA24 | --- | E3NX-FAH11 | E3NX-FAH6 |
| | | PNP output | E3NX-FA41 | E3NX-FA8 | --- | E3NX-FA51 | E3NX-FA9 | E3NX-FA9TW | E3NX-FA54 | E3NX-FA54TW | E3NX-FAH41 | E3NX-FAH8 |
| | | Connecting method | Pre-wired | Wire-saving Connector | Pre-wired | Pre-wired | Wire-saving Connector | | M8 Connector | | Pre-wired | Wire-saving Connector |
| Inputs/ outputs | Outputs | | 1 output | | | 2 outputs | 1 output | 2 outputs | 1 output | 2 outputs | 1 outputs | |
| | External inputs | | --- | | | 1 input | 1 input | --- | 1 input | --- | --- | |
| Light source (wavelength) | | | Red, 4-element LED (625 nm) | | | | | | | | Infrared LED (870nm) | |
| Power supply voltage | | | 10 to 30 VDC, including 10% ripple (p-p) | | | | | | | | | |
| Power consumption *2 | | | At Power supply voltage of 24 VDC<br>Standard Models:<br>Normal mode : 840 mW max. (Current consumption at 35 mA max.)<br>Eco function ON : 650 mW max. (Current consumption at 27 mA max.)<br>Eco function LO : 750 mW max. (Current consumption at 31 mA max.)<br>Advanced Models or Model for Sensor Communications Unit:<br>Normal mode : 920 mW max. (Current consumption at 38 mA max.)<br>Eco function ON : 680 mW max. (Current consumption at 28 mA max.)<br>Eco function LO : 800 mW max. (Current consumption at 33 mA max.)<br>Infrared models:<br>Normal mode : 1080 mW max. (Current consumption at 45 mA max.)<br>Eco function ON : 920 mW max. (Current consumption at 38 mA max.)<br>Eco function LO : 1020 mW max. (Current consumption at 42 mA max.) | | | | | | | | | |
| Control output | | | Load power supply voltage: 30 VDC max., open-collector output (depends on the NPN/PNP output format)<br>Load current: Groups of 1 to 3 Amplifier Units: 100 mA max., Groups of 4 to 30 Amplifier Units: 20 mA max.<br>(Residual voltage:<br>At load current of less than 10 mA: 1 V max.<br>At load current of 10 to 100 mA: 2 V max.)<br>OFF current: 0.1 mA max. | | | | | | | | | |
| Response time | Super-high-speed mode (SHS) | | Operate or reset for model with 1 output: 30 μs (Super High Speed mode (SHS2) of E3NX-FA11-5 is 60 μs each), with 2 outputs: 32 μs | | | | | | | | | |
| | High-speed mode (HS) | | Operate or reset: 250 μs | | | | | | | | | |
| | Standard mode (Stnd) | | Operate or reset: 1 ms | | | | | | | | | |
| | Giga-power mode (GIGA) | | Operate or reset: 16 ms | | | | | | | | | |
| Maximum connectable Units | | | 30 | | | | | | | | | |
| No. of Units for mutual interference prevention *3 | Super-high-speed mode (SHS) | | 0<br>**Note:** 2 units when the detection mode is set to Super High Speed mode (SHS2), and for other models, the mutual interference prevention function is disabled. | | | | | | | | | |
| | High-speed mode (HS) | | 10 | | | | | | | | | |
| | Standard mode (Stnd) | | 10 | | | | | | | | | |
| | Giga-power mode (GIGA) | | 10 | | | | | | | | | |
| Functions | | | Auto power control (APC), dynamic power control (DPC), timer, zero reset, resetting settings, eco mode, bank switching, power tuning, and hysteresis width | | | | | | | | | |

* Refer to E3NX-FA/ Fiber Amplifier on your OMRON website for details.

***1.** This type can prevent mutual interference for two units in the SHS2 mode.

***2.** At Power supply voltage of 10 to 30 VDC

Standard Models:
Normal mode : 990 mW max. (Current consumption: 33 mA max. at 30 VDC, 65 mA max. at 10 VDC)
Eco function ON : 780 mW max. (Current consumption: 26 mA max. at 30 VDC, 42 mA max. at 10 VDC)
Eco function LO : 840 mW max. (Current consumption: 28 mA max. at 30 VDC, 45 mA max. at 10 VDC)

Advanced Models:
Normal mode : 1,020 mW max. (Current consumption: 34 mA max. at 30 VDC, 67 mA max. at 10 VDC)
Eco function ON : 810 mW max. (Current consumption: 27 mA max. at 30 VDC, 44 mA max. at 10 VDC)
Eco function LO : 870 mW max. (Current consumption: 29 mA max. at 30 VDC, 48 mA max. at 10 VDC)

Infrared models:
Normal mode : 1,260 mW max. (Current consumption: 42 mA max. at 30 VDC, 80 mA max. at 10 VDC)
Eco function ON : 1,050 mW max. (Current consumption: 35 mA max. at 30 VDC, 60 mA max. at 10 VDC)
Eco function LO : 1,140 mW max. (Current consumption: 38 mA max. at 30 VDC, 70 mA max. at 10 VDC)

***3.** 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.

## Analog output models/ Model for Sensor Communications Unit

| Item | | Type | Analog output models | Model for Sensor Communications Unit | |
|---|---|---|---|---|---|
| | | NPN output | E3NX-FA11AN | E3NX-FA0 | E3NX-FAH0 |
| | | PNP output | E3NX-FA41AN | | |
| | | Connecting method | Pre-wired | Connector for Sensor Communications Unit | |
| Inputs/ outputs | Outputs | | 2 outputs | --- ✻1 | --- ✻1 |
| | External inputs | | --- | | |
| Light source (wavelength) | | | Red, 4-element LED (625 nm) | | Infrared LED (870nm) |
| Power supply voltage | | | 10 to 30 VDC, including 10% ripple (p-p) | Supplied from the connector through the communication units. | |
| Power consumption ✻2 | | | At Power supply voltage of 24 VDC<br>Normal mode : 960 mW max.<br>(Current consumption at 40 mA max.)<br>Eco function ON: 770 mW max.<br>(Current consumption at 32 mA max.)<br>Eco function LO : 870 mW max.<br>(Current consumption at 36 mA max.) | At Power supply voltage of 24 VDC<br>Normal mode : 920 mW max.<br>(Current consumption at 38 mA max.)<br>Eco function ON: 680 mW max.<br>(Current consumption at 28 mA max.)<br>Eco function LO : 800 mW max.<br>(Current consumption at 33 mA max.) | At Power supply voltage of 24 VDC<br>Normal mode : 1,080 mW max.<br>(Current consumption at 45 mA max.)<br>Eco function ON: 920 mW max.<br>(Current consumption at 38 mA max.)<br>Eco function LO : 1,020 mW max.<br>(Current consumption at 42 mA max.) |
| Control output | | | Load power supply voltage:<br>30 VDC max., open-collector output (depends on the NPN/PNP output format)<br>Load current: Groups of 1 to 3 Amplifier Units: 100 mA max., Groups of 4 to 30 Amplifier Units:<br>20 mA max.<br>(Residual voltage:<br>At load current of less than 10 mA: 1 V max.<br>At load current of 10 to 100 mA: 2 V max.)<br>OFF current: 0.1 mA max. | --- | |
| Analog output | | | Voltage output: 1-5 VDC (10 kΩ or more connected load), temperature characteristics: 0.3% F.S. / °C | --- | |
| Control output Response time | Super-high-speed mode (SHS) | | Operate or reset: 80 µs | Operate or reset: 32 µs | |
| | High-speed mode (HS) | | Operate or reset: 250µs | Operate or reset: 250 µs | |
| | Standard mode (Stnd) | | Operate or reset: 1 ms | Operate or reset: 1 ms | |
| | Giga-power mode (GIGA) | | Operate or reset: 16 ms | Operate or reset: 16 ms | |
| Maximum connectable Units | | | 30 | With E3NW-ECT: 30 units (When connected to an OMRON NJ-series Controller.)<br>With E3NW-CRT: 16 units (Note: E3NX-FAH0 can not be connected.)<br>With E3NW-CCL: 16 units | |
| No. of Units for mutual interference prevention ✻3 | Super-high-speed mode (SHS) | | 0 (The mutual interference prevention function is disabled if the detection mode is set to super-high-speed mode.) | | |
| | High-speed mode (HS) | | 10 | | |
| | Standard mode (Stnd) | | 10 | | |
| | Giga-power mode (GIGA) | | 10 | | |
| Functions | | | Auto power control (APC), dynamic power control (DPC), timer, zero reset, resetting settings, eco mode, bank switching, power tuning, and hysteresis width | | |

* Refer to E3NX-FA/ Fiber Amplifier on your OMRON website for details.

**✻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
Analog output models:
Normal mode : 1,080 mW max. (Current consumption: 36 mA max. at 30 VDC, 75 mA max. at 10 VDC)
Eco function ON : 840 mW max. (Current consumption: 28 mA max. at 30 VDC, 55 mA max. at 10 VDC)
Eco function LO : 960 mW max. (Current consumption: 32 mA max. at 30 VDC, 65 mA max. at 10 VDC)

**✻3.** 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.

# Dimensions

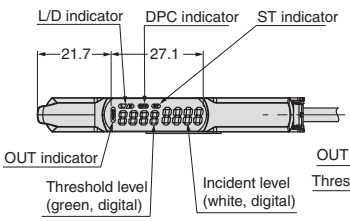
(Unit: mm)
Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

## Fiber Amplifier Units

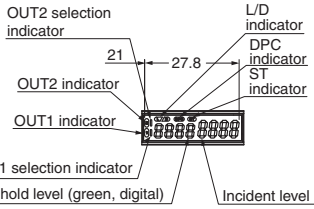
### Pre-wired Amplifier Units

**E3NX-FA□1(-5)**
**E3NX-FAH□1**
**E3NX-FA□AN**

E3NX-FA11(-5)/FA41/
FAH□1/FA□1AN

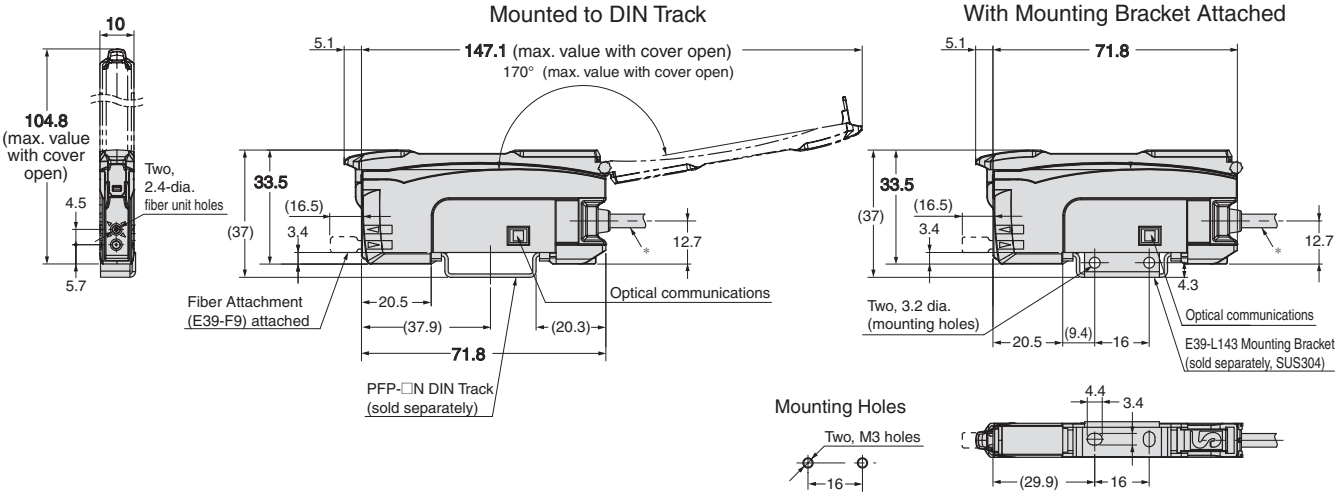



E3NX-FA21/FA51




*Cable Specifications

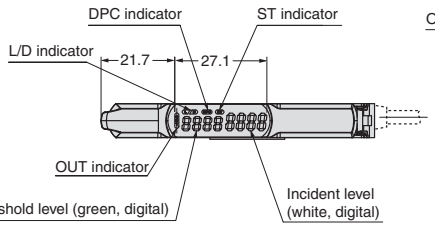
| Model | Outer diameter | No. of conductors | Others |
|---|---|---|---|
| E3NX-FA11(-5) | 4.0 dia. | 3 | Conductor cross-section: 0.2 mm² |
| E3NX-FA41 | | | Insulator dia.: 0.9 mm |
| E3NX-FAH□1 | | | Standard cable length: 2 m |
| E3NX-FA□1AN | | | Minimum bending radius: 12 mm |
| E3NX-FA21 | 4.0 dia. | 5 | |
| E3NX-FA51 | | | |



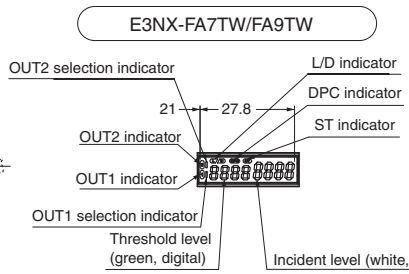

### Amplifier Units with Wire-saving Connectors

**E3NX-FA6**
**E3NX-FA7(TW)**
**E3NX-FA8**
**E3NX-FA9(TW)**
**E3NX-FAH6**
**E3NX-FAH8**

E3NX-FA6/FA7(TW)/FA8
/FA9(TW)/FAH6/FAH8

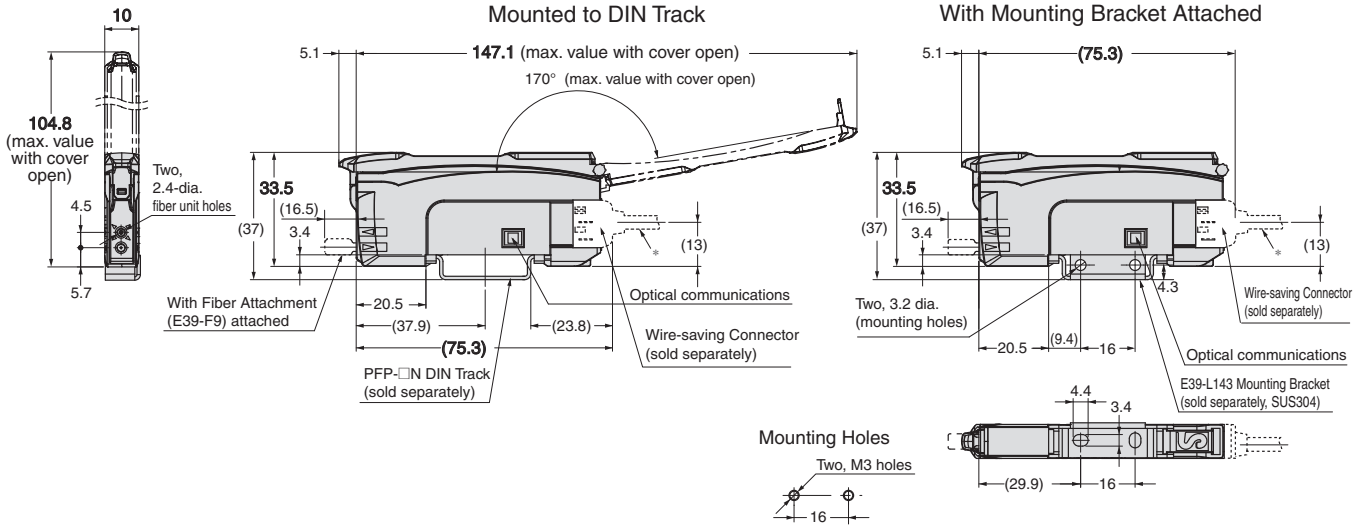



E3NX-FA7TW/FA9TW




*Cable Specifications

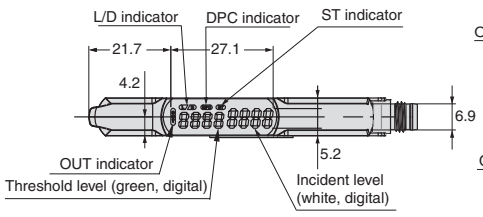
| Model | Outer diameter | No. of conductors |
|---|---|---|
| E3X-CN12 | 2.6 dia. | 1 |
| E3X-CN22 | 4.0 dia. | 2 |
| E3X-CN11 | | 3 |
| E3X-CN21 | | 4 |



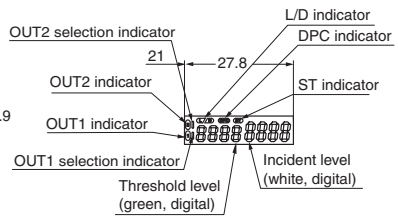
## Amplifier Units with M8 Connectors

**E3NX-FA24**
**E3NX-FA54**
**E3NX-FA54TW**

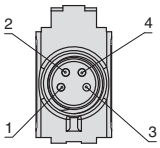
E3NX-FA24/FA54

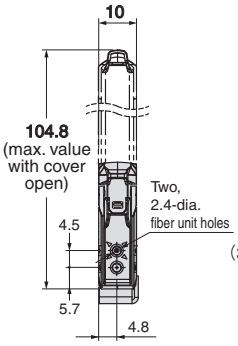



E3NX-FA54TW

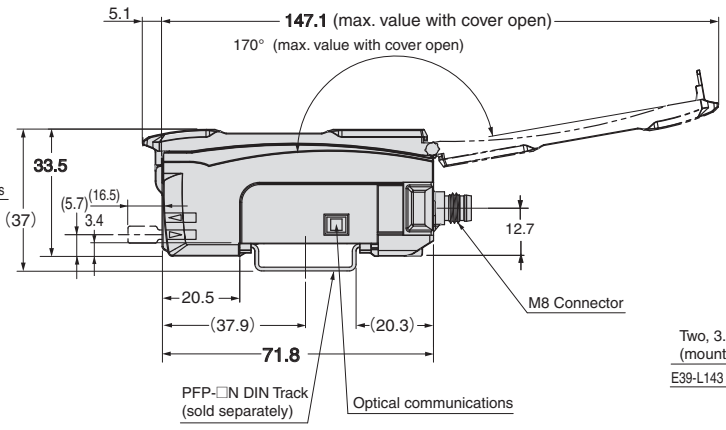



Connector pin arrangement

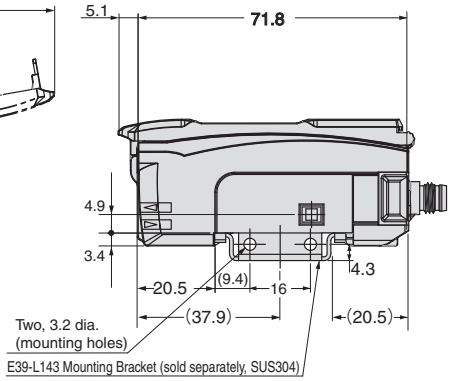


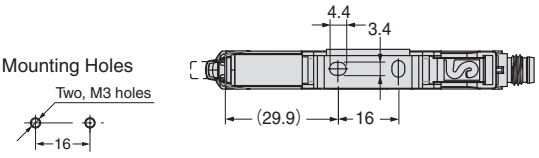

Mounted to DIN Track




With Mounting Bracket Attached

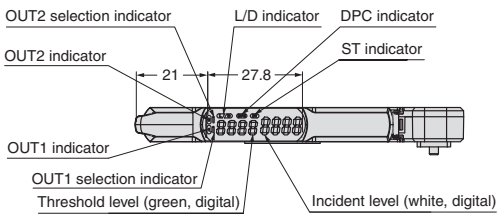


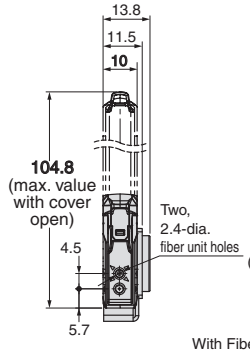

Mounting Holes



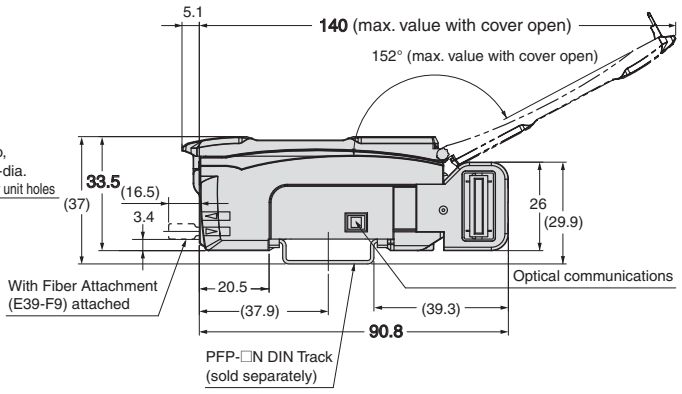

## Amplifier Unit with Connector for Sensor Communications Unit

**E3NX-FA0/FAH0**




Mounted to DIN Track

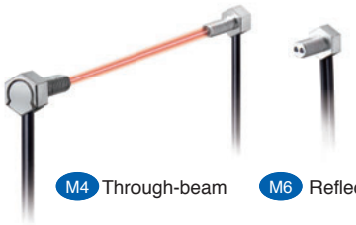


## NEW Introduction to New Fiber Units

A New Standard: Build-in Lens Series

**Hex Shape**

**E32-LT11N**
**E32-LD11N**



M4 Through-beam M6 Reflective

**Straight Type**

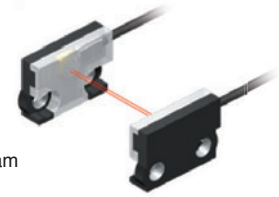
**E32-LT11 (R)**
**E32-LD11 (R)**

M6 Reflective

M4 Through-beam

**Flat Models**

**E32-LT35Z**



Through-beam

**Oil-resistant**

**E32-T11NF**

M8 Through-beam

## Fiber Sensor Best Selection Catalog

Refer to the Fiber Sensor Best Selection Catalog for information on the above Fiber Units and detailed information on the E3NX-FA.

Cat. No. E418


**Compliance with International Standards**

CE UL CERTIFIED *

* Only the E3NX-FA0, E3NX-FA11, E3NX-FA21, E3NX-FA41, E3NX-FA51, E3NX-FA6, E3NX-FA7□□, E3NX-FA8, E3NX-FA9□□, E3NX-FA24 and E3NX-FA54□□ are certified for UL standards.



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CSM_9_1_1217
**Cat. No. E426-E1-05** 1217(1212)