N-Smart
Presence Detection Measurement

OMRON

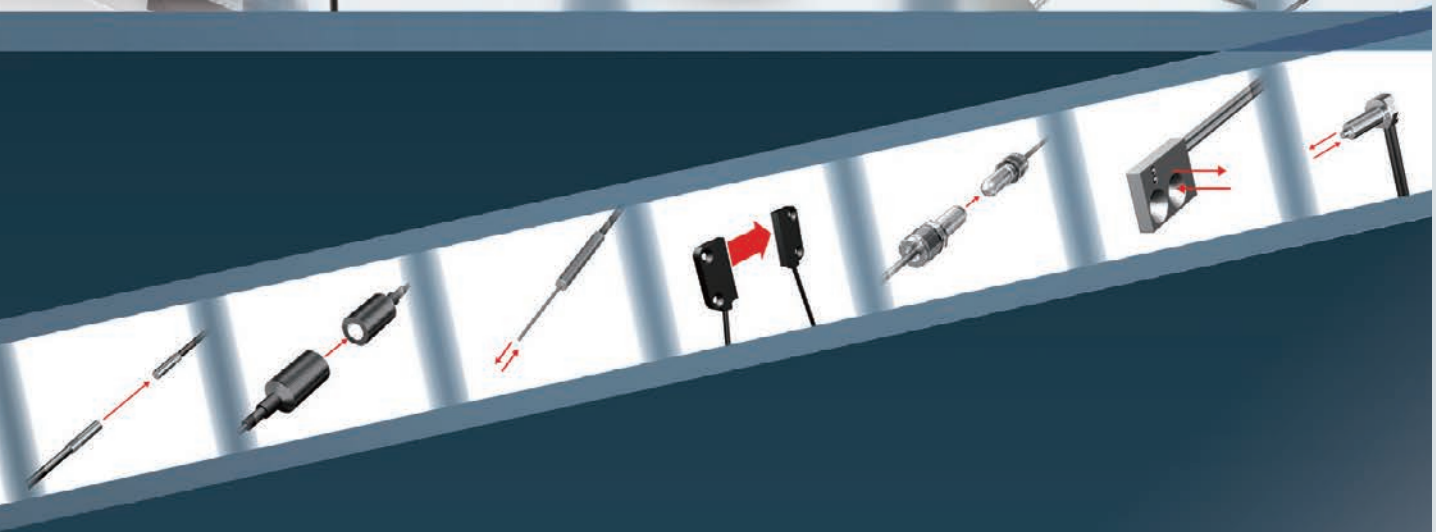
Best Selection

# Fiber Sensor Best Selection Catalog

## Start with Smart!

**Easily select the most reliable Fiber Unit for your detection conditions.**





Smart Fiber Amplifier Units

**E3NX-FA Series**

→ 68 Page

Addition of Infrared models, Analog output models and Communications models with wired outputs.



Smart Fiber Amplifier Units

**E3X-ZV Series**

→ 69 Page

A new fiber amplifier unit able to detect the "presence or absence" of workpieces with "solid stability" at an "amazing price" .



realizing

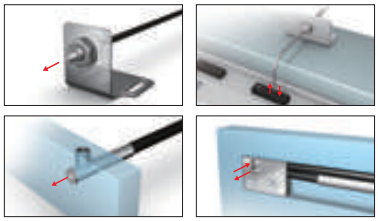

Fiber Sensor Features 2 Page
Selection Guide 4 Page
Fiber Units
Standard Installation 6 Page
Saving Space 16 Page
Beam Improvements 24 Page
Transparent Objects 38 Page
Environmental Immunity 42 Page
Applications 52 Page
Installation Information 62 Page
Fiber Amplifiers, Communications Unit, and Accessories 68 Page
Technical Guide and Precautions 96 Page
Model Index 102 Page

# Easy

## "Mounts Anywhere"

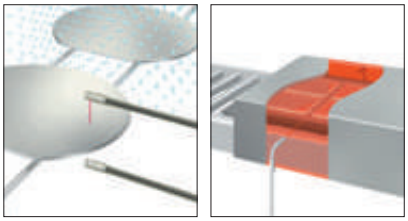
### Wide Variety

Variously-shaped, compact heads allow installation in any small space.



### Suitable for Harsh Environments

Fiber Units are available for various installation conditions and can be installed as is, even in harsh environments.



## "Achieve Easy Detection in Many Applications"

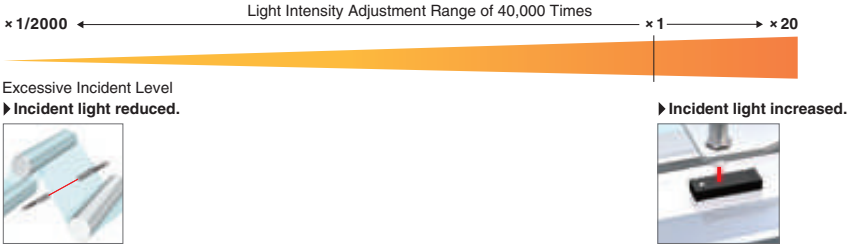
### Smart Tuning

Just press the button to set the optimum incident level and threshold.
Consistent settings are achieved for all users with this ultra-easy procedure.




### Optimum Light Intensity Adjustment from Transparent Objects to Black Workpieces

The incident level is optimized to enable stable detection even for saturated or insufficient incident levels.




## "Smooth Wiring and Setting"

### Reduced Wiring

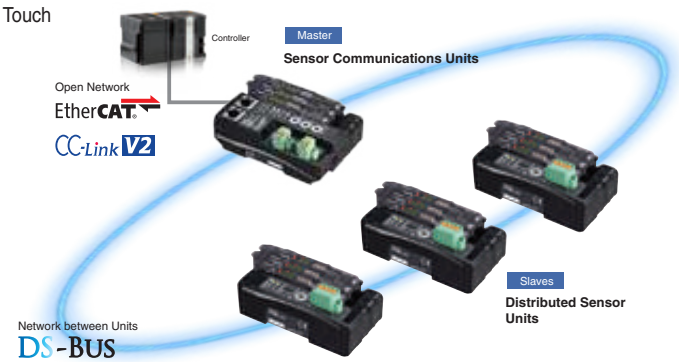
Simply link the Fiber Amplifier Units together for easy wiring and checking.

### Separate Installation

Use the Distributed Sensor Unit for distributed installation to reduce introduction costs and work.

### Easy Setup

Commissioning time is reduced with batch setting from a Touch Panel or backup data for process switchovers.




## Optimal Fiber Sensor for additional

Fiber Units for various Installation Conditions,



Smart Fiber Amplifier Units

**E3NX-FA**

68, 70 Page



**Fiber**

'Easy' and 'Stable' for

installation when starting production.

Fiber Amplifier Units with easy optimum setting

# Stable

## Fiber Units
## E32

06 Page



## "Expanded Application Response Capabilities"

### Improved Basic Performance

Improvements in the sensing distance and minimum sensing object increase the range of application for stable detection.

**1.5 Times**
the Sensing Distance*

**6 m**

For E32-LT11 Fiber Unit with a fiber length of 3.5 m

**1/10th**
the Minimum Sensing Object*

**0.3 μm dia.**

Typical example of actual measurements with E32-D11R Fiber Unit.

*Compared to E3X-ZV.

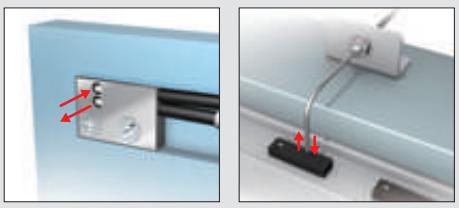
## Sensor Communications Units
## E3NW

EtherCAT
CC-Link V2

68, 70 Page

### Basic Features of Fiber Sensors

**Ideal for narrow spaces or for detecting minute objects.**



**Digital display achieves visual control and quantitative control.**

**Conventional Photoelectric Sensor with Built-in Amplifier**

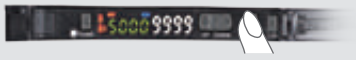
Set the threshold by a sensitivity adjuster / Check the operation by an indicator.




- Ambiguous standard (e.g., 3/4 turn of adjuster)
- Indicator does not show the present value.

**Fiber Sensor**

Quantitative control over threshold settings with a digital display.



- The reference value can be set numerically for easier specification.
- Easily perceivable present value.

# Sensor

## Minimal Cost Process.

## Selection by Category

**STEP 1**

**Select a Fiber Unit.**

Select a category. Fiber Unit Index 05 Page

Select a model. Category Pages 06 to 66 Page

**STEP 2**

**Select a Fiber Amplifier Unit and Communications Unit.** 68 Page

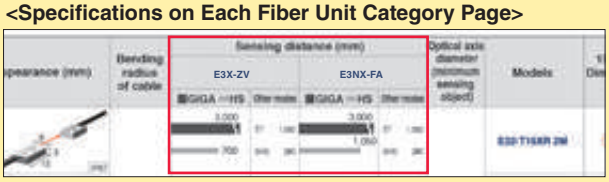
**STEP 3**

**Select Accessories of Fiber Amplifier Unit** 71,87 Page

### Before Selecting Fiber Units

The Fiber Units specifications give the sensing distance when the Fiber Unit and Fiber Amplifier Unit is combined. Check the Fiber Amplifier Unit series for easier selection.

<Specifications on Each Fiber Unit Category Page>




### Fiber Amplifier Unit Series

| | | | E3X-ZV Series  | E3NX-FA Series  |
|---|---|---|---|---|
| Fiber Amplifier Unit specifications | Output | | 1 output | 1 or 2 outputs (depending on the model) |
| | External input | | Not supported | Supported or not supported (depending on the model) |
| | Response time | | 50 µs /250 µs/1 ms/16 ms (Default: 250 µs) | 30 µs (32 µs)/250 µs/1 ms/16 ms (Default: 250 µs) |
| | Sensing distance (Giga-power mode) | E32-T11R | 2,000 mm | 3,000 mm |
| | | E32-D11R | 840 mm | 1,260 mm |
| | Minimum sensing object | E32-T11R | 5 µm dia. | 2 µm dia. |
| Sensor Communications Unit application | Communications method (Sensor Communications Unit model) | | — | EtherCAT (E3NW-ECT)<br>CC-Link (E3NW-CCL) |
| | Applicable Sensors | | — | Fiber Sensor (E3NX-FA0/FA10/FA40/FAH0)<br>Laser Sensors (E3NC-LA0, E3NC-SA0)<br>Contact-Type Sensor (E9NC-TA0) |
| Page listings | Ordering Information | | 86 Page | 70 Page |
| | Ratings and Specifications | | 88 Page | 72 Page |
| | Dimensions | | 89 Page | 76 Page |

## Selection by Model

**STEP 1**

**Search for the page in the model index.** 102 Page

**STEP 2**

**Search for the model on the corresponding pages.** Each Page

# Fiber Unit Index

## Standard Installation

### Threaded Models



Standard screw-type installation. The Fiber Units is mounted into a drilled hole and secured with nuts.

06 Page

### Hex-shaped Models



Easily mount tightening just one nut. The cable follows the wall, so extra space is not required.

10 Page

### Cylindrical Models



Ideal for installation in narrow spaces.
The Fiber Unit is secured with a set screw.

12 Page

## Saving Space

### Flat Models



Mount directly in limited spaces without using special mounting brackets.

16 Page

### Sleeve Models
(Close-range Detection)



Suitable for close-range detection.
Ideal for detecting minute objects in areas with limited space.

20 Page

## Beam Improvements

### Small-Spot, Reflective
(Minute Object Detection)



Small-spot to accurately detect small objects.

24 Page

### High-power Beam
(Long-distance Installation, Dust-resistant)



Suitable for detection on large equipment, of large objects, and in environments with airborne particles.

28 Page

## Beam Improvements

### Narrow View
(Detection Across Clearance)



The Fiber Unit emit a non-spreading beam to prevent false detection of light reflected off surrounding objects.

34 Page

### Detection without Background Interference

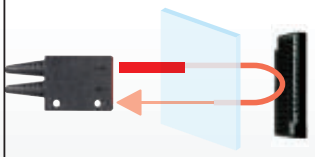


Detect only objects in the sensing range, and not in the background.

36 Page

## Transparent Object Detection

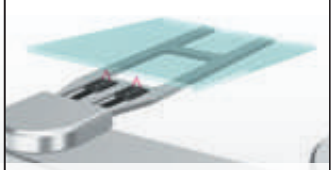
### Retro-reflective



Detect transparent objects reliably because the beam passes through the object twice, resulting in greater light interruption.

38 Page

### Limited-reflective
(Glass Detection)



The limited-reflective optical system provides stable detection of specular reflective glass.

40 Page

## Environmental Immunity

### Chemical-resistant, Oil-resistant



Made from materials that are resistant to various oils and chemicals.

42 Page

### Bending-resistant, Disconnection-resistant



Resistant to repeated bending on moving parts and breaking from snagging or shock.

44 Page

### Heat-resistant



Can be used in high-temperature environments at up to 400°C.

48 Page

## Special Applications

### Area Beam
(Area Detection)



Detect across areas for meandering materials or falling workpieces whose position vary.

52 Page

### Liquid-level Detection



Detect only liquid when being mounted on tubes or in liquid.

54 Page

### Vacuum-resistant



Can be used under high vacuums of up to $10^{-5}$ Pa.

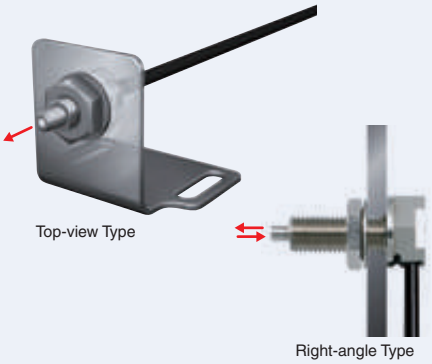
56 Page

### FPD, Semiconductors, and Solar Cells

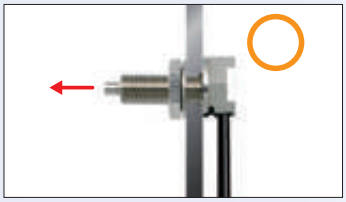


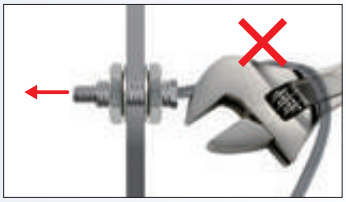
Designed specifically to reliably detect glass substrates and wafers.

58 Page



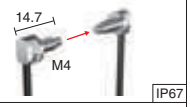
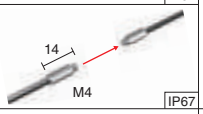
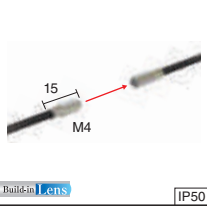

- Standard configuration. These Fiber Units are mounted into a hole drilled in a bracket and secured with nuts.
- The Right-angle Model prevents snagging on the cable because the cable runs along the mounting surface.





## Specifications

### Through-beam Fiber Units

| Sensing direction (Aperture angle) | Size | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA | HS | Other modes | Sensing distance (mm) E3NX-FA GIGA | HS | Other modes | Optical axis diameter (minimum sensing object) | Models | 07 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Right-angle (Approx. 60°) | M4 |  IP67 | Flexible, R1 | 2,000 | 700 | ST : 1,000 SHS: 280 | 3,000 | 1,050 | ST : 1,500 SHS: 280 | 1 dia. (5 μm dia./ 2 μm dia.) | E32-T11N 2M | 07-A |
| Top-view (Approx. 60°) | |  IP67 | | | | | | | | | E32-T11R 2M | 07-B |
| Top-view (Approx. 15°) | |  IP50 | R25 | *4,000 | 2,700 | ST : *4,000 SHS: 1,080 | *4,000 | *4,000 | ST : *4,000 SHS: 1,080 | 2.3 dia. (0.1 dia./ 0.03 dia.) | E32-LT11 2M | 07-C |
| | | | Flexible, R1 | *4,000 | 2,300 | ST : 3,500 SHS: 920 | *4,000 | 3,450 | ST : *4,000 SHS: 920 | | E32-LT11R 2M | |

* The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 μs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 μs)

**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.

**3.** The sensing distances for E3NX-FA are values for E3NX-FA□ models. The distances for E3NX-FAH□ infrared models are different.

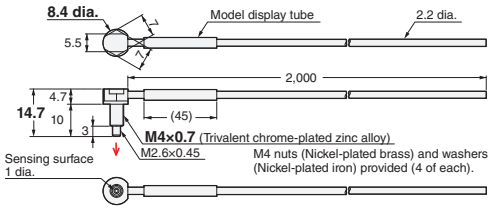
**4.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

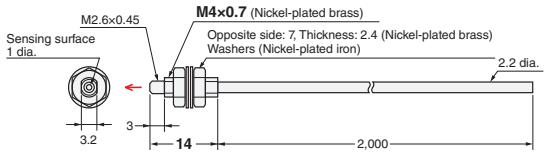
Installation Information → 62 to 66 Page

### Through-beam Fiber Units (Set of 2)

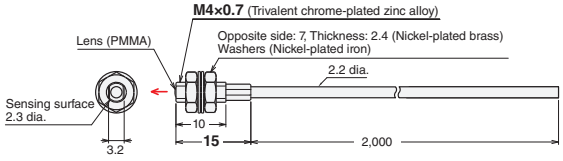
**07-A E32-T11N 2M (Free Cutting)**




**07-B E32-T11R 2M (Free Cutting)**




**07-C E32-LT11 2M (Free Cutting)**
**E32-LT11R 2M (Free Cutting)**




## - Reference Information for Model Selection -

### Features of the Right-angle Type

- Cable is less prone to snagging.
- Cable runs along the mounting surface for less space compared with Top-view Fiber Units.
- The nut is attached to the Fiber Unit to reduce installation work.

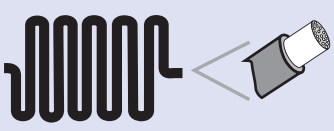
Build-in Lens

### What Are Fiber Units with Build-in Lenses?

These Fiber Units have built-in lenses.
They feature high-power beams.
You don't have to worry about the lens falling off and getting lost.

### What Is "Flexible" Fiber?

The flexible fiber has a small bending radius for easy routing without easily breaking.
It is easy to use because the cable can be bent without significantly reducing light intensity.




Structure which has a cladding around a large number of ultrafine cores.

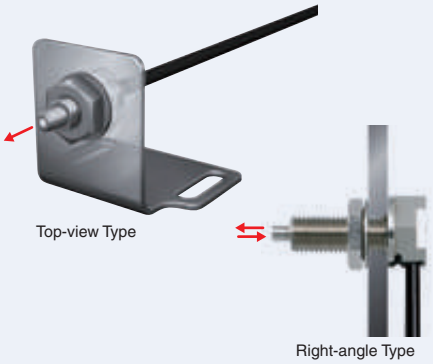
**And**

### Long-distance Sensing Applications

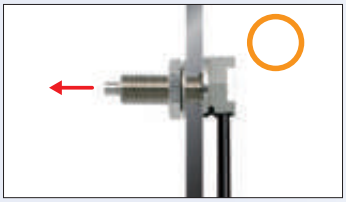
A separate Lens Unit can be attached to extend the sensing distance.
→ 30 Page

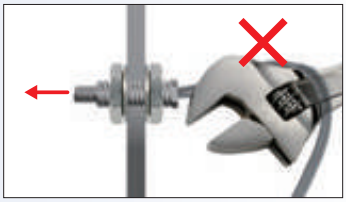
### Breaking Due to Snagging or Shock

The Fiber Unit can be protected from breaking with stainless steel spiral tube.
→ 44 Page (Excluding the E32-T11N 2M.)




- Standard configuration. These Fiber Units are mounted into a hole drilled in a bracket and secured with nuts.
- The Right-angle Model prevents snagging on the cable because the cable runs along the mounting surface.





## Specifications

### Reflective Fiber Units

| Sensing direction (Aperture angle) | Size | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA | E3X-ZV HS | E3X-ZV Other modes | E3NX-FA GIGA | E3NX-FA HS | E3NX-FA Other modes | Optical axis diameter (minimum sensing object) | Models | 09 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Right-angle (Approx. 60°) | M3 | Coaxial 20.5 M3 IP67 | Flexible, R4 | 110 | 46 | ST : 50 SHS: 14 | 160 | 69 | ST : 75 SHS: 14 | (5 µm dia./ 2 µm dia.) | E32-C31N 2M | 09-A |
| | M6 | Coaxial 24 M6 IP67 | | 780 | 220 | ST : 350 SHS: 100 | 1,170 | 340 | ST : 520 SHS: 100 | | E32-C91N 2M | 09-B |
| Top-view (Approx. 60°) | M3 | 11 M3 IP67 | Flexible, R1 | 140 | 40 | ST : 60 SHS: 16 | 210 | 60 | ST : 90 SHS: 16 | | E32-D21R 2M | 09-C |
| | | Coaxial 25 M3 IP67 | R25 | 330 | 100 | ST : 150 SHS: 44 | 490 | 150 | ST : 220 SHS: 44 | | E32-C31 2M | 09-D |
| | | Coaxial 11 M3 IP67 | R10 | | | | | | | | E32-C31M 1M | 09-E |
| | M4 | 15 M4 IP67 | Flexible, R1 | 140 | 40 | ST : 60 SHS: 16 | 210 | 60 | ST : 90 SHS: 16 | | E32-D211R 2M | 09-F |
| | M6 | 17 M6 IP67 | | 840 | 240 | ST : 350 SHS: 100 | 1,260 | 360 | ST : 520 SHS: 100 | | E32-D11R 2M | 09-G |
| | | Coaxial 23 M6 IP67 | R25 | 1,400 | 400 | ST : 600 SHS: 180 | 2,100 | 600 | ST : 900 SHS: 180 | | E32-CC200 2M | 09-H |
| Top-view (Approx. 15°) | M6 | 23 M6 Build-in Lens IP50 | R25 | 860 | 250 | ST : 360 SHS: 110 | 1,290 | 370 | ST : 540 SHS: 110 | (1 dia./ 0.03 dia.) | E32-LD11 2M | 09-I |
| | | | Flexible, R1 | 840 | 240 | ST : 350 SHS: 100 | 1,260 | 360 | ST : 520 SHS: 100 | | E32-LD11R 2M | |

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)

**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.

**3.** The sensing distances for Reflective Fiber Units are for white paper. (The sensing distance for the E32-LD11 2M / E32-LD11R 2M are for glossy white paper.)

**4.** The sensing distances for E3NX-FA are values for E3NX-FA□ models. The distances for E3NX-FAH□ infrared models are different.

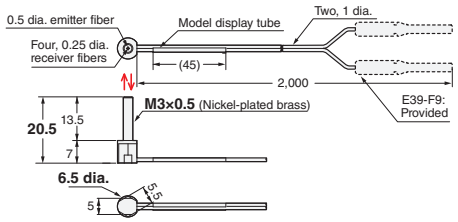
**5.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

Installation Information → 62 to 66 Page

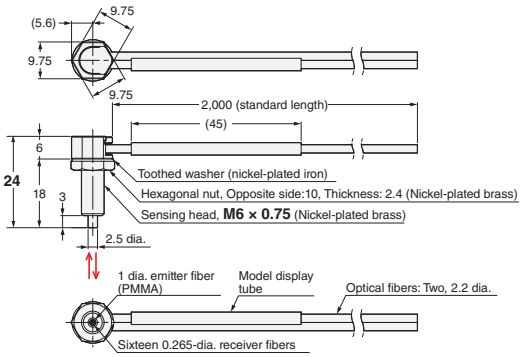
## Reflective Fiber Units

### 09-A E32-C31N 2M (Free Cutting)



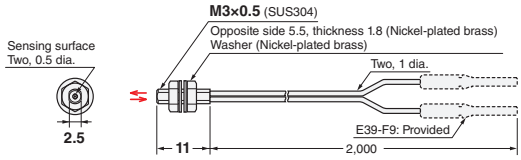

**Note:** There is a white line on the emitter fiber.
M3 nuts (Nickel-plated brass)
Washers (Nickel-plated brass) provided (2 of each)

### 09-B E32-C91N 2M (Free Cutting)

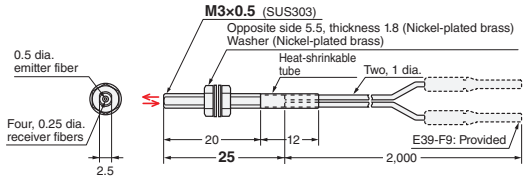



Note: There is a white line on the emitter fiber.

### 09-C E32-D21R 2M (Free Cutting)

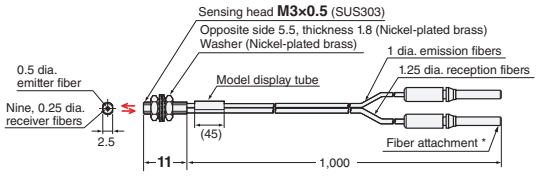



### 09-D E32-C31 2M (Free Cutting)




Note: There is a white line on the emitter fiber.

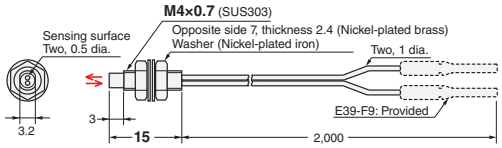
### 09-E E32-C31M 1M (Free Cutting)



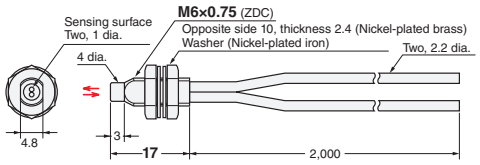

**Note:** There is a white line on the emitter fiber.

* The Fiber Attachments that are provided were specially designed for this Fiber Unit.
E39-F9 cannot be attached.

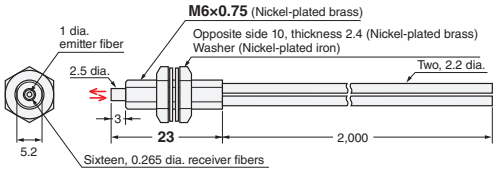
### 09-F E32-D211R 2M (Free Cutting)




### 09-G E32-D11R 2M (Free Cutting)

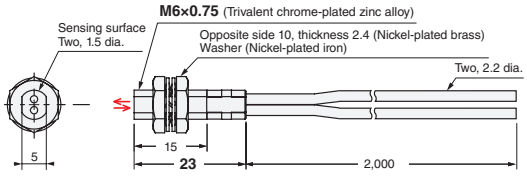



### 09-H E32-CC200 2M (Free Cutting)




Note: There is a white line on the emitter fiber.

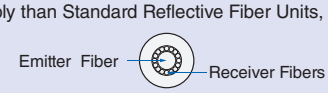
### 09-I E32-LD11 2M (Free Cutting)
### E32-LD11R 2M (Free Cutting)




## - Reference Information for Model Selection -

### Features of Coaxial Reflective Type

These Fiber Units offer better detection of small objects at close distances (of 2 mm or less) than Standard Reflective Fiber Units.
They also detect glossy surfaces more reliably than Standard Reflective Fiber Units, even if the surface is tilted.
The receiver fibers are arranged around the emitter fiber as shown below.




And

### Breaking Due to Snagging or Shock

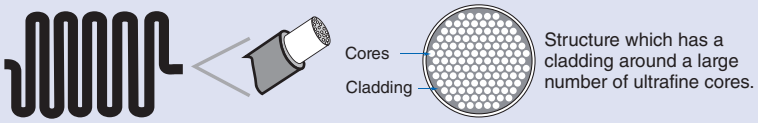
The Fiber Unit can be protected from breaking with stainless steel spiral tube.
→ 46 Page

### Features of the Right-angle Type

- Cable is less prone to snagging.
- Cable runs along the mounting surface for less space compared with Top-view Fiber Units.
- The nut is attached to the Fiber Unit to reduce installation work.

### What Is "Flexible" Fiber?

The flexible fiber has a small bending radius for easy routing without easily breaking.
It is easy to use because the cable can be bent without significantly reducing light intensity.




Build-in Lens

### What Are Fiber Units with Build-in Lenses?

These Fiber Units have built-in lenses.
They feature high-power beams.
You don't have to worry about the lens falling off and getting lost.



- You can easily mount these Fiber Units by making a hole in the bracket and tightening just one nut.
- The cable follows the wall, so extra space is not required, and the cable will not get caught on other objects.




- Build-in Lens

A Fiber Unit with Build-in Lens is the new standard in fiber units.
We recommend this new standard Fiber Unit that achieves stable detection with a high-power beam.
You don't have to worry about the lens falling off and getting lost.
Through-beam Flat Fiber Units are also available. (→ 16 page)

## Specifications

### Through-beam Fiber Units

| Aperture angle | Size | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA | HS | Other modes | Sensing distance (mm) E3NX-FA GIGA | HS | Other modes | Optical axis diameter (minimum sensing object) | Models | 11 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approx. 15° | M4 | 14.4, M4, Build-in Lens, IP50 | Flexible, R2 | 4,000* | 2,300 | ST : 3,500 SHS: 920 | 4,000* | 3,450 | ST : 4,000* SHS: 920 | 2.3 dia. (0.1 dia./ 0.03 dia.) | E32-LT11N 2M | 11-A |
| Approx. 60° | | 14.7, M4, IP67 | Flexible, R1 | 2,000 | 700 | ST : 1,000 SHS: 280 | 3,000 | 1,050 | ST : 1,500 SHS: 280 | 1 dia. (5 µm dia./ 2 µm dia.) | E32-T11N 2M | 11-B |

### Reflective Fiber Units

| Aperture angle | Size | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA | HS | Other modes | Sensing distance (mm) E3NX-FA GIGA | HS | Other modes | Optical axis diameter (minimum sensing object) | Models | 11 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approx. 15° | M6 | 15.8, M6, Build-in Lens, IP50 | Flexible, R2 | 840 | 240 | ST : 350 SHS: 100 | 1,260 | 360 | ST : 520 SHS: 100 | (0.1 dia./ 0.03 dia.) | E32-LD11N 2M | 11-C |
| Approx. 60° | M3 | Coaxial, 18.5, M3, IP67 | Flexible, R2 | 290 | 90 | ST : 130 SHS: 39 | 440 | 130 | ST : 190 SHS: 39 | (5 µm dia./ 2 µm dia.) | E32-C21N 2M | 11-D |
| | M4 | 13.5, M4, IP67 | Flexible, R2 | 840 | 240 | ST : 350 SHS: 100 | 1,260 | 360 | ST : 520 SHS: 100 | (5 µm dia./ 2 µm dia.) | E32-D21N 2M | 11-E |
| | M6 | Coaxial, 24, M6, IP67 | Flexible, R4 | 780 | 220 | ST : 350 SHS: 100 | 1,170 | 340 | ST : 520 SHS: 100 | (5 µm dia./ 2 µm dia.) | E32-C91N 2M | 11-F |

### Retro-reflective Fiber Units (With M.S.R. Function)

| Aperture angle | Size | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA | HS | Other modes | Sensing distance (mm) E3NX-FA GIGA | HS | Other modes | Optical axis diameter (minimum sensing object) | Models | 11 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approx. 15° | M6 | 8.5, 44, 15.8, 80, M6, Build-in Lens, IP50 | Flexible, R2 | 1,350 | 1,000 | ST : 1,200 SHS: 550 | 2,020 | 1,500 | ST : 1,800 SHS: 550 | – | E32-LR11NP 2M + E39-RP1 | 11-G |

* The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)

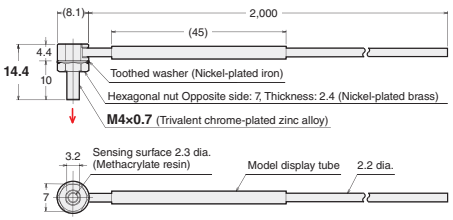
2. The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.
3. The sensing distances for Reflective Sensors are for white paper. (The sensing distances for the E32-LD11N 2M are for glossy white paper).
4. With Retro-reflective Models, objects with a high reflection factor may cause the Fiber Sensor to detect reflected light as incident light. Also, stable detection may not be possible for transparent objects. Check suitability beforehand.
5. The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

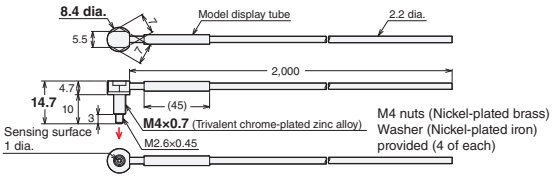
Installation Information → 62 to 66 Page

## Through-beam Fiber Units

### 11-A E32-LT11N 2M (Free Cutting)

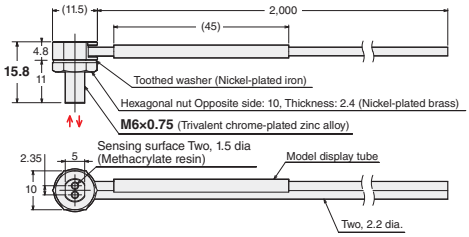



### 11-B E32-T11N 2M (Free Cutting)

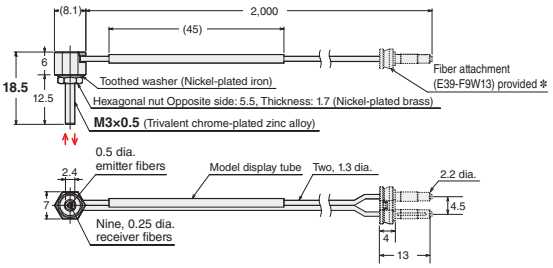



## Reflective Fiber Units

### 11-C E32-LD11N 2M (Free Cutting)



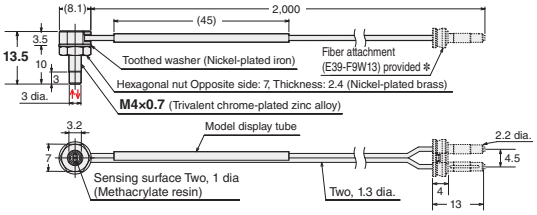

### 11-D E32-C21N 2M (Free Cutting)




**Note:** There is a white line on the emitter fiber.

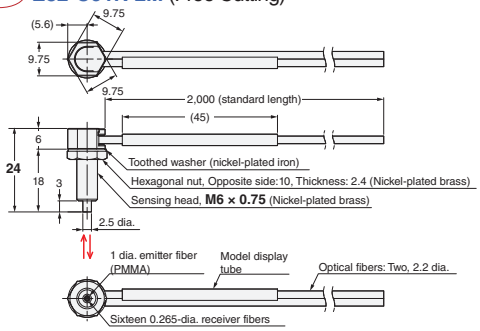
✻ Applicable Fiber Amplifier Units: E3NX-FA, E3NX-CA, and E3X-HD. Use the enclosed E39-F9-7 Fiber Attachment for other models, such as the E3X-SD, E3X-NA, and other models that have an 8-mm space between the emitter and receiver fiber insertion holes.

### 11-E E32-D21N 2M (Free Cutting)




✻ Applicable Fiber Amplifier Units: E3NX-FA, E3NX-CA, and E3X-HD. Use the enclosed E39-F9-7 Fiber Attachment for other models, such as the E3X-SD, E3X-NA, and other models that have an 8-mm space between the emitter and receiver fiber insertion holes.

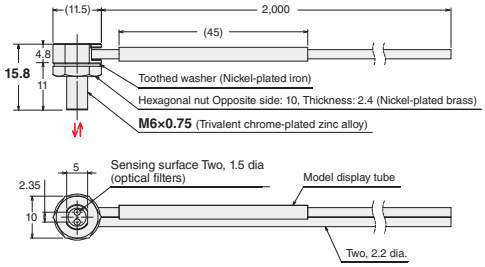
### 11-F E32-C91N 2M (Free Cutting)



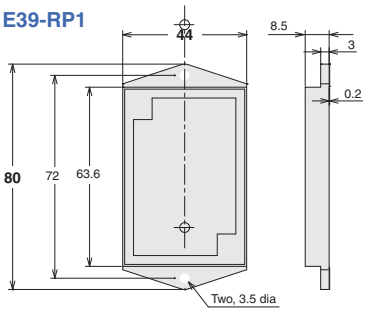

**Note:** There is a white line on the emitter fiber.

## Retro-reflective Fiber Units (With M.S.R. Function)

### 11-G E32-LR11NP 2M (Free Cutting)




### E39-RP1

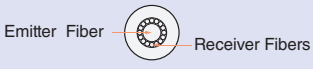



**Material:**
<Reflective surface> Methacrylate resin
<Back> ABS

## - Reference Information for Model Selection -

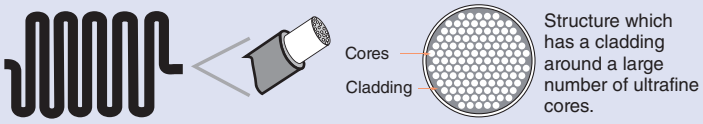
### Features of Coaxial Reflective Type

These Fiber Units offer better detection of small objects at close distances (of 2 mm or less) than Standard Reflective Fiber Units.
They also detect glossy surfaces more reliably than Standard Reflective Fiber Units, even if the surface is tilted.
The receiver fibers are arranged around the emitter fiber as shown below.




### What Is "Flexible" Fiber?

The flexible fiber has a small bending radius for easy routing without easily breaking.
It is easy to use because the cable can be bent without significantly reducing light intensity.




Structure which has a cladding around a large number of ultrafine cores.

### Transparent Object Detection

Retro-reflective Models are ideal for detection of transparent objects.

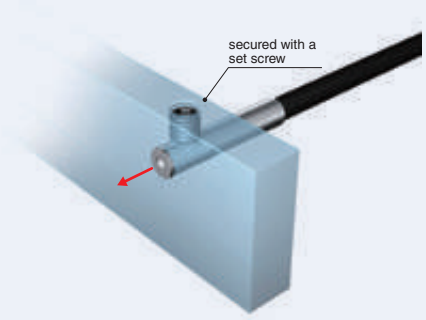
→ 39 Page: Performance Comparison of Transparent Object Detection

**And**

### Long-distance Sensing Applications with the E32-T11N

A separate Lens Unit can be attached to extend the sensing distance.

→ 30 Page




- Inserted where space is limited. (Secured using a set screw.)
- Ultramate space-saving by micro-fiber head. (1 dia. × 10 mm)




- Side-view models can be mounted where there is limited depth.

## Specifications

### Through-beam Fiber Units

| Size | Sensing direction | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA | HS | Other modes | Sensing distance (mm) E3NX-FA GIGA | HS | Other modes | Optical axis diameter (minimum sensing object) | Models | 13 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 dia. | Top-view | 10, 1 dia., IP67 | Flexible, R1 | 450 | 150 | ST : 250 SHS: 60 | 670 | 220 | ST : 370 SHS: 60 | 0.5 dia. (5 µm dia./ 2 µm dia.) | E32-T223R 2M | 13-A |
| 1.5 dia. | Top-view | 10, 1.5 dia., IP67 | Bendresistant, R4 | 680 | 220 | ST : 400 SHS: 90 | 1,020 | 330 | ST : 600 SHS: 90 | 0.5 dia. (5 µm dia./ 2 µm dia.) | E32-T22B 2M | 13-B |
| 3 dia. | Top-view | 14, 3 dia., IP67 | Flexible, R1 | 2,000 | 700 | ST : 1,000 SHS: 280 | 3,000 | 1,050 | ST : 1,500 SHS: 280 | 1 dia. (5 µm dia./ 2 µm dia.) | E32-T12R 2M | 13-C |
| 3 dia. | Side-view | 35, 3 dia., IP67 | Flexible, R1 | 750 | 260 | ST : 450 SHS: 100 | 1,120 | 390 | ST : 670 SHS: 100 | 1 dia. (5 µm dia./ 2 µm dia.) | E32-T14LR 2M | 13-D |

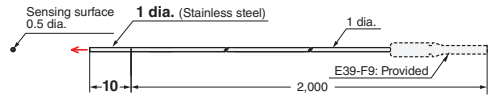
**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)
**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.
**3.** The sensing distances for E3NX-FA are values for E3NX-FA□ models. The distances for E3NX-FAH□ infrared models are different.
**4.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

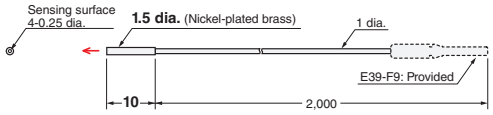
Installation Information → 62 to 66 Page

### Through-beam Fiber Units (Set of 2)

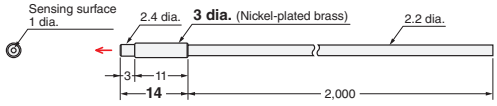
13-A **E32-T223R 2M** (Free Cutting)



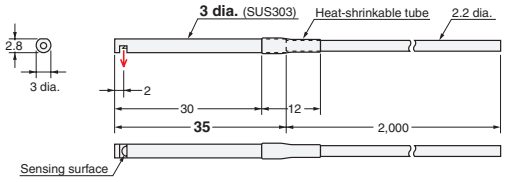

13-B **E32-T22B 2M** (Free Cutting)




13-C **E32-T12R 2M** (Free Cutting)



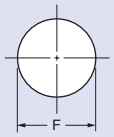

13-D **E32-T14LR 2M** (Free Cutting)




## - Reference Information for Model Selection -

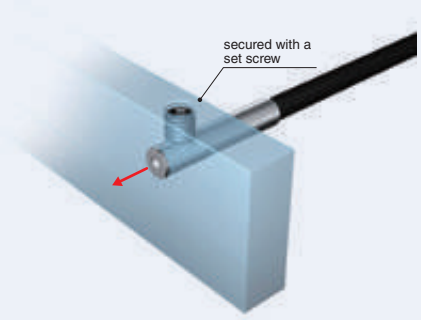
### Recommended Mounting Hole Dimensions

The recommended mounting-hole dimensions for Cylindrical Fiber Units are given below.




(Unit: mm)

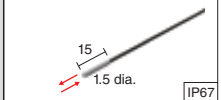
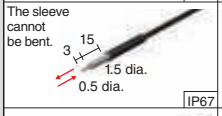
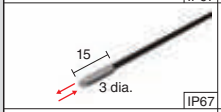
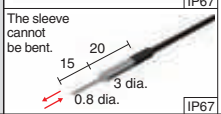
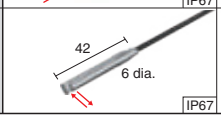
| Outer diameter of Fiber Unit | 1 dia. | 1.5 dia. | 3 dia. |
|---|---|---|---|
| Dimension F | 1.2 $^{+0.5}_{0}$ dia. | 1.7 $^{+0.5}_{0}$ dia. | 3.2 $^{+0.5}_{0}$ dia. |




- Inserted where space is limited. (Secured using a set screw.)

## Specifications

### Reflective Fiber Units

| Size | Sensing direction | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA | HS | Other modes | Sensing distance (mm) E3NX-FA GIGA | HS | Other modes | Optical axis diameter (minimum sensing object) | Models | 15 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.5 dia. | Top-view |  | Bend-resistant, R4 | 140 | 40 | ST : 60 SHS: 16 | 210 | 60 | ST : 90 SHS: 16 | (5 µm dia./ 2 µm dia.) | E32-D22B 2M | 15-A |
| 1.5 dia. + 0.5 dia. | |  | R4 | 28 | 8 | ST : 12 SHS: 4 | 42 | 12 | ST : 18 SHS: 4 | | E32-D43M 1M | 15-B |
| 3 dia. | |  | Flexible, R1 | 140 | 40 | ST : 60 SHS: 16 | 210 | 60 | ST : 90 SHS: 16 | | E32-D22R 2M | 15-C |
| | |  | Bend-resistant, R4 | 300 | 90 | ST : 140 SHS: 40 | 450 | 130 | ST : 210 SHS: 40 | | E32-D221B 2M | 15-D |
| | |  | R25 | 700 | 200 | ST : 300 SHS: 90 | 1,050 | 300 | ST : 450 SHS: 90 | | E32-D32L 2M | 15-E |
| 3 dia. + 0.8 dia. | |  | | 70 | 20 | ST : 30 SHS: 8 | 100 | 30 | ST : 45 SHS: 8 | | E32-D33 2M | 15-F |
| 6 dia. | Side-view |  | Flexible, R1 | 220 | 60 | ST : 100 SHS: 28 | 330 | 90 | ST : 150 SHS: 28 | | E32-D14LR 2M | 15-G |

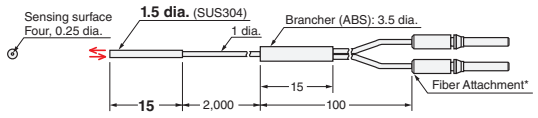
**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode ( 50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)
**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.
**3.** The sensing distances for Reflective Fiber Units are for white paper.
**4.** The sensing distances for E3NX-FA are values for E3NX-FA□ models. The distances for E3NX-FAH□ infrared models are different.
**5.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

Installation Information → 62 to 66 Page

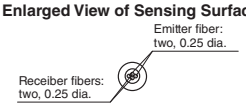
## Reflective Fiber Units

### 15-A E32-D22B 2M (No Cutting)

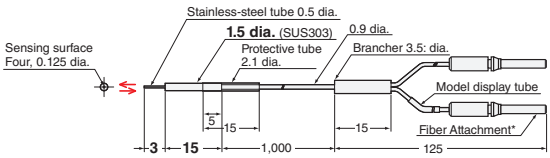



*Attached with adhesive and cannot be removed.

**Enlarged View of Sensing Surface**

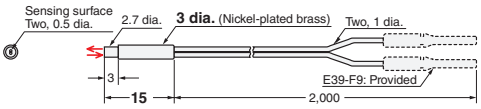



### 15-B E32-D43M 1M (No Cutting)

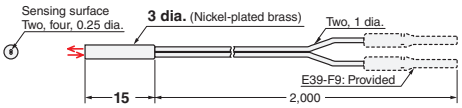



* Attached with adhesive and cannot be removed.

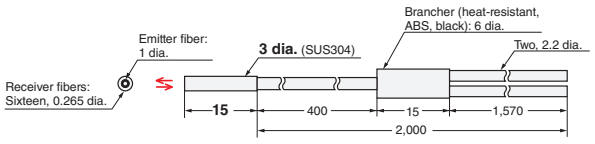
### 15-C E32-D22R 2M (Free Cutting)




### 15-D E32-D221B 2M (Free Cutting)

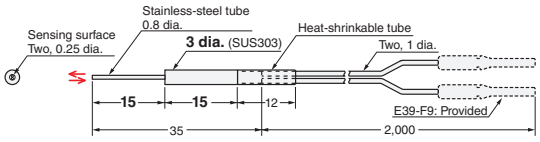



### 15-E E32-D32L 2M (Free Cutting)

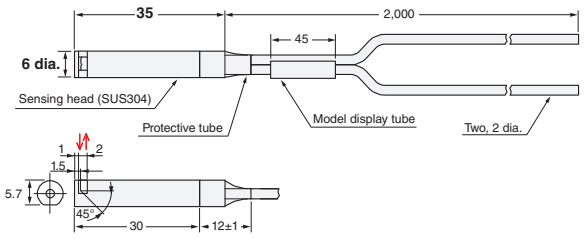



**Note:** There is a yellow dotted line on the Emitter fiber.

### 15-F E32-D33 2M (Free Cutting)



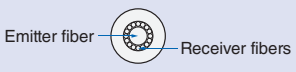

### 15-G E32-D14LR 2M (Free Cutting)




## - Reference Information for Model Selection -

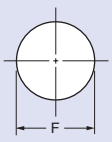
### Features of Coaxial Reflective Type

These Fiber Units offer better detection of small objects at close distances (of 2 mm or less) than Standard Reflective Fiber Units.
They also detect glossy surfaces more reliably than Standard Reflective Fiber Units, even if the surface is tilted.
The receiver fibers are arranged around the emitter fiber as shown below.



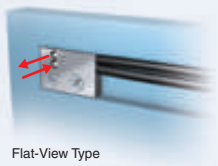

### Recommended Mounting Hole Dimensions

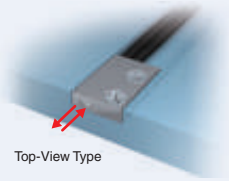
The recommended mounting-hole dimensions for Cylindrical Fiber Units are given below.

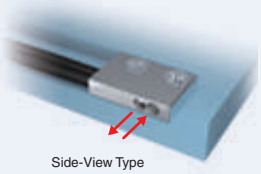



(Unit: mm)

| Outer diameter of Fiber Unit | 1.5 dia. | 3 dia. |
|---|---|---|
| Dimension F | 1.7 $^{+0.5}_{0}$ dia. | 3.2 $^{+0.5}_{0}$ dia. |


Flat-View Type

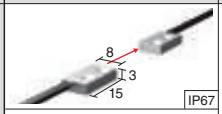
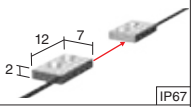
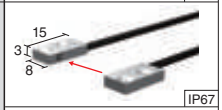
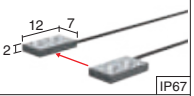
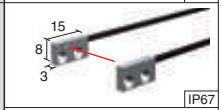
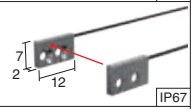
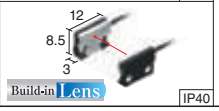

Top-View Type


Side-View Type

- Thin profile for mounting in limited spaces.
- Mounts directly without using special mounting brackets.

## Specifications

### Through-beam Fiber Units

| Sensing direction | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA | HS | Other modes | Sensing distance (mm) E3NX-FA GIGA | HS | Other modes | Optical axis diameter (minimum sensing object) | Models | 17 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Top-view |  IP67 | Flexible, R1 | 2,000 | 700 | ST : 1,000 SHS: 280 | 3,000 | 1,050 | ST : 1,500 SHS: 280 | 1 dia. (5 µm dia./ 2 µm dia.) | E32-T15XR 2M | 17-A |
| |  IP67 | | 450 | 150 | ST : 250 SHS: 60 | 670 | 220 | ST : 370 SHS: 60 | 0.5 dia. (5 µm dia./ 2 µm dia.) | E32-T25XR 2M | 17-B |
| Side-view |  IP67 | | 750 | 260 | ST : 450 SHS: 100 | 1,120 | 390 | ST : 670 SHS: 100 | 1 dia. (5 µm dia./ 2 µm dia.) | E32-T15YR 2M | 17-C |
| |  IP67 | | 170 | 50 | ST : 100 SHS: 20 | 250 | 70 | ST : 150 SHS: 20 | 0.5 dia. (5 µm dia./ 2 µm dia.) | E32-T25YR 2M | 17-D |
| Flat-view |  IP67 | | 750 | 260 | ST : 450 SHS: 20 | 1,120 | 390 | ST : 670 SHS: 100 | 1 dia. (5 µm dia./ 2 µm dia.) | E32-T15ZR 2M | 17-E |
| |  IP67 | | 170 | 50 | ST : 100 SHS: 20 | 250 | 70 | ST : 150 SHS: 20 | 0.5 dia. (5 µm dia./ 2 µm dia.) | E32-T25ZR 2M | 17-F |
| |  Build-in Lens IP40 | | 2,400 | 800 | ST : 1,200 SHS: 300 | 3,600 | 1,200 | ST : 1,800 SHS: 300 | 3 dia. (0.1 dia./ 0.03 dia.) | E32-LT35Z 2M | 17-G |

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)

**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.

**3.** The sensing distances for Reflective Fiber Units are for white paper.

**4.** The sensing distances for E3NX-FA are values for E3NX-FA□ models. The distances for E3NX-FAH□ infrared models are different.

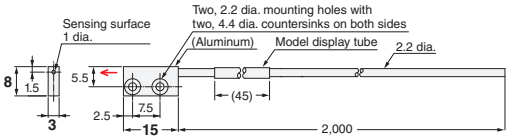
**5.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

Installation Information → 62 to 66 Page

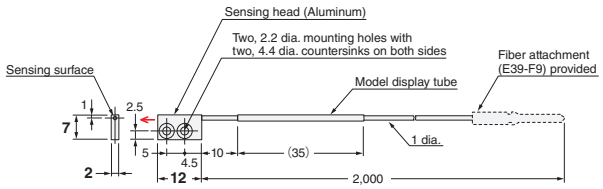
### Through-beam Fiber Units (Set of 2)

#### 17-A E32-T15XR 2M (Free Cutting)



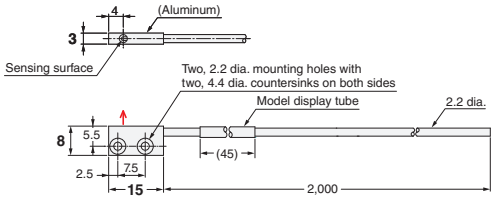

**Note: 1.** Set of two symmetrically shaped Fiber Units.
**2.** Four, M2 × 8 stainless steel countersunk mounting screws are provided.

#### 17-B E32-T25XR 2M (Free Cutting)



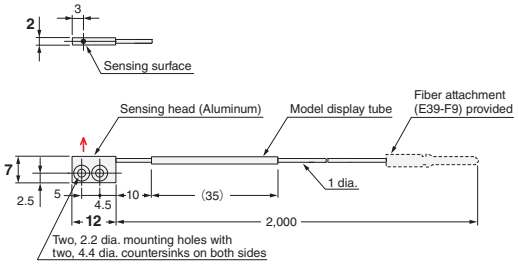

**Note: 1.** Set of two symmetrically shaped Fiber Units.
**2.** Four, M2 × 8 stainless steel countersunk mounting screws are provided.

#### 17-C E32-T15YR 2M (Free Cutting)



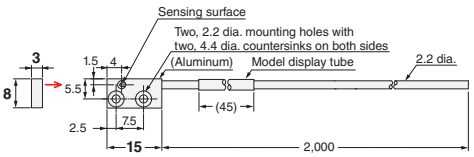

**Note: 1.** Set of two symmetrically shaped Fiber Units.
**2.** Four, M2 × 8 stainless steel countersunk mounting screws are provided.

#### 17-D E32-T25YR 2M (Free Cutting)



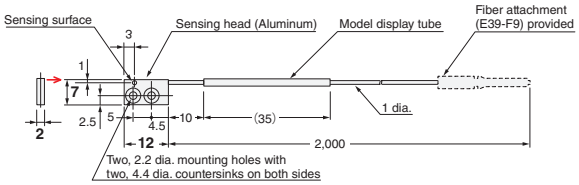

**Note: 1.** Set of two symmetrically shaped Fiber Units.
**2.** Four, M2 × 8 stainless steel countersunk mounting screws are provided.

#### 17-E E32-T15ZR 2M (Free Cutting)



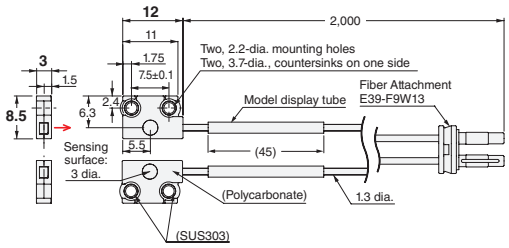

**Note: 1.** Set of two symmetrically shaped Fiber Units.
**2.** Four, M2 × 8 stainless steel countersunk mounting screws are provided.

#### 17-F E32-T25ZR 2M (Free Cutting)

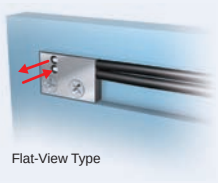



**Note: 1.** Set of two symmetrically shaped Fiber Units.
**2.** Four, M2 × 8 stainless steel countersunk mounting screws are provided.

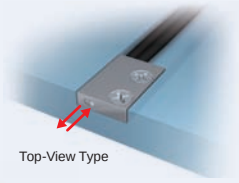
#### 17-G E32-LT35Z 2M (Free Cutting)



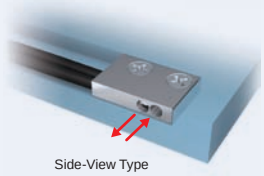

**Note: 1.** Set of two symmetrically shaped Fiber Units.
**2.** Four, M2 x 8 stainless-steel, pan-head mounting screws,
four spring washers, four flat washers, and four nuts are provided.



Flat-View Type



Top-View Type

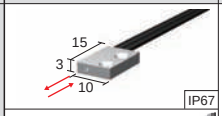
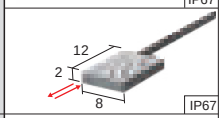
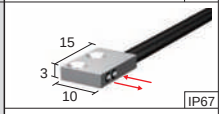
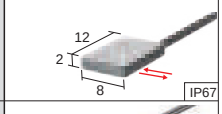
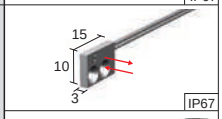
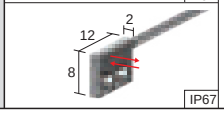


Side-View Type

- Thin profile for mounting in limited spaces.
- Mounts directly without using special mounting brackets.

## Specifications

### Reflective Fiber Units

| Sensing direction | Appearance (mm) | Bending radius of cable | Sensing distance (mm) | | | | Optical axis diameter (minimum sensing object) | Models | 19 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|
| | | | E3X-ZV | | E3NX-FA | | | | |
| | | | GIGA HS | Other modes | GIGA HS | Other modes | | | |
| Top-view |  IP67 | Flexible, R1 | 840 / 240 | ST : 350 SHS: 100 | 1,260 / 360 | ST : 520 SHS: 100 | (5 µm dia./ 2 µm dia.) | E32-D15XR 2M | 19-A |
| |  IP67 | | 140 / 40 | ST : 60 SHS: 16 | 210 / 60 | ST : 90 SHS: 16 | | E32-D25XR 2M | 19-B |
| Side-view |  IP67 | | 200 / 52 | ST : 100 SHS: 24 | 300 / 78 | ST : 150 SHS: 24 | | E32-D15YR 2M | 19-C |
| |  IP67 | | 40 / 10 | ST : 16 SHS: 4 | 60 / 10 | ST : 20 SHS: 4 | | E32-D25YR 2M | 19-D |
| Flat-view |  IP67 | | 200 / 52 | ST : 100 SHS: 24 | 300 / 78 | ST : 150 SHS: 24 | | E32-D15ZR 2M | 19-E |
| |  IP67 | | 40 / 10 | ST : 16 SHS: 4 | 60 / 10 | ST : 20 SHS: 4 | | E32-D25ZR 2M | 19-F |

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)

**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.

**3.** The sensing distances for Reflective Fiber Units are for white paper.

**4.** The sensing distances for E3NX-FA are values for E3NX-FA□ models. The distances for E3NX-FAH□ infrared models are different.

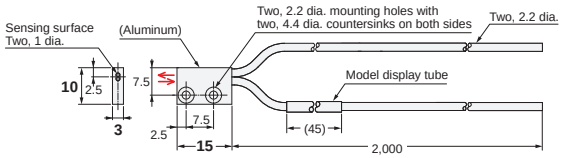
**5.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

Installation Information → 62 to 66 Page

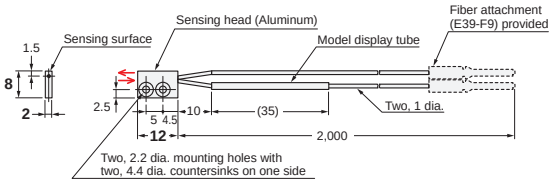
### Reflective Fiber Units

#### 19-A E32-D15XR 2M (Free Cutting)



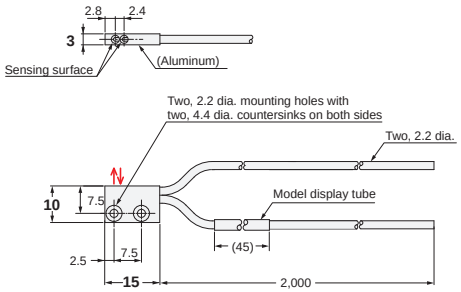

**Note:** Two, M2 × 8 stainless steel countersunk mounting screws are provided.

#### 19-B E32-D25XR 2M (Free Cutting)



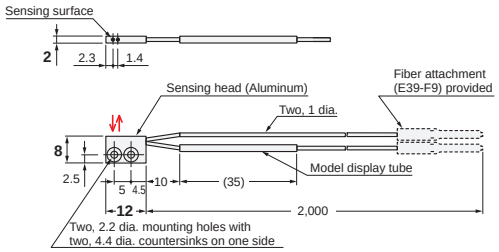

**Note:** Two, M2 × 8 stainless steel countersunk mounting screws are provided.

#### 19-C E32-D15YR 2M (Free Cutting)



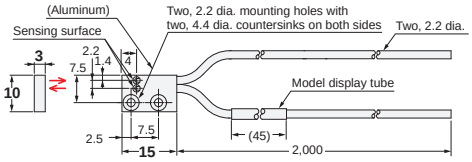

**Note:** Two, M2 × 8 stainless steel countersunk mounting screws are provided.

#### 19-D E32-D25YR 2M (Free Cutting)



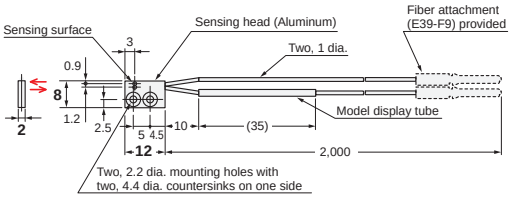

**Note:** Two, M2 × 8 stainless steel countersunk mounting screws are provided.

#### 19-E E32-D15ZR 2M (Free Cutting)

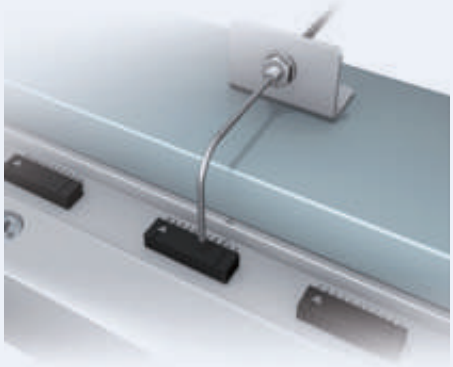



**Note:** Two, M2 × 8 stainless steel countersunk mounting screws are provided.

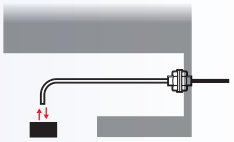
#### 19-F E32-D25ZR 2M (Free Cutting)




**Note:** Two, M2 × 8 stainless steel countersunk mounting screws are provided.



- Sleeve Fiber Units allow detection away from the point of installation for stable close-range detection of small objects.
- The shape of sleeve can be changed freely. (Refer to the sleeve bending specifications in the Appearance column of the specifications table.)



## Specifications

### Through-beam Fiber Units

| Sensing direction | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA | HS | Other modes | Sensing distance (mm) E3NX-FA GIGA | HS | Other modes | Optical axis diameter (minimum sensing object) | Models | 21 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Side-view | The sleeve cannot be bent. 15 20 1 dia. 2 dia. IP67 | Flexible, R1 | 170 | 50 | ST : 100 SHS: 20 | 250 | 75 | ST : 150 SHS: 20 | 0.5 dia. (5 μm dia./ 2 μm dia.) | E32-T24R 2M | 21-A |
| | The sleeve cannot be bent. 15 15 2.5 dia. 0.81 dia. IP67 | | 450 | 150 | ST : 250 SHS: 60 | 670 | 220 | ST : 370 SHS: 60 | | E32-T24E 2M | 21-B |
| Top-view | The sleeve cannot be bent. 40 15 0.5 dia. 3 dia. IP67 | R10 | 150 | 50 | ST : 90 SHS: 20 | 220 | 75 | ST : 130 SHS: 20 | 0.25 dia. (5 μm dia./ 2 μm dia.) | E32-T33 1M | 21-C |
| | The sleeve cannot be bent. 15 15 0.82 dia. M3 IP67 | | 510 | 170 | ST : 300 SHS: 68 | 760 | 250 | ST : 450 SHS: 68 | 0.5 dia. (5 μm dia./ 2 μm dia.) | E32-T21-S1 2M | 21-D |
| | Sleeve bending radius: 5 mm 90 11 1.2 dia. M4 IP67 | Flexible, R1 | 2,000 | 700 | ST : 1,000 SHS: 280 | 3,000 | 1,050 | ST : 1,500 SHS: 280 | 1 dia. (5 μm dia./ 2 μm dia.) | E32-TC200BR 2M | 21-E |

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 μs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 μs)

**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.

**3.** The sensing distances for E3NX-FA are values for E3NX-FA□ models. The distances for E3NX-FAH□ infrared models are different.

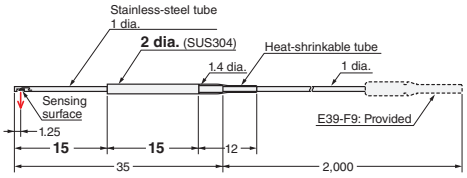
**4.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

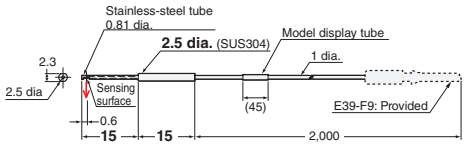
Installation Information → 62 to 66 Page

### Through-beam Fiber Units (Set of 2)

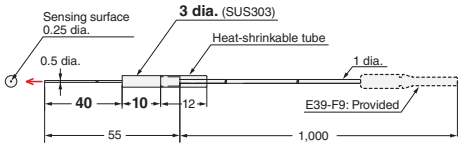
**21-A E32-T24R 2M (Free Cutting)**



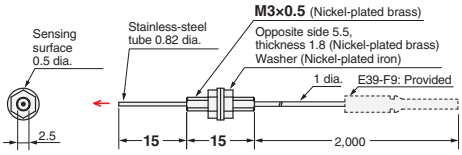

**21-B E32-T24E 2M (Free Cutting)**



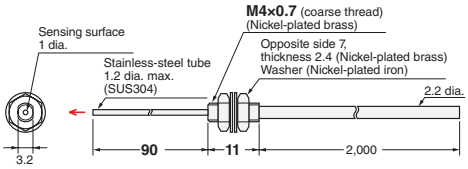

**21-C E32-T33 1M (Free Cutting)**




**21-D E32-T21-S1 2M (Free Cutting)**




**21-E E32-TC200BR 2M (Free Cutting)**




## - Reference Information for Model Selection -

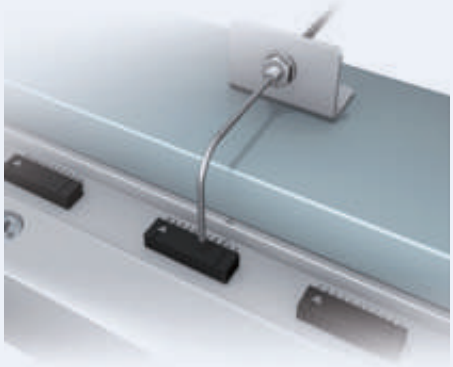
**And**

### In case of bending sleeve

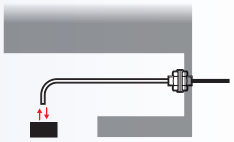
The E32-TC200BR has a bendable sleeve.
Use the Sleeve Bender to bend them.

**Sleeve Bender (sold separately)**

| Appearance | Applicable Fiber Units | Model |
|---|---|---|
|  Uses for the bending of the sleeve. | E32-TC200BR | E39-F11 |



- Sleeve Fiber Units allow detection away from the point of installation for stable close-range detection of small objects.
- The shape of sleeve can be changed freely. (Refer to the sleeve bending specifications in the Appearance column of the specifications table.)



## Specifications

### Reflective Fiber Units

| Sensing direction | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA | E3X-ZV HS | E3X-ZV Other modes | E3NX-FA GIGA | E3NX-FA HS | E3NX-FA Other modes | Optical axis diameter (minimum sensing object) | Models | 23 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Side-view | The sleeve cannot be bent. 20, 15, 3 dia., 2 dia. IP67 | Flexible, R1 | 70 | 20 | ST : 30 SHS: 8 | 100 | 30 | ST : 45 SHS: 8 | (5 µm dia./ 2 µm dia.) | E32-D24R 2M | 23-A |
| | Sleeve bending radius: 25 mm 65, 15, 4.8 dia., 2.1 dia. IP67 | R25 | 120 | 45 | ST : 53 SHS: 14 | 180 | 67 | ST : 79 SHS: 14 | | E32-D24-S2 2M | 23-B |
| Top-view | The sleeve cannot be bent. 15, 3, 1.5 dia., 0.5 dia. IP67 | R4 | 28 | 8 | ST : 12 SHS: 4 | 42 | 12 | ST : 18 SHS: 4 | | E32-D43M 1M | 23-C |
| | The sleeve cannot be bent. 15, 15, 2 dia., 0.5 dia. IP67 | | 14 | 4 | ST : 6 SHS: 2 | 21 | 6 | ST : 9 SHS: 2 | | E32-D331 2M | 23-D |
| | The sleeve cannot be bent. 20, 15, 3 dia., 0.8 dia. IP67 | R25 | 70 | 20 | ST : 30 SHS: 8 | 100 | 30 | ST : 45 SHS: 8 | | E32-D33 2M | 23-E |
| | The sleeve cannot be bent. 15, 5, 3 dia., 0.82 dia. IP67 | R4 | 63 | 18 | ST : 27 SHS: 7 | 94 | 27 | ST : 40 SHS: 7 | | E32-D32-S1 0.5M | 23-F |
| | The sleeve cannot be bent. 15, 15, M3, 0.82 dia. IP67 | | | | | | | | | E32-D31-S1 0.5M | 23-G |
| | Sleeve bending radius: 5 mm 11, 40, M3, 1.2 dia. IP67 | Flexible, R1 | 140 | 40 | ST : 60 SHS: 16 | 210 | 60 | ST : 90 SHS: 16 | | E32-DC200F4R 2M | 23-H |
| | The sleeve cannot be bent. 15, 22, 4 dia., 1.65 dia. IP67 | R10 | 250 | 72 | ST : 110 SHS: 30 | 370 | 100 | ST : 160 SHS: 30 | | E32-D22-S1 2M | 23-I |
| | Sleeve bending radius: 10 mm 16, 67, M4, 1.65 dia. IP67 | | | | | | | | | E32-D21-S3 2M | 23-J |
| | The sleeve cannot be bent. 17, 90, M6, 2.5 dia. IP67 | Flexible, R1 | 840 | 240 | ST : 350 SHS: 100 | 1,260 | 360 | ST : 520 SHS: 100 | | E32-DC200BR 2M | 23-K |
| | Sleeve bending radius: 10 mm 15, 10, 67, 3, 1.65 dia. IP67 | R10 | 250 | 72 | ST : 110 SHS: 30 | 370 | 100 | ST : 160 SHS: 30 | | E32-D25-S3 2M | 23-L |

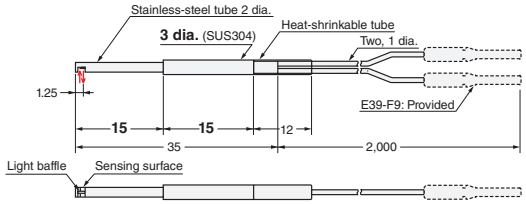
**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)
**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA. **3.**The sensing distances for Reflective Fiber Units are for white paper.
**4.** The sensing distances for E3NX-FA are values for E3NX-FA@ models. The distances for E3NX-FAH@ infrared models are different.
**5.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

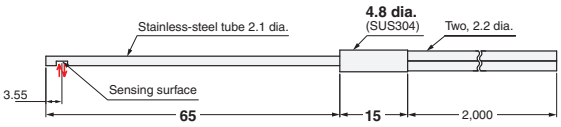
Installation Information → 62 to 66 Page

### Reflective Fiber Units

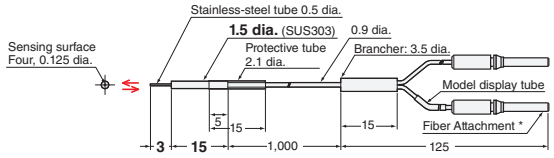
**23-A E32-D24R 2M** (Free Cutting)




**23-B E32-D24-S2 2M** (Free Cutting)

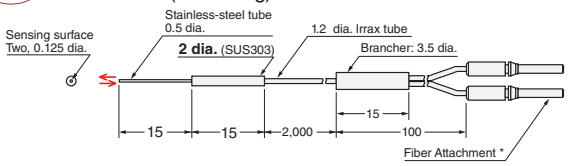



**23-C E32-D43M 1M** (No Cutting)



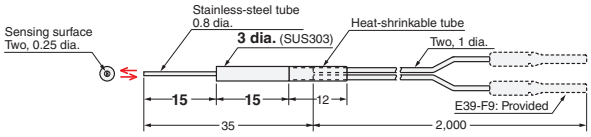

*Attached with adhesive and cannot be removed.

**23-D E32-D331 2M** (No Cutting)

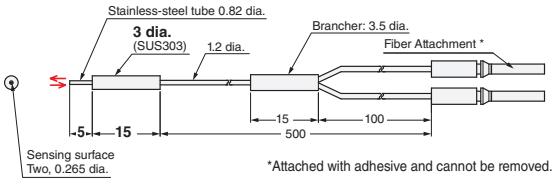



*Attached with adhesive and cannot be removed.

**23-E E32-D33 2M** (Free Cutting)

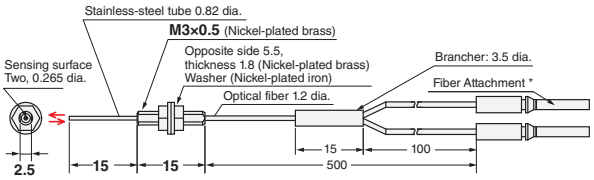



**23-F E32-D32-S1 0.5M** (No Cutting)



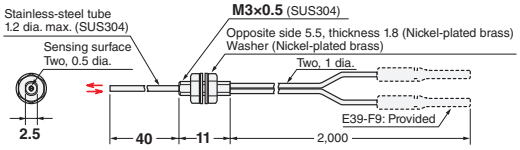

*Attached with adhesive and cannot be removed.

**23-G E32-D31-S1 0.5M** (No Cutting)

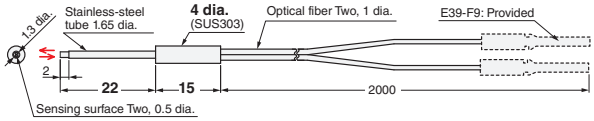



*Attached with adhesive and cannot be removed.

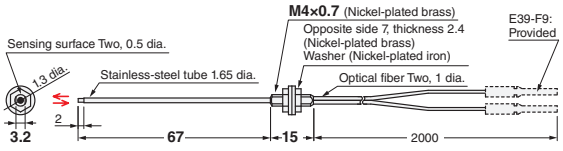
**23-H E32-DC200F4R 2M** (Free Cutting)



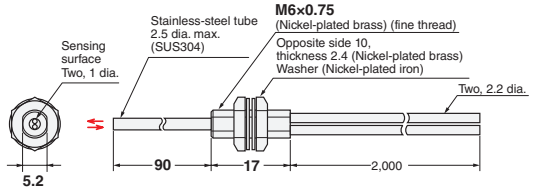

**23-I E32-D22-S1 2M** (Free Cutting)



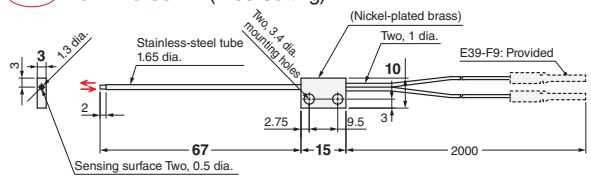

**23-J E32-D21-S3 2M** (Free Cutting)




**23-K E32-DC200BR 2M** (Free Cutting)




**23-L E32-D25-S3 2M** (Free Cutting)




## - Reference Information for Model Selection -

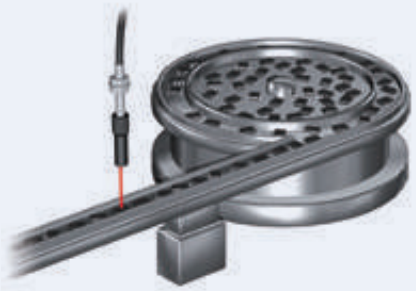
**And**

### In case of bending sleeve

The E32-DC200F4R , E32-D21-S3 and E32-D25-S3 have bendable sleeves.
Use the Sleeve Bender to bend them.

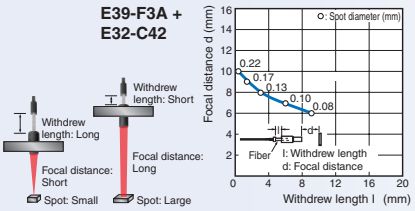
**Sleeve Bender (sold separately)**

| Appearance | Applicable Fiber Units | Model |
|---|---|---|
|  Uses for the bending of the sleeve. | E32-DC200F4R<br>E32-D21-S3<br>E32-D25-S3 | E39-F11 |

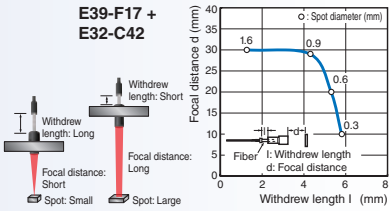


- Small-spot is ideal for detecting minute objects.
  Select the Fiber Unit that is best suited for the workpiece size and installation distance.
  (Refer to Reference Information for Model Selection)
- Available with a variable-spot Lens Unit to change the spot diameter without replacing the fiber. The spot diameter can be adjusted according to the size of the workpiece by changing the withdrew length and sensing distance.
  Refer to the following graph, which shows the relation between the withdrew length, focal distance, and spot diameter.

E39-F3A + E32-C42




E39-F17 + E32-C42




* Withdrew length: Approx. 1.3 to 5.8 mm

## Specifications

### Reflective Fiber Units

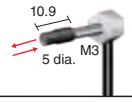
#### Variable-spot types

#### Lens Units + Fiber Unit

| Type | Spot diameter | Center distance (mm) | Lens Units: Models | Lens Units + Fiber Units: Appearance (mm) | Fiber Unit: Bending radius of cable | Fiber Unit: Model | 25 Page Dimensions No. |
|---|---|---|---|---|---|---|---|
| Variable spot | 0.1 to 0.6 dia. | 6 to 15 | E39-F3A |   | R25 | E32-C42 1M | 25-A |
| | 0.3 to 1.6 dia. | 10 to 30 | E39-F17 |   | | | 25-B |

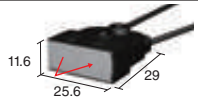
#### Parallel-light-spot types

#### Lens Units + Fiber Unit

| Type | Spot diameter | Center distance (mm) | Lens Units: Model | Lens Units + Fiber Units: Appearance (mm) | Fiber Unit: Bending radius of cable | Fiber Unit: Models | 25 Page Dimensions No. |
|---|---|---|---|---|---|---|---|
| Parallel light | 4 dia. | 0 to 20 | E39-F3C |   | R25 | E32-C31 2M | 25-C |
| | | | |   | Flexible, R2 | E32-C21N 2M | 25-D |

#### Small-spot types

#### Integrated Lens

| Type | Spot diameter | Center distance (mm) | Appearance (mm) | Bending radius of cable | Models | 25 Page Dimensions No. |
|---|---|---|---|---|---|---|
| Short-distance, Small-spot | 0.1 dia. | 5 |   Lens: unnecessary IP50 | R25 | E32-C42S 1M | 25-E |
| Long-distance, Small-spot | 6 dia. | 50 |   Lens: unnecessary IP50 | | E32-L15 2M | 25-F |

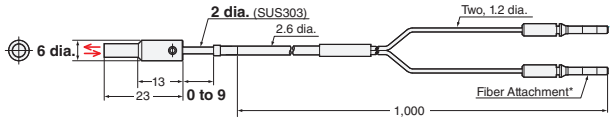
* The spot diameter and the center distance are the same when using with E3X-ZV series or E3NX-FA□ series. The distance for E3NX-FAH□ infrared models varies.

# Dimensions

Installation Information → 62 to 66 Page

## Reflective Fiber Units

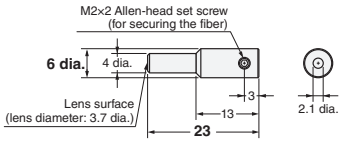
### 25-A E32-C42 1M (No Cutting) + E39-F3A




* Attached with adhesive and cannot be removed.

**Note:** There is a white tube on the emitter fiber.

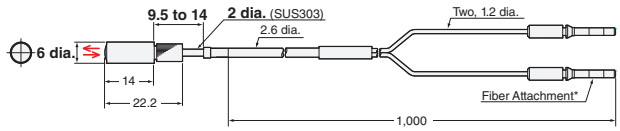
### E39-F3A




**Material:**
Aluminum for body and optical glass for lens.

**Note:** This is the Lens Unit for the E32-C42.

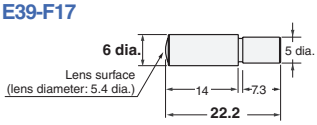
### 25-B E32-C42 1M (No Cutting) + E39-F17




* Attached with adhesive and cannot be removed.

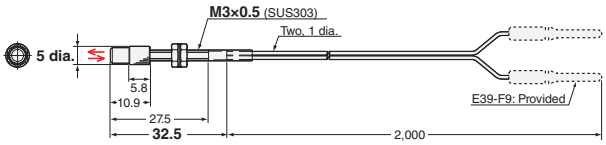
**Note:** There is a white tube on the emitter fiber.

### E39-F17



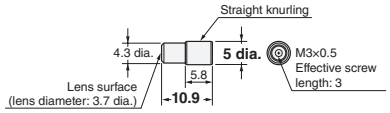

**Material:**
Aluminum for body and optical glass for lens.

### 25-C E32-C31 2M (Free Cutting) + E39-F3C




**Note:** There is a white line on the emitter fiber.

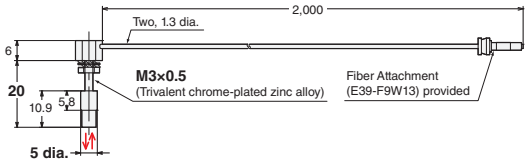
### E39-F3C




**Material:**
Aluminum for body and optical glass for lens.

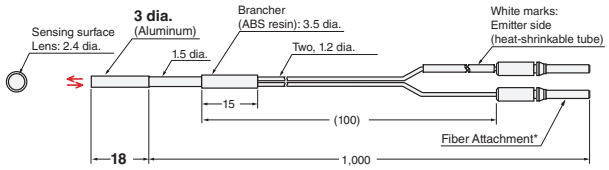
**Note:** This is the Lens Unit for the E32-C31 and E32-C31N.

### 25-D E32-C21N 2M (Free Cutting) + E39-F3C




**Note:** There is a white line on the emitter fiber.

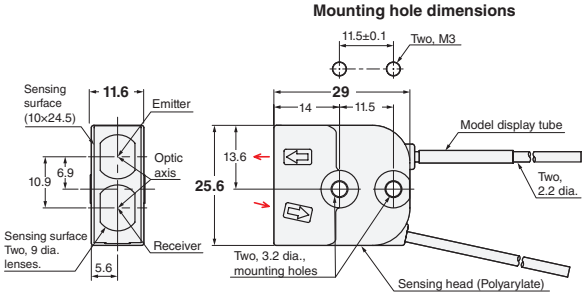
### 25-E E32-C42S 1M (No Cutting)




* Attached with adhesive and cannot be removed.

**Note:** There is a white tube on the emitter fiber.

### 25-F E32-L15 2M (Free Cutting)




**Note:** There is a white tube on the emitter fiber.

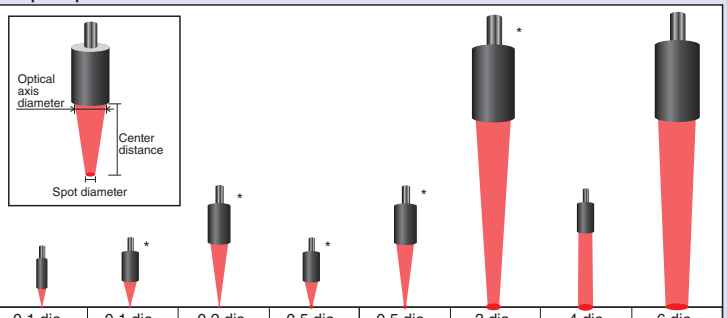
## - Reference Information for Model Selection -

### Model Selection Tips

Select the best model by following these steps.

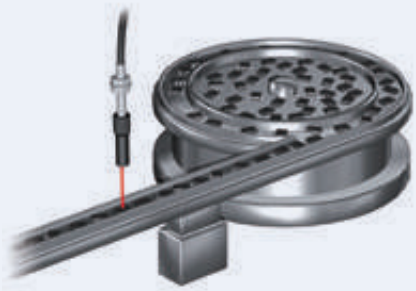
1. Select the model based on the spot diameter suitable for the workpiece size.
   * The Variable-spot Type is useful if there are different sensing object sizes.
2. Select the model based on the allowable installation distance and center distance.

<Map of Spot Diameters and Center Distances> (Unit: mm)




| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Spot diameter** | 0.1 dia. | 0.1 dia. | 0.2 dia. | 0.5 dia. | 0.5 dia. | 3 dia. | 4 dia. | 6 dia. |
| **Center distance** | 5 | 7 | 17 | 7 | 17 | 50 | 0 to 20 | 50 |
| **Optical axis diameter** | 2.4 | 3.7 | 4.8 | 3.7 | 4.8 | 9.4 | 3.7 | 10 |
| **Models** | E32-C42S | E39-F3A-5 + E32-C41 | E39-F3B + E32-C41 | E39-F3A-5 + E32-C31 E32-C21N | E39-F3B + E32-C31 E32-C21N | E39-F18 + E32-CC200 E32-C91N | E39-F3C + E32-C31 E32-C21N | E32-L15 |

* Refer to page 26 for details.



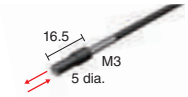
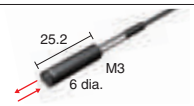
- Small-spot is ideal for detecting minute objects.
  Select the Fiber Unit that is best suited for the workpiece size and installation distance.
  (Refer to Reference Information for Model Selection)

## Specifications

### Reflective Fiber Units

#### Small-spot Models

#### Lens Units + Fiber Units

| Type | Spot diameter | Center distance (mm) | Lens Units | Lens Units + Fiber Units | Fiber Units | | 27 Page Dimensions No. |
|---|---|---|---|---|---|---|---|
| | | | Models | Appearance(mm) | Bending radius of cable | Models | |
| Short-distance, small-spot | 0.1 dia. | 7 | E39-F3A-5 |   | R25 | E32-C41 1M | 27-A |
| | 0.5 dia. | | |   | | E32-C31 2M | 27-B |
| | | | |   | Flexible, R2 | E32-C21N 2M | 27-C |
| Medium-distance, small-spot | 0.2 dia. | 17 | E39-F3B |   | R25 | E32-C41 1M | 27-D |
| | 0.5 dia. | | |   | | E32-C31 2M | 27-E |
| | | | |   | Flexible, R2 | E32-C21N 2M | 27-F |
| Long-distance, small-spot | 3 dia. | 50 | E39-F18 |   | R25 | E32-CC200 2M | 27-G |
| | | | |   | Flexible, R4 | E32-C91N 2M | 27-H |

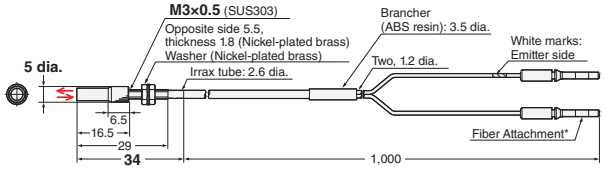
* The spot diameter and the center distance are the same when using with E3X-ZV series or E3NX-FA□ series. The distance for E3NX-FAH□ infrared models varies.

## Dimensions

Installation Information → 62 to 66 Page

## Reflective Fiber Units

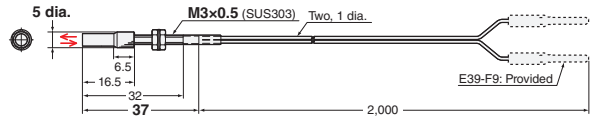
### 27-A E32-C41 1M (No Cutting) + E39-F3A-5




* Attached with adhesive and cannot be removed.

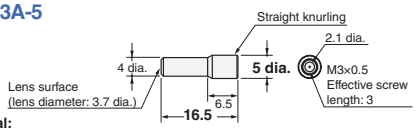
**Note:** There is a white tube on the emitter fiber.

### 27-B E32-C31 2M (Free Cutting) + E39-F3A-5




**Note:** There is a white line on the emitter fiber.

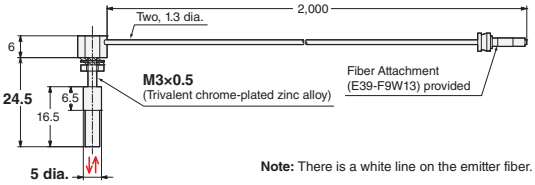
### E39-F3A-5




**Material:**
Aluminum for body and optical glass for lens

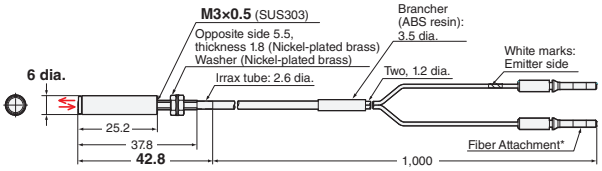
**Note:** This is a Lens Unit for the E32-C41, E32-C31 and E32-C31N.

### 27-C E32-C21N 2M (Free Cutting) + E39-F3A-5




**Note:** There is a white line on the emitter fiber.

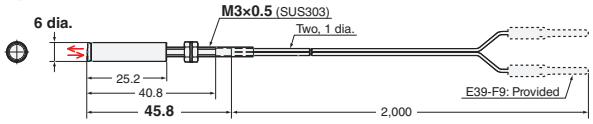
### 23-D E32-C41 1M (No Cutting) + E39-F3B




* Attached with adhesive and cannot be removed.

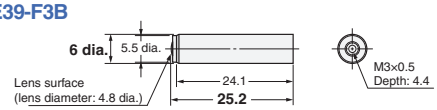
**Note:** There is a white tube on the emitter fiber.

### 27-E E32-C31 2M (Free Cutting) + E39-F3B




**Note:** There is a white line on the emitter fiber.

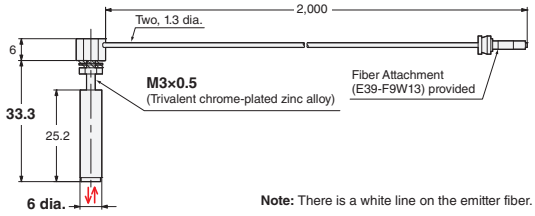
### E39-F3B




**Material:**
Aluminum for body and optical glass for lens

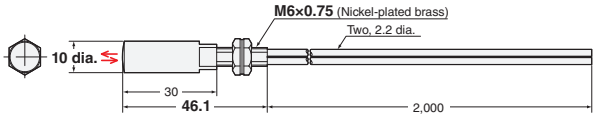
**Note:** This is a Lens Unit for the E32-C41, E32-C31 and E32-C31N.

### 27-F E32-C21N 2M (Free Cutting) + E39-F3B



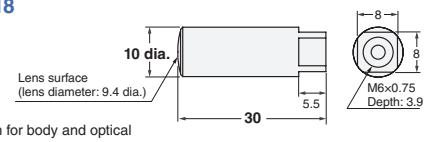

**Note:** There is a white line on the emitter fiber.

### 27-G E32-CC200 2M (Free Cutting) + E39-F18




**Note:** There is a white line on the emitter fiber.

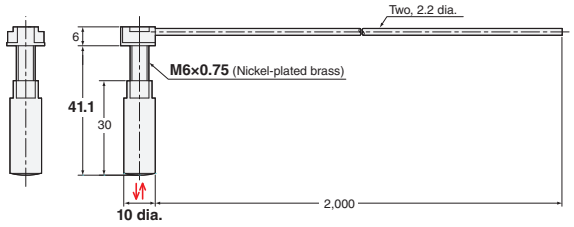
### E39-F18




**Material:**
Aluminum for body and optical glass for lens

**Note:** This is a Lens Unit for the E32-C91N and E32-CC200.

### 27-H E32-C91N 2M (Free Cutting) + E39-F18




**Note:** There is a white line on the emitter fiber.

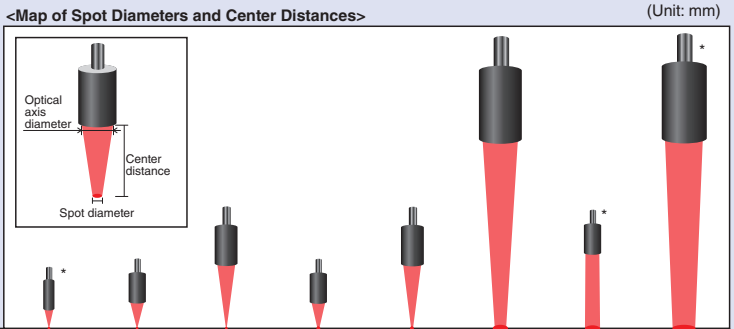
## - Reference Information for Model Selection -

### Model Selection Tips

Select the best model by following these steps.

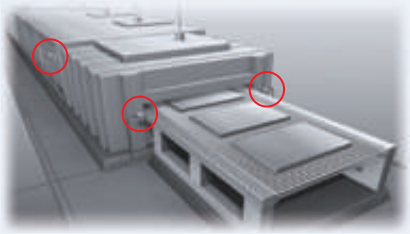
1. Select the model based on the spot diameter suitable for the workpiece size.
   * The Variable-spot Type is useful if there are different sensing object sizes.
2. Select the model based on the allowable installation distance and center distance.

<Map of Spot Diameters and Center Distances> (Unit: mm)




| Spot diameter | 0.1 dia. | 0.1 dia. | 0.2 dia. | 0.5 dia. | 0.5 dia. | 3 dia. | 4 dia. | 6 dia. |
|---|---|---|---|---|---|---|---|---|
| Center distance | 5 | 7 | 17 | 7 | 17 | 50 | 0 to 20 | 50 |
| Optical axis diameter | 2.4 | 3.7 | 4.8 | 3.7 | 4.8 | 9.4 | 3.7 | 10 |
| Models | E32-C42S | E39-F3A-5 + E32-C41 | E39-F3B + E32-C41 | E39-F3A-5 + E32-C31 E32-C21N | E39-F3B + E32-C31 E32-C21N | E39-F18 + E32-CC200 E32-C91N | E39-F3C + E32-C31 E32-C21N | E32-L15 |

* Refer to page 24 for details.



- Maximum sensing distance without attaching a Lens: 20 m (E32-T17L)
  Suitable for detection of large objects and for use in large-scale installations.
- Powerful enough to resist the influences of dust and dirt.
  (Refer to the comparisons of incident level on the Reference Information for Model Selection.)
- In addition to the products listed on this page, Lenses are available to extend the sensing distance. (→ 30 to 33 pages)

## Specifications

### Through-beam Fiber Units

| Sensing direction | Aperture angle | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA/HS | Sensing distance (mm) E3X-ZV Other modes | Sensing distance (mm) E3NX-FA GIGA/HS | Sensing distance (mm) E3NX-FA Other modes | Optical axis diameter (minimum sensing object) | Models | 29 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Right-angle | 15° | 14.4, M4, Built-in Lens, IP50 | Flexible, R2 | 4,000 *1 / 2,300 | ST: 3,500 SHS: 920 | 4,000 *1 / 3,450 | *1 ST: 4,000 SHS: 920 | 2.3 dia. (0.1 dia./ 0.03 dia.) | E32-LT11N 2M | 29-A |
| Top-view | 10° | 42, M14, IP67 | R25 | 20,000 *2 / 20,000 *2 | *2 ST: 20,000 SHS: 8,000 | 20,000 *2 / 20,000 *2 | *2 ST: 20,000 SHS: 8,000 | 10 dia. | E32-T17L 10M | 29-B |
| | 15° | 15, M4, Built-in Lens, IP50 | R25 | 4,000 *1 / 2,700 | *1 ST: 4,000 SHS: 1,080 | 4,000 *1 / 4,000 *1 | *1 ST: 4,000 SHS: 1,080 | 2.3 dia. (0.1 dia./ 0.03 dia.) | E32-LT11 2M | 29-C |
| | | | Flexible, R1 | 4,000 *1 / 2,300 | ST: 3,500 SHS: 920 | 4,000 *1 / 3,450 | *1 ST: 4,000 SHS: 920 | | E32-LT11R 2M | |
| Side-view | 30° | 10.5, 36.4, 8, IP67 | R25 | 4,000 *1 / 4,000 *1 | *1 ST: 4,000 SHS: 1,800 | 4,000 *1 / 4,000 *1 | *1 ST: 4,000 SHS: 1,800 | 4 dia. (0.1 dia./ 0.03 dia.) | E32-T14 2M | 29-D |

*1 The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.
*2 The optical fiber is 10 m long on each side, so the sensing distance is 20,000 mm.
**Note1.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.
**2.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

### Reflective Fiber Units

| Sensing direction | Aperture angle | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA/HS | Sensing distance (mm) E3X-ZV Other modes | Sensing distance (mm) E3NX-FA GIGA/HS | Sensing distance (mm) E3NX-FA Other modes | Optical axis diameter (minimum sensing object) | Model | 29 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Top-view | 4° | 22, 9, 17.5, IP40 | Bendresistant, R4 | 40 to 2,800 / 40 to 900 | ST: 40 to 1,400 SHS: 40 to 480 | 40 to 4,200 / 40 to 1,350 | ST: 40 to 2,100 SHS: 40 to 720 | – | E32-D16 2M | 29-E |

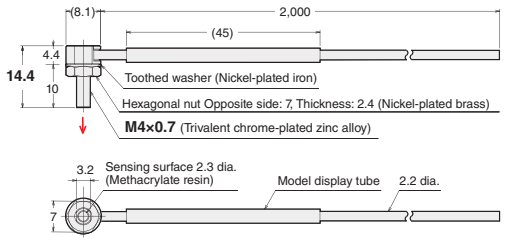
**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)
**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.
**3.** The sensing distances for Reflective Fiber Units are for white paper.
**4.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.
**5.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

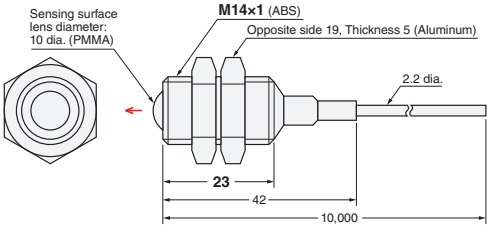
Installation Information → 62 to 66 Page

### Through-beam Fiber Units (Set of 2)

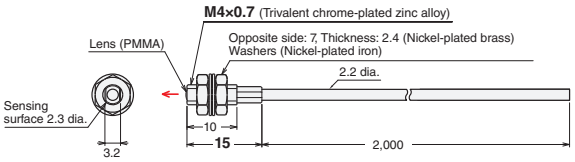
29-A **E32-LT11N 2M** (Free Cutting)



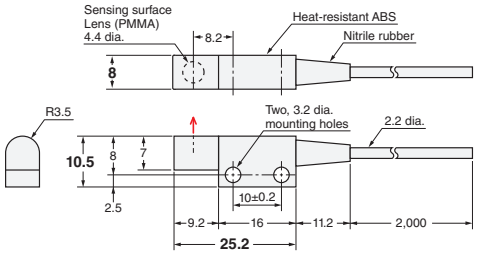

29-B **E32-T17L 10M** (Free Cutting)




29-C **E32-LT11 2M** (Free Cutting)
**E32-LT11R 2M** (Free Cutting)



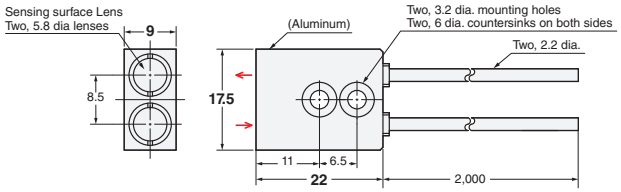

29-D **E32-T14 2M** (Free Cutting)




Installation Information → 62 to 66 Page

### Reflective Fiber Units

29-E **E32-D16 2M** (Free Cutting)

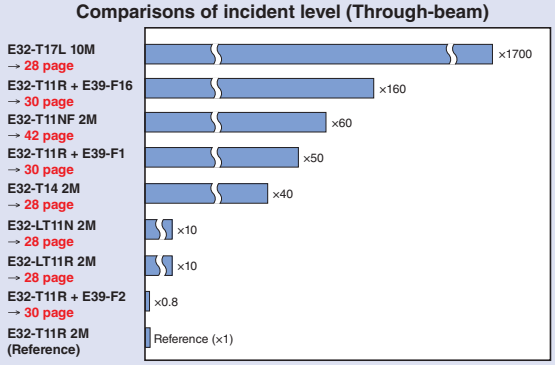



## - Reference Information for Model Selection -

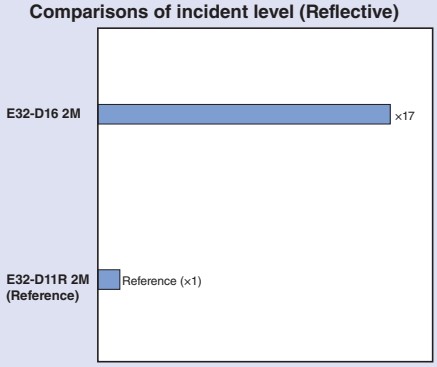
### Comparisons of incident level

Select the model based on the comparisons of incident level against Standard Fiber Units.

**Comparisons of incident level (Through-beam)**



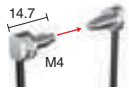
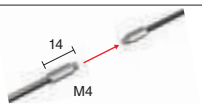
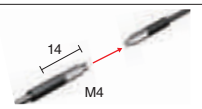

**Comparisons of incident level (Reflective)**



## Specifications

### Through-beam Fiber Units

| Lens Units | Type | High-power (incident level: 50 times) | Ultra-high-power (incident level: 160 times) | Side-View (incident level: 0.8 times) |
|---|---|---|---|---|
| | Models | E39-F1 | E39-F16 | E39-F2 |
| | Appearance |  30-A |  30-B |  30-C |
| | Aperture angle | Approx. 12° | Approx. 6° | Approx. 60° |
| Fiber Units | Optical axis diameter (minimum sensing object) | 4 dia. (0.1 dia.) | 7.2 dia. | 3 dia. (0.1 dia.) |

| Models | Appearance (mm) | Sensing distance (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E3X-ZV | | E3NX-FA | | E3X-ZV | | E3NX-FA | | E3X-ZV | | E3NX-FA | |
| | | GIGA HS | Other modes | GIGA HS | Other modes | GIGA HS | Other modes | GIGA HS | Other modes | GIGA HS | Other modes | GIGA HS | Other modes |
| E32-T11N 2M |  | 4,000* / 4,000* | * ST : 4,000 / SHS: 2,000 31-A | 4,000* / 4,000* | * ST : 4,000 / SHS: 2,000 | 4,000* / 4,000* | * ST : 4,000 / SHS: 3,600 31-D | 4,000* / 4,000* | * ST : 4,000 / SHS: 3,600 | – | – | – | – |
| E32-T11R 2M |  | 4,000* / 4,000* | * ST : 4,000 / SHS: 2,000 31-B | 4,000* / 4,000* | * ST : 4,000 / SHS: 2,000 | 4,000* / 4,000* | * ST : 4,000 / SHS: 3,600 31-E | 4,000* / 4,000* | * ST : 4,000 / SHS: 3,600 | 1,450 / 500 | ST : 800 / SHS: 200 31-G | 2,170 / 750 | ST : 1,200 / SHS: 200 |
| E32-T11 2M |  | 4,000* / 4,000* | * ST : 4,000 / SHS: 1,860 31-C | 4,000* / 4,000* | * ST : 4,000 / SHS: 1,860 | 4,000* / 4,000* | * ST : 4,000 / SHS: 4,000 31-F | 4,000* / 4,000* | * ST : 4,000 / SHS: 4,000 | 2,300 / 860 | ST : 1,320 / SHS: 320 31-H | 3,450 / 1,290 | ST : 1,980 / SHS: 320 |

* The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.

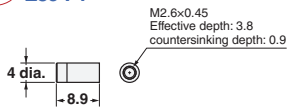
**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)
**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.
**3.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.
**4.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

Installation Information → 62 to 66 Page

### Lens Units (Set of 2)

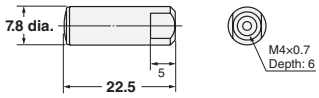
30-A E39-F1




**Material:** Brass for the body and optical glass for the lens itself.

**Note:** Two per set.

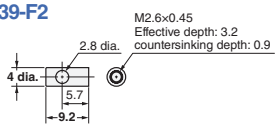
30-B E39-F16




**Material:** SUS303 for the body and optical glass for the lens itself.

**Note:** Two per set.

30-C E39-F2




**Material:** Brass for the body and optical glass for the lens itself.

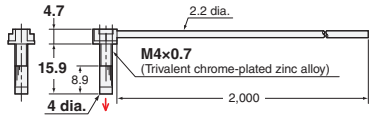
**Note:** Two per set.

## Dimensions

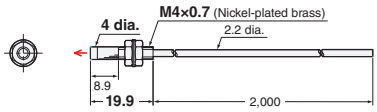
Installation Information → 62 to 66 Page

### Through-beam Fiber Units (Set of 2)

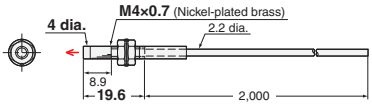
**31-A E32-T11N 2M (Free Cutting) + E39-F1**



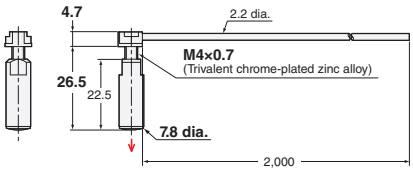

**31-B E32-T11R 2M (Free Cutting) + E39-F1**



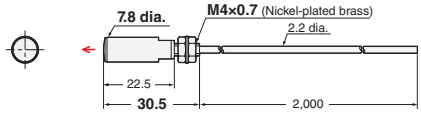

**31-C E32-T11 2M (Free Cutting) + E39-F1**



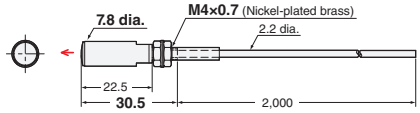

**31-D E32-T11N 2M (Free Cutting) + E39-F16**



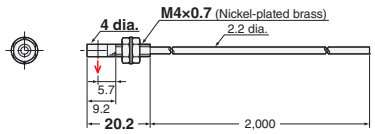

**31-E E32-T11R 2M (Free Cutting) + E39-F16**



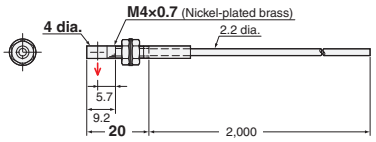

**31-F E32-T11 2M (Free Cutting) + E39-F16**




**31-G E32-T11R 2M (Free Cutting) + E39-F2**




**31-H E32-T11 2M (Free Cutting) + E39-F2**

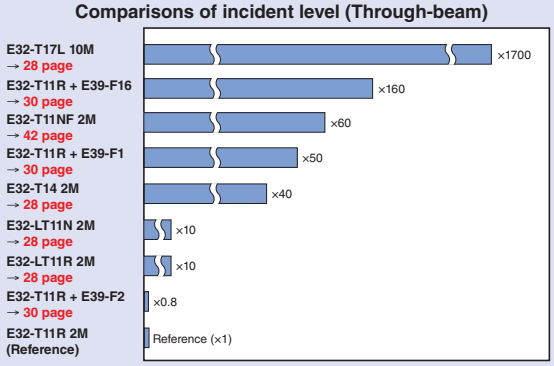



## - Reference Information for Model Selection -

### Comparisons of incident level

Select the model based on the comparisons of incident level against Standard Fiber Units.

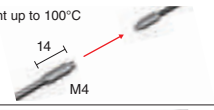
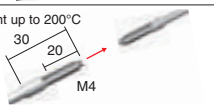
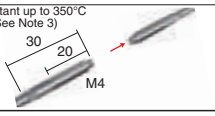
**Comparisons of incident level (Through-beam)**



## Specifications

### Through-beam Fiber Units (Heat-resistant)

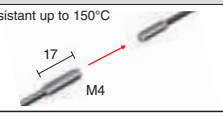
| Lens Units | Type | High-power (incident level: 50 times) | Ultra-high-power (incident level: 160 times) | Side-View (incident level: 0.8 times) |
|---|---|---|---|---|
| | Models | E39-F1 | E39-F16 | E39-F2 |
| | Appearance |  32-A |  32-B |  32-C |
| | Aperture angle | Approx. 12° | Approx. 6° | Approx. 60° |
| Fiber Units | Optical axis diameter (minimum sensing object) | 4 dia. (0.1 dia.) | 7.2 dia. | 3 dia. (0.1 dia.) |

| Models | Appearance (mm) | Sensing distance (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E3X-ZV | | E3NX-FA | | E3X-ZV | | E3NX-FA | | E3X-ZV | | E3NX-FA | |
| | | GIGA HS | Other modes | GIGA HS | Other modes | GIGA HS | Other modes | GIGA HS | Other modes | GIGA HS | Other modes | GIGA HS | Other modes |
| E32-T51R 2M | Heat-resistant up to 100°C  | 4,000* / 3,900 | ST : 4,000* SHS: 1,500 33-A | 4,000* / 4,000* | ST : 4,000* SHS: 1,500 | 4,000* / 4,000* | ST : 4,000* SHS: 4,000* 33-D | 4,000* / 4,000* | ST : 4,000* SHS: 4,000* | 1,400 / 500 | ST : 720 SHS: 200 33-G | 2,100 / 750 | ST : 1,080 SHS: 200 |
| E32-T81R-S 2M | Heat-resistant up to 200°C  | 4,000* / 2,700 | ST : 4,000* SHS: 1,000 33-B | 4,000* / 4,000* | ST : 4,000* SHS: 1,000 | 4,000* / 4,000* | ST : 4,000* SHS: 1,800 33-E | 4,000* / 4,000* | ST : 4,000* SHS: 1,800 | 1,000 / 360 | ST : 550 SHS: 140 33-H | 1,500 / 540 | ST : 820 SHS: 140 |
| E32-T61-S 2M | Heat-resistant up to 350°C (200°C) (See Note 3)  | 4,000* / 4,000* | ST : 4,000* SHS: 1,800 33-C | 4,000* / 4,000* | ST : 4,000* SHS: 1,800 | 4,000* / 4,000* | ST : 4,000* SHS: 3,100 33-F | 4,000* / 4,000* | ST : 4,000* SHS: 3,100 | 1,680 / 600 | ST : 900 SHS: 240 33-I | 2,520 / 900 | ST : 1,350 SHS: 240 |

* The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)
**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.
**3.** The ambient temperature of E32-T61-S must be between –40 to 200°C when using it with E39-F1 or E39-F2 Lens Unit. The ambient temperature of E32-T61-S must be between –40 to 350°C when using it with E39-F16 Lens Unit.
**4.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.
**5.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

| Lens Units | Type | High-power (incident level: 50 times) | Ultra-high-power (incident level: 160 times) |
|---|---|---|---|
| | Models | E39-F1-33 | E39-F16 |
| | Appearance |  32-D |  32-B |
| | Aperture angle | Approx. 12° | Approx. 6° |
| Fiber Units | Optical axis diameter (minimum sensing object) | 4 dia. (0.1 dia.) | 7.2 dia. |

| Models | Appearance (mm) | Sensing distance (mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | E3X-ZV | | E3NX-FA | | E3X-ZV | | E3NX-FA | |
| | | GIGA HS | Other modes | GIGA HS | Other modes | GIGA HS | Other modes | GIGA HS | Other modes |
| E32-T51 2M | Heat-resistant up to 150°C  | 4,000* / 2,300 | ST : 4,000* SHS: 1,400 33-J | 4,000* / 3,450 | ST : 4,000* SHS: 1,400 | 4,000* / 4,000* | ST : 4,000* SHS: 4,000* 33-K | 4,000* / 4,000* | ST : 4,000* SHS: 4,000* |

* The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.

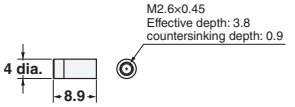
**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)
**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA. **3.**The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies. **4.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

Installation Information → 62 to 66 Page

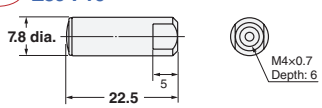
### Lens Units (Set of 2)

**32-A E39-F1**



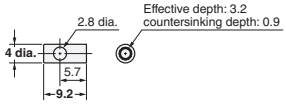

**Material:** Brass for the body and optical glass for the lens itself.
**Note:** Two per set.

**32-B E39-F16**



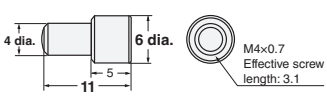

**Material:** SUS303 for the body and optical glass for the lens itself.
**Note:** Two per set.

**32-C E39-F2**




**Material:** Brass for the body and optical glass for the lens itself.
**Note:** Two per set.

**32-D E39-F1-33**



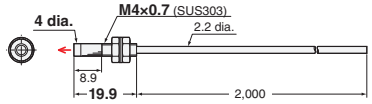

**Material:** Brass for the body and optical glass for the lens itself.
**Note 1:** Two per set.
**Note 2:** This is the Lens Unit for the E32-T51.

## Dimensions

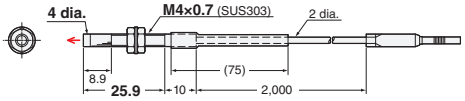
Installation Information → 62 to 66 Page

### Through-beam Fiber Units (Set of 2)

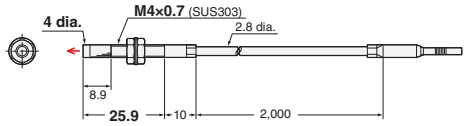
**33-A E32-T51R 2M (Free Cutting) + E39-F1**



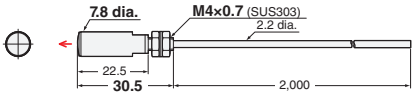

**33-B E32-T81R-S 2M (No Cutting) + E39-F1**



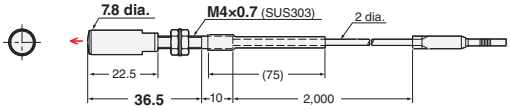

**33-C E32-T61-S 2M (No Cutting) + E39-F1**



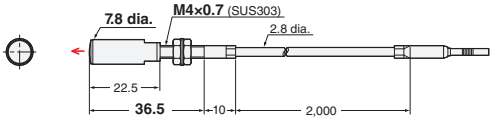

**33-D E32-T51R 2M (Free Cutting) + E39-F16**



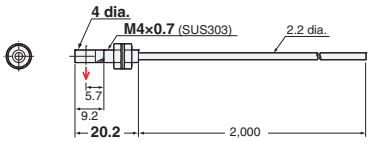

**33-E E32-T81R-S 2M (No Cutting) + E39-F16**



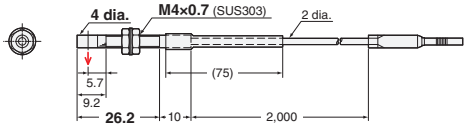

**33-F E32-T61-S 2M (No Cutting) + E39-F16**



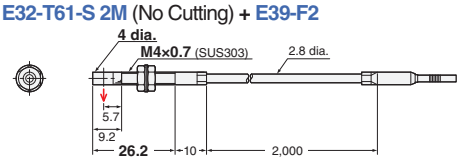

**33-G E32-T51R 2M (Free Cutting) + E39-F2**



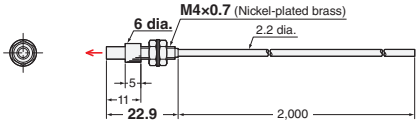

**33-H E32-T81R-S 2M (No Cutting) + E39-F2**



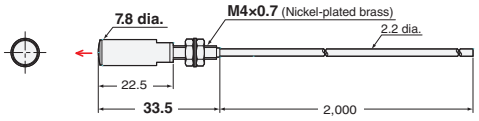

**33-I E32-T61-S 2M (No Cutting) + E39-F2**




**33-J E32-T51 2M (Free Cutting) + E39-F1-33**




**33-K E32-T51 2M (Free Cutting) + E39-F16**

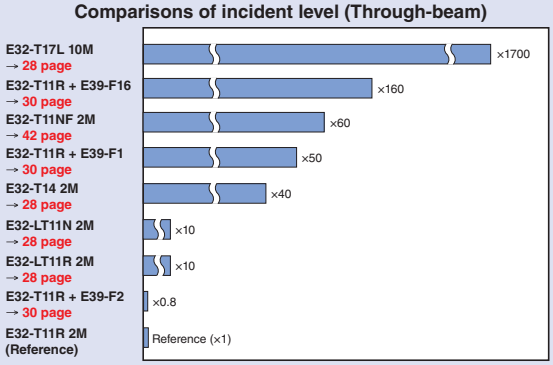


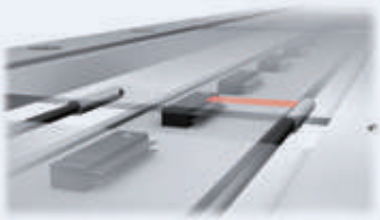

## - Reference Information for Model Selection -

### Comparisons of incident level

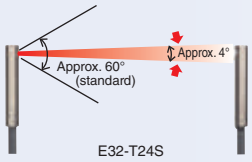
Select the model based on the comparisons of incident level against Standard Fiber Units.

**Comparisons of incident level (Through-beam)**



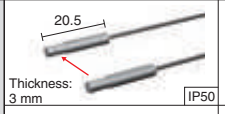
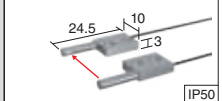
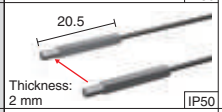
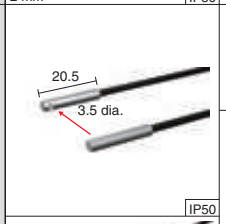
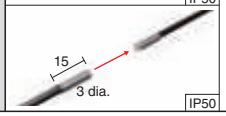


- The fine beam prevents false detection of light that is reflected off surrounding objects.




## Specifications

### Through-beam Fiber Units

| Sensing direction | Aperture angle | Appearance (mm) | Bending radius of cable | Sensing distance (mm) | | | | Optical axis diameter (minimum sensing object) | Models | 35 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | E3X-ZV | | E3NX-FA | | | | |
| | | | | GIGA HS | Other modes | GIGA HS | Other modes | | | |
| Side-view | 1.5° |   | Flexible, R1 | 3,220 / 1,200 | ST : 1,780 SHS: 500 | 4,000* / 1,800 | ST : 2,670 SHS: 500 | 2 dia. (0.1 dia./ 0.03 dia.) | E32-A03 2M | 35-A |
| | |   | R10 | | | | | | E32-A03-1 2M | 35-B |
| | 3.4° |   | | 1,280 / 450 | ST : 680 SHS: 200 | 1,920 / 670 | ST : 1,020 SHS: 200 | 1.2 dia. (0.1 dia./ 0.03 dia.) | E32-A04 2M | 35-C |
| | 4° |   | Flexible, R1 | 4,000* / 1,460 | ST : 2,200 SHS: 580 | 4,000* / 2,190 | ST : 3,300 SHS: 580 | 2 dia. (0.1 dia./ 0.03 dia.) | E32-T24SR 2M | 35-D |
| | | | R10 | 4,000* / 1,740 | ST : 2,600 SHS: 700 | 4,000* / 2,610 | ST : 3,900 SHS: 700 | | E32-T24S 2M | 35-E |
| Top-view | |   | | 4,000* / 2,500 | ST : 3,800 SHS: 1,000 | 4,000* / 3,750 | ST : 4,000* SHS: 1,000 | 1.7 dia. (0.1 dia./ 0.03 dia.) | E32-T22S 2M | 35-F |

* The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.

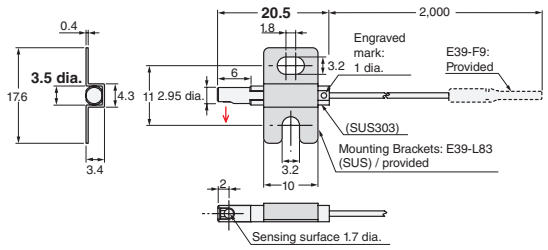
**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)
**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.
**3.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.
**4.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

Installation Information → 62 to 66 Page

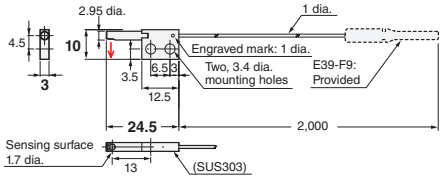
### Through-beam Fiber Units (Set of 2)

#### 35-A E32-A03 2M (Free Cutting)



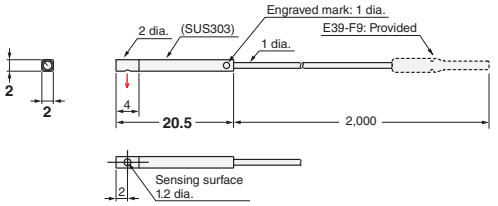

**Note:** Use the engraved surface and its opposing surface as installation (reference) surfaces.

#### 35-B E32-A03-1 2M (Free Cutting)



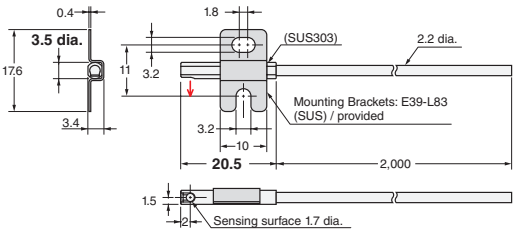

**Note 1:** Use the engraved surface and its opposing surface as installation (reference) surfaces.
**Note 2:** Set of two symmetrically shaped Fiber Units.

#### 35-C E32-A04 2M (Free Cutting)

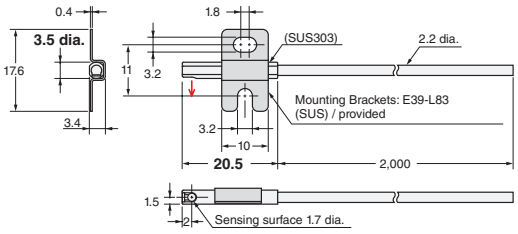



**Note:** Use the engraved surface and its opposing surface as installation (reference) surfaces.

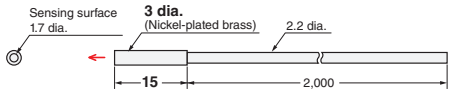
#### 35-D E32-T24SR 2M (Free Cutting)




#### 35-E E32-T24S 2M (Free Cutting)



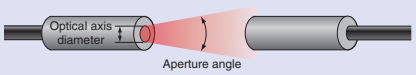

#### 35-F E32-T22S 2M (Free Cutting)

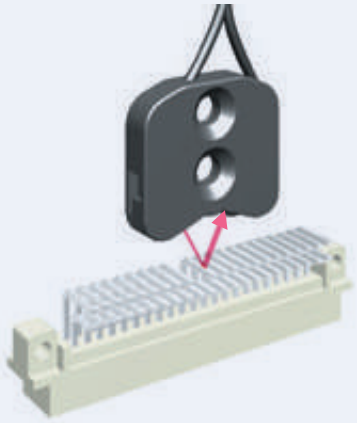



## - Reference Information for Model Selection -

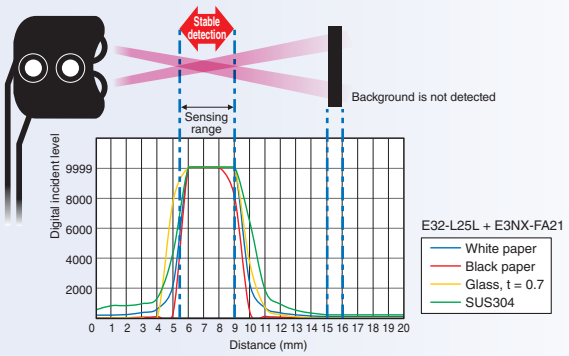
### Aperture angle and Optical Axis Diameter

The Aperture angle is the output angle of the emitted beam, and the optical axis diameter is the core diameter of the emitter fiber.
A fiber with a narrow view has a larger optical axis diameter than standard fibers, but the aperture angle is smaller so it is not influenced by surrounding objects.



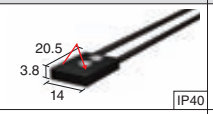
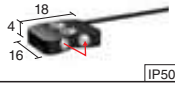


- These Fiber Units detect only objects in the sensing range. Objects in the background that are located beyond a certain point are not detected. They are not easily affected by the material or color of the sensing object.




## Specifications

### Limited-reflective Fiber Units

| Sensing direction | Appearance (mm) | Bending radius of cable | Sensing distance (mm) | | | | Standard sensing object (minimum sensing object) | Models | 37 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|
| | | | E3X-ZV | | E3NX-FA | | | | |
| | | | GIGA HS | Other modes | GIGA HS | Other modes | | | |
| Flat-view |   | R25 | 0 to 15<br>0 to 15 | ST : 0 to 15<br>SHS: 0 to 12 | 0 to 15<br>0 to 15 | ST : 0 to 15<br>SHS: 0 to 12 | Soda glass with reflection factor of 7% | E32-L16-N 2M | 37-A |
| |   | R10 | 0 to 4<br>0 to 4 | ST : 0 to 4<br>SHS: 0 to 4 | 0 to 4<br>0 to 4 | ST : 0 to 4<br>SHS: 0 to 4 | (5 µm dia./ 2 µm dia.) | E32-L24S 2M | 37-B |
| Side-view |   | | 5.4 to 9<br>5.4 to 9<br>(Center 7.2) | ST : 5.4 to 9<br>SHS: 5.4 to 9<br>(Center 7.2) | 5.4 to 9<br>5.4 to 9<br>(Center 7.2) | ST : 5.4 to 9<br>SHS: 5.4 to 9<br>(Center 7.2) | | E32-L25L 2M | 37-C |

**Note 1.** If operation is affected by the background, perform power tuning or use the ECO Mode to decrease the incident light level.

**2.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)

**3.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.

**4.** The sensing distances for Reflective Fiber Units are for white paper.

**5.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.

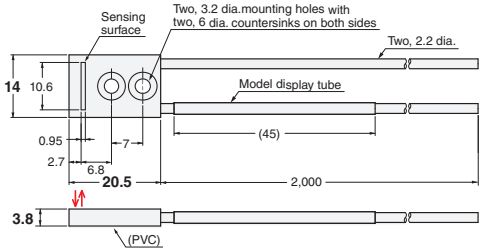
**6.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

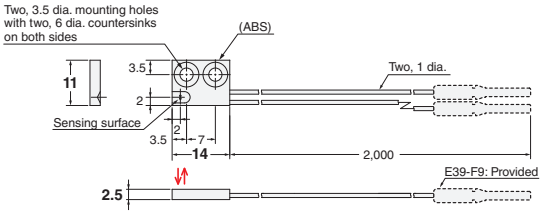
Installation Information → 62 to 66 Page

## Limited-reflective Fiber Units

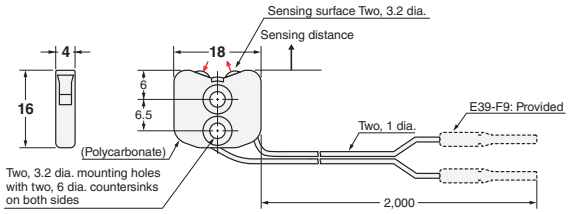
### 37-A E32-L16-N 2M (Free Cutting)




### 37-B E32-L24S 2M (Free Cutting)



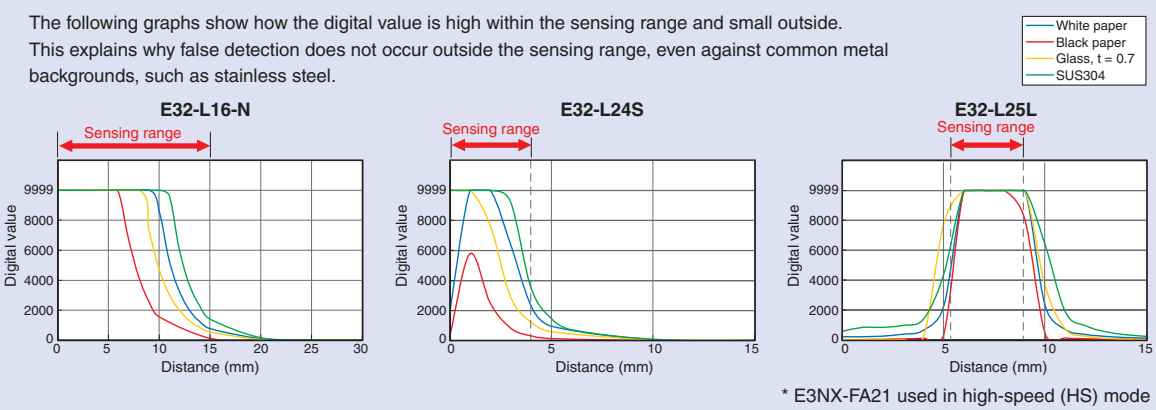

### 37-C E32-L25L 2M (Free Cutting)



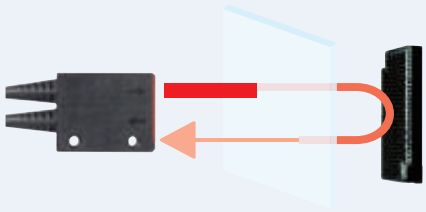

## - Reference Information for Model Selection -

### Sensing Distance vs. Digital Value

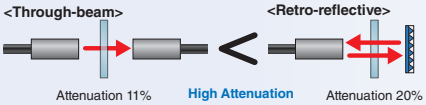
The following graphs show how the digital value is high within the sensing range and small outside. This explains why false detection does not occur outside the sensing range, even against common metal backgrounds, such as stainless steel.



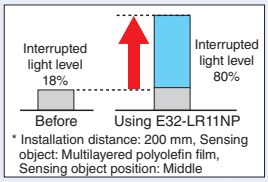

* E3NX-FA21 used in high-speed (HS) mode

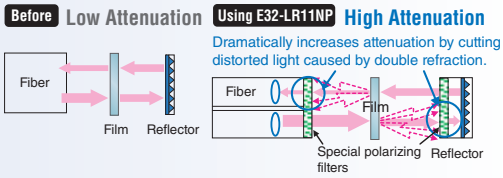


- Retro-reflective Fiber Units are ideal for detecting transparent objects.
  The light beam passes through the object twice, this model interrupts light more than Through-beam model.



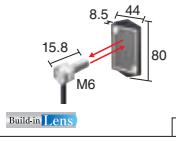
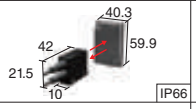
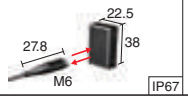

- Excellent detection performance with transparent films.
  (E32-LR11NP + E39-RP1)
  The specially designed filter eliminates undesirable light, which allows significantly more light to be interrupted for stable detection of films.




## Specifications

### Retro-reflective Fiber Units (With M.S.R. Function)

| Type | | Appearance (mm) | Bending radius of cable | Sensing distance (mm) | | | | Optical axis diameter (minimum sensing object) | Models | 39 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | E3X-ZV | | E3NX-FA | | | | |
| Features | Size | | | GIGA HS | Other modes | GIGA HS | Other modes | | | |
| Film detection * | M6 |  | Flexible, R2 | 1,350<br>1,000 | ST : 1,200<br>SHS: 550 | 2,020<br>1,500 | ST : 1,800<br>SHS: 550 | – | E32-LR11NP 2M + E39-RP1 | 39-A |
| Square | — |  | R25 | 150 to 1,500<br>150 to 1,500 | ST : 150 to 1,500<br>SHS: 150 to 1,500 | 150 to 1,500<br>150 to 1,500 | ST : 150 to 1,500<br>SHS: 150 to 1,500 | (0.2 dia./ 0.07 dia.) | E32-R16 2M | 39-B |
| Threaded Models | M6 |  | R10 | 10 to 250<br>10 to 250 | ST : 10 to 250<br>SHS: 10 to 250 | 10 to 370<br>10 to 370 | ST : 10 to 370<br>SHS: 10 to 250 | (0.1 dia./ 0.03 dia.) | E32-R21 2M | 39-C |

* This effect may not be as strong for some films. Check suitability beforehand.

**Note 1.** Objects with a high reflection factor may cause the Fiber Sensor to detect reflected light as incident light. Also, stable detection may not be possible for transparent objects. Check suitability beforehand.

**2.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)

**3.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.

**4.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.

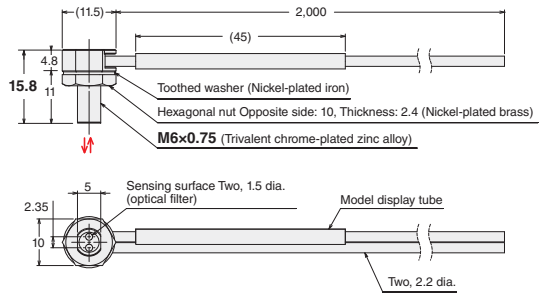
**5.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

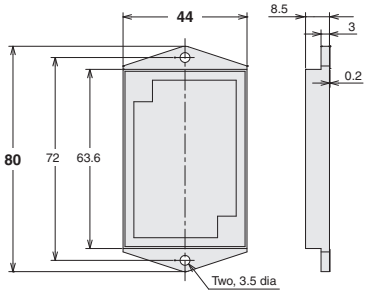
Installation Information → 62 to 66 Page

### Retro-reflective Fiber Units (With M.S.R. Function)

39-A **E32-LR11NP 2M** (Free Cutting)

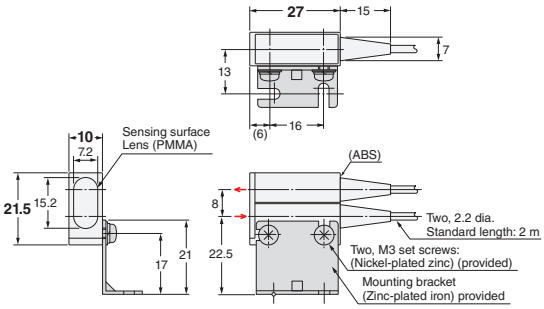



**E39-RP1**

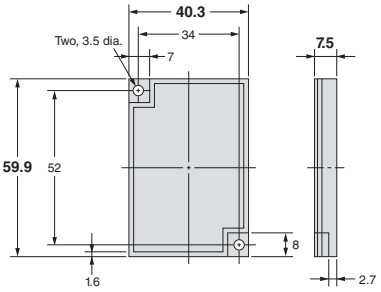



**Material:**
<Reflective surface> Methacrylate resin
<Back> ABS

39-B **E32-R16 2M** (Free Cutting)

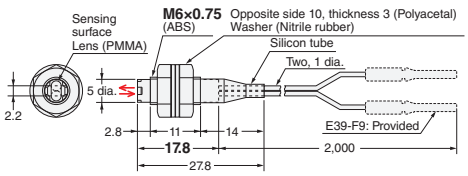



**E39-R1** (Provided)

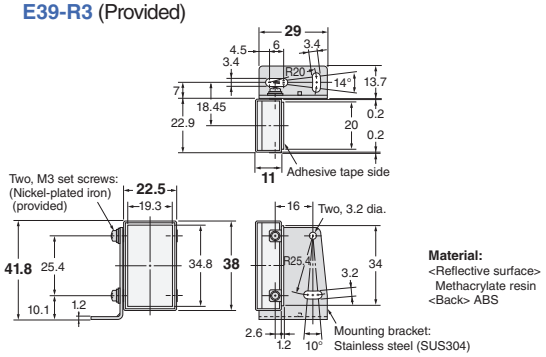



**Material:**
<Reflective surface> Methacrylate resin
<Back> ABS

39-C **E32-R21 2M** (Free Cutting)




**E39-R3** (Provided)




**Material:**
<Reflective surface> Methacrylate resin
<Back> ABS

## - Reference Information for Model Selection -

### Performance Comparison of Transparent Object Detection

For detecting transparent objects, consider using following products together: E32-LR11NP 2M + E39-RP1.

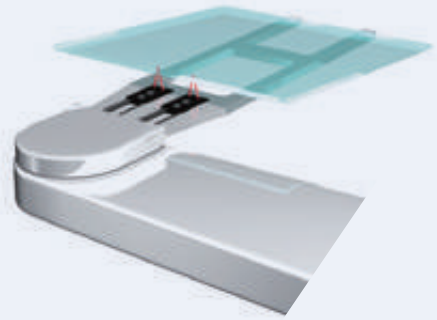
- This configuration features a special built-in optical filter that ensures stable detection of double-refractive materials, such as films and PET bottles.
- The retro-reflective model is suitable for detecting glass.

| Sensing object / Models | Film wrapper on cigarette packs | PET bottles | Glass bottles | Plate glass, t: 0.7 |
|---|---|---|---|---|
| E32-LR11NP 2M + E39-RP1 | ◎ | ◎ | ○ | ○ |
| E32-R16 2M | △ | △ | ○ | ○ |
| E32-R21 2M | △ | △ | ○ | ○ |

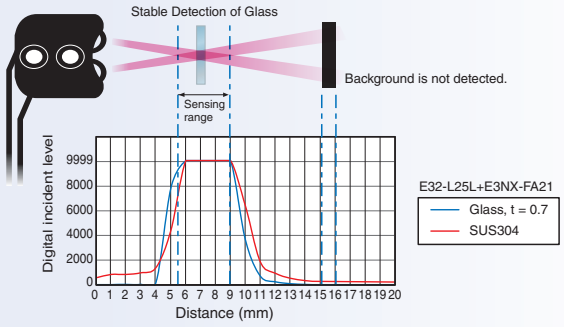
### E32-LR11NP Usage in Combination with a Sheet Reflector

Reference values of sensing distance are provided in the following table.

| Reflector shape (mm) | Sensing distance (mm) (reference values) E3X-ZV GIGA/HS | E3X-ZV Other modes | E3NX-FA GIGA/HS | E3NX-FA Other modes | Models |
|---|---|---|---|---|---|
| 50 × 12 | 550 / 430 | ST : 500 SHS: 250 | 820 / 640 | ST : 750 SHS: 250 | E39-RSP1 |
| 13.7 × 23 | 210 / 160 | ST : 190 – | 310 / 240 | ST : 280 – | E39-RP37 |

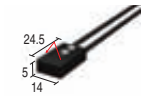
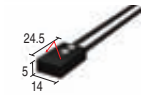


- These Fiber Units are based on a limited-reflective optical system where the emitting light and receiving light axes intersect at the same angle. This allows for stable detection of glass because the Fiber Units receives the specular reflection of the glass when the glass is in the sensing range.




## Specifications

### Limited-reflective Fiber Units

| Type: Features | Type: Detection direction | Appearance (mm) | Bending radius of cable | Sensing distance (mm): E3X-ZV GIGA | E3X-ZV HS | E3X-ZV Other modes | E3NX-FA GIGA | E3NX-FA HS | E3NX-FA Other modes | Standard sensing object (minimum sensing object) | Models | 41 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Small size | Flat-view |  IP50 | R10 | 0 to 4 | 0 to 4 | ST : 0 to 4<br>SHS: 0 to 4 | 0 to 4 | 0 to 4 | ST : 0 to 4<br>SHS: 0 to 4 | (5 µm dia./ 2 µm dia.) | E32-L24S 2M | 41-A |
| Standard | |  IP40 | R25 | 0 to 15 | 0 to 15 | ST : 0 to 15<br>SHS: 0 to 12 | 0 to 15 | 0 to 15 | ST : 0 to 15<br>SHS: 0 to 12 | Soda glass with reflection factor of 7% | E32-L16-N 2M | 41-B |
| Glass-substrate alignment, 70°C | |  IP40 | | 10 to 20 | 10 to 20 | ST : 10 to 20<br>SHS: – | 10 to 20 | 10 to 20 | ST : 10 to 20<br>SHS: – | | E32-A06 2M * | 41-C |
| Standard long distance | |  IP40 | | 12 to 30 | 12 to 30 | ST : 12 to 30<br>SHS: – | 12 to 30 | 12 to 30 | ST : 12 to 30<br>SHS: – | | E32-A12 2M | 41-D |
| Side View form | Side-view |  IP50 | R10 | 5.4 to 9<br>5.4 to 9 (Center 7.2) | | ST : 5.4 to 9<br>SHS: 5.4 to 9 (Center 7.2) | 5.4 to 9<br>5.4 to 9 (Center 7.2) | | ST : 5.4 to 9<br>SHS: 5.4 to 9 (Center 7.2) | (5 µm dia./ 2 µm dia.) | E32-L25L 2M | 41-E |
| Glass-substrate Mapping, 70°C | Top-view |  IP40 | R25 | 15 to 38<br>15 to 38<br>(Center 25) | | ST : 15 to 38 (Center 25)<br>SHS: – | 15 to 38<br>15 to 38<br>(Center 25) | | ST : 15 to 38 (Center 25)<br>SHS: – | End surface of soda glass with reflection factor of 7% (t = 0.7 mm, rounded edges) | E32-A09 2M | 41-F |

* If operation is affected by the background, perform power tuning to decrease the incident light level.

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)

**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.

**3.** The sensing distances for Reflective Fiber Units are for white paper.

**4.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.

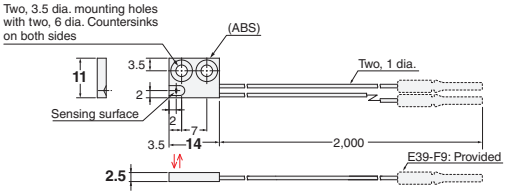
**5.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

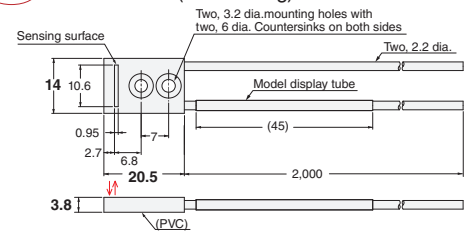
Installation Information → 62 to 66 Page

## Limited-reflective Fiber Units

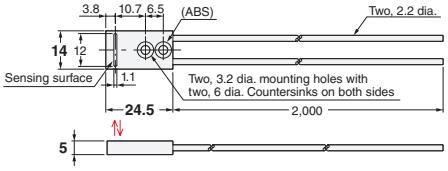
### 41-A E32-L24S 2M (Free Cutting)



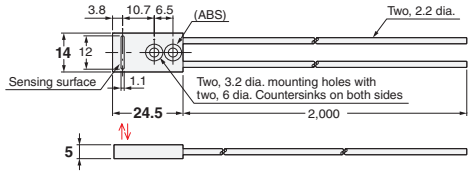

### 41-B E32-L16-N 2M (Free Cutting)



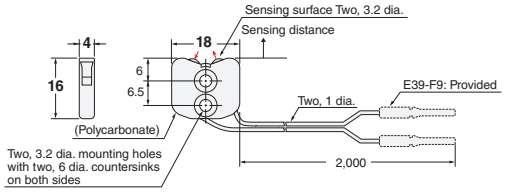

### 41-C E32-A08 2M (Free Cutting)



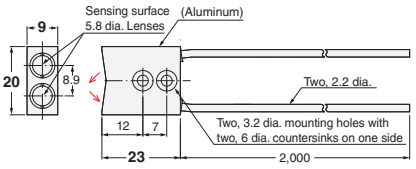

### 41-D E32-A12 2M (Free Cutting)




### 41-E E32-L25L 2M (Free Cutting)



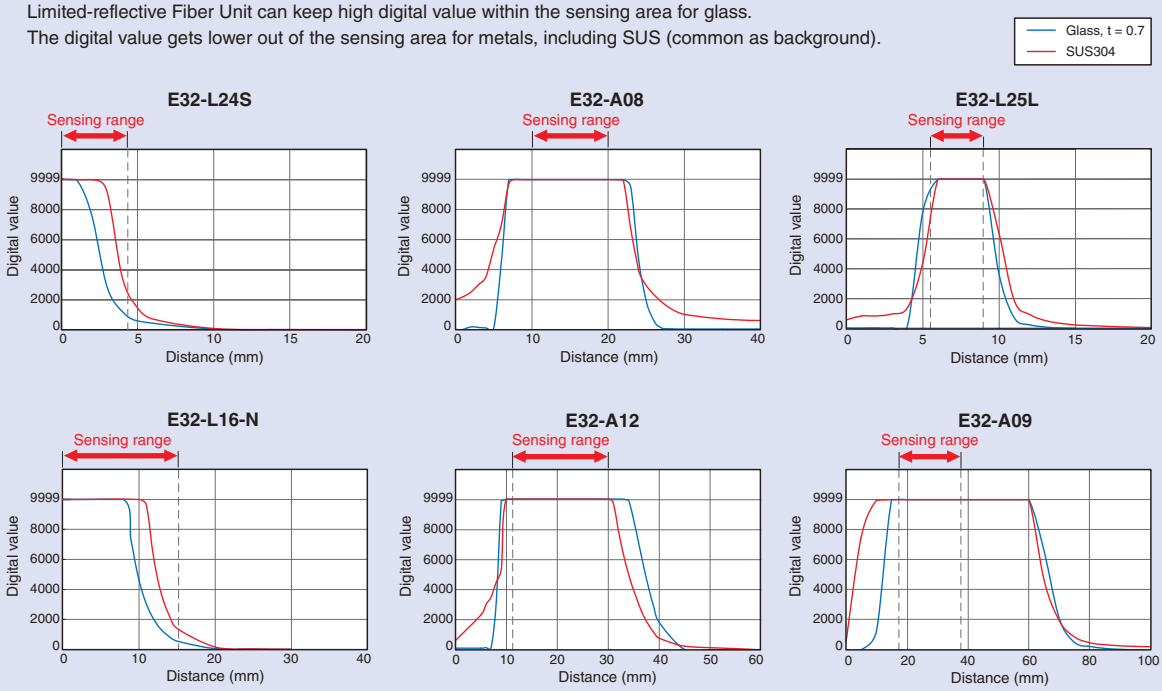

### 41-F E32-A09 2M (Free Cutting)



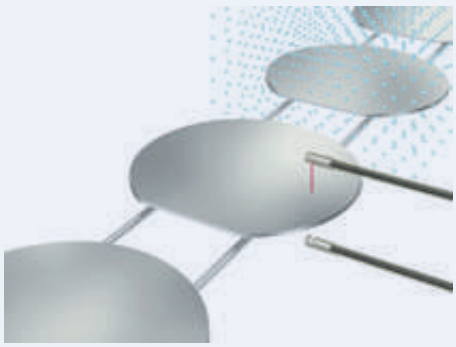

## - Reference Information for Model Selection -

### Sensing Distance vs. Digital Value

Limited-reflective Fiber Unit can keep high digital value within the sensing area for glass.
The digital value gets lower out of the sensing area for metals, including SUS (common as background).




* E3NX-FA21 used in high-speed (HS) mode.



• These Fiber Units are made from fluororesin for resistance to chemicals.

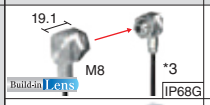
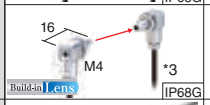
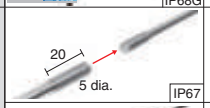
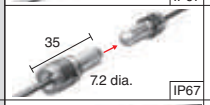
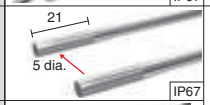
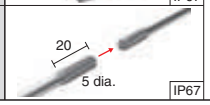
**Chemical-resistant Data for Fluororesin (Reference)**

| Material / Chemical | Fluororesin | Acryl | ABS | Polycarbonate | Polyethylene | PVC |
|---|---|---|---|---|---|---|
| Hydrochloric acid | ◎ | △ | △ | △ | △ | × |
| Sulfuric acid | ◎ | × | × | × | × | × |
| Sodium hydroxide | ◎ | △ | △ | × | ○ | × |
| Methyl alcohol | ◎ | × | △ | × | ○ | × |
| Acetone | ◎ | × | × | × | △ | × |
| Toluene | ◎ | △ | × | × | △ | × |
| Benzene | ◎ | △ | △ | × | △ | × |

**Note:** Results depend on concentration.

## Specifications

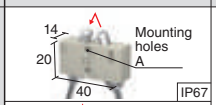
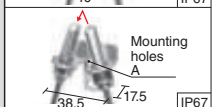
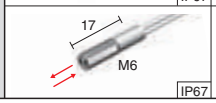
### Through-beam Fiber Units

| Type | Sensing direction | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA | E3X-ZV HS | E3X-ZV Other modes | E3NX-FA GIGA | E3NX-FA HS | E3NX-FA Other modes | Optical axis diameter (minimum sensing object) | Models | 43 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oil-resistant | Right-angle |  | Flexible, R1 | 4,000 *1 | 4,000 *1 | *1 ST : 4,000 SHS: 2,200 | 4,000 *1 | 4,000 *1 | *1 ST : 4,000 SHS: 2,200 | 4 dia. (0.1 dia./ 0.03 dia.) | E32-T11NF 2M | 43-A |
| | |  | Flexible, R1 | 2,200 | 730 | ST : 1,100 SHS: 270 | 3,300 | 1,100 | ST : 1,600 SHS: 270 | 2 dia. (0.1 dia./ 0.03 dia.) | E32-T11NFS 2M | 43-A2 |
| Chemical/ oil resistant | Top-view |  | R40 | 4,000 *1 | 4,000 *1 | *1 ST : 4,000 SHS: 1,600 | 4,000 *1 | 4,000 *1 | *1 ST : 4,000 SHS: 1,600 | 4 dia. (0.1 dia./ 0.03 dia.) | E32-T12F 2M | 43-B |
| | |  | R4 | 4,000 *1 | 2,600 | *1 ST : 4,000 SHS: 1,000 | 4,000 *1 | 3,900 | *1 ST : 4,000 SHS: 1,000 | | E32-T11F 2M | 43-C |
| | Side-view |  | R40 | 1,400 | 500 | ST : 800 SHS: 200 | 2,100 | 750 | ST : 1,200 SHS: 200 | 3 dia. (0.1 dia./ 0.03 dia.) | E32-T14F 2M | 43-D |
| Chemical/ oil resistant 150°C *2 | Top-view |  | R40 | 4,000 *1 | 1,800 | ST : 2,800 SHS: 700 | 4,000 *1 | 2,700 | *1 ST : 4,000 SHS: 700 | 4 dia. (0.1 dia./ 0.03 dia.) | E32-T51F 2M | 43-E |

*1 The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm. *2 For continuous operation, use the Fiber Unit between –40 and 130°C.
*3. The IP68G is the degree of protection which is defined according to the JIS (Japanese Industrial Standards). The IP68 indicates the same level of protection as defined by the IEC, and the G indicates that a device has resistance to oil. Passed OMRON's Oil-resistant Component Evaluation Standards (OMRON's own durability evaluation standards) (Cutting oil type: specified in JIS K 2241:2000; Temperature: 35°C max.)

**Note1.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.
**2.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

### Reflective Fiber Units

| Type | Sensing direction | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA | E3X-ZV HS | E3X-ZV Other modes | E3NX-FA GIGA | E3NX-FA HS | E3NX-FA Other modes | Standard sensing object (minimum sensing object) | Models | 43 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Semiconductors: Cleaning, developing, and etching, 60°C | Top-view |  | R40 | 8 to 20 mm from tip of lens (Recommended sensing distance: 11 mm) 19 to 31 mm from center of mounting hole A (Recommended sensing distance: 22 mm) | | | | | | Glass (t=0.7 mm) | E32-L11FP 2M | 43-F |
| Semiconductors: Resist stripping, 85°C | |  | | 8 to 20 mm from tip of lens (Recommended sensing distance: 11 mm) 32 to 44 mm from center of mounting hole A (Recommended sensing distance: 35 mm) | | | | | | | E32-L11FS 2M | 43-G |
| Chemical/ oil resistant | |  | | GIGA – 130 | | ST : 190 SHS: 60 | GIGA – 190 | | ST : 280 SHS: 60 | (5 µm dia./ 2 µm dia.) | E32-D12F 2M | 43-H |
| Only cable: chemical resistant | |  | R4 | 840 240 | | ST : 350 SHS: 100 | 1,260 360 | | ST : 520 SHS: 100 | | E32-D11U 2M | 43-I |

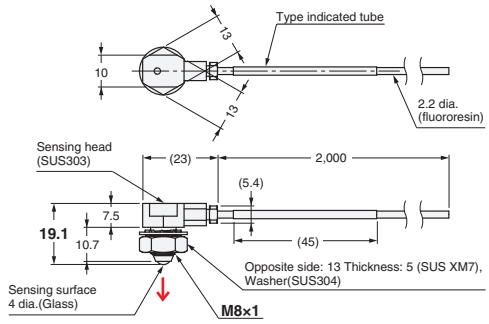
**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)
**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA. **3.**The sensing distances for Reflective Fiber Units are for white paper.
**4.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.
**5.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

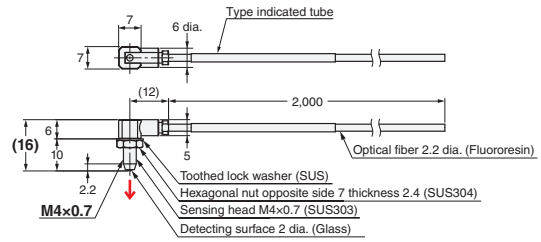
Installation Information → 62 to 66 Page

### Through-beam Fiber Units (Set of 2)

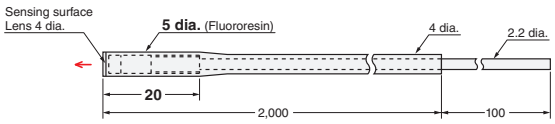
#### 43-A E32-T11NF 2M (Free Cutting)



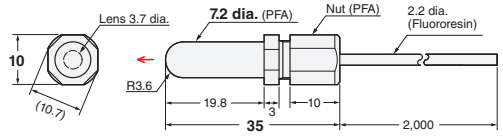

#### 43-A2 E32-T11NFS 2M (Free Cutting)



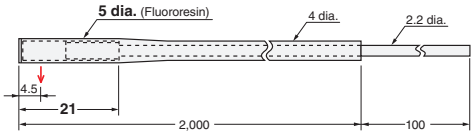

#### 43-B E32-T12F 2M (Free Cutting)



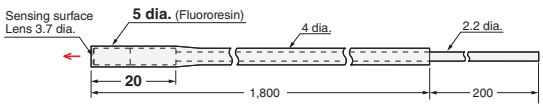

#### 43-C E32-T11F 2M (Free Cutting)




#### 43-D E32-T14F 2M (Free Cutting)



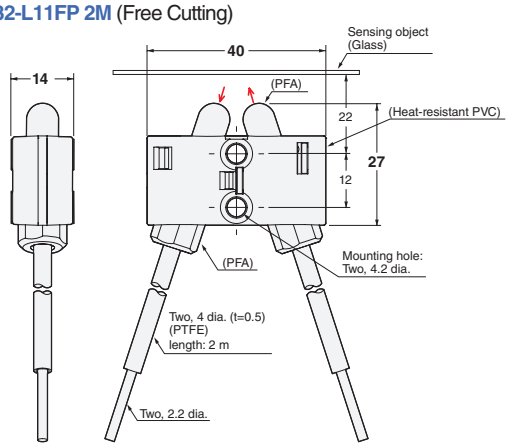

#### 43-E E32-T51F 2M (Free Cutting)



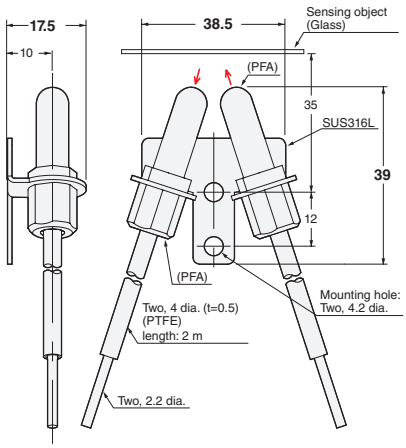

Installation Information → 62 to 66 Page

### Reflective Fiber Units

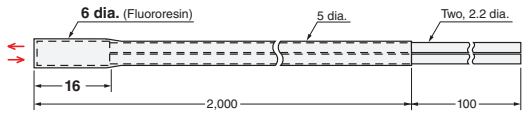
#### 43-F E32-L11FP 2M (Free Cutting)



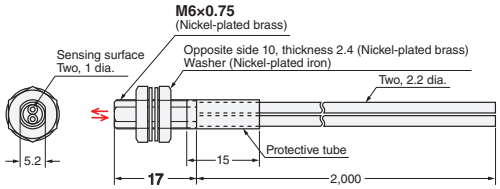

#### 43-G E32-L11FS 2M (Free Cutting)




#### 43-H E32-D12F 2M (Free Cutting)




#### 43-I E32-D11U 2M (Free Cutting)




## - Reference Information for Model Selection -

### Oil-resistance performance of the E32-T11NF

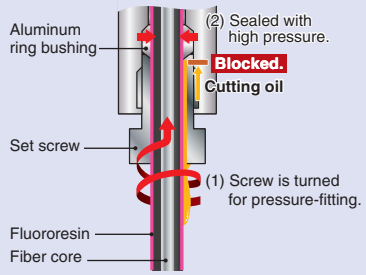
**Fluororesin Outer Cable Sheath**

The fluororesin that covers the entire surface of the cable sheath (fiber covering) prevents the penetration of cutting oil.

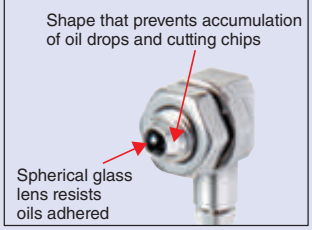
**Mechanical Seal Structure**

An aluminum ring bushing is compressed and deformed by a set screw to seal the structure by pressing against the fluororesin part of the fiber core. This prevents the ingress of cutting oil from the joined surfaces.

**Mechanical Seal Structure**

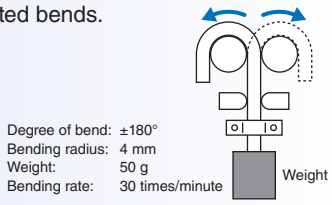



**Structure Around Sensing Surface Also Resists Cutting Oil and Cutting Chips**





- Capable of withstanding one million repeated bends.



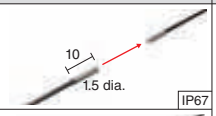
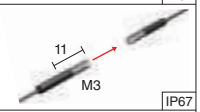
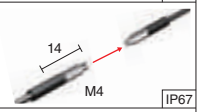
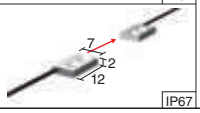

- A large number of independent fine fibers ensures good flexibility. Suitable for use on moving parts without easily breaking.



- Protective Stainless Spiral Tube is available for covering the fiber cable to protect it from accidental breaking due to snagging or shock.

## Specifications

### Through-beam Fiber Units

| Size | Appearance (mm) | Bending radius of cable | Sensing distance (mm) | | | | Optical axis diameter (minimum sensing object) | Models | 45 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|
| | | | E3X-ZV | | E3NX-FA | | | | |
| | | | GIGA HS | Other modes | GIGA HS | Other modes | | | |
| 1.5 dia. |   | Bendresistant, R4 | 680 220 | ST : 400 SHS: 90 | 1,020 330 | ST : 600 SHS: 90 | 0.5 dia. (5 μm dia./ 2 μm dia.) | E32-T22B 2M | 45-A |
| M3 |   | | | | | | | E32-T21 2M | 45-B |
| M4 |   | | 2,500 900 | ST : 1,350 SHS: 360 | 3,750 1,350 | ST : 2,020 SHS: 360 | 1 dia. (5 μm dia./ 2 μm dia.) | E32-T11 2M | 45-C |
| Square |   | | 500 170 | ST : 300 SHS: 70 | 750 250 | ST : 450 SHS: 70 | 0.5 dia. (5 μm dia./ 2 μm dia.) | E32-T25XB 2M | 45-D |

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 μs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 μs)
**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.
**3.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.
**4.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Protective Stainless Spiral Tube (Sold separately)

Insert the fiber cable into the protective tube to prevent breaking by snagging or shock.

| Applicable Fiber Units | Model | Quantity | 45 Page Dimensions No. |
|---|---|---|---|
| E32-T11R 2M/E32-T11 2M/ E32-LT11 2M/E32-LT11R 2M/ E32-T51R 2M/E32-T51 2M | E39-F32C 1M | 2 pieces | 45-E |

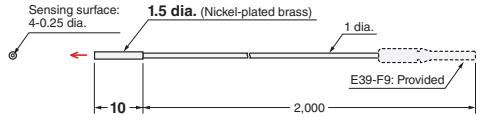
* This Tube cannot be used if a Lens Unit is being used.

## Dimensions

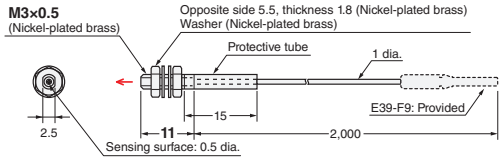
Installation Information → 62 to 66 Page

### Through-beam Fiber Units (Set of 2)

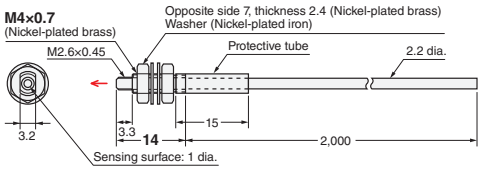
#### 45-A E32-T22B 2M (Free Cutting)



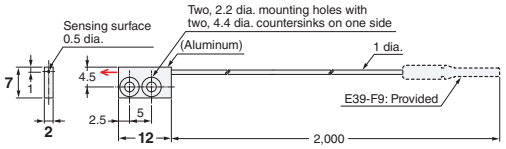

#### 45-B E32-T21 2M (Free Cutting)




#### 45-C E32-T11 2M (Free Cutting)

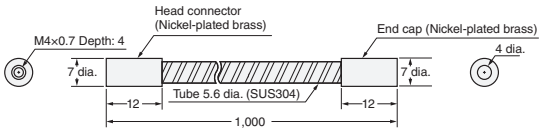



#### 45-D E32-T25XB 2M (Free Cutting)




**Note 1:** Set of two symmetrically shaped Fiber Units.
**Note 2:** Four, M2 × 8 stainless steel countersunk mounting screws are provided.

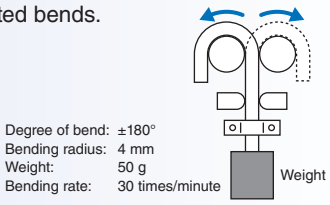
#### 45-E E39-F32C 1M



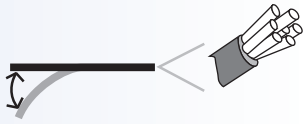

**Note:** Saddles (four, trivalent chromate-plated iron) are provided.



- Capable of withstanding one million repeated bends.



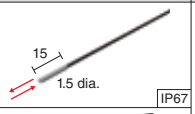
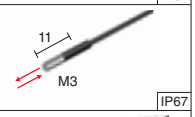
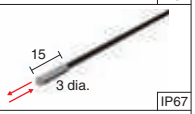
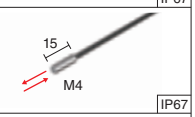
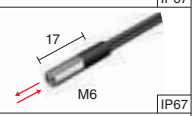
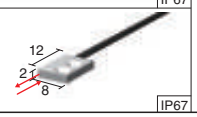

- A large number of independent fine fibers ensures good flexibility. Suitable for use on moving parts without easily breaking.



- Protective Stainless Spiral Tube is available for covering the fiber cable to protect it from accidental breaking due to snagging or shock.

## Specifications

### Reflective Fiber Units

| Size | Appearance (mm) | Bending radius of cable | Sensing distance (mm) | | | | Optical axis diameter (minimum sensing object) | Models | 47 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|
| | | | E3X-ZV | | E3NX-FA | | | | |
| | | | GIGA HS | Other modes | GIGA HS | Other modes | | | |
| 1.5 dia. |   | Bendresistant, R4 | 140 / 40 | ST: 60 SHS: 16 | 210 / 60 | ST: 90 SHS: 16 | (5 µm dia./ 2 µm dia.) | E32-D22B 2M | 47-A |
| M3 |   | | | | | | | E32-D21 2M | 47-B |
| 3 dia. |   | | 300 / 90 | ST: 140 SHS: 40 | 450 / 130 | ST: 210 SHS: 40 | | E32-D221B 2M | 47-C |
| M4 |   | | | | | | | E32-D21B 2M | 47-D |
| M6 |   | | 840 / 240 | ST: 350 SHS: 100 | 1,260 / 360 | ST: 520 SHS: 100 | | E32-D11 2M | 47-E |
| Square |   | | 240 / 60 | ST: 100 SHS: 30 | 360 / 90 | ST: 150 SHS: 30 | | E32-D25XB 2M | 47-F |

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)
**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values.
**3.** The first value is for the E3X-ZV and the second value is for the E3NX-FA.The sensing distances for Reflective Fiber Units are for white paper.
**4.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.
**5.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Protective Stainless Spiral Tube (Sold separately)

Insert the fiber cable into the protective tube to prevent breaking by snagging or shock.

| Applicable Fiber Units | Models | Quantity | 47 Page Dimensions No. |
|---|---|---|---|
| E32-D21R 2M/E32-C31 2M/ E32-D21 2M | E39-F32A 1M | 1 piece | 47-G |
| E32-D211R 2M/E32-D21B 2M | E39-F32C 1M | 2 pieces | |
| E32-D11R 2M/E32-CC200 2M/ E32-D11 2M/E32-D51R 2M/ E32-D51 2M | E39-F32D 1M | 1 piece | |

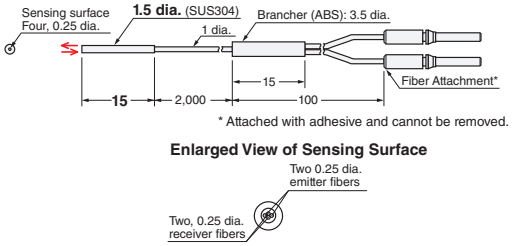
* This Tube cannot be used if a Lens Unit is being used.

## Dimensions

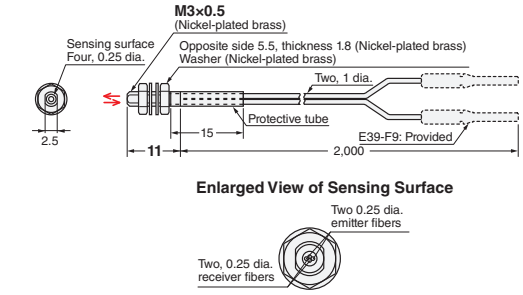
Installation Information → 62 to 66 Page

# Limited-reflective Fiber Units

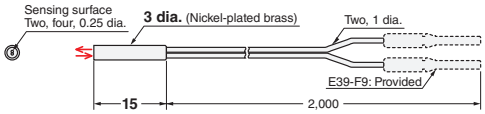
### 47-A E32-D22B 2M (No Cutting)



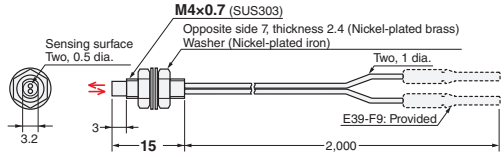

### 47-B E32-D21 2M (Free Cutting)



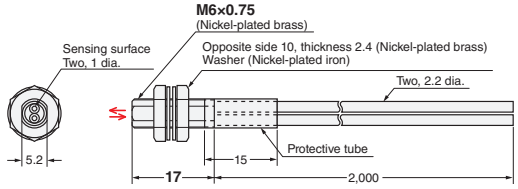

### 47-C E32-D221B 2M (Free Cutting)



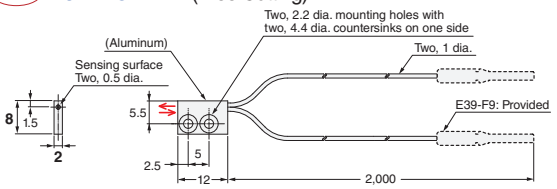

### 47-D E32-D21B 2M (Free Cutting)




### 47-E E32-D11 2M (Free Cutting)

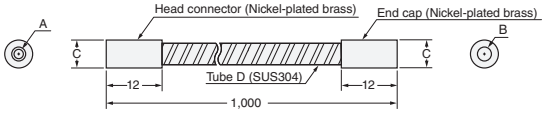



### 47-F E32-D25XB 2M (Free Cutting)



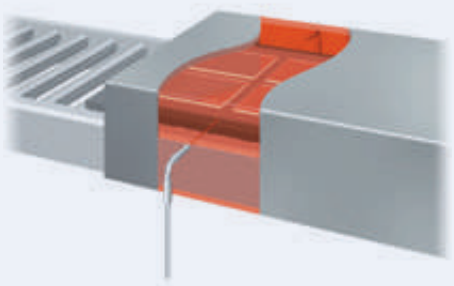

**Note:** Two, M2×8 stainless steel countersunk mounting screws are provided.

### 47-G E39-F32A 1M/E39-F32C 1M/E39-F32D 1M




| Models | A | B | C | D |
|---|---|---|---|---|
| E39-F32A 1M | M3×0.5 Depth: 4 | 3 dia. | 6 dia. | (4.6 dia.) |
| E39-F32C 1M | M4×0.7 Depth: 4 | 4 dia. | 7 dia. | (5.6 dia.) |
| E39-F32D 1M | M6×0.75 Depth: 4 | 5 dia. | 8.5 dia. | (7 dia.) |

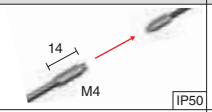
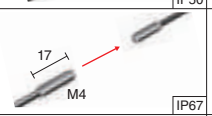
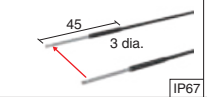
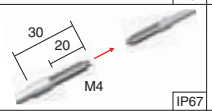
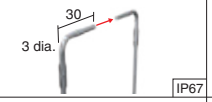
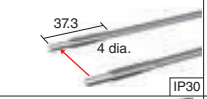
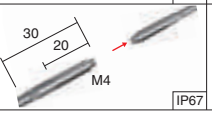
**Note:** Saddles (two (four for the E39-F32C 1M), trivalent chromate-plated iron) are provided.



- Wide product variety for temperatures from 100 to 350°C. Select the model according to heat-resistant temperature.

## Specifications

### Through-beam Fiber Units

| Heat-resistant temperature | Appearance (mm) | Bending radius of cable | Sensing distance (mm) | | | | Optical axis diameter (minimum sensing object) | Models | 49 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|
| | | | E3X-ZV | | E3NX-FA | | | | |
| | | | GIGA HS | Other modes | GIGA HS | Other modes | | | |
| 100°C *1 |   | Flexible, R2 | 1,600 / 560 | ST : 800 SHS: 225 | 2,400 / 840 | ST : 1,200 SHS: 225 | 1 dia. (0.1 dia./ 0.03 dia.) | E32-T51R 2M | 49-A |
| 150°C *2 |   | R35 | 2,800 / 1,000 | ST : 1,500 SHS: 400 | 4,000 *5 / 1,500 | ST : 2,250 SHS: 400 | 1.5 dia. (0.1 dia./ 0.03 dia.) | E32-T51 2M | 49-B |
| 150°C *2 |   | R35 | 840 / 300 | ST : 450 SHS: 120 | 1,260 / 450 | ST : 670 SHS: 120 | 1.5 dia. (0.1 dia./ 0.03 dia.) | E32-T54 2M | 49-C |
| 200°C *3 |   | R10 | 1,000 / 360 | ST : 550 SHS: 140 | 1,500 / 540 | ST : 820 SHS: 140 | 0.7 dia. (5 μm dia./ 2 μm dia.) | E32-T81R-S 2M | 49-D |
| 200°C |   | R25 | 4,000 *5 / 1,740 | ST : 2,600 SHS: 700 | 4,000 *5 / 2,610 | ST : 3,900 SHS: 700 | 1.7 dia. (0.1 dia./ 0.03 dia.) | E32-T84S-S 2M | 49-E |
| 300°C |   | R25 | 360 / 120 | ST : 190 SHS: 50 | 540 / 180 | ST : 290 SHS: 70 | – | E32-T64-2 2M | 49-F |
| 350°C *4 |   | R25 | 1,680 / 600 | ST : 900 SHS: 240 | 2,520 / 900 | ST : 1,350 SHS: 240 | 1 dia. (5 μm dia./ 2 μm dia.) | E32-T61-S 2M | 49-G |
| 70°C | – | | | | | | | Standard Fiber Units can be used. | – |

*1 For continuous operation, use the Fiber Unit between –40 to 90°C.
*2 For continuous operation, use the Fiber Unit between –40 to 130°C.
*3 The heat-resistant rating is not the same for all parts of the Fiber Unit. Refer to the dimensions diagrams for details.
*4 The ambient operating temperature for the E32-T61-S 2M is –60 to 350°C.
*5 The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.

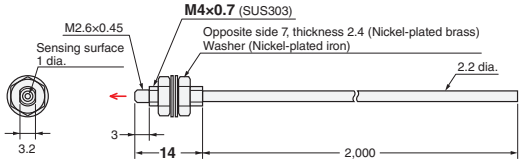
**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 μs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 μs)
**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.
**3.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.
**4.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

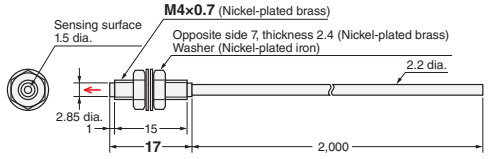
Installation Information → 62 to 66 Page

### Through-beam Fiber Units (Set of 2)

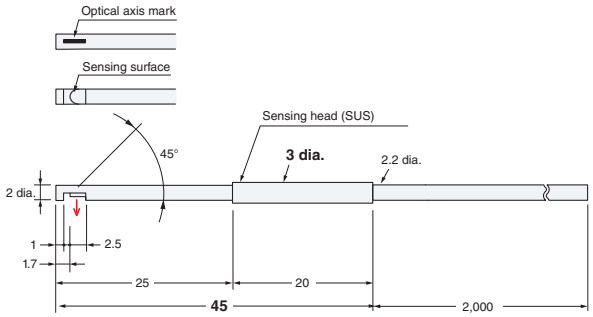
#### 49-A E32-T51R 2M (Free Cutting)



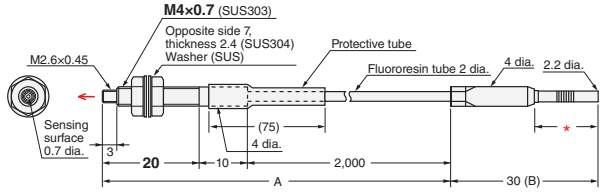

#### 49-B E32-T51 2M (Free Cutting)




#### 49-C E32-T54 2M (Free Cutting)

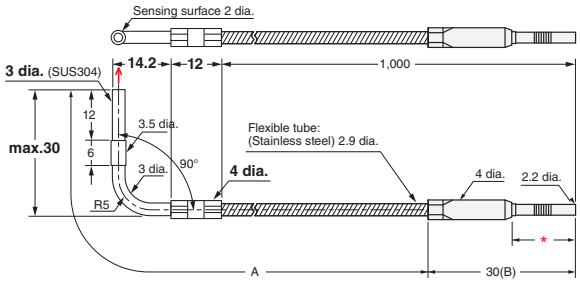



#### 49-D E32-T81R-S 2M (No Cutting)



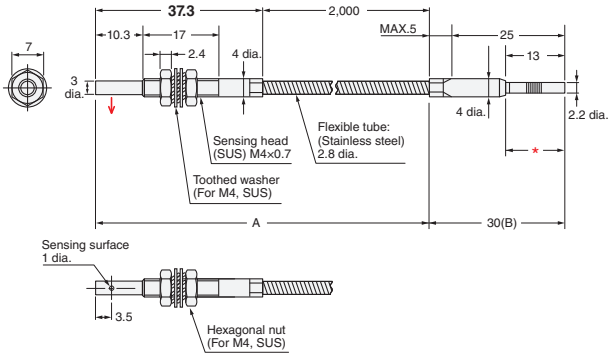

**Note:** The maximum allowable temperatures for sections A and B are 200°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *) must be maintained within the Amplifier Unit's operating temperature range.

#### 49-E E32-T84S-S 2M (No Cutting)



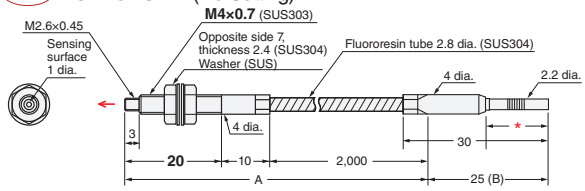

**Note:** The maximum allowable temperatures for sections A and B are 200°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *) must be maintained within the Amplifier Unit's operating temperature range.

#### 49-F E32-T64-2 2M (No Cutting)




**Note:** The maximum allowable temperatures for sections A and B are 300°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *) must be maintained within the Amplifier Unit's operating temperature range.

#### 49-G E32-T61-S 2M (No Cutting)




**Note:** The maximum allowable temperatures for sections A and B are 350°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *) must be maintained within the Amplifier Unit's operating temperature range.

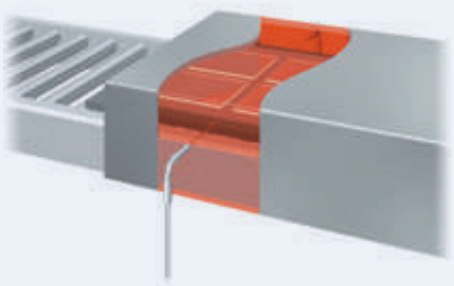
### - Reference Information for Model Selection -

**And**

#### Long-distance Sensing Applications

A separate Lens Unit can be attached to extend the sensing distance.

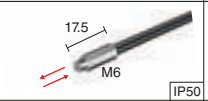
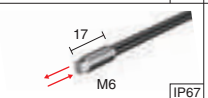
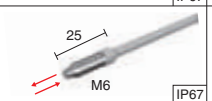
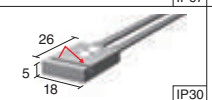
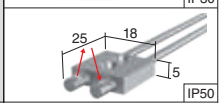
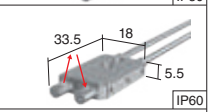
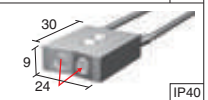
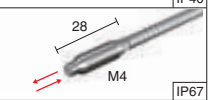
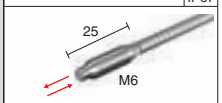
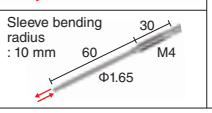
→ 32 page



- Wide product variety for temperatures from 100 to 400°C. Select the model according to heat-resistant temperature.

## Specifications

### Reflective Fiber Units

| Heat-resistant temperature | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA / HS | E3X-ZV Other modes | E3NX-FA GIGA / HS | E3NX-FA Other modes | Standard sensing object (minimum sensing object) | Models | 51 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|
| 100°C *1 |  IP50 | Flexible, R2 | 670 / 190 | ST : 280 SHS: 80 | 1,000 / 280 | ST : 420 SHS: 80 | (5 µm dia./ 2 µm dia.) | E32-D51R 2M | 51-A |
| 150°C *2 |  IP67 | R35 | 1,120 / 320 | ST : 450 SHS: 144 | 1,680 / 480 | ST : 670 SHS: 144 | | E32-D51 2M | 51-B |
| 200°C *3 |  IP67 | R10 | 420 / 120 | ST : 180 SHS: 54 | 630 / 180 | ST : 270 SHS: 54 | | E32-D61R-S 2M | 51-C |
| 300°C *3 |  IP30 | R25 | 10 to 20 / 10 to 20 | ST : 10 to 20 SHS: – | 10 to 20 / 10 to 20 | ST : 10 to 20 SHS: – | Soda glass with reflection factor of 7% | E32-A08H2 2M | 51-D |
| |  IP50 | | 1 to 5 / 1 to 5 | ST : 1 to 5 SHS: – | 1 to 5 / 1 to 5 | ST : 1 to 5 SHS: – | – | E32-L64 2M | 51-E |
| 200°C *3 |  IP60 | | 4 to 10 / 4 to 10 | ST : 4 to 10 SHS: 4 to 10 | 4 to 10 / 4 to 10 | ST : 4 to 10 SHS: 4 to 10 | (5 µm dia./ 2 µm dia.) | E32-L86 2M | 51-F |
| 300°C *3 |  IP40 | | 20 to 30 / 20 to 30 | ST : 20 to 30 SHS: – | 20 to 30 / 20 to 30 | ST : 20 to 30 SHS: – | End surface of soda glass with eflection factor of 7% (t = 0.7 mm, rounded edges) | E32-A09H2 2M | 51-G |
| 350°C *3 |  IP67 | | 420 / 120 | ST : 180 SHS: 54 | 630 / 180 | ST : 270 SHS: 54 | (5 µm dia./ 2 µm dia.) | E32-D611-S 2M | 51-H |
| |  | | | | | | | E32-D61-S 2M | 51-I |
| 400°C *3 |  Sleeve bending radius : 10 mm | | 280 / 80 | ST : 120 SHS: 36 | 420 / 120 | ST : 180 SHS: 36 | | E32-D73-S 2M | 51-J |
| 70°C | – | | | | | | | Standard Fiber Units can be used. | – |

*1 For continuous operation, use the Fiber Unit between –40 to 90°C.
*2 For continuous operation, use the Fiber Unit between –40 to 130°C.
*3 The heat-resistant rating is not the same for all parts of the Fiber Unit. Refer to the dimensions diagrams for details.

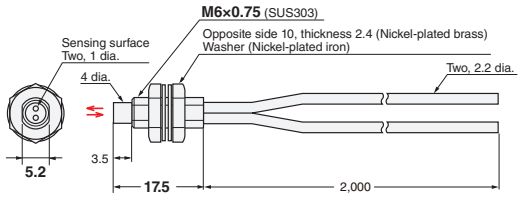
**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)
**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.
**3.** The sensing distances for Reflective Fiber Units are for white paper.
**4.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.
**5.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

# Dimensions

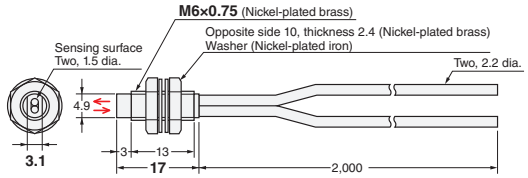
Installation Information → 62 to 66 Page

## Reflective Fiber Units

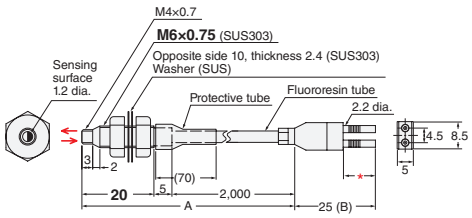
### 51-A E32-D51R 2M (Free Cutting)




### 51-B E32-D51 2M (Free Cutting)

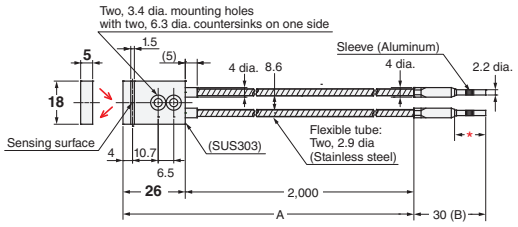



### 51-C E32-D81R-S 2M (No Cutting)

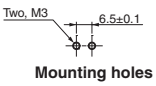



**Note:** The maximum allowable temperatures for sections A and B are 200°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *) must be maintained within the Amplifier Unit's operating temperature range.

### 51-D E32-A08H2 2M (No Cutting)

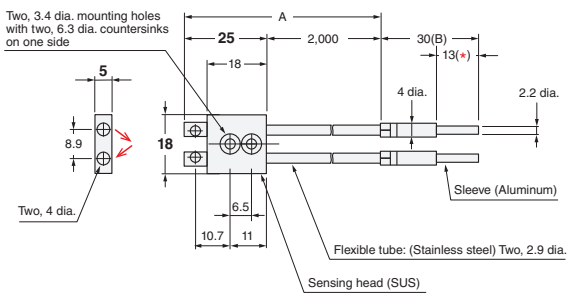



**Note:** The maximum allowable temperatures for sections A and B are 300°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *) must be maintained within the Amplifier Unit's operating temperature range.



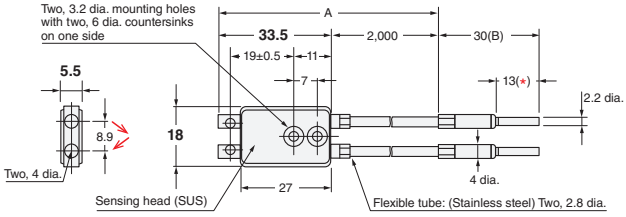

**Mounting holes**

### 51-E E32-L64 2M (No Cutting)



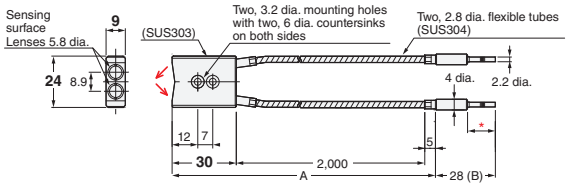

**Note:** The maximum allowable temperatures for sections A and B are 300°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *) must be maintained within the Amplifier Unit's operating temperature range.

### 51-F E32-L86 2M (No Cutting)



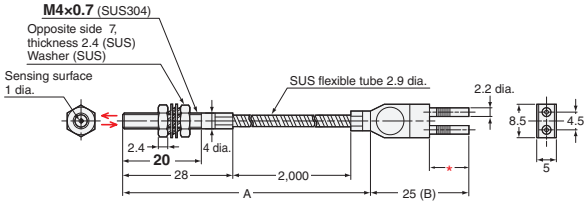

**Note:** The maximum allowable temperatures for sections A and B are 200°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *) must be maintained within the Amplifier Unit's operating temperature range.

### 51-G E32-A09H2 2M (No Cutting)



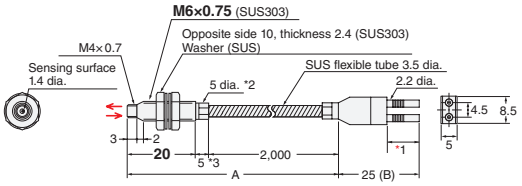

**Note:** The maximum allowable temperatures for sections A and B are 300°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *) must be maintained within the Amplifier Unit's operating temperature range.

### 51-H E32-D611-S 2M (No Cutting)




**Note:** The maximum allowable temperatures for sections A and B are 350°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *) must be maintained within the Amplifier Unit's operating temperature range.

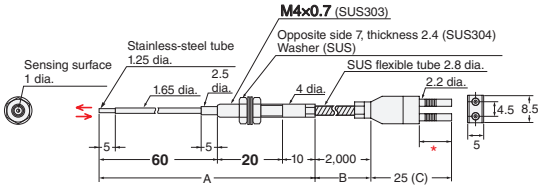
### 51-I E32-D61-S 2M (No Cutting)



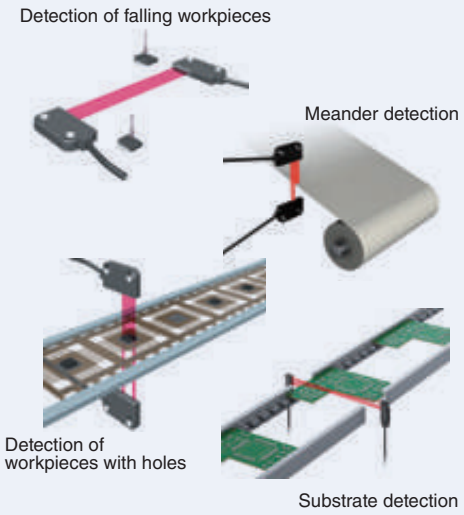

*2. The diameter is 6 dia. if the fiber length exceeds 10 m.
*3. The length is 10 if the fiber length exceeds 10 m.

**Note:** The maximum allowable temperatures for sections A and B are 350°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *1) must be maintained within the Amplifier Unit's operating temperature range.

### 51-J E32-D73-S 2M (No Cutting)

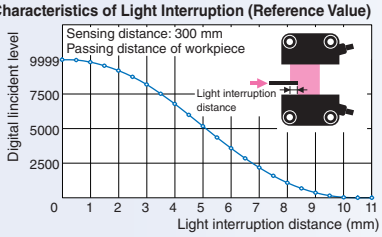



**Note:** The maximum allowable temperatures for sections A, B, and C are 400°C, 300°C, and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *) must be maintained within the Amplifier Unit's operating temperature range.




- Area beams are optimum for detecting workpieces presented in inconsistent positions, such as falling workpieces, or for meander detection, or for detecting workpieces with holes.
- This Fiber Unit is ideal for meander detectin because it outputs the digital value in a linear relation to the interrupted light distance.

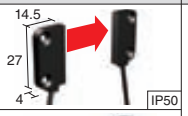
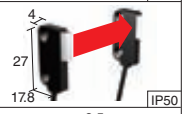
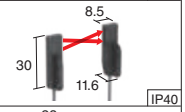
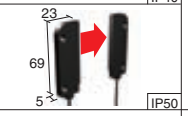
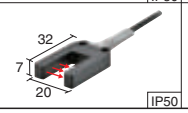
**Characteristics of Light Interruption (Reference Value)**




E32-T16PR+E3NX-FA21

## Specifications

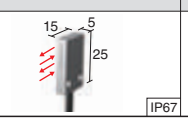
### Through-beam Fiber Units

| Type | Sensing width | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA / HS | E3X-ZV Other modes | E3NX-FA GIGA / HS | E3NX-FA Other modes | Optical axis diameter (minimum sensing object) | Models | 53 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Area | 11 mm |  IP50 | Flexible, R1 | 3,100 / 1,120 | ST : 1,700 SHS: 440 | 4,000 *1 / 1,680 | ST : 2,550 SHS: 440 | *2 (0.2 dia./ 0.07 dia.) | E32-T16PR 2M | 53-A |
| | |  IP50 | | 2,750 / 960 | ST : 1,500 SHS: 380 | 4,000 *1 / 1,440 | ST : 2,250 SHS: 380 | | E32-T16JR 2M | 53-B |
| | |  IP40 | | 40 to 420 / 40 to 420 | ST : 40 to 420 SHS: 40 to 160 | 40 to 630 / 40 to 630 | ST : 40 to 630 SHS: 40 to 240 | – | E32-A13 2M | 53-C |
| | 30 mm |  IP50 | | 4,000 *1 / 1,700 | ST : 2,600 SHS: 680 | 4,000 *1 / 2,550 | ST : 3,900 SHS: 680 | *2 (0.3 dia./ 0.1 dia.) | E32-T16WR 2M | 53-D |
| Array | 10 mm |  IP50 | R5 | 10 / 10 | ST : 10 SHS: 10 | 10 / 10 | ST : 10 SHS: 10 | 11 dia. | E32-G16 2M | 53-E |

*1 The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.
*2 The values for the minimum sensing object were obtained for detection in the sensing area with the sensing distance set to 300 mm.
(The values are for a stationary sensing object.)
The first value is for the E3X-ZV and the second value is for the E3NX-FA.

**Note 1.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.
**2.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

### Reflective Fiber Units

| Type | Sensing width | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA / HS | E3X-ZV Other modes | E3NX-FA GIGA / HS | E3NX-FA Other modes | Optical axis diameter (minimum sensing object) | Model | 53 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Array | 11 mm |  IP67 | Bend-resistant, R4 | 700 / 200 | ST : 300 SHS: 90 | 1,050 / 300 | ST : 450 SHS: 90 | (5 μm dia./ 2 μm dia.) | E32-D36P1 2M | 53-F |

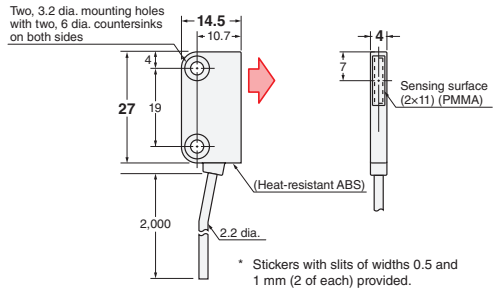
**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 μs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 μs)
**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values.
The first value is for the E3X-ZV and the second value is for the E3NX-FA.
**3.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.
**4.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

Installation Information → 62 to 66 Page

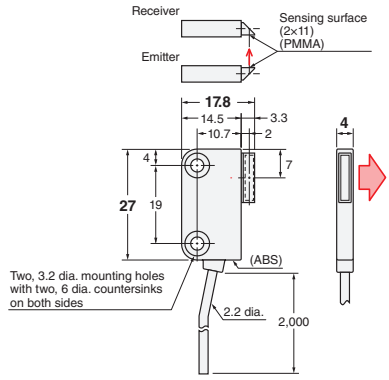
### Through-beam Fiber Units (Set of 2)

#### 53-A E32-T16PR 2M (Free Cutting)

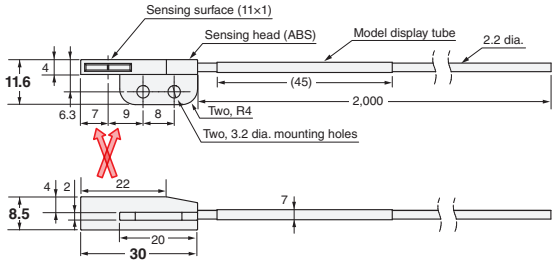



* Stickers with slits of widths 0.5 and 1 mm (2 of each) provided.

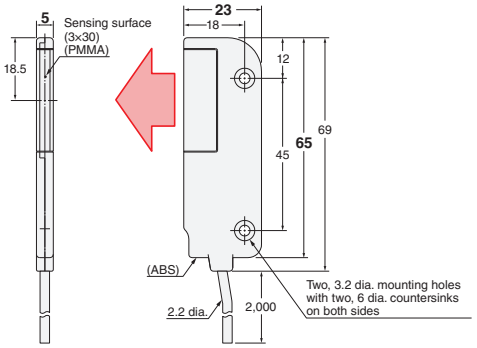
#### 53-B E32-T16JR 2M (Free Cutting)



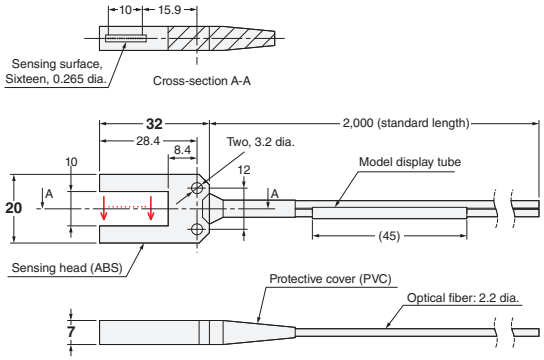

#### 53-C E32-A13 2M (Free Cutting)




#### 53-D E32-T16WR 2M (Free Cutting)

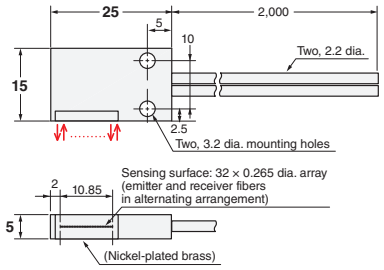



#### 53-E E32-G16 2M




### Through-beam Fiber Units (Set of 2)

#### 53-F E32-D36P1 2M (Free Cutting)





- Fiber Units for detecting liquid levels are available in two types: for tube mounting and liquid contact.

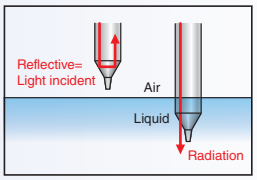
**▶ Tube-mounting Types**

Detect the liquid level inside transparent tubes.
Strap the Fiber Unit to a tube with band.

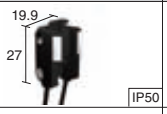
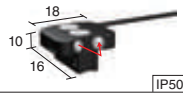
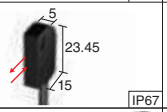


**▶ Liquid-contact Type**

Detect the liquid level by direct contact with the liquid.
This model has excellent chemical-resistance because the Fiber Unit is covered in fluororesin.



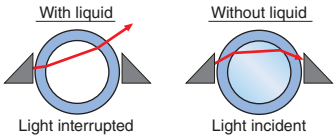
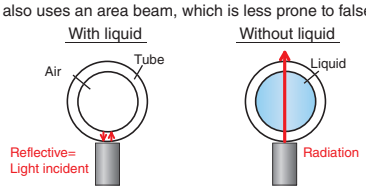

## Specifications

| Detection scheme | Tube diameter | Features | Appearance (mm) | Bending radius of cable | Applicable range | Optical axis diameter (minimum sensing object) | Models | 55 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|
| Tube-mounting | 3.2, 6.4 and 9.5 dia. | • Resistant to bubbles and droplets<br>• Residual quantity detection |   | Bend-resistant, R4 | Applicable tube: Transparent tube with a diameter of 3.2, 6.4, or 9.5 dia. and a recommended wall thickness of 1 mm | – | E32-A01 5M | 55-A |
| | 8 to 10 dia. | Ideal for mounting at multilevels |   | R10 | Applicable tube: Transparent tube with a diameter of 8 to 10 dia. and a recommended wall thickness of 1 mm | – | E32-L25T 2M | 55-B |
| | No restrictions | • Usable on large diameter tubes<br>• Resistant to bubbles and droplets |   | R4 | Applicable tube: Transparent tube (no restrictions on diameter) | – | E32-D36T 2M | 55-C |
| Liquid contact (heat-resistant up to 200°C) | – | – |   | R40<br>R25<br>*3 | Liquid-contact Type *1 | – | E32-D82F1 4M | 55-D |

*1 If you want to change the amount of received light, please Refer to the Instruction Sheet of the Fiber Amplifier used.
*2 The applicable range is the same whether an E3X-ZV series or E3NX-FA series is used. This does not include E3NX-FAH□ infrared models varies.
When using a Fiber Amplifier Unit in giga-power mode, level detection may not work depending on the tube diameter. Make sure to confirm operation with the actual tube.
*3 The bending radius of the sensing section (except for the unbendable section) is 40 mm, and the bending radius of the fiber is 25 mm.

## - Reference Information for Model Selection -

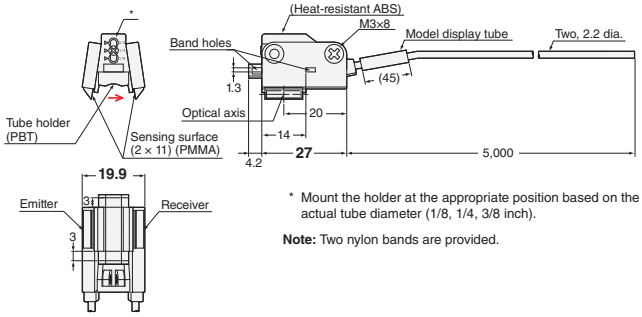
### Determining the Best Model for Tube-mounted Types

| Mounting and conditions | Recommended Unit | Features |
|---|---|---|
| When bubbles and the water droplets are generated | E32-A01 | This is a Through-beam Model, so the incident light will differ greatly between with and without of liquid.<br>It also uses an area beam, which is less prone to false detection by bubbles and droplets.<br>  |
| Multilevel installation in limited space | E32-L25T | This model is suitable for mounting at multilevels because of the thin type (height: 10 mm). |
| Mounting on large diameter tubes | E32-D36T | This model has no restrictions on the tube diameter, so it can be mounted on many different tube sizes.<br>It also uses an area beam, which is less prone to false detection by bubbles and droplets.<br>  |

## Dimensions

Installation Information → 62 to 66 Page

### 55-A E32-A01 5M (Free Cutting)



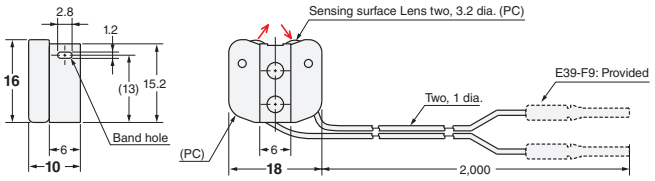

* Mount the holder at the appropriate position based on the actual tube diameter (1/8, 1/4, 3/8 inch).

**Note:** Two nylon bands are provided.

**Tube-mounting Examples**



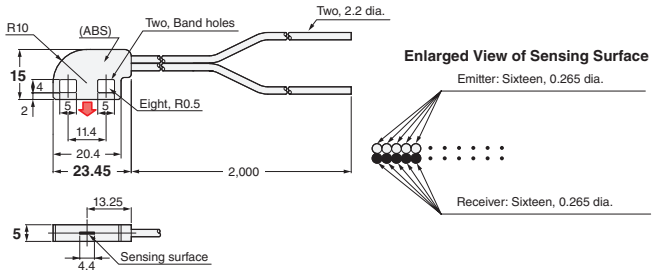
### 55-B E32-L25T 2M (Free Cutting)




**Note:** Two nylon bands and one anti-reflector are provided.

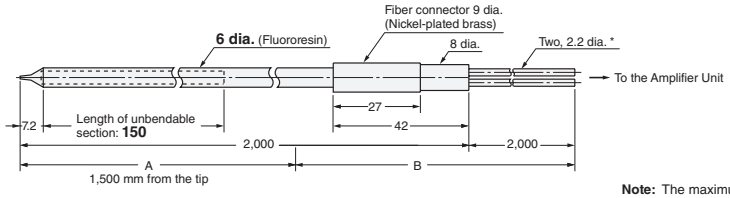


### 55-C E32-D36T 2M (Free Cutting)






### 55-D E32-D82F1 4M (Free Cutting)




* The 2-m section of optical fiber on the Amplifier unit side is plastic and therefore allows free cutting.

**Note:** The maximum allowable temperature is 200°C for section A and 85°C for section B.

**And**

### Designed for Safe Residual quantity detection (E32-A01 only)

The E32-A01 Fiber Unit is designed to default to the same output as for liquid absent in the event of a failure, such as when the fiber breaks. This makes it suitable for residual quantity detection.

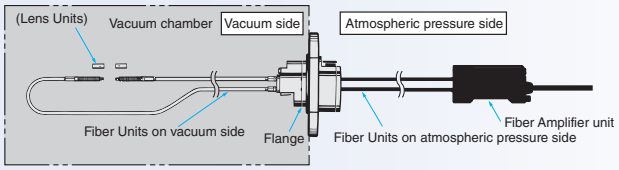
| | |
|---|---|
| Trouble (disconnection) | Light interrupted |
| With liquid | Light interrupted |
| Without liquid | Light incident |

If the failure goes unnoticed, this failsafe design will prevent false detection of liquid when there is no liquid present.



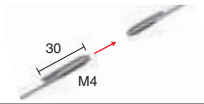
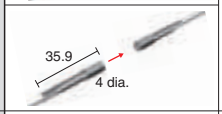
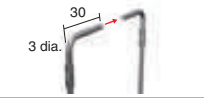
- Can be used under high vacuums of up to $10^{-5}$ Pa.
- Available in models with heat resistant up to 120 or 200°C.

**Configuration Example for using under vacuum**




## Specifications

### Through-beam Fiber Units

| Type | Heat-resistant temperature | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA | HS | Other modes | Sensing distance (mm) E3NX-FA GIGA | HS | Other modes | Optical axis diameter (minimum sensing object) | Models | 57 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vacuum side | 120°C |   | R30 | 720 | 260 | ST : 400 SHS: 100 | 1,080 | 390 | ST : 600 SHS: 100 | 1.2 dia. (10 µm dia./ 4 µm dia.) | E32-T51V 1M | 57-A |
| | |   | | 2,000* | 1,360 | ST : 2,000 SHS: 520 | 2,000* | 2,000* | ST : 2,000* SHS: 520 | 4 dia. (0.1 dia./ 0.03 dia.) | E32-T51V 1M + E39-F1V | 57-B |
| | 200°C |   | R25 | 1,760 | 640 | ST : 950 SHS: 260 | 2,000* | 960 | ST : 1,420 SHS: 260 | 2 dia. (0.1 dia./ 0.03 dia.) | E32-T84SV 1M | 57-C |
| Atmospheric pressure side | 70°C |  | | – | | ST : – SHS: – | – | | ST : – SHS: – | – | E32-T10V 2M | 57-D |

* The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)
**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.
**3.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.
**4.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Flange

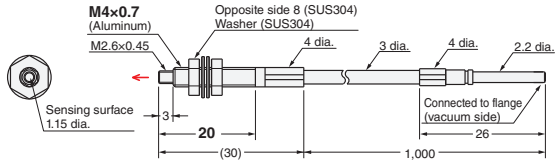
| Appearance | Type | Models | 57 Page Dimensions No. |
|---|---|---|---|
|  | 4-channel flange | E32-VF4 | 57-E |
|  | 1-channel flange | E32-VF1 | 57-F |

## Dimensions

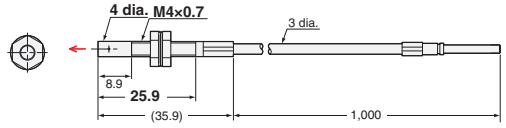
Installation Information → 62 to 66 Page

### Through-beam Fiber Units (Set of 2)

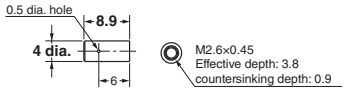
**57-A E32-T51V 1M (No Cutting)**



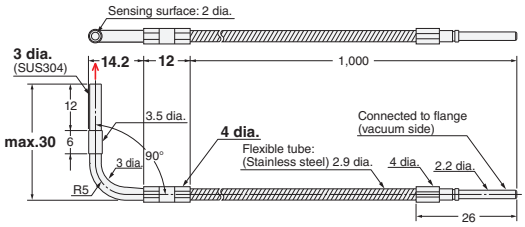

**57-B E32-T51V 1M (No Cutting) + E39-F1V**



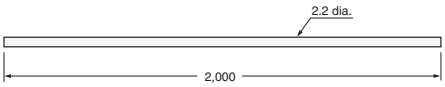

**E39-F1V**



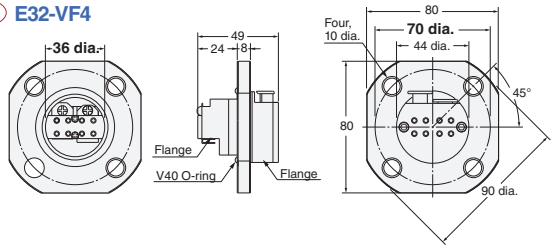

**57-C E32-T84SV 1M (No Cutting)**




**57-D E32-T10V 2M (Free Cutting)**

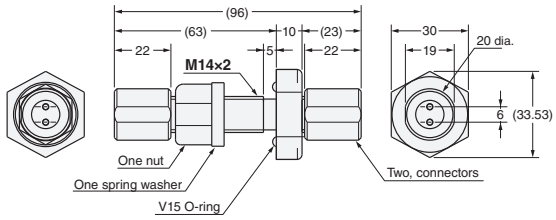



**57-E E32-VF4**




**Note 1.** Mount the Flange so that the V40 O-ring is on the atmospheric-pressure side of the vacuum chamber wall.
**2.** Mounting-hole dimensions: 38 dia. ±0.5 mm
**3.** The maximum tightening torque is 9.8 N·m.
**4.** A V40 O-ring is provided.

**53-F E32-VF1**

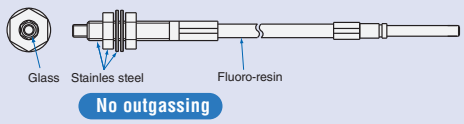


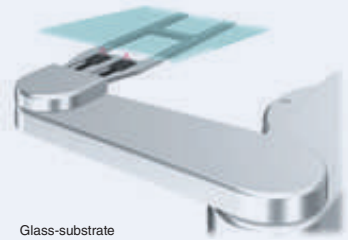

**Note 1.** Mount the Flange so that the V15 O-ring is on the atmospheric-pressure side of the vacuum chamber wall.
**2.** Mounting-hole dimensions: 14.5 dia. ±0.2 mm
**3.** The maximum tightening torque is 14.7 N·m for the clamp nut and 1.5 N·m for the connector.
**4.** A V15 O-ring, nut, spring washer, two connectors, and four O-rings for the fibers are provided.

## - Reference Information for Model Selection -

### What Is a Vacuum-resistant Fiber Unit?

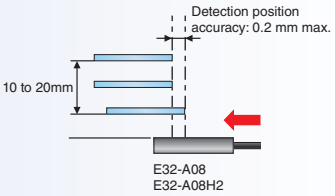
- The Flange is designed to create an air-tight seal on the vacuum side.
- The fibers and Flange on the vacuum side are made of non-outgassing materials.
  These parts are inspected, cleaned, and sealed in an air-tight package in a clean room prior to shipment.





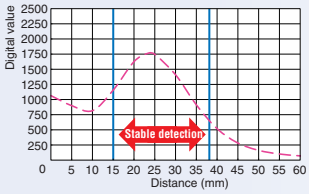
Glass-substrate Alignment

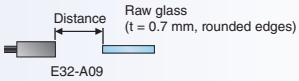
- **Glass-substrate Alignment**
  - Detection position accuracy: 0.2 mm max. No variation in detection positions even if the sensing distance changes.
  - Tilting workpiece does not affect detection.



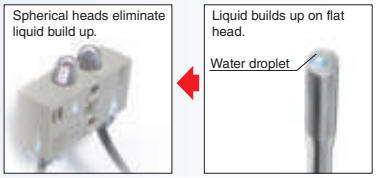

- **Glass-substrate Mapping**

  Stable detection is possible even for difficult-to-detect curved surfaces.



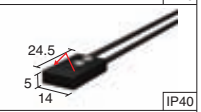
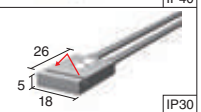
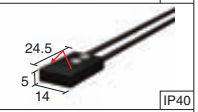
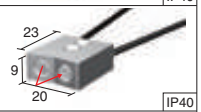
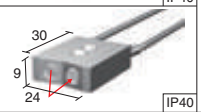
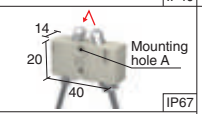
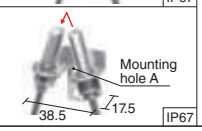




- **Glass Presence Detection in Wet Processes**
  - Stable non-contact detection even with warped glass.
  - The spherical heads ensure stable detection without being influenced by liquid.




## Specifications

### Limited-reflective Fiber Units

| Application | Ambient temperature | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA HS | Sensing distance (mm) E3X-ZV Other modes | Sensing distance (mm) E3NX-FA GIGA HS | Sensing distance (mm) E3NX-FA Other modes | Standard sensing object (minimum sensing object) | Models | 59 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Glass presence detection | 70°C |  IP40 | R25 | 0 to 15<br>0 to 15 | ST : 0 to 15<br>SHS: 0 to 12 | 0 to 15<br>0 to 15 | ST : 0 to 15<br>SHS: 0 to 12 | Soda glass with reflection factor of 7% | E32-L16-N 2M *1 | 59-A |
| Glass-substrate Alignment | 70°C |  IP40 | | 10 to 20<br>10 to 20 | ST : 10 to 20<br>SHS: – | 10 to 20<br>10 to 20 | ST : 10 to 20<br>SHS: – | | E32-A08 2M *1 | 59-B |
| | 300°C |  IP30 | | | | | | | E32-A08H2 2M *1 | 59-C |
| | 70°C |  IP40 | | 12 to 30<br>12 to 30 | ST : 12 to 30<br>SHS: – | 12 to 30<br>12 to 30 | ST : 12 to 30<br>SHS: – | | E32-A12 2M | 59-D |
| Mapping of glass substrates | 70°C |  IP40 | | 15 to 38<br>15 to 38 (Center 25) | ST : 15 to 38<br>SHS: – (Center 25) | 15 to 38<br>15 to 38 (Center 25) | ST : 15 to 38<br>SHS: – (Center 25) | End surface of soda glass with reflection factor of 7% (t = 0.7 mm, rounded edges) | E32-A09 2M | 59-E |
| | 300°C *2 |  IP40 | | 20 to 30<br>20 to 30 (Center 25) | ST : 20 to 30<br>SHS: – (Center 25) | 20 to 30<br>20 to 30 (Center 25) | ST : 20 to 30<br>SHS: – (Center 25) | | E32-A09H2 2M | 59-F |
| Wet processes (Cleaning, Resist developing, and etching) | 60°C |  IP67 | R40 | 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) | | | | Glass (t=0.7mm) | E32-L11FP 2M | 59-G |
| Wet processes (Resist stripping) | 85°C |  IP67 | | 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) | | | | | E32-L11FS 2M | 59-H |

*1 If operation is affected by the background, perform power tuning to decrease the incident light level.
*2 The maximum allowable temperature is not the same for all parts of the Fiber Unit. Refer to the dimensions diagrams for details. Must not be repeatedly subject to rapid temperature changes.

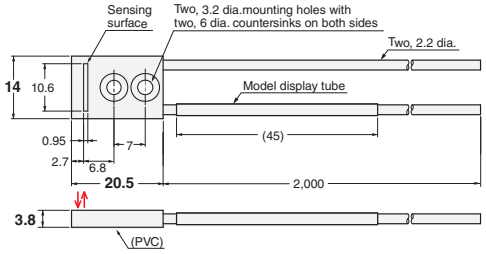
**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)
**2.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.
**3.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

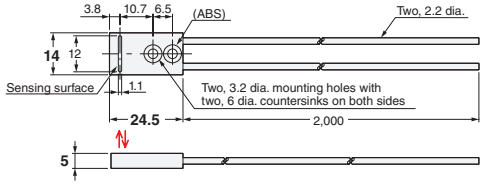
Installation Information → 62 to 66 Page

# Limited-reflective Fiber Units

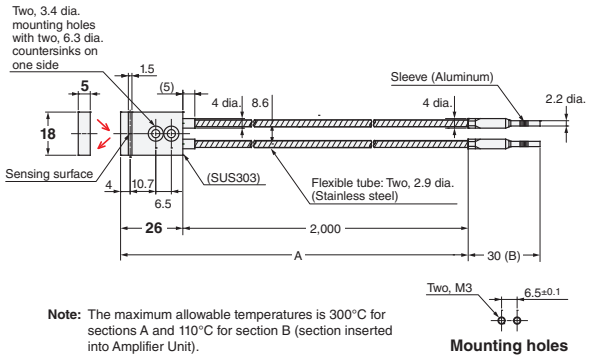
### 59-A E32-L16-N 2M (Free Cutting)




### 59-B E32-A08 2M (Free Cutting)




### 59-C E32-A08H2 2M (No Cutting)

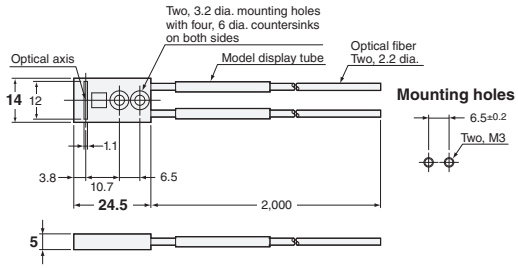



**Note:** The maximum allowable temperatures is 300°C for sections A and 110°C for section B (section inserted into Amplifier Unit).




**Mounting holes**

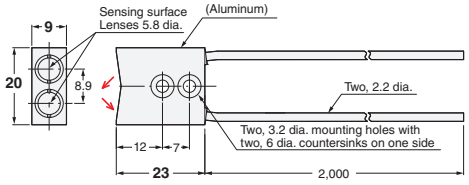
### 59-D E32-A12 2M (Free Cutting)



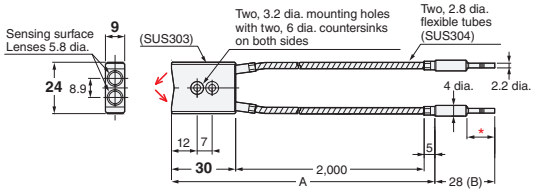

**Mounting holes**




### 59-E E32-A09 2M (Free Cutting)

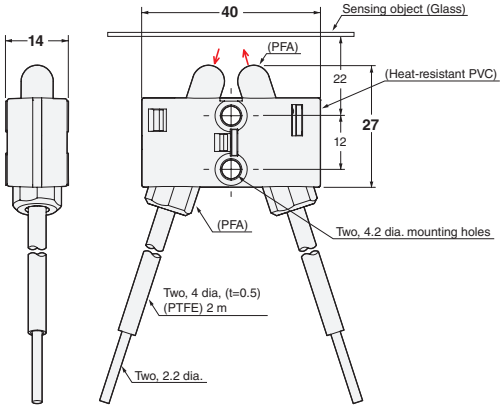



### 59-F E32-A09H2 2M (No Cutting)

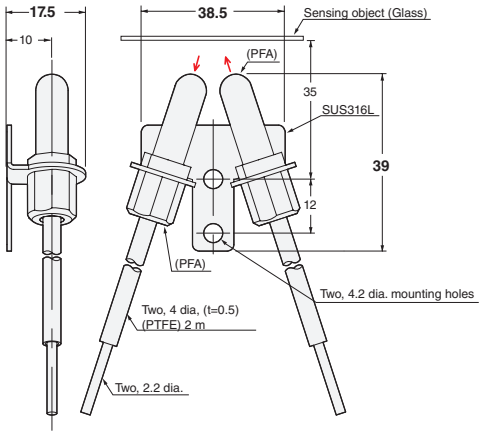



**Note:** The maximum allowable temperatures for sections A and B are 300°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *) must be maintained within the Amplifier Unit's operating temperature range.

### 59-G E32-L11FP 2M (Free Cutting)



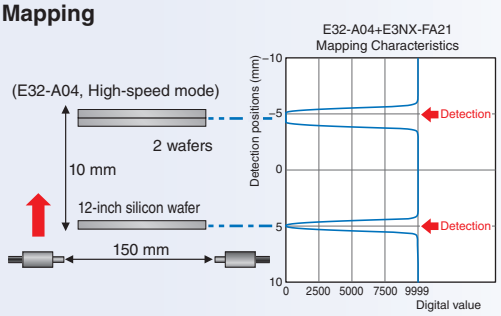

### 59-H E32-L11FS 2M (Free Cutting)





Wafer Mapping

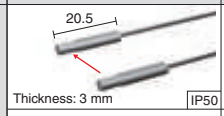
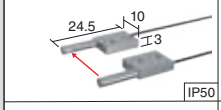
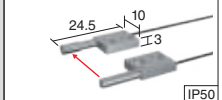
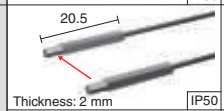
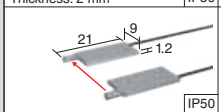
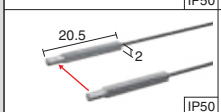
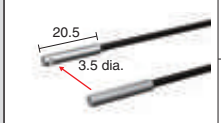
• **Wafer Mapping**




- Thin-profile design enables easy mounting on robot arms.
- Easy to adjust optical axis.
  (Typical alignment error between mechanical and optical axes is only ±0.1°.)
- Reliably wafer detection, even when stacked closely together.

## Specifications

### Through-beam Fiber Units

| Application | Ambient temperature | Aperture angle | Appearance (mm) | Bending radius of cable | Sensing distance (mm) E3X-ZV GIGA | HS | Other modes | Sensing distance (mm) E3NX-FA GIGA | HS | Other modes | Optical axis diameter (minimum sensing object) | Models | 61 Page Dimensions No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wafer Mapping | 70°C | 1.5° |  Thickness: 3 mm IP50 | Flexible, R1 | 3,220 | 1,200 | ST : 1,780 SHS: 500 | 4,000 * | 1,800 | ST : 2,670 SHS: 500 | 2 dia. (0.1 dia./ 0.03 dia.) | E32-A03 2M | 61-A |
| | | |  IP50 | R10 | | | | | | | | E32-A03-1 2M | 61-B |
| | | |  IP50 | R10 | 2,500 | 940 | ST : 1,400 SHS: 380 | 2,500 | 940 | ST : 1,400 SHS: 380 | – | E32-A03-2 2M | 61-C |
| | | 3.4° |  Thickness: 2 mm IP50 | R10 | 1,280 | 450 | ST : 680 SHS: 200 | 1,920 | 670 | ST : 1,020 SHS: 200 | 1.2 dia. (0.1 dia./ 0.03 dia.) | E32-A04 2M | 61-D |
| | | |  IP50 | R10 | 1,280 | 450 | ST : 680 SHS: 200 | 1,920 | 670 | ST : 1,020 SHS: 200 | | E32-A04-1 2M | 61-E |
| | | |  IP50 | R10 | 960 | 335 | ST : 510 SHS: 150 | 1,440 | 500 | ST : 760 SHS: 150 | – | E32-A04-8 2M | 61-F |
| | | 4° |  3.5 dia. IP50 | Flexible, R1 | 4,000 * | 1,460 | ST : 2,200 SHS: 580 | 4,000 * | 2,190 | ST : 3,300 SHS: 580 | 2 dia. (0.1 dia./ 0.03 dia.) | E32-T24SR 2M | 61-G |
| | | | | R10 | 4,000 * | 1,740 | ST : 2,600 SHS: 700 | 4,000 * | 2,610 | ST : 3,900 SHS: 700 | | E32-T24S 2M | 61-H |

* The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
[E3X-ZV] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50 µs)
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 µs)

**2.** The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.

**3.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.

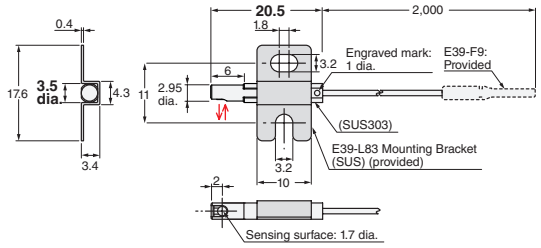
**4.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

Installation Information → 62 to 66 Page

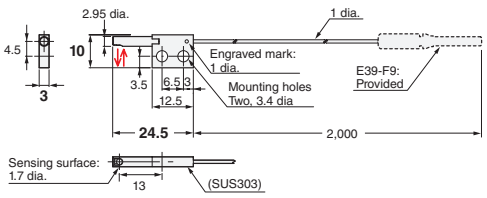
### Through-beam Fiber Units (Set of 2)

#### 61-A E32-A03 2M (Free Cutting)



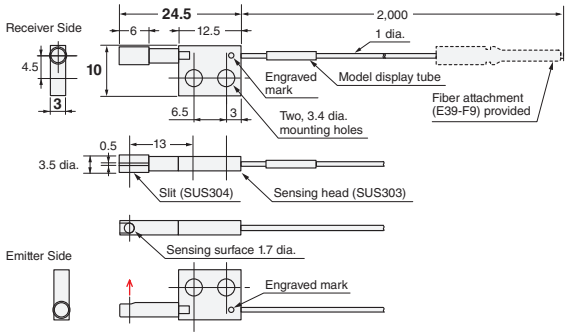

**Note:** Use the engraved surface and its opposing surface as installation (reference) surfaces.

#### 61-B E32-A03-1 2M (Free Cutting)



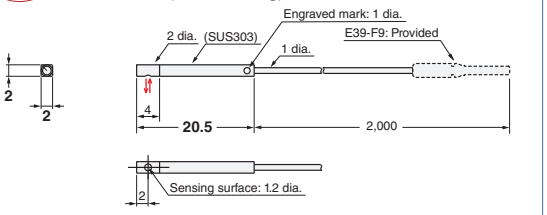

**Note1:** Use the engraved surface and its opposing surface as installation (reference) surfaces.
**2.** Set of two symmetrical parts.

#### 61-C E32-A03-2 2M (Free Cutting)



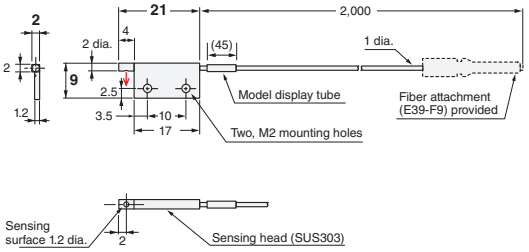

**Note:** Use the engraved surface and its opposing surface as installation (reference) surfaces.

#### 61-D E32-A04 2M (Free Cutting)

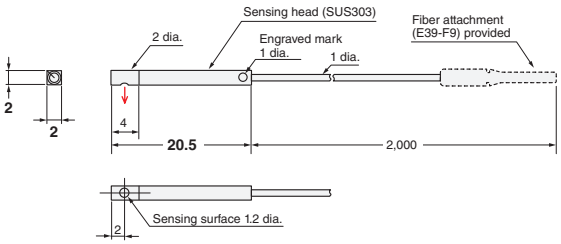



**Note:** Use the engraved surface and its opposing surface as installation (reference) surfaces.

#### 61-E E32-A04-1 2M (Free Cutting)

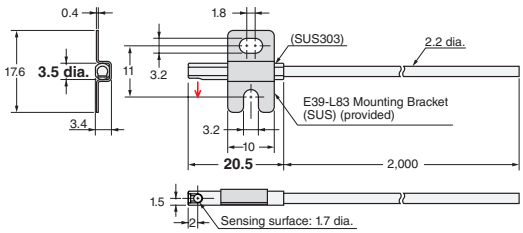



#### 61-F E32-A04-8 2M (Free Cutting)

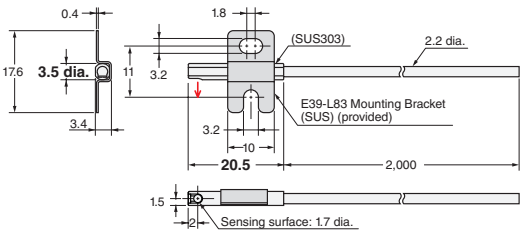



**Note:** Use the engraved surface and its opposing surface as installation (reference) surfaces.

#### 61-G E32-T24SR 2M (Free Cutting)




#### 61-H E32-T24S 2M (Free Cutting)



| Models | Installation | | | Cable | | | | | | Weight (packed state) (g) | Demensions Page No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ambient temperature | Tightening torque | Mounting hole | Bending radius | Unbendable length*1 | Tensile strength | Sheath material | Core material | Emitter/receiver differentiation | | |
| **E32-A01 5M** | –40 to 70°C | 0.03N · m | – | R4 | 10 | 9.8N | Fluororesin | Plastic | None | 200 | 55 Page 55-A |
| **E32-A03 2M** | –40 to 70°C | 0.29N · m | – | R1 | 0 | 9.8N | Polyethylene | Plastic | None | 40 | 35 Page 35-A<br>61 Page 61-A |
| **E32-A03-1 2M** | –40 to 70°C | 0.29N · m | – | R10 | 10 | 9.8N | Polyethylene | Plastic | None | 50 | 35 Page 35-B<br>61 Page 61-B |
| **E32-A03-2 2M** | –40 to 70°C | 0.29N · m | – | R10 | 10 | 9.8N | Polyethylene | Plastic | Slit on receiver side | – | 61 Page 61-C |
| **E32-A04 2M** | –40 to 70°C | 0.29N · m | $2.2^{+0.5}_{0}$ dia. | R10 | 10 | 9.8N | Polyethylene | Plastic | None | 40 | 35 Page 35-C<br>61 Page 61-D |
| **E32-A04-1 2M** | –40 to 70°C | 0.29N · m | – | R10 | 10 | 9.8N | Polyethylene | Plastic | None | – | 61 Page 61-E |
| **E32-A04-8 2M** | –25 to 105°C | 0.29N · m | – | R10 | 10 | 9.8N | Fluororesin | Plastic | None | 80 | 61 Page 61-F |
| **E32-A08 2M** | –40 to 70°C | 0.53N · m | – | R25 | 10 | 9.8N | Polyethylene | Plastic | None | 60 | 41 Page 41-C<br>59 Page 59-B |
| **E32-A08H2 2M** | –40 to 300°C *2 | 0.53N · m | – | R25 | 10 | 29.4N | SUS | Glass | None | 240 | 51 Page 51-D<br>59 Page 59-C |
| **E32-A09 2M** | –40 to 70°C | 0.53N · m | – | R25 | 10 | 9.8N | Polyethylene | Plastic | None | 60 | 41 Page 41-F<br>59 Page 59-E |
| **E32-A09H2 2M** | –40 to 300°C *2, *3 | 0.53N · m | – | R25 | 10 | 9.8N | SUS | Glass | None | 230 | 51 Page 51-G<br>59 Page 59-F |
| **E32-A12 2M** | –40 to 70°C | 0.53N · m | – | R25 | 10 | 9.8N | Polyethylene | Plastic | None | 60 | 41 Page 41-D<br>59 Page 59-D |
| **E32-A13 2M** | –25 to 70°C | 0.29N · m | – | R1 | 0 | 9.8N | PVC | Plastic | None | – | 53 Page 53-C |
| **E32-C21N 2M** | –40 to 70°C | 0.29N · m | $3.2^{+0.5}_{0}$ dia. *4 | R2 | 0 | 9.8N | Polyethylene | Plastic | White line on emitter cable | 30 | 11 Page 11-D |
| **E32-C31 2M** | –40 to 70°C | 0.78N · m | $3.2^{+0.5}_{0}$ dia. *4 | R25 | 10 | 9.8N | Polyethylene | Plastic | White line on emitter cable | 40 | 09 Page 09-D |
| **E32-C31M 1M** | –40 to 70°C | 0.78N · m | $3.2^{+0.5}_{0}$ dia. *4 | R10 | 10 | 9.8N | Polyethylene | Plastic | White line on emitter cable | 40 | 09 Page 09-E |
| **E32-C31N 2M** | –40 to 70°C | 0.29N · m | $3.2^{+0.5}_{0}$ dia. *4 | R4 | 0 | 9.8N | PVC and Polyethylene | Plastic | White line on emitter cable | 40 | 09 Page 09-A |
| **E32-C41 1M** | –40 to 70°C | 0.78N · m | $3.2^{+0.5}_{0}$ dia. *4 | R25 | 10 | 9.8N | Polyethylene | Plastic | White tube on emitter cable | 30 | 27 Page 27-A, 27-D |
| **E32-C42 1M** | –40 to 70°C | 0.29N · m | $2.2^{+0.5}_{0}$ dia. | R25 | 10 | 9.8N | Polyethylene | Plastic | White tube on emitter cable | 30 | 25 Page 25-A, 25-B |
| **E32-C42S 1M** | –40 to 70°C | 0.29N · m | $3.2^{+0.5}_{0}$ dia. | R25 | 10 | 4N | Polyolefin | Plastic | White tube on emitter cable | 30 | 25 Page 25-E |
| **E32-CC200 2M** | –40 to 70°C | 0.98N · m | $6.2^{+0.5}_{0}$ dia. | R25 | 10 | 29.4N | Polyethylene | Plastic | White line on emitter cable | 40 | 09 Page 09-H |
| **E32-C91N 2M** | –40 to 70°C | 0.98N · m | $6.2^{+0.5}_{0}$ dia. | R4 | 0 | 29.4N | Polyethylene | Plastic | White line on emitter cable | 36 | 09 Page 09-B<br>11 Page 11-F |
| **E32-D11 2M** | –40 to 70°C | 0.98N · m | $6.2^{+0.5}_{0}$ dia. | R4 | 10 | 29.4N | PVC | Plastic | None | 50 | 47 Page 47-E |
| **E32-D11R 2M** | –40 to 70°C | 0.98N · m | $6.2^{+0.5}_{0}$ dia. | R1 | 0 | 29.4N | PVC | Plastic | None | 50 | 09 Page 09-G |
| **E32-D11U 2M** | –40 to 70°C | 0.98N · m | $6.2^{+0.5}_{0}$ dia. | R4 | 10 | 29.4N | Fluororesin | Plastic | None | 60 | 43 Page 43-I |
| **E32-D12F 2M** | –40 to 70°C | 0.78N · m | $6.5^{+0.5}_{0}$ dia. | R40 | 10 | 29.4N | Fluororesin | Plastic | None | 190 | 43 Page 43-H |
| **E32-D14LR 2M** | –40 to 70°C | 0.98N · m | – | R1 | 0 | 29.4N | PVC | Plastic | None | 100 | 15 Page 15-G |
| **E32-D15XR 2M** | –40 to 70°C | 0.15N · m | – | R1 | 0 | 29.4N | PVC | Plastic | None | 60 | 19 Page 19-A |
| **E32-D15YR 2M** | –40 to 70°C | 0.15N · m | – | R1 | 0 | 29.4N | PVC | Plastic | None | 60 | 19 Page 19-C |
| **E32-D15ZR 2M** | –40 to 70°C | 0.15N · m | – | R1 | 0 | 29.4N | PVC | Plastic | None | 60 | 19 Page 19-E |
| **E32-D16 2M** | –40 to 70°C | 0.53N · m | – | R4 | 10 | 29.4N | PVC | Plastic | None | 70 | 29 Page 29-E |
| **E32-D21 2M** | –40 to 70°C | 0.78N · m | $3.2^{+0.5}_{0}$ dia. *4 | R4 | 10 | 9.8N | PVC | Plastic | None | 20 | 47 Page 47-B |
| **E32-D211R 2M** | –40 to 70°C | 0.78N · m | $4.2^{+0.5}_{0}$ dia. | R1 | 0 | 9.8N | Polyethylene | Plastic | None | 40 | 09 Page 09-F |
| **E32-D21B 2M** | –40 to 70°C | 0.78N · m | $4.2^{+0.5}_{0}$ dia. | R4 | 10 | 9.8N | PVC | Plastic | None | 40 | 47 Page 47-D |

*1 Unbendable length of cable from fiber head.
Do not bend the cable for at least 20 mm from where the cable inserts into the Fiber Amplifier Unit.
*2 The heat-resistant rating is not the same for all parts of the Fiber Unit. Refer to the dimensions diagrams for details.
*3 Avoid rapid temperature changes.
*4 For embedded mounting, prepare a hole with a diameter of 2.6 mm.

| Models | Installation | | | Cable | | | | | | Weight (packed state) (g) | Demensions Page No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ambient temperature | Tightening torque | Mounting hole | Bending radius | Unbendable length*1 | Tensile strength | Sheath material | Core material | Emitter/receiver differentiation | | |
| **E32-D21N 2M** | –40 to 70°C | 0.78N · m | 4.2$^{+0.5}_{0}$ dia. | R2 | 0 | 9.8N | Polyethylene | Plastic | None | 30 | 11 Page 11-E |
| **E32-D21R 2M** | –40 to 70°C | 0.78N · m | 3.2$^{+0.5}_{0}$ dia. *2 | R1 | 0 | 9.8N | Polyethylene | Plastic | None | 20 | 09 Page 09-C |
| **E32-D21-S3 2M** | –40 to 70°C | 0.78N · m | 4.2$^{+0.5}_{0}$ dia. | R10 | 10 | 9.8N | Polyethylene | Plastic | None | 50 | 23 Page 23-J |
| **E32-D221B 2M** | –40 to 70°C | 0.29N · m | 3.2$^{+0.5}_{0}$ dia. | R4 | 10 | 9.8N | PVC | Plastic | None | 40 | 15 Page 15-D<br>47 Page 47-C |
| **E32-D22B 2M** | –40 to 70°C | 0.2N · m | 1.7$^{+0.5}_{0}$ dia. | R4 | 10 | 9.8N | PVC | Plastic | None | 30 | 15 Page 15-A<br>47 Page 47-A |
| **E32-D22R 2M** | –40 to 70°C | 0.29N · m | 3.2$^{+0.5}_{0}$ dia. | R1 | 0 | 9.8N | Polyethylene | Plastic | None | 40 | 15 Page 15-C |
| **E32-D22-S1 2M** | –40 to 70°C | 0.29N · m | 4.2$^{+0.5}_{0}$ dia. | R10 | 10 | 9.8N | Polyethylene | Plastic | None | 45 | 23 Page 23-I |
| **E32-D24R 2M** | –40 to 70°C | 0.29N · m | 3.2$^{+0.5}_{0}$ dia. | R1 | 0 | 9.8N | Polyethylene | Plastic | None | 40 | 23 Page 23-A |
| **E32-D24-S2 2M** | –40 to 70°C | 0.29N · m | 5$^{+0.5}_{0}$ dia. | R25 | 10 | 19.6N | Polyethylene | Plastic | None | 55 | 23 Page 23-B |
| **E32-D25XB 2M** | –40 to 70°C | 0.15N · m | – | R4 | 10 | 9.8N | PVC | Plastic | None | 40 | 47 Page 47-F |
| **E32-D25XR 2M** | –40 to 70°C | 0.15N · m | – | R1 | 0 | 9.8N | Polyethylene | Plastic | None | 40 | 19 Page 19-B |
| **E32-D25YR 2M** | –40 to 70°C | 0.15N · m | – | R1 | 0 | 9.8N | Polyethylene | Plastic | None | 40 | 19 Page 19-D |
| **E32-D25ZR 2M** | –40 to 70°C | 0.15N · m | – | R1 | 0 | 9.8N | Polyethylene | Plastic | None | 40 | 19 Page 19-F |
| **E32-D25-S3 2M** | –40 to 70°C | 0.29N · m | – | R10 | 10 | 9.8N | Polyethylene | Plastic | None | 50 | 23 Page 23-L |
| **E32-D31-S1 0.5M** | –40 to 70°C | 0.78N · m | 3.2$^{+0.5}_{0}$ dia. *2 | R4 | 10 | 9.8N | Polyolefin | Plastic | None | 35 | 23 Page 23-G |
| **E32-D32L 2M** | –40 to 70°C | 0.29N · m | 3.2$^{+0.5}_{0}$ dia. | R25 | 10 | 29.4N | Polyethylene | Plastic | Yellow dotted line on emitter cable | 50 | 15 Page 15-E |
| **E32-D32-S1 0.5M** | –40 to 70°C | 0.29N · m | 3.2$^{+0.5}_{0}$ dia. | R4 | 10 | 9.8N | Polyolefin | Plastic | None | 35 | 23 Page 23-F |
| **E32-D33 2M** | –40 to 70°C | 0.29N · m | 3.2$^{+0.5}_{0}$ dia. | R25 | 10 | 9.8N | Polyethylene | Plastic | None | 40 | 15 Page 15-F<br>23 Page 23-E |
| **E32-D331 2M** | –40 to 70°C | 0.29N · m | 2.2$^{+0.5}_{0}$ dia. | R4 | 10 | 9.8N | Polyethylene | Plastic | None | 30 | 23 Page 23-D |
| **E32-D36P1 2M** | –40 to 70°C | 0.78N · m | – | R4 | 10 | 29.4N | Polyethylene | Plastic | None | 60 | 53 Page 53-F |
| **E32-D36T 2M** | –40 to 70°C | – | – | R4 | 10 | 29.4N | Polyethylene | Plastic | None | 190 | 55 Page 55-C |
| **E32-D43M 1M** | –40 to 70°C | 0.29N · m | 1.7$^{+0.5}_{0}$ dia. | R4 | 10 | 9.8N | Polyethylene | Plastic | None | 30 | 15 Page 15-B<br>23 Page 23-C |
| **E32-D51 2M** | –40 to 150°C *3 | 0.98N · m | 6.2$^{+0.5}_{0}$ dia. | R35 | 10 | 29.4N | Fluororesin | Plastic | None | 60 | 51 Page 51-B |
| **E32-D51R 2M** | –40 to 100°C *4 | 0.98N · m | 6.2$^{+0.5}_{0}$ dia. | R2 | 0 | 29.4N | Polyurethane | Plastic | None | 60 | 51 Page 51-A |
| **E32-D61-S 2M** | –60 to 350°C *5 | 0.98N · m | 6.2$^{+0.5}_{0}$ dia. | R25 | 10 | 29.4N | SUS | Glass | None | 190 | 51 Page 51-I |
| **E32-D611-S 2M** | –60 to 350°C *5 | 0.98N · m | 4.2$^{+0.5}_{0}$ dia. | R25 | 10 | 29.4N | SUS | Glass | None | 170 | 51 Page 51-H |
| **E32-D73-S 2M** | –40 to 400°C *5 | 0.78N · m | 4.2$^{+0.5}_{0}$ dia. | R25 | 10 | 29.4N | SUS | Glass | None | 170 | 51 Page 51-J |
| **E32-D81R-S 2M** | –40 to 200°C *5 | 0.78N · m | 6.2$^{+0.5}_{0}$ dia. | R10 | 10 | 9.8N | Fluororesin | Glass | None | 70 | 51 Page 51-C |
| **E32-D82F1 4M** | –40 to 200°C | 0.29N · m | 6.5$^{+0.5}_{0}$ dia. | R25 | 10 | 29.4N | Fluororesin | Plastic | None | 450 | 55 Page 55-D |
| **E32-DC200BR 2M** | –40 to 70°C | 0.98N · m | 6.2$^{+0.5}_{0}$ dia. | R1 | 0 | 29.4N | PVC | Plastic | None | 60 | 23 Page 23-K |
| **E32-DC200F4R 2M** | –40 to 70°C | 0.78N · m | 3.2$^{+0.5}_{0}$ dia. *2 | R1 | 0 | 9.8N | Polyethylene | Plastic | None | 40 | 23 Page 23-H |
| **E32-G16 2M** | –40 to 70°C | 0.53N · m | – | R5 | 0 *6 | 29.4N | Polyethylene | Plastic | – | 51 | 53 Page 53-E |
| **E32-L11FP 2M** | –10 to 60°C | 0.78N · m | – | R40 | 10 | 9.8N | Fluororesin | Plastic | None | 310 | 43 Page 43-F<br>59 Page 59-G |
| **E32-L11FS 2M** | –10 to 85°C | 0.78N · m | – | R40 | 10 | 9.8N | Fluororesin | Plastic | None | 310 | 43 Page 43-G<br>59 Page 59-H |

*1 Unbendable length of cable from fiber head.
Do not bend the cable for at least 20 mm from where the cable inserts into the Fiber Amplifier Unit.
*2 For embedded mounting, prepare a hole with a diameter of 2.6 mm.
*3 For continuous operation, use the Fiber Unit between –40 to 130°C.
*4 For continuous operation, use the Fiber Unit between –40 to 90°C.
*5 The heat-resistant rating is not the same for all parts of the Fiber Unit. Refer to the dimensions diagrams for details.
*6 The bending radius of the protective cover (PVC, 25 mm) is 10 mm min.

| Models | Installation | | | Cable | | | | | | Weight (packed state) (g) | Demensions Page No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ambient temperature | Tightening torque | Mounting hole | Bending radius | Unbendable length*1 | Tensile strength | Sheath material | Core material | Emitter/receiver differentiation | | |
| **E32-L15 2M** | –40 to 70°C | 0.53N · m | – | R25 | 10 | 29.4N | Polyethylene | Plastic | White tube on emitter cable | 60 | 25 Page 25-F |
| **E32-L16-N 2M** | –40 to 70°C | 0.29N · m | – | R25 | 10 | 29.4N | Polyethylene | Plastic | None | 60 | 37 Page 37-A<br>41 Page 41-B<br>59 Page 59-A |
| **E32-L24S 2M** | –40 to 70°C | 0.29N · m | – | R10 | 10 | 9.8N | Polyethylene | Plastic | None | 40 | 37 Page 37-B<br>41 Page 41-A |
| **E32-L25L 2M** | –40 to 105°C *2 | 0.29N · m | – | R10 | 10 | 9.8N | Polyethylene | Plastic | None | 40 | 37 Page 37-C<br>41 Page 41-E |
| **E32-L25T 2M** | –40 to 70°C | – | – | R10 | 10 | 9.8N | Polyethylene | Plastic | None | 40 | 55 Page 55-B |
| **E32-L64 2M** | –40 to 300°C *3 | 0.54N · m | – | R25 | 0 | 9.8N | SUS | Glass | None | 220 | 51 Page 51-E |
| **E32-L86 2M** | –40 to 200°C *3 | 0.54N · m | – | R25 | 0 | 9.8N | SUS | Glass | None | 205 | 51 Page 51-F |
| **E32-LD11 2M** | –40 to 70°C | 0.98N · m | – | R25 | 10 | 29.4N | Polyethylene | Plastic | None | 40 | 09 Page 09-I |
| **E32-LD11N 2M** | –40 to 70°C | 0.98N · m | 6.2$^{+0.5}_{0}$ dia. | R2 | 0 | 29.4N | Polyethylene | Plastic | None | 40 | 11 Page 11-C |
| **E32-LD11R 2M** | –40 to 70°C | 0.98N · m | – | R1 | 0 | 29.4N | Polyethylene | Plastic | None | 40 | 09 Page 09-I |
| **E32-LR11NP 2M** | –40 to 70°C *4 | 0.98N · m | 6.2$^{+0.5}_{0}$ dia. | R2 | 0 | 29.4N | Polyethylene | Plastic | None | 40 | 39 Page 39-A<br>11 Page 11-G |
| **E32-LT11 2M** | –40 to 70°C | 0.78N · m | – | R25 | 10 | 29.4N | Polyethylene | Plastic | None | 40 | 07 Page 07-C<br>29 Page 29-C |
| **E32-LT11N 2M** | –40 to 70°C | 0.78N · m | 4.2$^{+0.5}_{0}$ dia. | R2 | 0 | 29.4N | Polyethylene | Plastic | None | 40 | 29 Page 29-A<br>11 Page 11-A |
| **E32-LT11R 2M** | –40 to 70°C | 0.78N · m | – | R1 | 0 | 29.4N | Polyethylene | Plastic | None | 40 | 07 Page 07-C<br>29 Page 29-C |
| **E32-LT35Z 2M** | –40 to 70°C | 0.15N · m | – | R1 | 0 | 9.8N | Polyethylene | Plastic | None | 25 | 17 Page 17-G |
| **E32-R16 2M** | –25 to 55°C | 0.54N · m | – | R25 | 10 | 29.4N | Polyethylene | Plastic | None | 220 (E39-R1 included.) | 39 Page 39-B |
| **E32-R21 2M** | –40 to 70°C | 0.39N · m | 6.2$^{+0.5}_{0}$ dia. | R10 | 10 | 9.8N | Polyethylene | Plastic | None | 70 (E39-R3 included.) | 39 Page 39-C |
| **E32-T10V 2M** | –25 to 70°C | 0.3N · m | – | R25 | 10 | 29.4N | Fluororesin | Plastic | None | 170 | 57 Page 57-D |
| **E32-T11 2M** | –40 to 70°C | 0.78N · m | 4.2$^{+0.5}_{0}$ dia. | R4 | 10 | 29.4N | PVC | Plastic | None | 40 | 45 Page 45-C |
| **E32-T11F 2M** | –40 to 70°C | 0.29N · m | – | R4 | 10 | 29.4N | Fluororesin | Plastic | None | 60 | 43 Page 43-C |
| **E32-T11N 2M** | –40 to 70°C | 0.78N · m | 4.2$^{+0.5}_{0}$ dia. | R1 | 0 | 29.4N | PVC | Plastic | None | 70 | 07 Page 07-A<br>11 Page 11-B |
| **E32-T11NF 2M** | –25 to 70°C | 12N · m | 8.5$^{+0.5}_{0}$ dia. | R1 | 0 | 29.4N | Fluororesin | Plastic | None | 80 | 43 Page 43-A |
| **E32-T11NFS 2M** | –25 to 70°C | 0.78N · m | 4.2$^{+0.5}_{0}$ dia. | R1 | 0 | 29.4N | Fluororesin | Plastic | None | 70 | 43 Page 43-A2 |
| **E32-T11R 2M** | –40 to 70°C | 0.78N · m | 4.2$^{+0.5}_{0}$ dia. | R1 | 0 | 29.4N | PVC | Plastic | None | 50 | 07 Page 07-B<br>11 Page 11-B |
| **E32-T12F 2M** | –40 to 70°C | 0.78N · m | 5.5$^{+0.5}_{0}$ dia. | R40 | 10 | 29.4N | Fluororesin | Plastic | None | 210 | 43 Page 43-B |
| **E32-T12R 2M** | –40 to 70°C | 0.29N · m | 3.2$^{+0.5}_{0}$ dia. | R1 | 0 | 29.4N | PVC | Plastic | None | 60 | 13 Page 13-C |
| **E32-T14 2M** | –40 to 70°C | 0.49N · m | – | R25 | 10 | 29.4N | Polyethylene | Plastic | None | 60 | 29 Page 29-D |
| **E32-T14F 2M** | –40 to 70°C | 0.78N · m | 5.5$^{+0.5}_{0}$ dia. | R40 | 10 | 29.4N | Fluororesin | Plastic | None | 220 | 43 Page 43-D |
| **E32-T14LR 2M** | –40 to 70°C | 0.29N · m | 3.2$^{+0.5}_{0}$ dia. | R1 | 0 | 29.4N | PVC | Plastic | None | 60 | 13 Page 13-D |
| **E32-T15XR 2M** | –40 to 70°C | 0.15N · m | – | R1 | 0 | 29.4N | PVC | Plastic | None | 60 | 17 Page 17-A |
| **E32-T15YR 2M** | –40 to 70°C | 0.15N · m | – | R1 | 0 | 29.4N | PVC | Plastic | None | 60 | 17 Page 17-C |
| **E32-T15ZR 2M** | –40 to 70°C | 0.15N · m | – | R1 | 0 | 29.4N | PVC | Plastic | None | 60 | 17 Page 17-E |
| **E32-T16JR 2M** | –40 to 70°C | 0.29N · m | – | R1 | 0 | 9.8N | PVC | Plastic | None | 60 | 53 Page 53-B |
| **E32-T16PR 2M** | –40 to 70°C | 0.29N · m | – | R1 | 0 | 9.8N | PVC | Plastic | None | 60 | 53 Page 53-A |
| **E32-T16WR 2M** | –25 to 55°C | 0.29N · m | – | R1 | 0 | 9.8N | PVC | Plastic | None | 60 | 53 Page 53-D |
| **E32-T17L 10M** | –40 to 70°C | 0.78N · m | 14.5$^{+1}_{0}$ dia. | R25 | 10 | 29.4N | Polyethylene | Plastic | None | 240 | 29 Page 29-B |

*1 Unbendable length of cable from fiber head.
Do not bend the cable for at least 20 mm from where the cable inserts into the Fiber Amplifier Unit.
*2 For continuous operation, use the Fiber Unit between –40 to 90°C.
*3 The heat-resistant rating is not the same for all parts of the Fiber Unit. Refer to the dimensions diagrams for details.
*4 Ambient operating temperature of the recommended reflector (E39-RP1) is –40 to 60°C.

| Models | Installation | | | Cable | | | | | | Weight (packed state) (g) | Demensions Page No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ambient temperature | Tightening torque | Mounting hole | Bending radius | Unbendable length*1 | Tensile strength | Sheath material | Core material | Emitter/receiver differentiation | | |
| **E32-T21 2M** | –40 to 70°C | 0.78N · m | $3.2^{+0.5}_{0}$ dia. *2 | R4 | 10 | 9.8N | PVC | Plastic | None | 30 | 45 Page 45-B |
| **E32-T21-S1 2M** | –40 to 70°C | 0.78N · m | $3.2^{+0.5}_{0}$ dia. *2 | R10 | 10 | 9.8N | Polyethylene | Plastic | None | 45 | 21 Page 21-D |
| **E32-T223R 2M** | –40 to 70°C | 0.20N · m | $1.2^{+0.5}_{0}$ dia. | R1 | 20 | 9.8N | Polyethylene | Plastic | None | 40 | 13 Page 13-A |
| **E32-T22B 2M** | –40 to 70°C | 0.20N · m | $1.7^{+0.5}_{0}$ dia. | R4 | 10 | 9.8N | PVC | Plastic | None | 40 | 13 Page 13-B<br>45 Page 45-A |
| **E32-T22S 2M** | –40 to 70°C | 0.29N · m | $3.2^{+0.5}_{0}$ dia. | R10 | 10 | 29.4N | PVC | Plastic | None | 60 | 35 Page 35-F |
| **E32-T24E 2M** | –40 to 70°C | 0.29N · m | $2.7^{+0.5}_{0}$ dia. | R10 | 10 | 9.8N | Polyethylene | Plastic | None | 40 | 21 Page 21-B |
| **E32-T24R 2M** | –40 to 70°C | 0.29N · m | $2.2^{+0.5}_{0}$ dia. | R1 | 0 | 9.8N | Polyethylene | Plastic | None | 40 | 21 Page 21-A |
| **E32-T24S 2M** | –40 to 70°C | 0.29N · m | – | R10 | 10 | 29.4N | PVC | Plastic | None | 60 | 35 Page 35-E<br>61 Page 61-H |
| **E32-T24SR 2M** | –40 to 70°C | 0.29N · m | – | R1 | 0 | 9.8N | PVC | Plastic | None | 60 | 35 Page 35-D<br>61 Page 61-G |
| **E32-T25XB 2M** | –40 to 70°C | 0.15N · m | – | R4 | 10 | 9.8N | PVC | Plastic | None | 40 | 45 Page 45-D |
| **E32-T25XR 2M** | –40 to 70°C | 0.15N · m | – | R1 | 0 | 9.8N | Polyethylene | Plastic | None | 40 | 17 Page 17-B |
| **E32-T25YR 2M** | –40 to 70°C | 0.15N · m | – | R1 | 0 | 9.8N | Polyethylene | Plastic | None | 40 | 17 Page 17-D |
| **E32-T25ZR 2M** | –40 to 70°C | 0.15N · m | – | R1 | 0 | 9.8N | Polyethylene | Plastic | None | 40 | 17 Page 17-F |
| **E32-T33 1M** | –40 to 70°C | 0.29N · m | $3.2^{+0.5}_{0}$ dia. | R10 | 10 | 9.8N | Polyethylene | Plastic | None | 40 | 21 Page 21-C |
| **E32-T51 2M** | –40 to 150°C *3 | 0.78N · m | $4.2^{+0.5}_{0}$ dia. | R35 | 10 | 29.4N | Fluororesin | Plastic | None | 70 | 49 Page 49-B |
| **E32-T51F 2M** | –40 to 150°C *3 | 0.78N · m | $5.5^{+0.5}_{0}$ dia. | R40 | 10 | 29.4N | Fluororesin | Plastic | None | 220 | 43 Page 43-E |
| **E32-T51R 2M** | –40 to 100°C *4 | 0.78N · m | $4.2^{+0.5}_{0}$ dia. | R2 | 0 | 29.4N | Polyurethane | Plastic | None | 60 | 49 Page 49-A |
| **E32-T51V 1M** | –25 to 120°C | 0.29N · m | $4.2^{+0.5}_{0}$ dia. | R30 | 10 | 29.4N | Fluororesin | Glass | None | 160 | 57 Page 57-A |
| **E32-T54 2M** | –40 to 150°C *3 | 0.29N · m | – | R35 | 10 | 29.4N | Fluororesin | Plastic | None | 160 | 49 Page 49-C |
| **E32-T61-S 2M** | –60 to 350°C *5 | 0.78N · m | $4.2^{+0.5}_{0}$ dia. | R25 | 10 | 29.4N | SUS | Glass | None | 200 | 49 Page 49-G |
| **E32-T64-2 2M** | –25 to 300°C *5 | 0.78N · m | – | R25 | 10 | 29.4N | SUS | Glass | None | 70 | 49 Page 49-F |
| **E32-T81R-S 2M** | –40 to 200°C *5 | 0.78N · m | $4.2^{+0.5}_{0}$ dia. | R10 | 10 | 9.8N | Fluororesin | Glass | None | 60 | 49 Page 49-D |
| **E32-T84SV 1M** | –25 to 200°C | 0.29N · m | $4.5^{+0.5}_{0}$ dia. | R25 | 10 | 29.4N | SUS | Glass | None | 190 | 57 Page 57-C |
| **E32-T84S-S 2M** | –40 to 200°C *5 | 0.29N · m | – | R25 | 10 | 9.8N | SUS | Glass | None | – | 49 Page 49-E |
| **E32-TC200BR 2M** | –40 to 70°C | 0.78N · m | $4.2^{+0.5}_{0}$ dia. | R1 | 0 | 29.4N | PVC | Plastic | None | 60 | 21 Page 21-E |
| **E32-VF1** | –25 to 70°C | – | – | – | – | – | – | – | – | 240 | 57 Page 57-F |
| **E32-VF4** | –25 to 70°C | – | – | – | – | – | – | – | – | 280 | 57 Page 57-E |
| **E39-F1** | –40 to 200°C | – | – | – | – | – | – | – | – | 2 | 30 Page 30-A<br>31 Page 31-A to 31-C<br>32 Page 32-A<br>33 Page 33-A to 33-C |
| **E39-F1-33** | –40 to 200°C | – | – | – | – | – | – | – | – | 3 | 32 Page 32-D |
| **E39-F11** | – | – | – | – | – | – | – | – | – | 30 | – |
| **E39-F16** | –40 to 350°C | – | – | – | – | – | – | – | – | 15 | 30 Page 30-B<br>31 Page 31-D to 31-F<br>32 Page 32-B<br>33 Page 33-D to 33-F, 33-K |
| **E39-F17** | –25 to 70°C | – | – | – | – | – | – | – | – | 10 | 25 Page 25-B |

*1 Unbendable length of cable from fiber head.
Do not bend the cable for at least 20 mm from where the cable inserts into the Fiber Amplifier Unit.
*2 For embedded mounting, prepare a hole with a diameter of 2.6 mm.
*3 For continuous operation, use the Fiber Unit between –40 to 130°C.
*4 For continuous operation, use the Fiber Unit between –40 to 90°C.
*5 The heat-resistant rating is not the same for all parts of the Fiber Unit. Refer to the dimensions diagrams for details.

| Models | Installation | | | Cable | | | | | | Weight (packed state) (g) | Demensions Page No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ambient temperature | Tightening torque | Mounting hole | Bending radius | Unbendable length*1 | Tensile strength | Sheath material | Core material | Emitter/receiver differentiation | | |
| **E39-F18** | –40 to 70°C | – | – | – | – | – | – | – | – | 5 | 27 Page (27-G), (27-H) |
| **E39-F1V** | –25 to 120°C | – | – | – | – | – | – | – | – | 3 | 57 Page (57-B) |
| **E39-F2** | –40 to 200°C | – | – | – | – | – | – | – | – | 2 | 30 Page (30-C)<br>31 Page (31-G), (31-H)<br>32 Page (32-C)<br>33 Page (33-G) to (33-I) |
| **E39-F32A 1M** | –40 to 150°C | – | – | R30 | – | – | – | – | – | 70 | 47 Page (47-G) |
| **E39-F32C 1M** | –40 to 150°C | – | – | R30 | – | – | – | – | – | 110 | 45 Page (45-E)<br>47 Page (47-G) |
| **E39-F32D 1M** | –40 to 150°C | – | – | R30 | – | – | – | – | – | 80 | 47 Page (47-G) |
| **E39-F3A** | –40 to 70°C | – | – | – | – | – | – | – | – | 2 | 25 Page (25-A) |
| **E39-F3A-5** | –40 to 70°C | – | – | – | – | – | – | – | – | 1 | 27 Page (27-A), (27-B), (27-C) |
| **E39-F3B** | –25 to 55°C | – | – | – | – | – | – | – | – | 2 | 27 Page (27-D), (27-E), (27-F) |
| **E39-F3C** | –25 to 55°C | – | – | – | – | – | – | – | – | 1 | 25 Page (25-C), (25-D) |
| **E39-R1** | –25 to 55°C | – | – | – | – | – | – | – | – | 20 | 39 Page (39-B) |
| **E39-R3** | –25 to 55°C | – | – | – | – | – | – | – | – | 20 | 39 Page (39-C) |
| **E39-RP1** | –40 to 60°C | – | – | – | – | – | – | – | – | 25 | 39 Page (39-A)<br>11 Page (11-G) |
| **E39-RP37** | –25 to 55°C | – | – | – | – | – | – | – | – | 4 | – |
| **E39-RSP1** | –25 to 55°C | – | – | – | – | – | – | – | – | 4 | – |

*1 Unbendable length of cable from fiber head.
Do not bend the cable for at least 20 mm from where the cable inserts into the Fiber Amplifier Unit.

MEMO

# Smart Fiber Amplifier Units

## E3NX-FA Series

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



70 Page

### Expanded Application Response Capabilities

#### Advanced Basic Performance

Improvements in the sensing distance and minimum sensing object have increased the range of application for stable detection.

| 1.5 Times the Sensing Distance* | 1/10th the Minimum Sensing Object* |
|---|---|
| 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. |

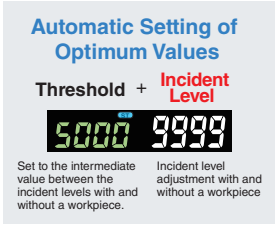
*Compared to E3X-ZV.

### Achieve Easy Detection in Many Applications

#### Advanced Smart Tuning

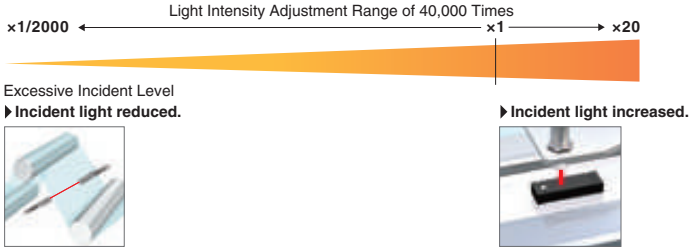
Just press the S TUNE button once with a workpiece and once without a workpiece to automatically set the optimum incident level and threshold. Consistent settings are achieved for all users with this ultra-easy procedure.




#### Optimum Light Intensity Adjustment from Transparent Objects to Black Workpieces

The incident level is optimized to enable stable detection even for saturated or insufficient incident levels.




# Sensor Communications Units for E3NX-FA

## E3NW Series

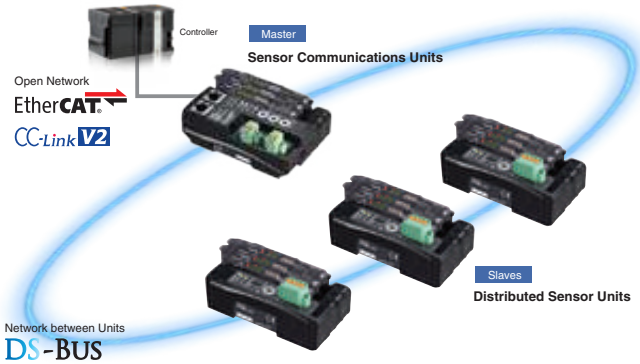
### The Next-generation E3NW Sensor Network Units Revolutionize On-site Sensing



EtherCAT
CC-Link V2

70 Page

The Sensor Communications Unit with a master function and the Distributed Sensor Units with slave functions enable N-Smart Sensors communication over open networks.




#### Greatly Reduced Machine Manufacturing Costs

There is no need to change the current distributed installation to introduce a network without increasing costs.

#### Greatly Reduced Machine Commissioning Time

All of the settings can be made at the same time from a Touch Panel.

#### Greatly Improved Machine Productivity

Realtime monitoring lets you perform maintenance before malfunctions occur.

# Smart Fiber Amplifier Units

## E3X-ZV Series

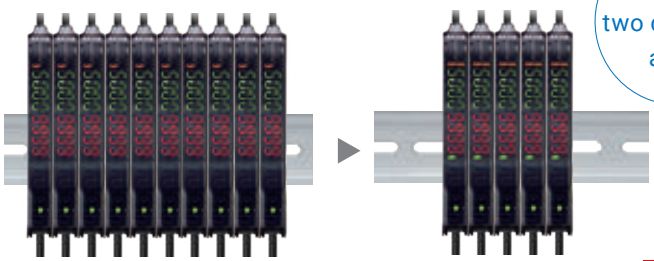
### Affordable Amplifier Units with Simple Operation and Stable Detection Capabilities



86 Page

### 2-channel model option to attain the ultimate cost reduction

The 2-channel model equipped with amplifier functions for two fiber amplifier units enables substantial purchase cost reduction since the required number of units is halved. Furthermore, it greatly contributes to the downsizing of equipment and control panel in addition to allowing substantial reduction in wiring workload and power consumption.



One unit, two detection areas

E3X-ZV (1-channel model)

E3X-MZV (2-channel model) Patented *1

Note: Refer to E3X-ZV/MZV Catalog (Cat. No. E600).
*1. "Patent pending or Patented" indication means patent is pending or is patented in Japan. (As of February 2021.)

### <Fiber Amplifier Unit Comparison>

| | | | E3X-ZV Series  | E3NX-FA Series  |
|---|---|---|---|---|
| Fiber Amplifier Unit specifications | Output | | 1 output | 1 or 2 outputs (depending on the model) |
| | External input | | Not supported | Supported or not supported (depending on the model) |
| | Response time | | 50 µs /250 µs/1 ms/16 ms (Default: 250 µs) | 30 µs (32 µs)/250 µs/1 ms/16 ms (Default: 250 µs) |
| | Sensing distance (Giga-power mode) | E32-T11R | 2,000 mm | 3,000 mm |
| | | E32-D11R | 840 mm | 1,260 mm |
| | Minimum sensing object | E32-T11R | 5 µm dia. | 2 µm dia. |
| Sensor Communications Unit application | Communications method (Sensor Communications Unit model) | | — | EtherCAT (E3NW-ECT)<br>CC-Link (E3NW-CCL) |
| | Applicable Sensors | | — | Fiber Sensor (E3NX-FA0/FA10/FA40/FAH0)<br>Laser Sensors (E3NC-LA0, E3NC-SA0)<br>Contact-Type Sensor (E9NC-TA0)* |
| Page listings | Ordering Information | | 86 Page | 70 Page |
| | Ratings and Specifications | | 88 Page | 72 Page |
| | Dimensions | | 89 Page | 76 Page |

**Note.** The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.

## Fiber Amplifier Unit Accessories

71, 87 Page

# E3NX-FA Fiber Amplifier Units and Related Products

## Fiber Amplifier Units E3NX-FA Series

| Type | Appearance | Connecting method | Inputs/ outputs | Models | | Ratings and Specifications | Dimensions |
|---|---|---|---|---|---|---|---|
| | | | | NPN output | PNP output | | |
| Standard models |  | Pre-wired (2 m) | 1 output | E3NX-FA11 2M | E3NX-FA41 2M | Page 72 | Page 76 76-A |
| | | | | E3NX-FA11-5 2M *1 | — | | |
| |  | Wire-saving Connector | 1 output | E3NX-FA6 | E3NX-FA8 | | Page 76 76-B |
| Advanced models |  | Pre-wired (2 m) | 2 outputs + 1 input | E3NX-FA21 2M | E3NX-FA51 2M | | Page 76 76-A |
| |  | Wire-saving Connector | 1 output + 1 input | E3NX-FA7 | E3NX-FA9 | | Page 76 76-B |
| | | | 2 outputs | E3NX-FA7TW | E3NX-FA9TW | | |
| |  | M8 Connector | 1 output + 1 input | E3NX-FA24 | E3NX-FA54 | | Page 77 77-A |
| | | | 2 outputs | — | E3NX-FA54TW | | |
| Infrared models |  | Pre-wired (2 m) | 1 output | E3NX-FAH11 2M | E3NX-FAH41 2M | | Page 76 76-A |
| |  | Wire-saving Connector | 1 output | E3NX-FAH6 | E3NX-FAH8 | | Page 76 76-B |
| Analog output models |  | Pre-wired (2 m) | 2 output | E3NX-FA11AN 2M | E3NX-FA41AN 2M | Page 74 | Page 76 76-A |
| Model for Sensor Communications Unit *2 |  | Connector for Sensor Communications Unit | — | E3NX-FA0 | | | Page 77 77-B |
| | | | | E3NX-FAH0 | | | |
| |  | Connector for Sensor Communications Unit Pre-wired (2 m) | 1 output | E3NX-FA10 2M | E3NX-FA40 2M | | Page 77 77-B |

*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.
**Note.** The sensing distances for E3NX-FA in this catalog are values for E3NX-FA□ models. The distances for E3NX-FAH□ infrared models are different.

## Sensor Communications Unit

### Sensor Communications Unit

| Communication method | Appearance | Applicable Fiber Amplifier Model | Model | Ratings and Specifications | Dimensions |
|---|---|---|---|---|---|
| EtherCAT |  | E3NX-FA0<br>E3NX-FA10<br>E3NX-FA40<br>E3NX-FAH0 | E3NW-ECT | Page 84 | Page 85 85-A |
| CC-Link |  | | E3NW-CCL | *1 | *1 |

*1. For details, refer to your OMRON website.

## Distributed Sensor Unit

| Appearance | Applicable Fiber Amplifier Model | Model | Ratings and Specifications | Dimensions |
|---|---|---|---|---|
|  | E3NX-FA0 | E3NW-DS | Page 84 | Page 85 85-B |

Note. The Distributed Sensor Unit can be connected to any of the Sensor Communications Units.
Use the following DS-Bus communication cable (recommended) when connecting a sensor communications unit and a distributed sensor unit.

| Item | Manufacturer | Model |
|---|---|---|
| Communication cable | BANDO DENSEN Co., Ltd. | ESVC 0.5X2C, black |

## Connector cover for Sensor Communications Unit and Distributed Sensor Unit (provided)

Order a Cover when required, e.g., if you lose the covers.

| Model |
|---|
| E39-G27 |

# 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. * Protective stickers: provided.

| Type | Appearance | Cable length | Number of conductors | Applicable Fiber Amplifier Units | Models | Ratings, Specifications and Dimensions |
|---|---|---|---|---|---|---|
| Master Connector |  | 2 m | 4 | E3NX-FA7<br>E3NX-FA7TW<br>E3NX-FA9<br>E3NX-FA9TW | E3X-CN21 | Page 94 94-A |
| Slave Connector |  | | 2 | | E3X-CN22 | Page 94 94-B |
| Master Connector |  | | 3 | E3NX-FA6<br>E3NX-FA8<br>E3NX-FAH6<br>E3NX-FAH8 | E3X-CN11 | Page 94 94-A |
| Slave Connector |  | | 1 | | E3X-CN12 | Page 94 94-B |

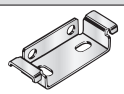
## Sensor I/O Connectors (Required for models with M8 Connectors.)

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

| Appearance | Cable length | Number of conductors | Models | Ratings and Specifications | Dimensions |
|---|---|---|---|---|---|
| Straight  | 2 m | 4 | XS3F-M421-402-A | Page 94 | Page 94 94-C |
| | 5 m | | XS3F-M421-405-A | | |
| L-shaped  | 2 m | | XS3F-M422-402-A | | Page 94 94-D |
| | 5 m | | XS3F-M422-405-A | | |

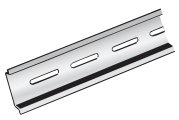
## Mounting Bracket

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

| Appearance | Model | Quantity | Dimensions |
|---|---|---|---|
|  | E39-L143 | 1 | Page 95 95-A |

## DIN Track

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

| Appearance | Type | Models | Quantity | Dimensions |
|---|---|---|---|---|
|  | Shallow type, total length: 1 m | PFP-100N | 1 | Page 95 95-B |
| | Shallow type, total length: 0.5 m | PFP-50N | | |
| | Deep type, total length: 1 m | PFP-100N2 | | Page 95 95-C |

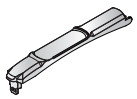
## End Plate

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

| Appearance | Model | Quantity | Dimensions |
|---|---|---|---|
|  | PFP-M | 1 | Page 95 95-D |

## 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 |

# 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 : 1,080 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: 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. | | | | | | | | | |
| 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),<br>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 | | | | | | | | | |
| Response time | Super-high-speed mode (SHS) | | Operate or reset for model with 1 output: 30 ms (Super High Speed mode (SHS2) of E3NX-FA11-5 is 60 ms each), with 2 outputs: 32 ms | | | | | | | | | |
| | High-speed mode (HS) | | Operate or reset: 250 ms | | | | | | | | | |
| | Standard mode (Stnd) | | 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 | | | | | | | | | |
| No. of Units for mutual interference prevention *4 | Super-high-speed mode (SHS) | | 0 | | | | | | | | | |
| | High-speed mode (HS) | | 10 | | | | | | | | | |
| | Standard mode (Stnd) | | 10 | | | | | | | | | |
| | Giga-power mode (GIGA) | | 10 | | | | | | | | | |

*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 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. When the Super High Speed mode (SHS) is set, mutual interference prevention is disabled (2 units for E3NX-FA11-5).

| 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 |
| 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 *5 | Select from initial reset (factory defaults) or user reset (saved settings). | | | | | | | | | |
| | | Eco mode *6 | 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, OFF or Execution on power-up. | | | | | | | | Select from ON or OFF. | |
| | | Output 1 | Select from normal detection mode, area detection mode or differential detection mode. | | | | | | | | Select from normal detection mode or area detection mode. | |
| | | Output 2 | — | | | Select from normal detection mode, alarm output mode, error output mode or differential detection mode. | — | Select from normal detection mode, alarm output mode, error output mode or differential detection mode. | — | Select from normal detection mode, alarm output mode, error output mode or differential detection mode. | — | |
| | | External input | — | | | Select from input OFF, tuning, power tuning, emission OFF, Sensor OFF, zero reset, or bank switching. | | — | Select from input OFF, tuning, power tuning, emission OFF, Sensor 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 *7 | | | 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) | | | | | | | | | |
| Ambient humidity range | | | Operating and storage: 35 to 85% (with no condensation) within the surrounding air temperature range shown above | | | | | | | | | |
| Altitude | | | 2,000 m max. | | | | | | | | | |
| Installation environment | | | Pollution degree 3 | | | | | | | | | |
| Insulation resistance | | | 20 MW 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/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. 115 g/ approx. 75 g | Approx. 60g/approx. 20g | | Approx. 65 g/approx. 25 g | | Approx. 115 g/ approx. 75 g | Approx. 60g/ approx. 20g |
| Materials | Case | | Polycarbonate (PC) | | | | | | | | | |
| | Cover | | Polycarbonate (PC) | | | | | | | | | |
| | Cable | | PVC | | | | | | | | | |
| MTTFd (Year) | | | 231 | 228 | 223 | 219 | 114 | 219 | 220 | 212 | 202 | 364 |
| Accessories | | | Instruction Manual | | | | | | | | | |

*5. The bank is not reset by the user reset function or saved by the user save function.
*6. Eco LO is supported for Amplifier Units manufactured in July 2014 or later.
*7. When the number of connected units is 11 or more, the ambient temperature is less than 50°C.

## Analog output models/ Model for Sensor Communications Unit

| Item | | Type | Analog output models | Model for Sensor Communications Unit | | |
|---|---|---|---|---|---|---|
| | | NPN output | E3NX-FA11AN | E3NX-FA10 | E3NX-FA0 | E3NX-FAH0 |
| | | PNP output | E3NX-FA41AN | E3NX-FA40 | | |
| | | Connecting method | Pre-wired | Connector for Sensor Communications Unit Pre-wired | Connector for Sensor Communications Unit | |
| Inputs/ outputs | | Outputs | 2 outputs | 1 output | — *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 26 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<br>(depends on the NPN/PNP output format)<br>Load current: Groups of 1 to 3 Amplifier Units: 100 mA max.,<br>Groups of 4 to 30 Amplifier Units:20 mA max.<br>(Residual voltage: 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 (reference value) | | | Voltage output: 1-5 VDC<br>(10 kW or more connected load),<br>temperature characteristics:<br>0.3% F.S. / °C | — | | |
| 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),<br>and OUT selection indicator (orange, only on models with 2 outputs) | | | |
| Protection circuits | | | Power supply reverse polarity protection,<br>output short-circuit protection, and output reverse polarity protection | | Power supply reverse polarity protection and output short-circuit protection | |
| Control output Response time | | Super-high-speed mode (SHS) | Operate or reset: 80 ms | Operate or reset: 32 ms | | |
| | | High-speed mode (HS) | Operate or reset: 250ms | Operate or reset: 250 ms | | |
| | | 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 | | |
| Sensitivity adjustment | | | Smart Tuning (2-point tuning, full auto tuning, position tuning, maximum sensitivity tuning, power tuning, percentage tuning (-99% to 99%)) or manual adjustment | | | |
| Maximum connectable Units | | | 30 | 16 | With E3NW-ECT: 30 units<br>(When connected to an OMRON NJ-series Controller.)<br>With E3NW-CRT: 16 units<br>(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 | | | |

*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.

| Item | | Type | Analog output models | Model for Sensor Communications Unit | | |
|---|---|---|---|---|---|---|
| | | NPN output | E3NX-FA11AN | E3NX-FA10 | E3NX-FA0 | E3NX-FAH0 |
| | | PNP output | E3NX-FA41AN | E3NX-FA40 | | |
| | | Connecting method | Pre-wired | Connector for Sensor Communications Unit Pre-wired | Connector for Sensor Communications Unit | |
| 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 *4 | Select from initial reset (factory defaults) or user reset (saved settings). | | | |
| | | 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 4. | | | |
| | | Sensor OFF setting | — | | Select from ON or OFF. | — |
| | | Power tuning | Select from ON or OFF. | | | |
| | | Output 1 | Select from normal detection mode, area detection mode or differential detection mode (E3NX-FA10/40 only). | | | |
| | | Output 2 | Select from Analog scaling or Analog offset. | — | Select from normal detection mode, alarm output mode, error output mode or differential detection mode (E3NX-FA0 only). | |
| | | 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 *5 | | | 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<br>(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<br>(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) within the surrounding air temperature range shown above | | | |
| Altitude | | | 2,000 m max. | | | |
| Installation environment | | | Pollution degree 3 | | | |
| Insulation resistance | | | 20 MW 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 $m/s^2$ 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. 95 g/approx. 45 g | Approx. 65 g/approx. 25 g | Approx. 65 g/approx. 25 g |
| Materials | | Case | Polycarbonate (PC) | | | |
| | | Cover | Polycarbonate (PC) | | | |
| | | Cable | PVC | | | |
| MTTFd (Year) | | | 214 | — | | |
| Accessories | | | Instruction Manual | | | |

*4. The bank is not reset by the user reset function or saved by the user save function.
*5. When the number of connected units is 11 or more, the ambient temperature is less than 50°C.

(Unit: mm)

## Dimensions

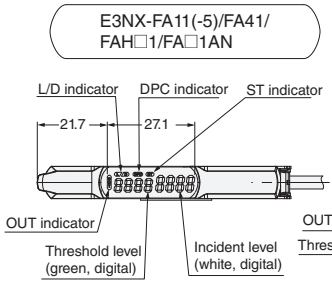
Tolerance class IT16 applies to demmensions in this date sheet unless otherwise specified.

### Pre-wired Amplifier Units

76-A

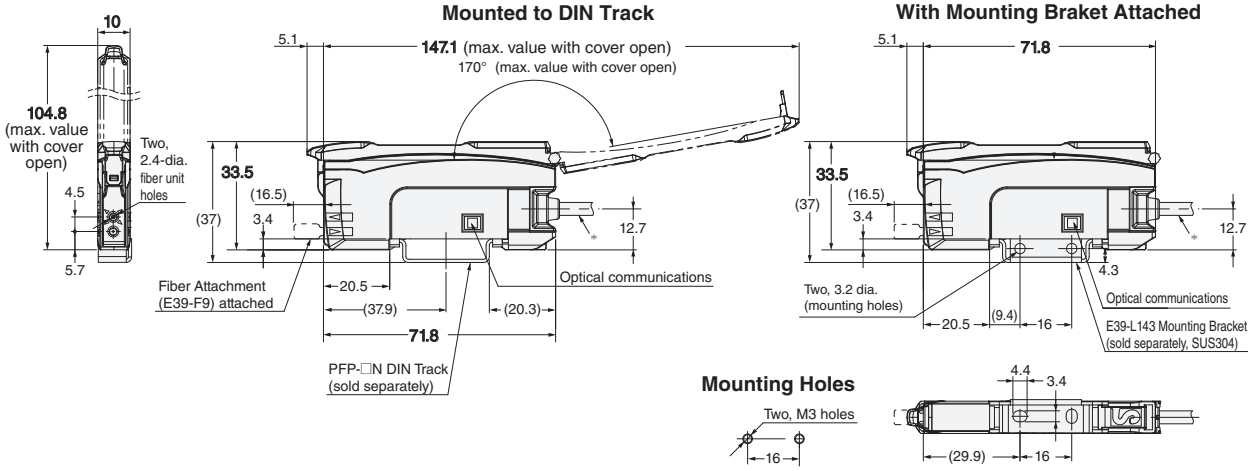
**E3NX-FA□1(-5)**
**E3NX-FAH□1**
**E3NX-FA□AN**






*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 | | 4 | Standard cable length: 2 m |
| E3NX-FA□1AN | | | Minimum bending radius: 12 mm |
| E3NX-FA21 | 4.0 dia. | 5 | |
| E3NX-FA51 | | | |

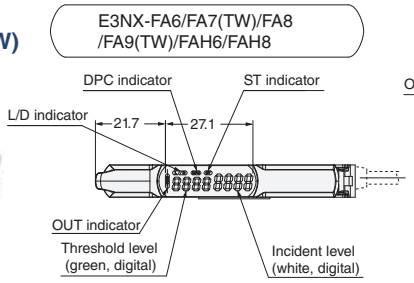



### Amplifier Units with Wire-saving Connectors

76-B

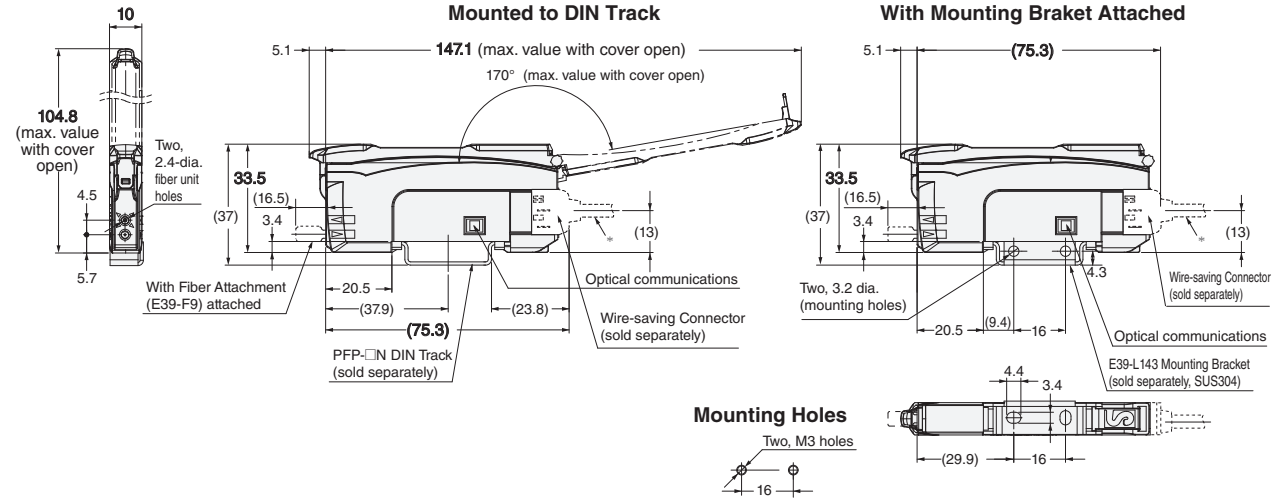
**E3NX-FA6**
**E3NX-FA7(TW)**
**E3NX-FA8**
**E3NX-FA9(TW)**
**E3NX-FAH6**
**E3NX-FAH8**






*Cable Specifications

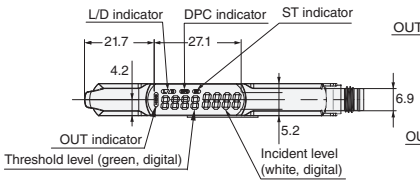
| Model | Outer diameter | No. of conductors |
|---|---|---|
| E3X-CN12 | 2.6 dia. | 1 |
| E3X-CN22 | 4.0 dia. | 2 |
| E3X-CN11 | | 3 |
| E3X-CN21 | | 4 |

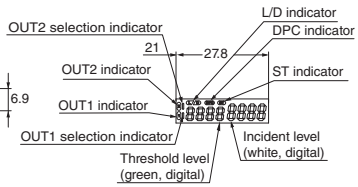


## Amplifier Units with M8 Connector

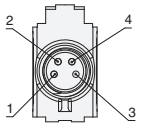
77-A **E3NX-FA24**
**E3NX-FA54**
**E3NX-FA54TW**

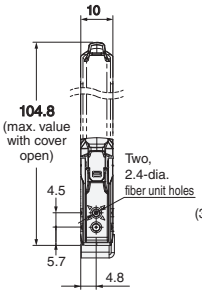




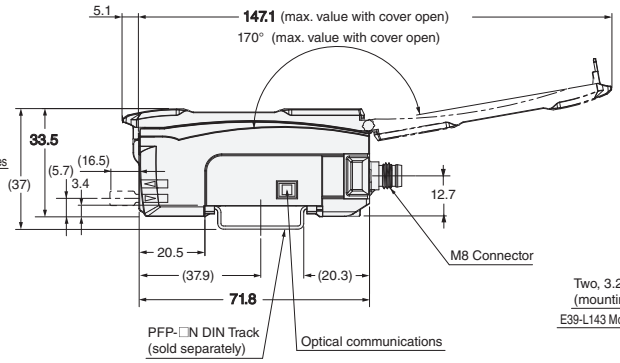




**Connector pin arrangement**

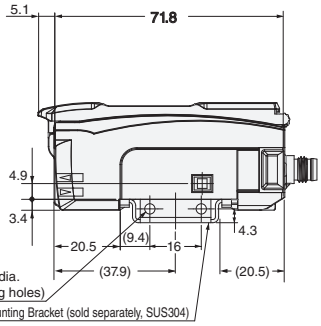


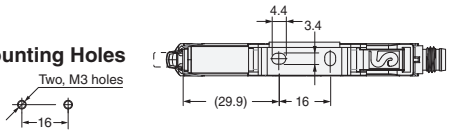

**Mounted to DIN Track**




**With Mounting Bracket Attached**



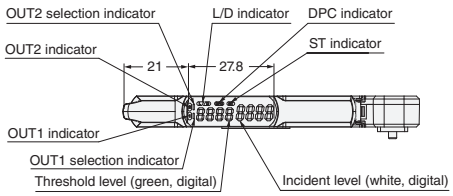

**Mounting Holes**



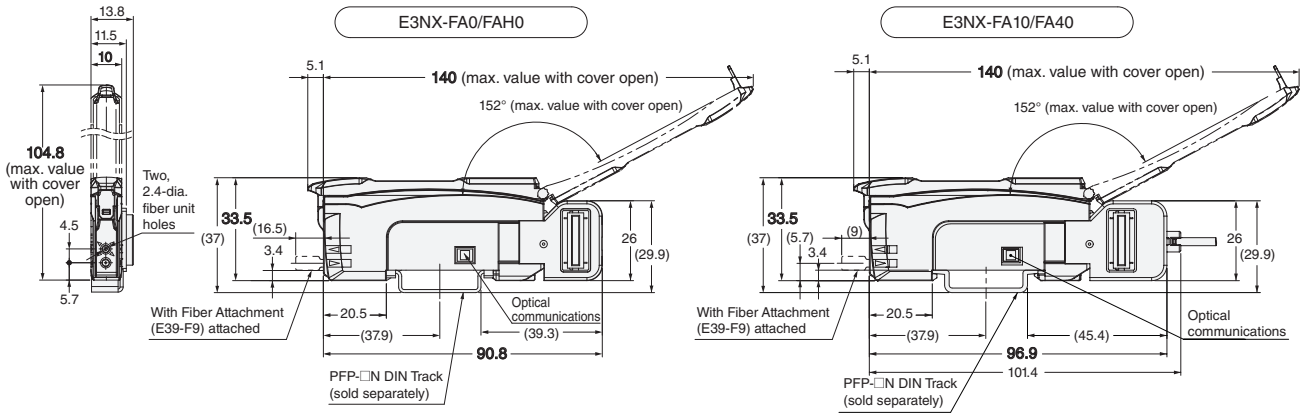

## Amplifier Unit with Connector for Sensor Communications Unit

77-B **E3NX-FA0/FA10/FA40**



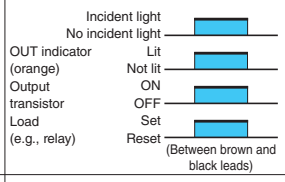
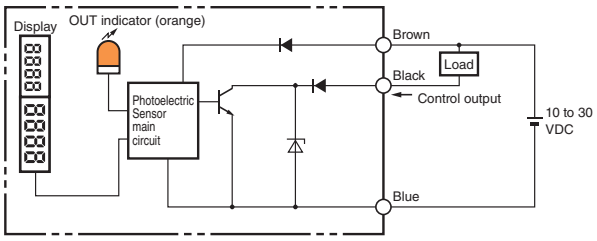
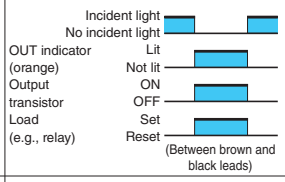
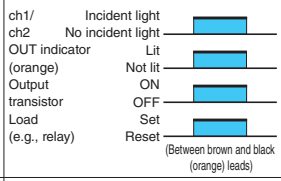
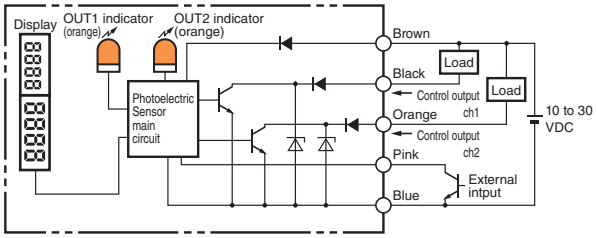
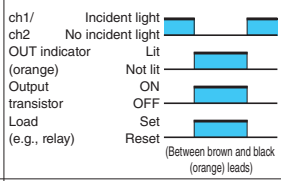
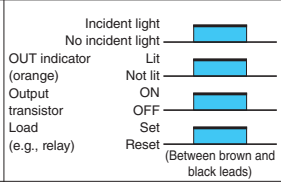
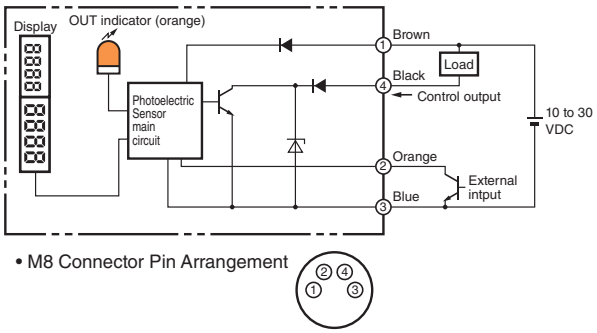
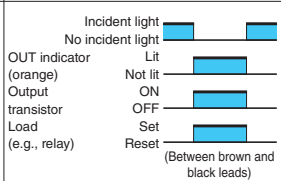
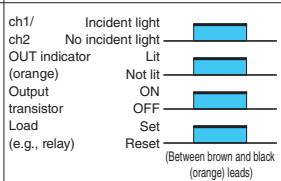
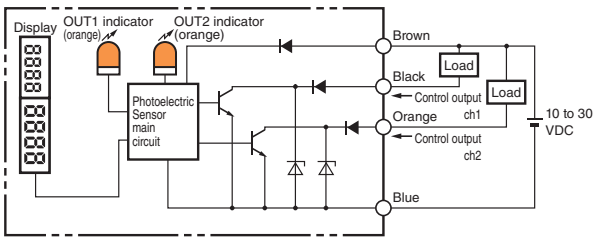
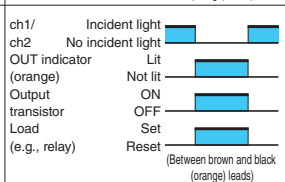
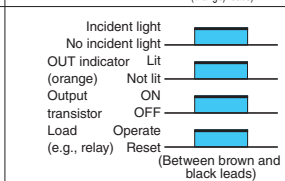
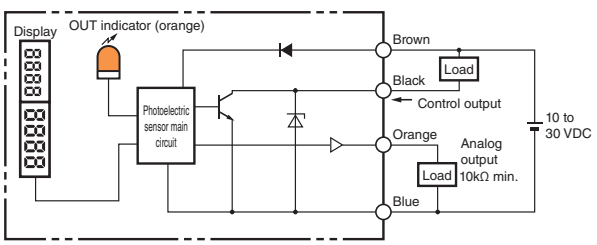
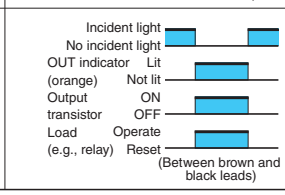



**Mounted to DIN Track**



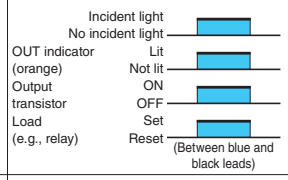
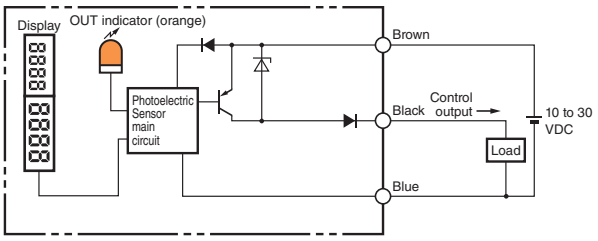
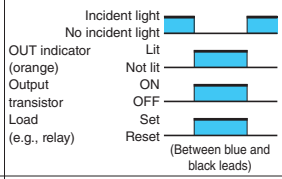
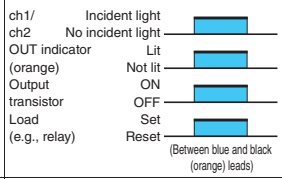
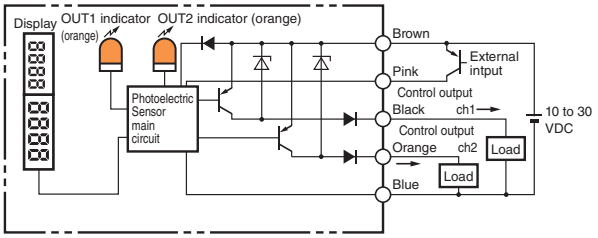
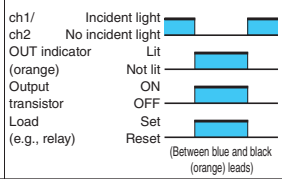
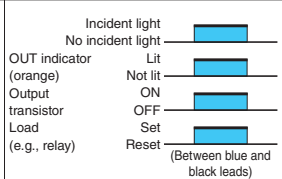
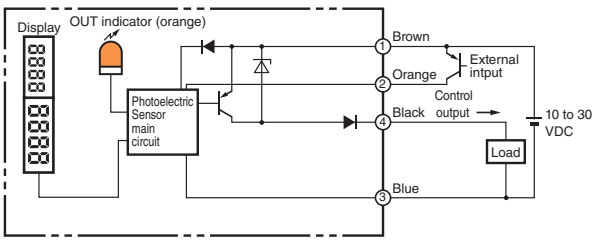
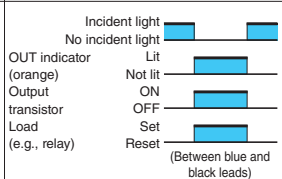
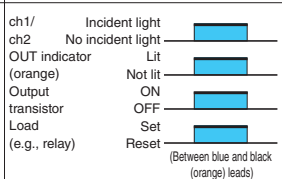
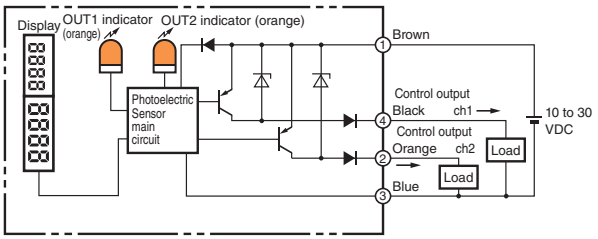
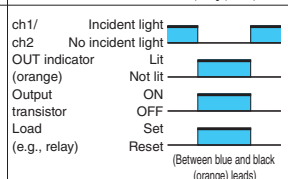
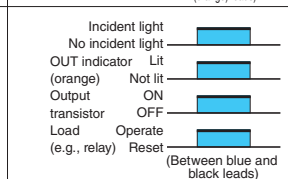
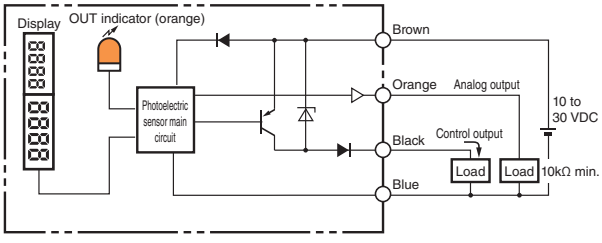
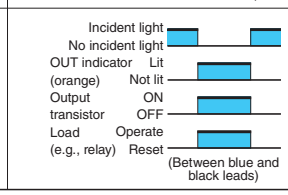
## I/O Circuit Diagrams

### NPN Output

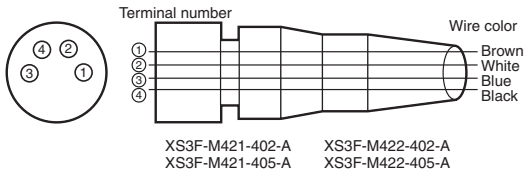
| Models | Operation mode | Timing chart | L/D indicators | Output circuit |
|---|---|---|---|---|
| E3NX-FA11<br>E3NX-FA6<br>E3NX-FA11-5<br>E3NX-FAH11<br>E3NX-FAH6 | Light-ON |  | L lit. |  |
| | Dark-ON |  | D lit. | |
| E3NX-FA21 | Light-ON |  | L lit. |  |
| | Dark-ON |  | D lit. | |
| E3NX-FA7<br>E3NX-FA24 | Light-ON |  | L lit. |  |
| | Dark-ON |  | D lit. | |
| E3NX-FA7TW | Light-ON |  | L lit. |  |
| | Dark-ON |  | D lit. | |
| E3NX-FA11AN | Light-ON |  | L lit. |  |
| | Dark-ON |  | D lit. | |

**Note.** For E3NX-FA6/ FA7/ FA8/ FA9/ FA7TW/ FA9TW/ FAH6/ FAH8, diagram with optional wire-saving connector.

## PNP Output

| Models | Operation mode | Timing chart | L/D indicators | Output circuit |
|---|---|---|---|---|
| E3NX-FA41<br>E3NX-FA8<br>E3NX-FAH41<br>E3NX-FAH8 | Light-ON |  | L lit. |  |
| | Dark-ON |  | D lit. | |
| E3NX-FA51 | Light-ON |  | L lit. |  |
| | Dark-ON |  | D lit. | |
| E3NX-FA9<br>E3NX-FA54 | Light-ON |  | L lit. | <br>• M8 Connector Pin Arrangement<br> |
| | Dark-ON |  | D lit. | |
| E3NX-FA9TW<br>E3NX-FA54TW | Light-ON |  | L lit. | <br>• M8 Connector Pin Arrangement<br> |
| | Dark-ON |  | D lit. | |
| E3NX-FA41AN | Light-ON |  | L lit. |  |
| | Dark-ON |  | D lit. | |

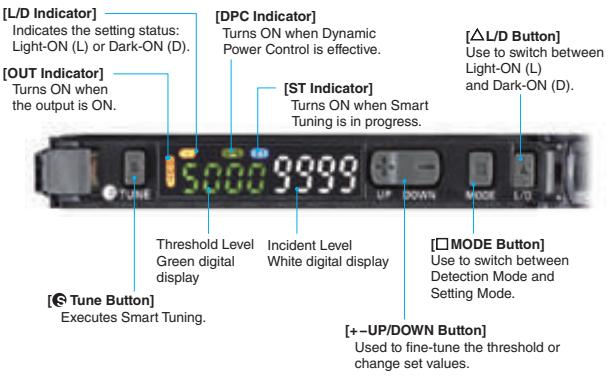
## Plug (Sensor I/O Connector)



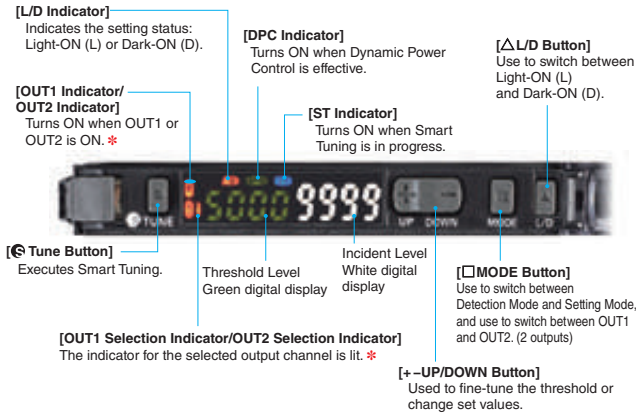

| Wire color | Connection pin | Application |
|---|---|---|
| Brown | 1 | Power supply (+V) |
| White | 2 | External input / Output |
| Blue | 3 | Power supply (0 V) |
| Black | 4 | Output |

## Nomenclature

### E3NX-FA11/FA41/FA6/FA8/FA7/FA9/ FA24/FA54/FA11-5/FAH11/FAH41/ FAH6/FAH8/FA11AN/FA41AN




### E3NX-FA21/FA51/FA7TW/FA9TW/FA54TW/ FA10/FA40/FA0/FAH0




* Only OUT1 turns ON for output.

## Operating Procedures

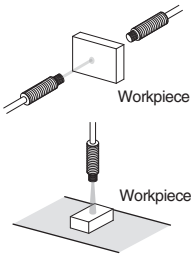
### Basic Settings

### Output switching

**1.** Press △ L/D button.

Through-beam:
Set to "Dark ON" to turn the output ON with a workpiece in the detection area.
[L/D Indicator] turns D ON.

Reflective:
Set to "Light ON" to turn the output ON with a workpiece in the detection area.
[L/D Indicator] turns L ON.

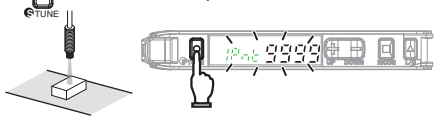



### Smart Tuning [Easy Sensitivity Setting]

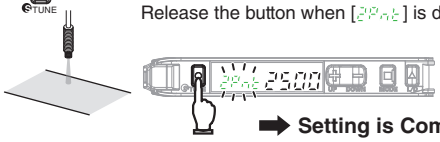
#### (1) Detect for Workpiece Presence/Absence

- **2-point Tuning**

**1.** Press S TUNE button with a workpiece in the detection area.



**2.** Press S TUNE button again without a workpiece in the detection area.
Release the button when [2Pnt] is displayed.



➡ **Setting is Completed**

Incident light level setting:
The larger incident level of the Step 1 and 2 values is adjusted to the power tuning level.
Threshold setting:
Set to the middle between the Step 1 and 2 incident light levels.

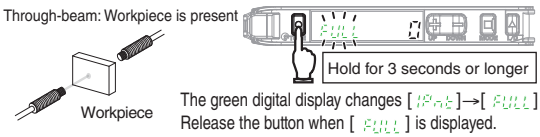
CHECK! Step 1 and Step 2 can be reversed.

#### (2) Enhance Durability of the Fiber Head against Dust and Dirt

- **Maximum Sensitivity Tuning**

**1.** Hold S TUNE button for 3 seconds or longer with/without workpiece as shown below.
Release the button when [ FULL ] is displayed.

Through-beam: Workpiece is present







The green digital display changes [ tPnt ]→[ FULL ]
Release the button when [ FULL ] is displayed.

Reflective: Workpiece is absent

➡ **Setting is Completed**



Incident light level setting:
The incident level in Step 1 is adjusted to "0".
Threshold setting:
The value is set to approx. 7% of the incident light level of 1.

CHECK! However, the Sensor becomes more susceptible to the influence of background objects.

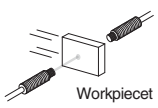
#### (3) Adjust for Moving Workpiece without Stopping Line

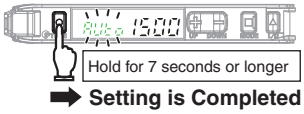
- **Full Auto Tuning**

**1.** Hold the S TUNE button without the presence of a workpiece, and pass the workpiece through while [ tPnt ]→[ FULL ]→[ AUto ] is displayed in green digital.



(Keep holding the S TUNE button while the workpiece passes through, and hold 7 seconds or longer until [ AUto ] is displayed in green digital. After the workpiece passes through, release your finger from the S TUNE button.)




➡ **Setting is Completed**

Incident light level setting: Adjust the max. incident light level on Step 1 as the power tuning level.
Threshold setting: Set to the middle between max. and min. incident light levels on Step 1.

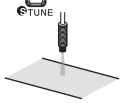
## Basic Settings

### (4) Determine Workpiece Position

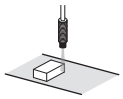
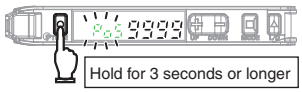
- **Position Tuning**

1. Turn ON power tuning in SET mode.
Refer to "Detailed Settings"

2. Press [TUNE] button without a workpiece in the area.




3. Place the workpiece at the desired position and hold [TUNE] button.


The green digital display changes [2Point]→[Pos].

**➡ Setting is Completed**

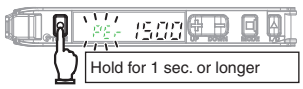
Incident light level setting: The Step 3 incident level is adjusted to half the power tuning level.
Threshold setting: Set to the same value as the Step 3 incident level.

### (5) Detect Transparent or Small Workpiece (Set Threshold by incident light level percentage)

- **Percentage Tuning**

1. Turn ON Percentage Tuning in SET mode.
Refer to "Detailed Settings"

2. Press [TUNE] button without a workpiece in the area.


**➡ Setting is Completed**

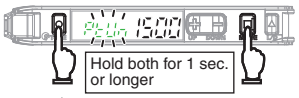
Incident light level setting:
The Step 2 incident light level is adjusted to the power tuning level.
Threshold setting:
Set to the value obtained by (Incident Level at Step 2 × Percentage Tuning Level).

CHECK! No Smart Tuning other than Power Tuning can be used if Percentage Tuning is set.

### (6) Restore from the Incident Level Changed due to Dust and Dirt

- **Power Tuning**

1. Hold [TUNE] and [MODE] buttons for 1 second or longer without a workpiece in the area.


**➡ Setting is Completed**

Incident light level setting: The Step 1 incident level is adjusted to the power tuning level.
Threshold setting: Not changed.

CHECK! Perform the procedure with a workpiece in the area for reflective model setting. If the setting is made after position tuning, set both the through-beam model and reflective model with a workpiece.

Refer to " • Smart Tuning Error " for error displays.

- **Smart Tuning Error**

| Error / Display / Cause | Error Origin Tuning Type | Remedy |
|---|---|---|
| Near Error<br>nEAr Err<br>The light level difference between Points 1 and 2 are extremely small. | 2-point Tuning<br>Full Auto Tuning | • Change the detection function mode to a slower response time mode.<br>• Reduce the distance between the emitter and receiver. (Through-beam)<br>• Place the Fiber Head closer to the sensing object. (Reflective) |
| Over Error<br>ouEr Err<br>Incident light level is too high. | All | • Use a thin-diameter fiber.<br>• Widen the emitter and receiver distance. (Through-beam)<br>• Distance the Fiber Head from the sensing object. (Reflective) |
| Low Error<br>Lo Err<br>Incident light level is too low. | Tuning other than Maximum Sensitivity Tuning | • Reduce the distance between the emitter and receiver. (Through-beam)<br>• Place the Fiber Head closer to the sensing object. (Reflective) |

Refer to " Detailed Settings " to change the power tuning level.

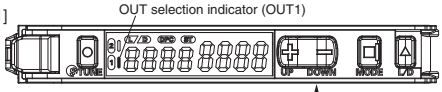
## Channel switching

(Models with 2 Outputs: E3NX-FA21,E3NX-FA51,E3NX-FA7TW, E3NX-FA9TW and E3NX-FA54TW)

■ The OUT selection indicators and the settings will change.

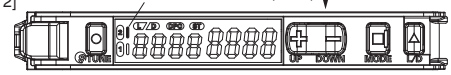
1. Press [TUNE] button for 1 second.
2. The OUT selection indicators (OUT1/OUT2) switch.

[Output 1] OUT selection indicator (OUT1)



Press the MODE button for 1 second in detection mode.

[Output 2] OUT selection indicator (OUT2)



CHECK! In the detailed settings, the OUT selection indicators will each light whenever the output (OUT1/OUT2) is set.

## Minute Adjustment of Threshold Level

1. Press [UP/DOWN] button to adjust the threshold level.

The threshold level becomes higher. The threshold level becomes lower.



CHECK! Hold the key for high-speed level adjustment.

## Convenient Setting Features

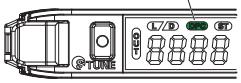
### (1) Stable Detection Regardless of Incident Level Change due to Dust and Dirt

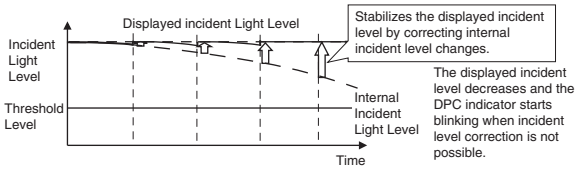
- **DPC Function (Use of the function with Through-beam model or Retro-reflective model is recommended)**

1. Perform Smart Tuning.
Refer to "Smart Tuning"
Refer to "Power Tuning"

2. Set the DPC function ON in SET mode.
Refer to "Detailed Settings" .

The DPC indicator turns ON when the DPC function is effective.



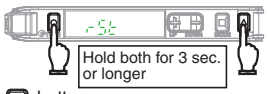



### (2) Reset Settings

- **Setting Reset**

Initializes all the settings by returning them to the factory defaults.

1. Hold [TUNE] button and then hold [L/D] button for 3 seconds or longer.




2. Select [rSt] in [UP/DOWN] and press [MODE] button.
3. Select [rSt no] in [UP/DOWN] and press [MODE] button.

### (3) Save or Read Settings

1. Hold [TUNE] button and then hold [L/D] button for 3 seconds or longer.

- **User Save Function**

Saves the current settings.

2. Select [SAvE] in [UP/DOWN] and press [MODE] button.
3. Select [SAvE YES] in [UP/DOWN] and press [MODE] button.

- **User Reset Function**

Reads out the saved settings.

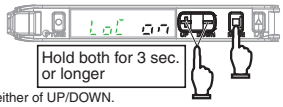
2. Select [rSt] in [UP/DOWN] and press [MODE] button.
3. Select [rSt USEr] in [UP/DOWN] and press [MODE] button.

### (4) Prevent Mistake-operation

- **Key Lock Function**

Disables all button operations. [ LoC on] is displayed when the button is pressed.

■ **Enable/Cancel (This procedure)**




* Press either of UP/DOWN.

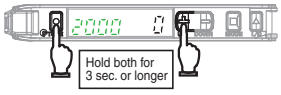
## Convenient Setting Features

### (5) Reset Incident Light Level to "0"

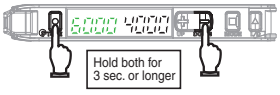
- **Zero Reset Function**

Changes the incident light level to "0".
The threshould level is also shifted accordingly.
The lower limit of the threshold is –1,999.

■ Enable



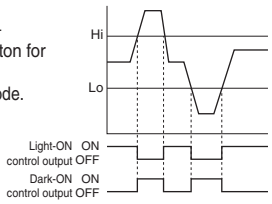

■ Cancel




### (6) Producing an Output When the Incident Level Is within an Area

- **Area Detection Mode**

1. Select [SET Mode] – [OUT1 Mode] – [Area Detection Mode]. Press MODE button for at least 3 seconds to leave the SET mode.
2. Press MODE button in [Detection Mode] to display OUT1 HIGH and OUT 1 LOW. "HIGH" and "LOW" will appear on the green digital display.
3. Press TUNE button for the high and low thresholds to execute smart tuning.



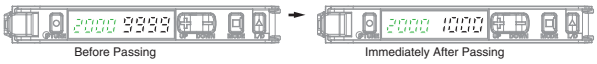

CHECK! Percentage Tuning: The thresholds are set as follows:
High: Incident level from step 3 + Incident level from step 3 × Percentage tuning level
Low: Incident level from step 3 – Incident level from step 3 × Percentage tuning level

### (7) Monitoring the Incident Level for Sensing Objects Passing at High Speed

- **Change Finder**

1. Select [SET Mode]→[Digital Display] to set [d SP CFdr].
2. Press MODE button for 3 seconds or longer to leave the SET mode.
3. Send a workpiece past the Fiber Unit.
4. The maximum and minimum incident levels will be displayed for 0.5 seconds when the workpiece passes.

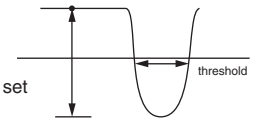
CHECK! The maximum value and minimum value are displayed with Light-ON and Dark-ON respectively.

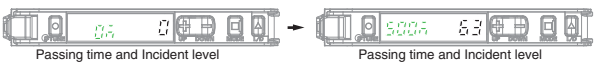



### (8) Determining If the Workpiece Can Be Detected

- **Solution Viewer**

1. Press MODE button and L/D button together for 3 seconds or longer to set [SoLU on].
   To clear the setting, press MODE button and L/D button together for 3 seconds or longer to set [SoLU oFF].
2. Send a workpiece past the Fiber Unit.
3. Displaying the Passing Time and Difference in Incident Levels.



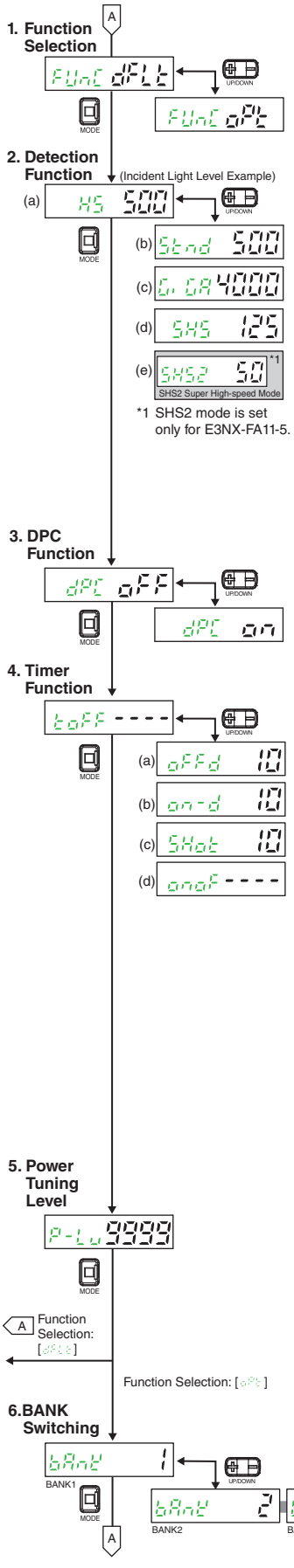

## Detailed Settings

Hold MODE button for 3 seconds or longer to enter SET mode.
SET mode provides the function settings described hereafter. The initial display shown after transition from one function to another represents the factory default.

CHECK! The OUT selection indicators shows items for output 1 or output 2 individually for each output.



| Function Setting | Description |
|---|---|




### Changing Functions to Set in SET mode

[oPLt]: Functions 1. to 5. can be set
[oPt]: Functions 1. to 16. can be set.

### Changing Light Level and Response Time

| Detection Function | Response Time | Light Level |
|---|---|---|
| (a) HS High-speed mode | 250 µs | 1(Standard) |
| (b) STND Standard mode | 1ms | 1 time |
| (c) GIGA Giga mode | 16ms | 8 times |
| (d) SHS Super High-speed mode*2 | 30µs | 0.1 times |
| (e) SHS2 Super High-speed Mode | 60µs | 0.1 times |

Smart Tuning is canceled if the detection mode is changed.

*2 The communication and mutual interference prevention functions are disabled when the detection mode is set to super-high-speed mode. The response time for models with 2 outputs is 32 µs

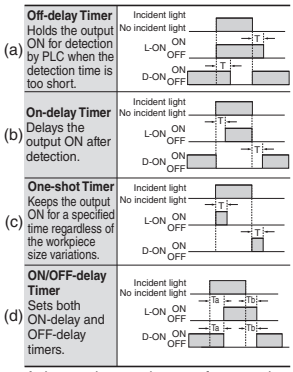
CHECK! The incident light level in SET mode is a reference value. It may be changed when switched to detection mode.

### Stable Detection Regardless of Incident Light Level Change

Refer to "Convenient Setting Features"

### Setting Output Timer

(Settings are displayed for both outputs for models with 2 outputs.)




A timer value can be set after pressing MODE button when a timer menu (other display than "----") is displayed.
Use UP/DOWN button to set the time.
(1 to 9999 ms in 1 ms steps; the initial value: 10 ms)

### Changing the Target Incident Light Level (Power Tuning Level)

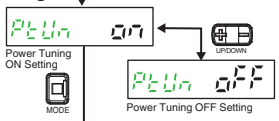
Use UP/DOWN button to set the power tuning level.
[100 to 9999 in 1 steps; the initial value: 9999]

Refer to "Convenient Setting Features"

### Saving Settings in Each Bank

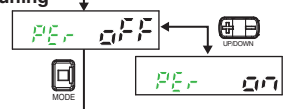
| Function Setting | Description |
|---|---|

**7. Power Tuning ON/OFF Setting**




**Setting ON or OFF Incident Level Adjustment when Tuning**

**8. Percentage Tuning**




**Detecting Transparent or Small Workpiece**

Press MODE button in [PEr on] menu, then use UP/DOWN button to set the percentage tuning level.
(–99% to 99% in 1% steps; the initial value: –10%)

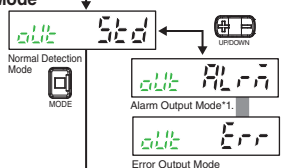
Refer to "Smart Tuning"

**9. Output 1 Mode**




**Changing the Output Mode for Output 1**

**10. Output 2 Mode**

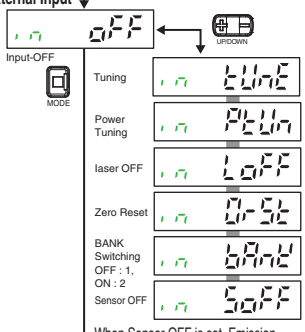



*1 When the alarm output mode is selected, NC output is fixed.

**Changing the Output Mode for Output 2**

Alarm Output Mode:
Press MODE button and then set the alarm output level with UP/DOWN button.
(0 to 100 P in 1-P increments, default: 50 P)
ON-delay of 300 ms is applied.
Error Output Mode:
An output is made when a DPC error, EEPROM error, or Load short circuit detection error occurs.

**11. External Input**




When Sensor OFF is set, Emission OFF and Output OFF are set by an external input signal. In addition, the setting is retained on power-up when Sensor OFF is set. Sensor OFF can be released from an externally input signal.

**Changing the Type of External Input**

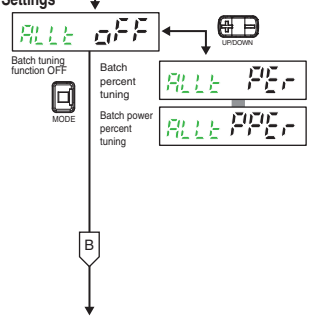
The closed-circuit input time for tuning is the same as the key input time.

| | First point | Second point |
|---|---|---|
| 2-point Tuning | Less than 3 seconds | Less than 3 seconds |
| Maximum Sensitivity Tuning | 3 seconds min. Less than 7 seconds | — |
| Full Auto Tuning | 7.0 s or longer | — |
| Position Tuning | Less than 3 seconds | 3 seconds or longer |
| Power/ percentage tuning | 25 ms min. | — |

| | Enable | Cancel |
|---|---|---|
| Zero reset | Less than 3 seconds | 3 seconds min. |

Enable/Cancel of Zero reset is the timing when input is turned off.

**12. Batch Tuning Settings**

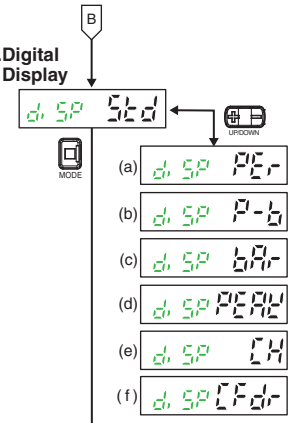



**Tuning Multiple Amplifiers at Once**

When a setting other than OFF is selected, the percentage tuning setting is displayed continuously.
When using the batch tuning function, set tuning for the external input (11).

| Function Setting | Description |
|---|---|

**13. Digital Display**




**Changing Digital Display in RUN Mode for Specific Purpose**

Checking a Margin Against Threshold

(a) Threshold / Light Level Ratio — The ratio of the incident light level to the threshold is displayed in white digital figures.

Setting Threshold using a Small or Fast Moving Workpiece

(b) Peak Light Level / Bottom Light Level — Holds and displays the minimum value of the peak of the light incident and the maximum value of the bottom of the light interruption.

Setting for Intuitive Analog Display

(c) Threshold 120% 100% 80% — Displays the current level in the 80 to 120% range against the threshold value (100%).

Adjusting Optical Axis

(d) Peak Light Level / Light Level — Holds the peak incident light level and displays it in green digital figures.

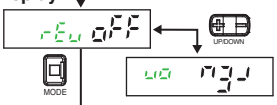
Checking the Channel No. in Group Mounting

(e) Ch. No. / Light Level — Checking the Channel No. in Group Mounting.

Checking the Light Level of Fast Moving Workpiece

(f) Threshold / Light level when the workpiece passes — Light level when the workpiece passes is displayed in white digital figures for 0.5 seconds.

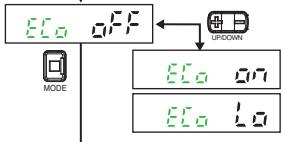
**14. Inverted Display**




**Mounting Amplifier in Inverted Direction**

Inverts the display upside down.
The digital display shows the threshold value in green, and light incident level in white.

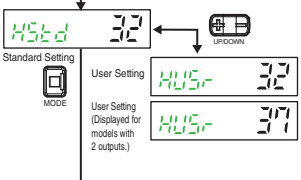
**15. Eco Function**




**Saving Power Consumption**

ECo on
Indicators (Green and White digital displays) turn OFF in approx. 10 seconds after a key operation.
ECo Lo
Indicators (Green and White digital displays) turn ON with low brightness in approx. 10 seconds after a key operation.

**16. Hysteresis width**




**Changing the Hysteresis Width**

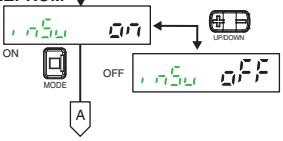
The hysteresis width is set to a default value. The hysteresis width is set so that the judgement output is stable near the threshold value.

CHECK! Be sure to check the stability of outputs as there is a possibility of chattering.

Press MODE button with [HYS-] displayed and then set the hysteresis width with UP/DOWN button.

(0 to 9999)

**17. Using the External Input to Write to EEPROM**




**Turning ON and OFF Writing to EEPROM**

The settings thathave been changed by an external input with [oFF] will not be overwritten to prevent EEPROM from reaching its lifespan (1,000,000 writings).

## Ratings and Specifications

| Item / Models | E3NW-ECT | E3NW-DS |
|---|---|---|
| Connectable Sensor Amplifier Units | N-Smart<br>Smart Fiber Amplifier Unit: E3NX-FA0/FA10/FA40<br>Smart Fiber Amplifier Unit (Infrared models): E3NX-FAH0<br>Color Fiber Amplifier Unit: E3NX-CA0 *1<br>Smart Laser Amplifier Unit: E3NC-LA0<br>Smart Laser Amplifier Unit (CMOS type): E3NC-SA0<br>Contact-Type Smart Amplifier Unit: E9NC-TA0 *2 | |
| Power supply voltage | 24VDC (20.4 to 26.4 VDC) | |
| Power and current consumption | 2.4 W max. (Not including the power supplied to Sensor.)<br>100 mA max. (Not including the current supplied to Sensor.) | 2 W max. (Not including the power supplied to Sensor.)<br>80 mA max. (Not including the current supplied to Sensor.) |
| Indicators | L/A IN Indicator (Green), L/A OUT Indicator (Green), PWR Indicator (Green), RUN Indicator (Green), ERROR Indicator (Red),and SS (Sensor Status) indicator (Green/Red) | RUN Indicator (Green), and SS (Sensor Status) indicator (Green/Red) |
| Vibration resistance (destruction) | 10 to 60 Hz with a 0.7-mm double amplitude, 60 to 150 Hz 50 m/s² for 1.5 hours each in X, Y, and Z directions | |
| Shock resistance (destruction) | Destruction: 150 m/s² for 3 times each in X, Y, and Z directions | |
| Ambient temperature range | Operating: 0 to 55°C, *3 Storage: –30 to 70°C (with no icing or condensation) | |
| Ambient humidity range | Operating and storage: 25% to 85% (with no condensation) | |
| Maximum connectable Sensors | 30 *4 | 10 |
| Maximum connectable Distributed Sensor units | 8 | — |
| Insulation resistance | 20 MΩ min. (at 500 VDC) | |
| Dielectric strength | 500 VAC 50/60Hz 1 min | |
| Mounting method | 35-mm DIN track-mounting | |
| Weight (packed state/unit only) | Approx. 185 g/Approx. 95 g | Approx. 160 g/Approx. 40 g |
| Materials | Polycarbonate | |
| Accessories | Power supply connector,Communications connector for E3NW-DS, DIN Track End Plates (2) and Instruction manual | Power supply/communications connector, DIN Track End Plates (2), Ferrite cores (2) and Instruction manual |

*1. The E3NX-CA0 is supported for firmware version 1.06 or higher (Sensor Communications Units manufactured in June 2016 or later).
*2. The E9NC-TA0 is supported for firmware version 1.03 or higher (Sensor Communications Units manufactured in July 2014 or later).
*3. Temperature Limitations Based on Number of Connected Amplifier Units:
Groups of 1 or 2 Amplifiers: 0 to 55°C, Groups of 3 to 10 Amplifiers: 0 to 50°C, Groups of 11 to 16 Amplifiers: 0 to 45°C, Groups of 17 to 30 Amplifiers: 0 to 40°C
*4. A maximum total of 30 Sensors can be connected to a Sensor Communications Unit and Distributed Sensor Units.

### Communications Specifications

| Item | Specifications |
|---|---|
| Protocol | EtherCAT |
| Modulation | Baseband |
| Baud rate | 100 Mbps |
| Physical layer | 100Base-TX (IEEE802.3u) |
| Topology | Daisy chain |
| Communications media | STP category 5 or higher |
| Communications distance | 100 m max. between nodes |
| Noise immunity | Compliant with IEC 61000-4-4, 1 kV min. |
| Node address setting method | Set the decimal rotary switches or software *1 |
| Node address range | 000 to 192 *2 |

*1. The software setting is used when the node address setting switches are set to 0.
*2. The range depend on the EtherCAT master that is used. Refer to the E3NW-ECT EtherCAT Sensor Communications Unit Operation Manual for details.

CC-Link-compatible products are also available. Refer to your OMRON website for details.

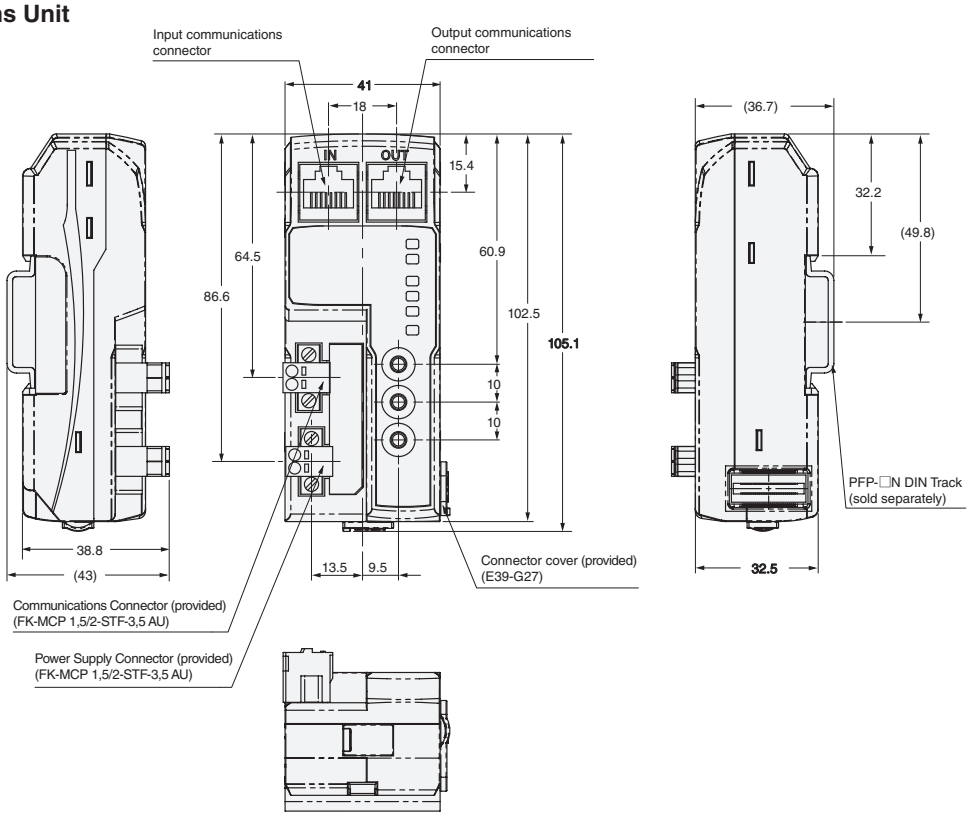
## Dimensions

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

### Sensor Communications Unit

85-A **E3NW-ECT**

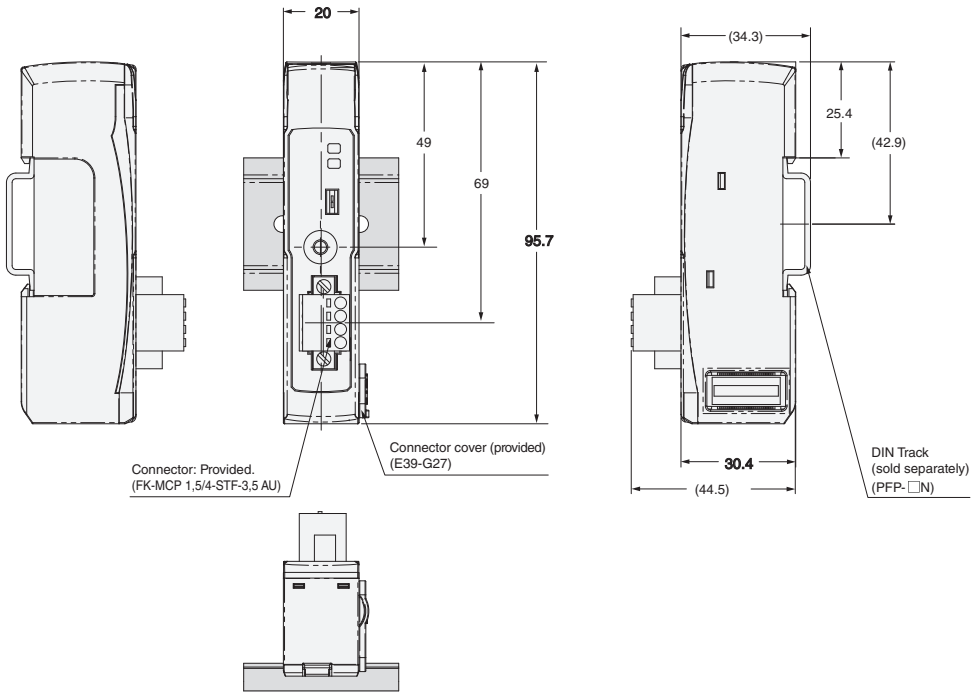





### Distributed Sensor Unit

85-B **E3NW-DS**





# E3X-ZV Fiber Amplifier Units and Related Products

## Fiber Amplifier Units E3X-ZV Series

| Type | Appearance | Connecting method | Models | | Ratings and Specifications | Dimensions |
|---|---|---|---|---|---|---|
| | | | NPN output | PNP output | | |
| Standard models |  | Pre-wired (2 m) | E3X-ZV11 2M | E3X-ZV41 2M | Page 88 | Page 89 89-A |
| |  | Wire-saving Connector | E3X-ZV6 | E3X-ZV8 | | Page 89 89-B |

# Accessories (sold separately)

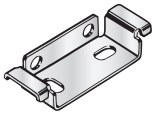
## Wire-saving connectors (Required for models for Wire-saving Connectors.)

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

| Type | Appearance | Cable length | Number of conductors | Models | Ratings and Specifications | Dimensions |
|---|---|---|---|---|---|---|
| Master Connector |  | 2m | 3 | E3X-CN11 | Page 94 | Page 94 94-A |
| Slave Connector |  | | 1 | E3X-CN12 | | Page 94 94-B |

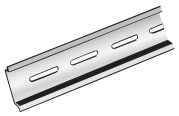
## Mounting Bracket

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

| Appearance | Model | Quantity | Dimensions |
|---|---|---|---|
|  | E39-L143 | 1 | Page 95 95-A |

## DIN Track

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

| Appearance | Type | Models | Quantity | Dimensions |
|---|---|---|---|---|
|  | Shallow type, total length: 1 m | PFP-100N | 1 | Page 95 95-B |
| | Shallow type, total length: 0.5 m | PFP-50N | | |
| | Deep type, total length: 1 m | PFP-100N2 | | Page 86 95-C |

## End Plate

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

| Appearance | Model | Quantity | Dimensions |
|---|---|---|---|
|  | PFP-M | 1 | Page 95 95-D |

## Ratings and Specifications

| Item | | Type | Standard models | |
|---|---|---|---|---|
| | | NPN output | E3X-ZV11 | E3X-ZV6 |
| | | PNP output | E3X-ZV41 | E3X-ZV8 |
| | | Connecting method | Pre-wired | Wire-saving Connector |
| Outputs | | | 1 output | |
| Light source (wavelength) | | | Red, 4-element LED (625 nm) | |
| Power supply voltage | | | 12 to 24 VDC ±10%, ripple (p-p) 10% max. | |
| Power consumption | | | Normal mode: 720 mW max.<br>(Power supply voltage 24 V:<br>Current consumption 30 mA max. /<br>Power supply voltage 12 V:<br>Current consumption 60 mA max.)<br>Eco function ON: 530 mW max.<br>(Power supply voltage 24 V:<br>Current consumption 22 mA max. /<br>Power supply voltage 12 V:<br>Current consumption 44 mA max.) | |
| Control output | | | Load power supply voltage: 26.4 VDC, open collector output type<br>(NPN or PNP output differs depending on the type.)<br>Load current: 100 mA max.<br>(Residual voltage: Load current less than 10 mA: 1 V max., load current 10 to 100 mA: 2 V max.) OFF current: 0.1 mA max. | |
| Indicators | | | 7-segment displays (Threshold Level display: green, Incident Light Level display: red)<br>Display direction: Switchable between normal and reversed.<br>Smart Tuning Indicator (green)<br>Standard models only: OUT indicator (orange)<br>2-channel models only: OUT1/2 indicator (orange), CH Indicator (green) | |
| Protection circuits | | | Power supply reverse polarity protection, output short-circuit protection and output reverse polarity protection | |
| Response time | | Super-highspeed mode (SHS) | Operate or reset: 50 µsµ | |
| | | High-speed mode (HS) | Operate or reset: 250 µs *1 | |
| | | Standard mode (Stnd) | Operate or reset: 1 ms *3 | |
| | | Giga-power mode (GIGA) | Operate or reset: 16 ms | |
| Sensitivity adjustment | | | Smart Tuning (2-point tuning, power tuning, percentage tuning (–99% to 99%), maximum sensitivity tuning, full auto tuning, position tuning) or manual adjustment | |
| Maximum connectable Units | | | 16 | |
| Mutual interference prevention function | | | Emission cycle setting switching type<br>(up to 4 units) | |
| Functions | | DPC (Dynamic Power Control) | Yes | |
| | | ATC (Active Threshold Control) | Yes | |
| | | Timer | Select from timer disabled, OFF-delay, ON-delay or one-shot timer: 1 to 9,999 ms | |
| | | Zero reset | Negative values can be displayed. (Threshold value is shifted.) | |
| | | Resetting settings | Select from initial reset (factory defaults) or user reset (saved settings). | |
| | | Eco mode | Select from OFF (digital display lit) and Eco ON (digital display not lit). | |
| | | Power tuning | Select from ON or OFF. | |
| Ambient illumination (Receiver side) | | | Incandescent lamp: 20,000 lx max., Sunlight: 30,000 lx max. | |
| Ambient temperature range | | | Operating: -25°C to 55°C<br>Storage: -30°C 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 | |
| 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/s$^2$ for 3 times each in X, Y, and Z directions | |
| Weight (packed state/Sensor only) | | | Approx. 95 g/<br>approx. 65 g | Approx. 45 g/<br>approx. 20 g |
| Materials | | Case | Polycarbonate (PC). | |
| | | Cover | Polycarbonate (PC) | |
| | | Cable | PVC | |
| MTTFd (Year) | | | 298 | |
| Accessories | | | Instruction manual, Compliance sheet | |

*1.Mutual interference prevention function in the Response Time Priority Mode: 2 units: 350 µs; 3 units: 400 µs / In the Unit Number Priority Mode: 4 units: 700 µs
*2.Mutual interference prevention function in the Unit Number Priority Mode: 4 units: 1.6 ms

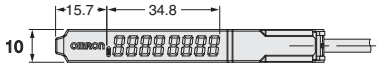
# Dimensions

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

## Pre-wired Amplifier Units

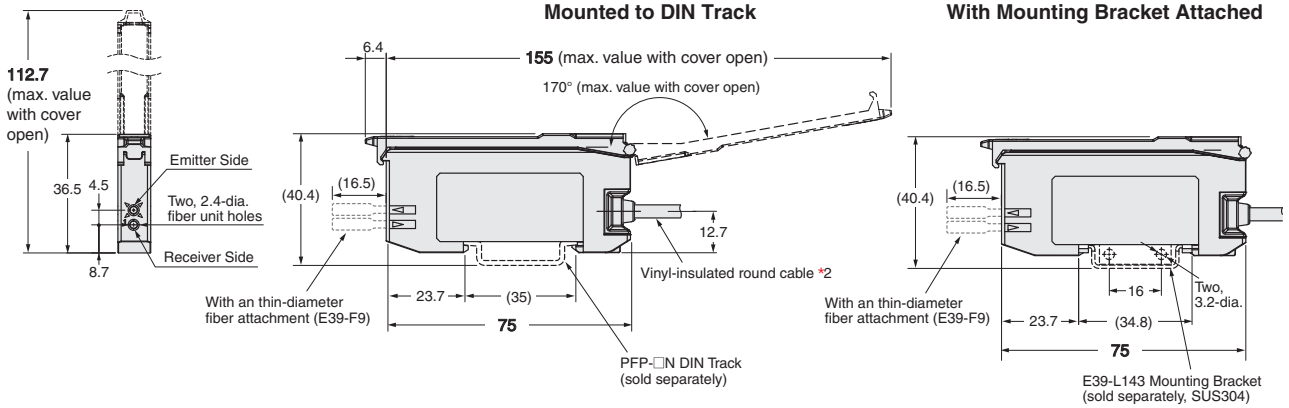
89-A **E3X-ZV11**
**E3X-ZV41**



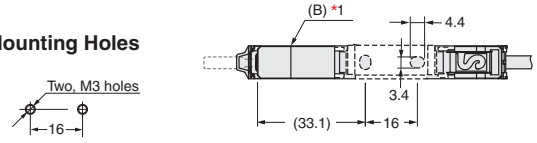



*1. The Mounting Bracket can also be used on side B.
*2. Cable Specifications

| Outer diameter | No. of conductors | Others |
|---|---|---|
| 4.0 dia. | 3 | Conductor cross-section: 0.12 mm² |
| | | Insulator dia.: 0.9 mm |
| | | Standard cable length: 2 m |
| | | Minimum bending radius: 12 mm (Reference value) |



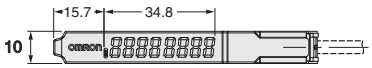

### Mounting Holes

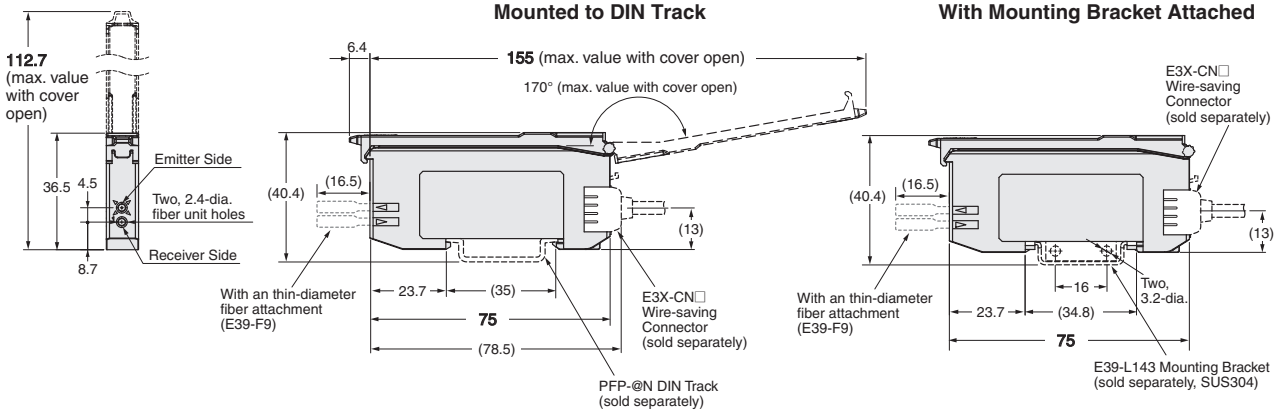



## Wire-saving Connectors Units

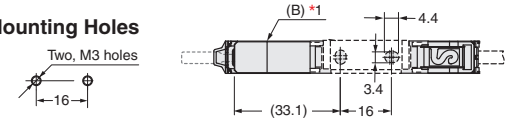
89-B **E3X-ZV6**
**E3X-ZV8**





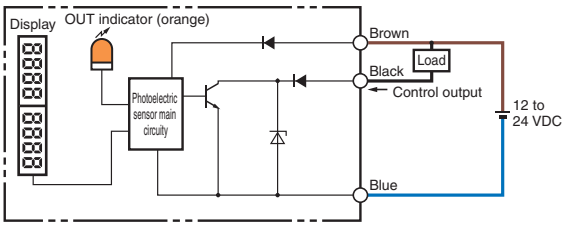

### Mounting Holes



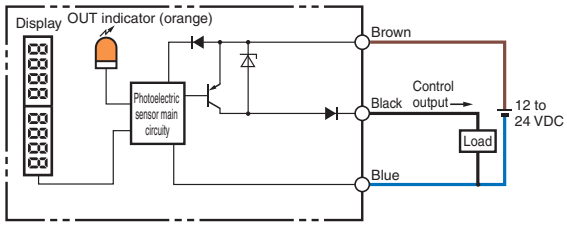

*1. The Mounting Bracket can also be used on side B.

## I/O Circuit Diagrams

### NPN Output

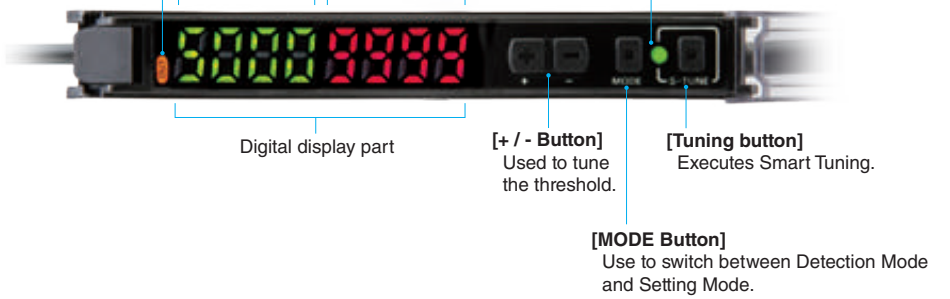
| Model | Operation mode | Timing chart | Output circuit |
|---|---|---|---|
| E3X-ZV11<br>E3X-ZV6 | Light-ON | Incident light / No incident light<br>OUT indicator (orange): Lit / Not lit<br>Output transistor: ON / OFF<br>Load (e.g., relay): Operate / Reset<br>(Between brown and black leads) |  |
| | Dark-ON | Incident light / No incident light<br>OUT indicator (orange): Lit / Not lit<br>Output transistor: ON / OFF<br>Load (e.g., relay): Operate / Reset<br>(Between brown and black leads) | |

### PNP Output

| Model | Operation mode | Timing chart | Output circuit |
|---|---|---|---|
| E3X-ZV41<br>E3X-ZV8 | Light-ON | Incident light / No incident light<br>OUT indicator (orange): Lit / Not lit<br>Output transistor: ON / OFF<br>Load (e.g., relay): Operate / Reset<br>(Between blue and black leads) |  |
| | Dark-ON | Incident light / No incident light<br>OUT indicator (orange): Lit / Not lit<br>Output transistor: ON / OFF<br>Load (e.g., relay): Operate / Reset<br>(Between blue and black leads) | |

## Nomenclature

E3X-ZV11
E3X-ZV41
E3X-ZV6
E3X-ZV8



# Operating Procedures

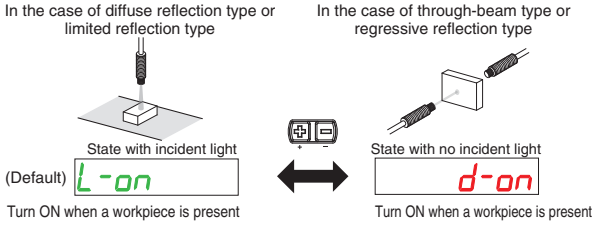
## Basic Settings

### Output switching

#### Selection of Light ON (L-ON) or Dark ON (D-ON)

**• Output switching**

1. Hold the MODE button for 3 seconds or longer to enter the SET Mode.
2. Press the + / − button to select the following item.



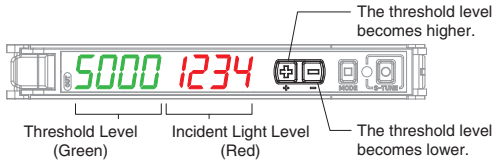

3. Press the MODE button for 3 seconds or longer to return to the Detection Mode.

#### Adjustment of Threshold Level

**• Minute Adjustment of Threshold Level**

Set the threshold level in the Detection Mode.
Press the + / − button to adjust the threshold level.

CHECK! Hold the key for high-speed level adjustment.




### Initialization

#### Initializing Settings

**• Setting Reset**

Initialize all settings to the factory-set defaults.

1. Hold the MODE button for 3 seconds or longer to enter the SET Mode.
2. Press the MODE button twice. rSt no
3. Press the + / − button once. rSt YES Initialization selected
4. Press the MODE button once. Init oY Initialization completed

CHECK! Settings can also be initialized by pressing the MODE button for 7 seconds or longer in the Detection Mode.
Contents saved by User Save Function are not cleared by the setting initialization.

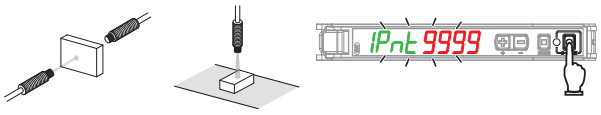
### Basic Smart Tuning Method

Adjust the received light intensity and the threshold to appropriate values through Smart Tuning.

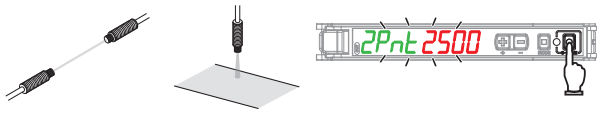
#### Most Basic Setting Method

**• 2-point Tuning**

1. Press the S-TUNE button with a workpiece in the detection area.




2. Press the S-TUNE button again without a workpiece in the detection area.




Incident light level setting: The larger incident level of the Step 1 and 2 values is adjusted to the power tuning level.
Threshold setting: Set to the middle between the Step 1 and 2 incident light levels.

CHECK! Step 1 and Step 2 can be reversed.

#### Making Received Light Intensity Uniform

**• Power Tuning**

1. Hold the S-TUNE and MODE buttons for 1 second or longer and release the button when [ PtUn ] appears.




Incident light level setting: The Step 1 incident level is adjusted to the power tuning level.
Threshold setting: Not changed. If the value is low, it will be set to the minimum value in which an output is turned ON / OFF correctly.

CHECK! Perform the procedure with a workpiece in the area for reflective model setting.
If the setting is made after position tuning, set both the through-beam model and reflective model with a workpiece.
When power tuning ON / OFF setting is OFF, power tuning cannot be performed.

#### Setting a Threshold with Received Light Intensity Ratio

**• Percentage Tuning**

1. Turn ON Percentage Tuning in SET mode. Refer to "Detailed Settings".
2. Hold the S-TUNE button for 1 second or longer without a workpiece in the area.




Incident light level setting: The Step 2 incident light level is adjusted to the power tuning level.
Threshold setting: Set to [Set received light intensity x Percentage tuning level].

CHECK! No Smart Tuning other than Power Tuning can be used if Percentage Tuning is set.
Set the Percentage tuning level to be below 0 in the case of a through-beam type (Dark ON: D-ON), or to be above 0 in the case of a reflective type (Light ON: L-ON).

# Operating Procedures

## Convenient Setting Features

### Various Smart Tuning Methods

#### When Received Light Intensity Decreases due to Dust or Dirt

**• Maximum Sensitivity Tuning**

Long-press the S-TUNE button for 3 seconds or longer in the presence of a workpiece in the case of through-beam type or without the presence of a workpiece in the case of reflective type, and then take your finger off the button when [ FULL ] is displayed on the green digital display part.

The green digital display changes [ IPnt ] → [ FULL ].

Incident light level setting: The incident level when the S-TUNE button pressed is adjusted to "0".
Threshold setting: The value is set to approx.
7% of the incident light level when the S-TUNE button pressed.
If the incident light level when the S-TUNE button pressed is smaller during long distance detection, the minimum value by which an output is correctly turned ON will be set.

#### Making Adjustment with Passing Workpiece

**• Full Auto Tuning**

Hold the S-TUNE button without the presence of a workpiece, and pass the workpiece through while [ IPnt ] → [ FULL ] → [ AUto ] is displayed in green digital.
(Keep holding the S-TUNE button while the workpiece passes through, and hold 7 seconds or longer until [ AUto ] is displayed in green digital. After the workpiece passes through, release your finger from the S-TUNE button.)

Incident light level setting: Adjust the max. incident light level while pressing the S-TUNE button as the power tuning level.
Threshold setting: Set to the middle between max. and min. incident light levels while pressing the S-TUNE button.

#### Determine Workpiece Position

**• Position Tuning**

1. Press the S-TUNE button without a workpiece in the area.
   The green digital display changes [ IPnt ].
2. Place the workpiece at the desired position and hold the S-TUNE button for 3 seconds or longer.
   The green digital display changes [ 2Pnt ] → [ PoS ].

Incident light level setting: The Step 2 incident level is adjusted to half the power tuning level.
Threshold setting: Set to the same value as the Step 2 incident level.

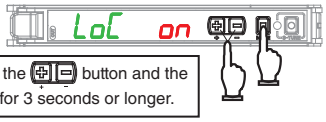
### Convenient Settings

#### Preventing Malfunction

**• Key Lock Function**

Enable / Cancel (Same procedure)

Disables all button operations.




Hold both the + - button and the MODE button for 3 seconds or longer.

* Press either of the + or - button.

#### Returning Received Light Intensity Display to "0"

**• Zero Reset Function**

Enable




Hold both the + button and the S-TUNE button for 3 seconds or longer.

CHECK! The zero reset function is canceled when either of the DPC function / differential function / Smart Tuning is performed.
When DPC (ATC) function or the differential output modes are performed, the zero reset cannot be performed.

Cancel




Hold both the - button and the S-TUNE button for 3 seconds or longer.

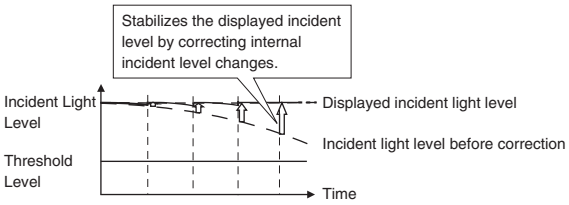
CHECK! When released, [ 0r5t oFF ] is displayed.
The threshold also changes accordingly. The lower threshold limit is -1999.

#### For Stable Detection Regardless of Received Light Intensity Changed due to Dust or Dirt

**• DPC Function (Dynamic Power Control)**

Use this function with through-beam type or regressive reflection type.

Turn on DPC function in SET Mode ▶ Smart Tuning in Detection Mode




CHECK! Set output switching to D-ON (Dark ON). When power tuning ON / OFF setting is OFF, Smart Tuning is in error or maximum sensitivity tuning is executed, the DPC function is disabled.
DPC function does not work depending on the setting.
When the Smart Tuning indicator is lit up and the DPC function is set to ON, the DPC function works.

CHECK! If the threshold level must be changed according to the change in the received light intensity,
the ATC Function (Active Threshold Control) can be used instead. (Make the ratio of the received light intensity to the threshold level constant.)
The ATC function is enabled when the DPC function is set to ATC in the SET Mode and the Smart Tuning is executed in the Detection Mode. Other restrictions conform to those for the DPC function.

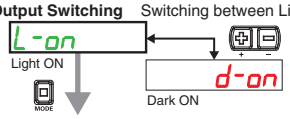
## Detailed Settings

Hold MODE button for 3 seconds or longer to enter SET mode. SET mode provides the following function settings. Contents on the leftmost side of each item (thick-frame parts) are factory defaults.

A

Press and hold the MODE button for 3 seconds or longer in the setting mode to switch to the detection mode.

**1. Output Switching** Switching between Light ON (L-ON) and Dark ON (D-ON)




**2. Detection Function** Changing Light Level and Response Time

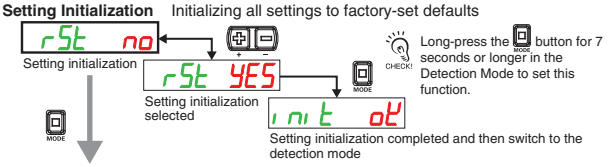
(Incident Light Level Example)




| Detection function | HS | STND | GIGA | SHS |
|---|---|---|---|---|
| Response time | 250µs | 1ms | 16ms | 50µs |
| Light quantity | 1 (reference) | x1 | x8 | x0.24 |

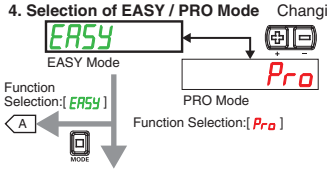
CHECK! The response time differs when the mutual interference prevention function is enabled. Please check 10. Mutual Interference Prevention Function.

**3. Setting Initialization** Initializing all settings to factory-set defaults



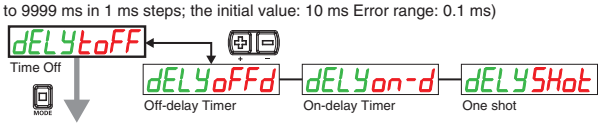

CHECK! Long-press the MODE button for 7 seconds or longer in the Detection Mode to set this function.

**4. Selection of EASY / PRO Mode** Changing settings of 5 to 16

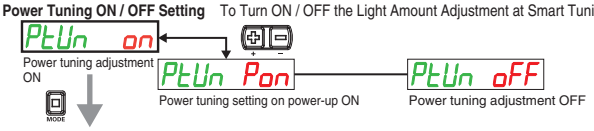



**5. Delay Timer Function** Setting Output Timer

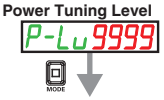
After pressing the MODE button, Use the +/− button to set the time.
(1 to 9999 ms in 1 ms steps; the initial value: 10 ms Error range: 0.2 ms)
For ZV6M / ZV8M: (0.1 to 0.5ms in 0.1 ms steps; 0.5 to 5ms in 0.5 ms steps;
5 to 9999 ms in 1 ms steps; the initial value: 10 ms Error range: 0.1 ms)




**6. Power Tuning ON / OFF Setting** To Turn ON / OFF the Light Amount Adjustment at Smart Tuning

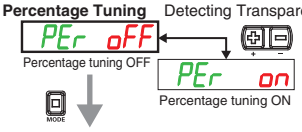



**7. Power Tuning Level** Changing the Target Incident Light Level (Power Tuning Level)



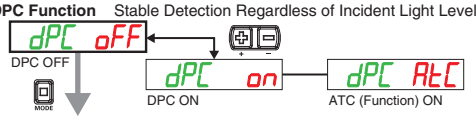

Use the +/− button to set the power tuning level.
[100 to 9999 in 1 steps; the initial value: 9999]

**8. Percentage Tuning** Detecting Transparent or Microscopic object

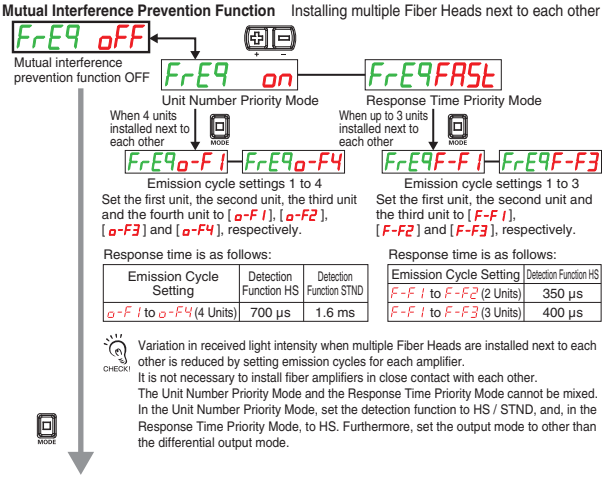



Press the MODE button in [ PEr on ] menu, then use the +/− button to set the percentage tuning level.
(-99% to 99% in 1% steps; the initial value: -6%)

**9. DPC Function** Stable Detection Regardless of Incident Light Level Change




**10. Mutual Interference Prevention Function** Installing multiple Fiber Heads next to each other




Emission cycle settings 1 to 4
Set the first unit, the second unit, the third unit and the fourth unit to [ o-F1 ], [ o-F2 ], [ o-F3 ] and [ o-F4 ], respectively.

Response time is as follows:

| Emission Cycle Setting | Detection Function HS | Detection Function STND |
|---|---|---|
| o-F1 to o-F4 (4 Units) | 700 µs | 1.6 ms |

Emission cycle settings 1 to 3
Set the first unit, the second unit and the third unit to [ F-F1 ], [ F-F2 ] and [ F-F3 ], respectively.

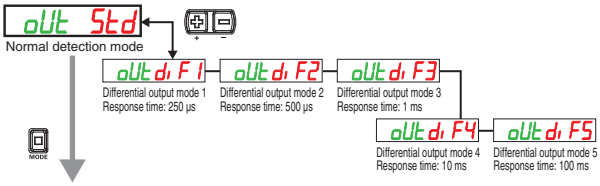
Response time is as follows:

| Emission Cycle Setting | Detection Function HS |
|---|---|
| F-F1 to F-F2 (2 Units) | 350 µs |
| F-F1 to F-F3 (3 Units) | 400 µs |

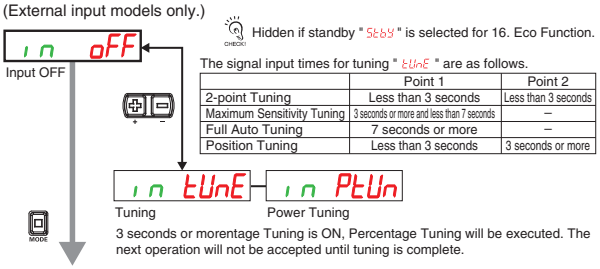
CHECK! Variation in received light intensity when multiple Fiber Heads are installed next to each other is reduced by setting emission cycles for each amplifier.
It is not necessary to install fiber amplifiers in close contact with each other.
The Unit Number Priority Mode and the Response Time Priority Mode cannot be mixed.
In the Unit Number Priority Mode, set the detection function to HS / STND, and, in the Response Time Priority Mode, to HS. Furthermore, set the output mode to other than the differential output mode.

**11. Output Mode** Changing Output Mode

The differential output modes 1 to 5 is turned on if the difference when compared with th received light intensity before the response time exceeds the threshold level. The differential output modes can be set by setting the detection function to HS. Also set DPC (ATC) function setting to OFF.




**12. External input** Changing the type of external input
(External input models only.)




CHECK! Hidden if standby " Stby " is selected for 16. Eco Function.

The signal input times for tuning " tUnE " are as follows.

| | Point 1 | Point 2 |
|---|---|---|
| 2-point Tuning | Less than 3 seconds | Less than 3 seconds |
| Maximum Sensitivity Tuning | 3 seconds or more and less than 7 seconds | – |
| Full Auto Tuning | 7 seconds or more | – |
| Position Tuning | Less than 3 seconds | 3 seconds or more |

3 seconds or morentage Tuning is ON, Percentage Tuning will be executed. The next operation will not be accepted until tuning is complete.

**13. Emission Level Adjustment Function** Increasing / decreasing emission power



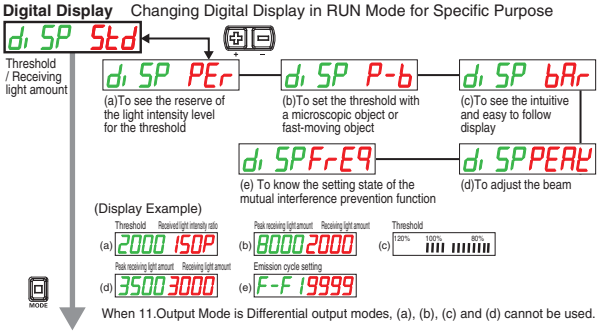

(The red digital display shows the incident light level.)

The emission level can be increased / decreased with the +/− button.
(L100 to 1. Initial value: L100)

CHECK! The emission level is updated when Smart Tuning is executed. The emission level can also be adjusted by increasing / decreasing it after Smart Tuning using the emission level adjustment function. However, since the light receiving sensitivity cannot be changed, the resultsof Smart Tuning cannot be reproduced. Depending on your environment, it may not work properly when the emission level is set low.

The emission level alone can be set by long-pressing both the MODE button and the S-TUNE button for 3 seconds or longer in the Detection Mode.

**14. Digital Display** Changing Digital Display in RUN Mode for Specific Purpose

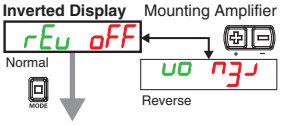



(Display Example)



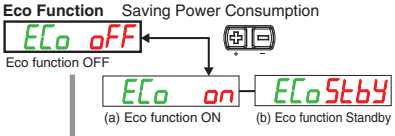

When 11.Output Mode is Differential output modes, (a), (b), (c) and (d) cannot be used.

**15. Inverted Display** Mounting Amplifier in Inverted Direction The display reverses.




Threshold and light intensity are displayed on green digital and red digital respectively.

**16. Eco Function** Saving Power Consumption

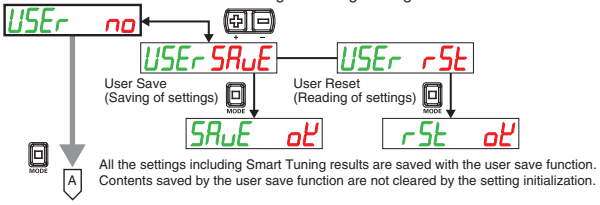



(a) The indicators (green digital and red digital) turn OFF. They turn ON for approx. 10 seconds and then turn OFF by button operation.

(b) The following state is entered during external signal input.
- Display goes off (the segment of the fourth digit of the threshold value lights in sequence)
- Emission stops
- Output turns OFF (for both L-ON and D-ON)
- " Stby " lights up for approx. 10 seconds by button operation

CHECK! This can be selected when 12. External Input is " oFF ".

**17. User Save / Reset Functions** Saving / Reading Settings




All the settings including Smart Tuning results are saved with the user save function. Contents saved by the user save function are not cleared by the setting initialization.

## Ratings and Specifications

### Wire-saving Connectors

| Item | Type | Master Connector | | Slave Connector | |
|---|---|---|---|---|---|
| | Models | E3X-CN21 | E3X-CN11 | E3X-CN22 | E3X-CN12 |
| Number of conductors | | 4 | 3 | 2 | 1 |
| Diameter of cable | | 4 dia. | | | 2.6 dia. |
| Rated current | | 2.5A | | | |
| Rated voltage | | 50VDC | | | |
| Contact resistance | | 20 mΩ max. (20 mVDC max., 100 mA max.) (The above figure is for connection to the Amplifier Unit and the adjacent Connector. It does not include the conductor resistance of the cable.) | | | |
| Number of insertions | | Destruction: 50 times (for connection to the Amplifier Unit and the adjacent Connector) | | | |
| Material | Housing | Polybutylene terephthalate (PBT) | | | |
| | Contact | Phosphor bronze/gold-plated nickel | | | |
| Weight (packed state) | | Approx. 55 g | | | Approx. 25 g |

### Sensor I/O Connectors

| Item | Models | XS3F-M42□-40□-A |
|---|---|---|
| Number of conductors | | 4 |
| Diameter of cable | | 4 dia. |
| Rated current | | 1A |
| Rated voltage | | 125VDC |
| Contact resistance | | 40 mΩ max. (20 mVDC max., 100 mA max.) |
| Number of insertions | | Destruction: 200 times |

## Dimensions

(Unit: mm)

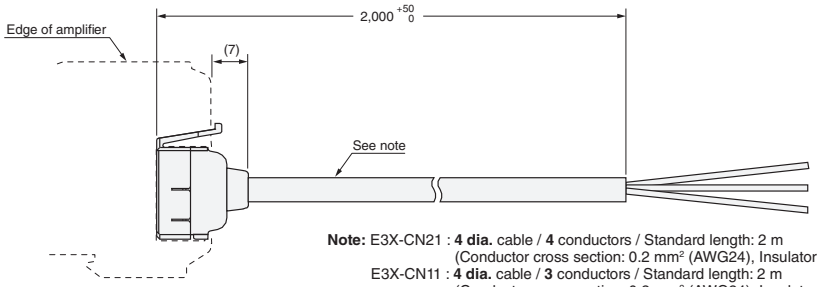
Tolerance class IT16 applies to demmensions in this date sheet unless otherwise specified.

### Wire-saving Connectors (for Models with Wire-saving Connectors)

#### Master Connector

94-A E3X-CN21
E3X-CN11



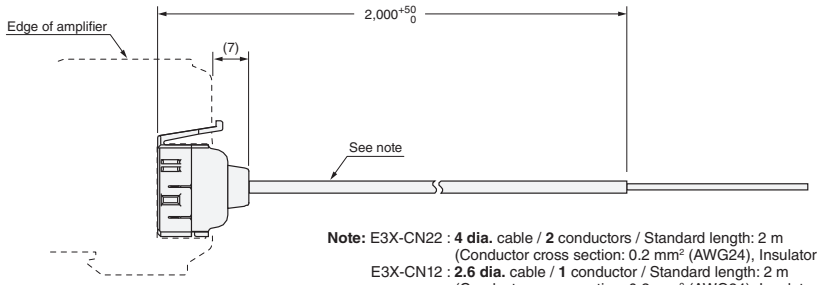



**Note:** E3X-CN21 : **4 dia.** cable / **4** conductors / Standard length: 2 m
(Conductor cross section: 0.2 mm² (AWG24), Insulator diameter: 1.1 mm)
E3X-CN11 : **4 dia.** cable / **3** conductors / Standard length: 2 m
(Conductor cross section: 0.2 mm² (AWG24), Insulator diameter: 1.1 mm)

#### Slave Connector

94-B E3X-CN22
E3X-CN12

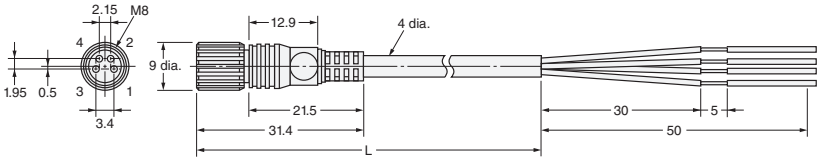




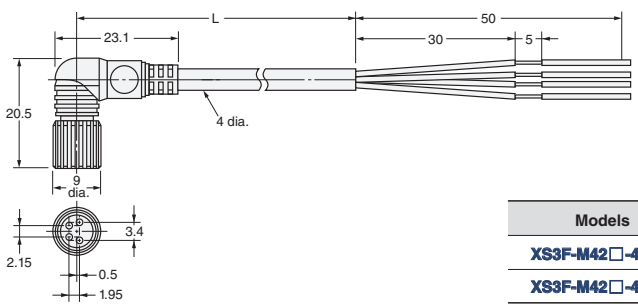

**Note:** E3X-CN22 : **4 dia.** cable / **2** conductors / Standard length: 2 m
(Conductor cross section: 0.2 mm² (AWG24), Insulator diameter: 1.1 mm)
E3X-CN12 : **2.6 dia.** cable / **1** conductor / Standard length: 2 m
(Conductor cross section: 0.2 mm² (AWG24), Insulator diameter: 1.1 mm)

### Sensor I/O Connectors (for Models with M8 Connectors)

94-C XS3F-M421-402-A
XS3F-M421-405-A



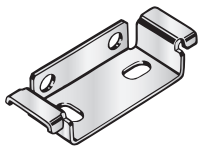

94-D XS3F-M422-402-A
XS3F-M422-405-A

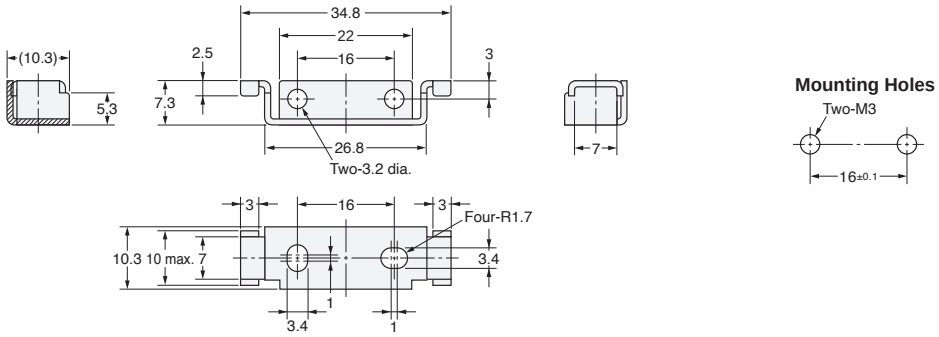



| Models | Cable length L (m) |
|---|---|
| XS3F-M42□-402-A | 2 |
| XS3F-M42□-405-A | 5 |

## Mounting Brackets

95-A **E39-L143**



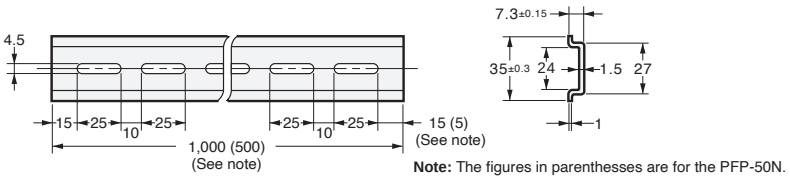



Material: Stainless steel (SUS304)

### DIN track

95-B **PFP-100N**
**PFP-50N**

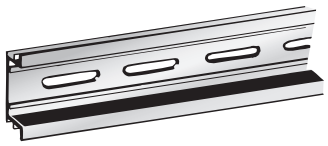


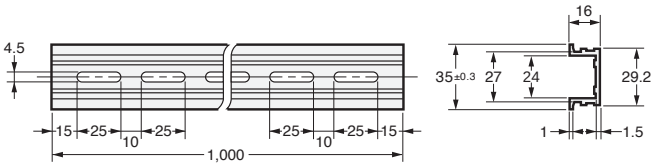



**Note:** The figures in parentheses are for the PFP-50N.

Material: Aluminum

95-C **PFP-100N2**

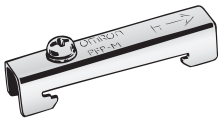


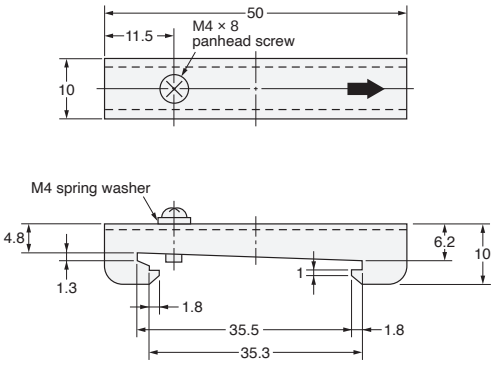



Material: Aluminum

### End Plate

95-D **PFP-M**



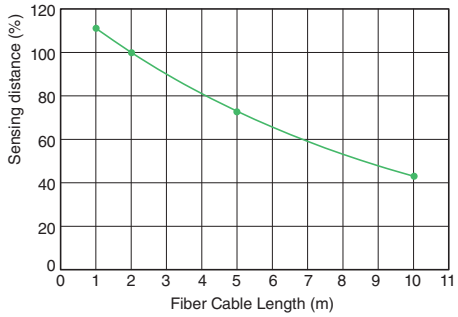



Material: Iron, zinc plating

# Reference Information for Fiber Units

## Influence of Fiber Cable Length

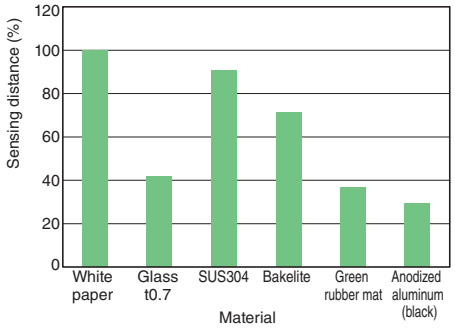
The sensing distance listed in the Fiber Units specifications are based on the fiber cable lengths found in the suffix of the model number.
The sensing distance will change if the fiber cable is cut or extended.
The following graph shows the percentage change of the various fiber cable length, where 100% is the sensing distance for a fiber cable with a length of 2 m.
Use this as a guideline for installation distances.
Keep in mind that extending the cable with a fiber connector will result in even shorter sensing distances than the value given in the graph.




* The 100% value is for a fiber cable with a length of 2 m (same for Through-beam and Reflective Models).

## Reflective Models: Sensing Distance Ratios by Workpiece Materials

The following graph shows the percentage change of the various workpieces, where 100% is the sensing distance for white paper, the standard sensing object.
Refer to the value of the material that looks like your workpiece.



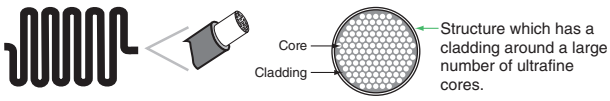

* White paper is 100%.

## Types of Fiber Cables

This section describes the features of different types of fiber cables.
(This is given in the Fiber Unit specifications as either Flexible or Bend-resistant for the cable bending radius, and Coaxial for the appearance.
If no difinition is given, a standard cable is used.)

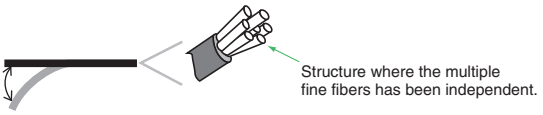
### ● Flexible Fibers

The flexible fiber has a small bending radius for easy routing without easily breaking.
It is easy to use because the cable can be bent without significantly reducing light intensity.



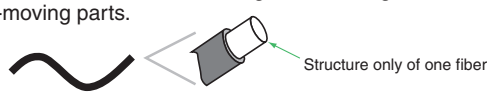

### ● Break-resistant Fibers

This fiber is resistant to repeated bends for use on moving parts.



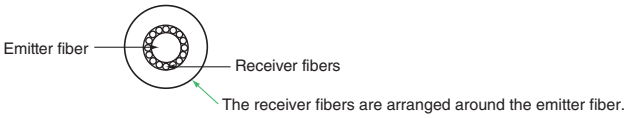

### ● Standard Fibers

This fiber have a large bending radius compared with bend-resistant or flexible fiber.
Use this fiber where the bending radius is large, or on non-moving parts.

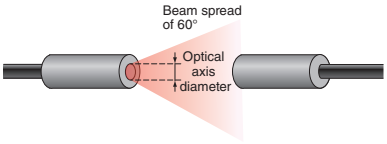
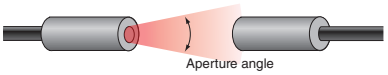



### ● Coaxial Reflective Fibers

These fibers are suitable for sensing small objects at close range.



## Q&A

| Category | Question | Answer |
|---|---|---|
| Fiber Units | How do I interpret the optical axis diameter in the Fiber Unit specifications? | The optical axis diameter is the beam size that the Through-beam Fiber Unit uses for detection.<br>If you are detecting objects larger than the optical axis diameter, you can expect stable detection performance because the object will block all of the beams of light that are used for detection.<br>The incident level may fluctuate, however, if the workpiece passes the beam at high speed.<br>In this case, it is best to select a Fiber Unit with a smaller optical axis diameter, or change the response time of the Fiber Amplifier Unit to High-speed mode or to Super-high-speed mode setting.<br> |
| | Are there any differences between the Fiber Units that are used for emitter and receiver? | With Through-beam Fiber Units, there is no difference between emitter fibers and receiver fibers.<br>With Reflective Fiber Units, the emitter fibers and receiver fibers are different on Coaxial Reflective Models.<br>Emitter fiber cables have identification marks. Refer to the individual dimensions diagrams of Fiber Units for details. |
| | What size must the hole be to mount a Threaded or Cylindrical Fiber Unit? | Refer to the recommended mounting hole dimensions given on pages 58 to 61. |
| | Are Fiber Cables available in different lengths? | Some models are available with either 5-m or 10-m cable.<br>Ask your OMRON representative for details. |
| | What is the aperture angle? | The aperture angle is the angle at which the emitter beam spreads out.<br> |
| | Are these Fiber Units CE certified? | Fiber Units do not have any electrical components and therefore are exempt from CE certification. |
| | Can these Fiber Units be used in explosionproof areas? | Explosion-proof certification has not been obtained.<br>Depending on the country in which the Fiber Units are used and how they are used, certification may be required.<br>Check the relevant laws and regulations before use. |
| | Built-in Lens<br>What the Fiber Units with built-in lenses? | These highly recommended Fiber Units have built-in lenses that achieve stable detection with high-power beams. |
| Fiber Amplifier Units | Can the Fiber Amplifier Unit be operated from a mobile console? | Mobile consoles cannot be used with either the E3NX-FA Series or the E3X-ZV Series. |
| | Can a Sensor Communications Unit be used? | If you use E3NX-FA0 Amplifier Units, you can use the E3NW-ECT(EtherCAT), E3NW-CRT(CompoNet) or E3NW-CCL (CC-Link). |

For common precautions, refer to www.ia.omron.com

## Fiber Amplifier Unit

### ⚠ 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 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.

(1) 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

(2) Do not use the product in environments subject to flammable or explosive gases.

(3) Do not use the product in any atmosphere or environment that exceeds the ratings.

(4) To secure the safety of operation and maintenance, do not install the product close to high-voltage devices and power devices.

(5) 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.

(6) Do not apply load exceeding the ratings. Otherwise, damage or fire may result.

(7) Do not short the load. Otherwise, damage or fire may result.

(8) Connect the load correctly.

(9) Do not miswire such as the polarity of the power supply.

(10) To use this device as connecting with each other, be sure to connect with the same power supply and turn ON the power simultaneously. Using a separate power supply will influence the functions when connecting the devices to use them.

(11) Do not use the product if the case is damaged.

(12) 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.

(13) When setting the Sensor, be sure to check safety, such as by stopping the equipment.

(14) Be sure to turn off the power supply before connecting or disconnecting wires.

(15) Do not attempt to disassemble, repair, or modify the product Unit in any way.

(16) When disposing of the product, treat it as industrial waste.

(17) Do not use the Sensor in water, rain, or outdoors.

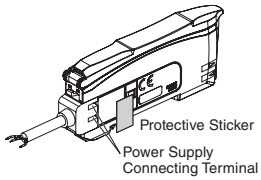
### Precautions for Correct Use

(1) Be sure to mount the unit to the DIN track until it clicks.

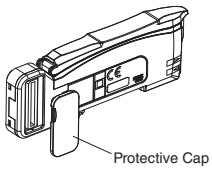
(2) When using Amplifier Units with Wire-saving Connectors, attach the protective stickers (provided with E3X-CN-series Connectors) on the unused power pins to prevent electrical shock and short circuiting. When using Amplifier Units with Connectors for Communications Units, attach the protective caps (provided with Sensor Communications Unit).

(3) <E3NX-FA series>

**Amplifier Unit with Wire-saving Connector**




**Amplifier Unit with Connector for Communications Unit**




The length for the cable extension must be 30 m or less (or less than 10 m for S-mark certified models).
Be sure to use a cable of at least 0.3 $mm^2$ for extension.
The power voltage must be 24 to 30 V when connecting amplifier units with extension cable and wire-saving connector.
<E3X-ZV series>
The length for the cable extension must be 30 m or less.
Be sure to use a cable of at least 0.3 $mm^2$ for extension.

(4) Do not apply the forces on the cord exceeding the following limits: Pull: 40N; torque: 0.1N·m; pressure: 20N; bending: 29.4N

(5) Do not apply excessive force such as tension, compression or torsion to the Amplifier Unit with the Fiber Unit fixed to the Amplifier Unit.

(6) Always keep the protective cover in place when using the Amplifier Unit. Not doing so may cause malfunction.

(7) 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.

(8) The product is ready to operate 250 ms after the power supply is turned ON.

(9) The Mobile Console E3X-MC11, E3X-MC11-SV2 and E3X-MC11-S cannot be connected.

(10) Mutual interference prevention on the E3NX-FA Series does not function among the E3X-HD, E3X-DA-S, E3X-DA-N, E3X-SD, or E3X-NA Fiber Amplifier Units.
The mutual interference prevention function on the E3X-ZV/MZV Series works only between the E3X-ZV/MZV Series.
Mutual interference prevention on the E3X-HD Series does function among the E3X-DA-S and E3X-MDA Fiber Amplifier Units.

(11) 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.

(12) The E3NW-ECT Sensor Communications Unit can be used with the E3NX-FA0, but the E3X-DRT21-S, E3X-CRT, and E3X-ECT Sensor Communications Units cannot be used.
The E3X-ZV/MZV Series cannot be used with Sensor Communications Units.

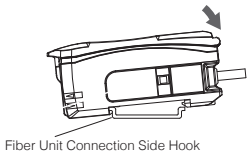
(13) If you notice an abnormal condition such as a strange odor, extreme heating of the unit, or smoke immediately stop using the product, turn off the power, and consult your dealer.

(14) Do not use thinner, benzine, acetone, and lamp oil for cleaning.

## Mounting the Fiber Amplifier Units

### ■ Mounting on DIN Track

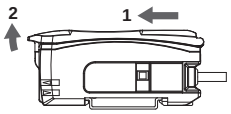
1. Let the hook on the Amplifier Unit's Fiber Unit connection side catch the track and push the unit until it clicks.




### ■ Removing from DIN Track

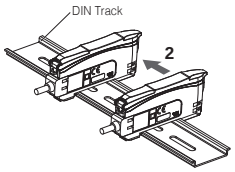
1. Push the unit in the direction 1.
2. Lift it up in the direction 2.

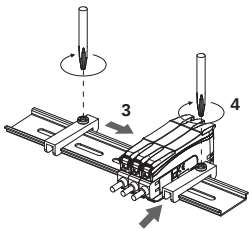
Refer to "I/O Circuit Diagrams" or check the side of the unit for wire color and role indications.




### ■ Mounting Amplifier Units in Group (Wire-saving Connector Type Models)

1. Mount the Fiber Amplifier units one at a time onto the DIN track and push them until they click.
2. Slide the Fiber Amplifier units in the direction 2.
3. Use End Plates (PFP-M: separately sold) at the both ends of the grouped Fiber Amplifier units to prevent them from separating due to vibration or other cause.
4. Tighten the screw on the End Plates using a driver.




Tighten the screw while pressing the End Plate.

CHECK!

- Under environments such as vibration, use an end plates even with a single Fiber Amplifier Unit.
- The maximum numbers of connectable Amplifier Units are given in the following table.

| | | Maximum number of interconnected | Maximum number of mutual interference prevention |
|---|---|---|---|
| E3NX-FA series*1 | | 30 | 10 |
| E3X-ZV/MZV series standard models*1 (E3X-HD11/HD41/HD6/HD8) | | 16 | — *2 |
| E3X-HD0 *3 | With E3X-ECT*3 | 30 | 10 |
| | With E3X-CRT*3 | 16 | 10 |

- If Units are to be connected, the ambient temperature will change with the number of Units that are connected. Check the Ratings and Characteristics specifications.
- Always turn OFF the power before connecting or disconnecting Units.

*1. The mutual interference prevention function cannot be used if the detection mode is set to super-high-speed mode (SHS).

*2. Mutual interference between up to 4 channels can be prevented by setting each Amplifier Unit individually.

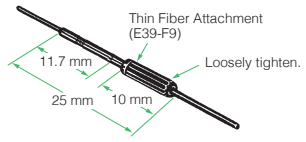
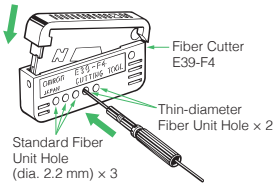
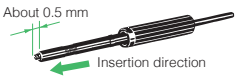
*3. Have been discontinued at the end of October 2024.

## Mounting Fiber Units

### ■ Use Fiber Cutter

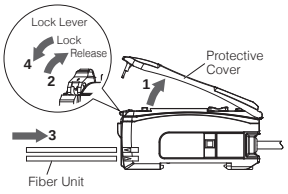
Cut a thin fiber as follows.

For standard fibers, insert to the desired cutting position and cut.

| | | |
|---|---|---|
| (1) | **The fiber is shipped loosely tightened as shown in the figure at the right** |   |
| (2) | **Adjust the fiber to the desired length and fully tighten.** |  |
| (3) | **Insert the Fiber Unit into E39-F4 and cut it.** |   |
| (4) | **Finished state. (Correctly cut end)** |   **Note:** The insertion direction into the Fiber Amplifier Unit is shown in the above figure. |

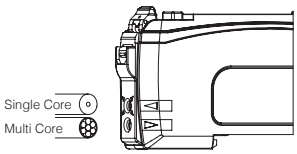
### ■ Mount Fiber Unit

1. Open the protective cover.
2. Raise the lock lever.
3. Insert the Fiber Unit in the fiber unit hole to the bottom.
4. Return the lock lever to the original position and fix the Fiber Unit.




CHECK!

- When mounting a coaxial reflective Fiber Unit, insert the single-core Fiber Unit to the upper hole (Emitter side) and the multi-core Fiber Unit to the lower hole (Receiver side).
The cables for the Single-core Fiber Units (Emitters) have identification marks. Refer to the dimensions diagrams for details.




- When removing the Fiber Unit, follow the above steps in reverse order.
To maintain the characteristics of the Fiber Unit, make sure the lock is released before removing the Fiber Unit.

## Fiber Units

### ⚠ Warning

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



## Precautions for Correct Use

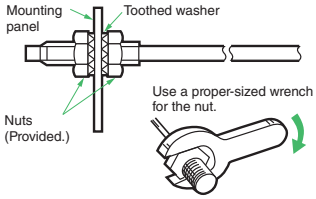
Do not use the Fiber Unit in atmospheres or environments that exceed product ratings.

### • Mounting

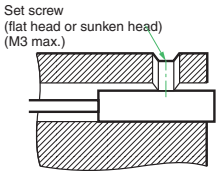
#### Tightening Force

Refer to pages 62 to 66 for the tightening torque to apply when mounting a Fiber Unit.

<Threaded Models>

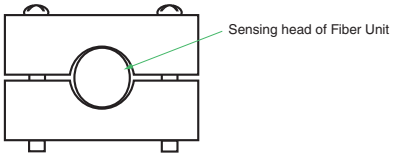



<Cylindrical Models>



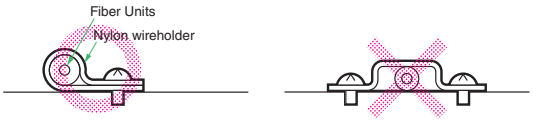

<Chemical and Oil-resistant Models>

The following method is recommended for mounting Fiber Units with fluororesin-covered sensing heads (E32-T□F and E32-D□F) to prevent from cracking the fluororesin case.
If you use a set screw to secure the Fiber Unit, tighten it with care to prevent from cracking the case.

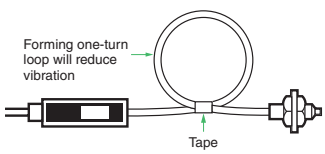



#### Connections

- Do not subject the Fiber Unit to excessive force, such as tension or compression.
  Refer to pages 62 to 66 for tensile strengths.
- Make sure any bend in the Fiber Unit is larger than the allowable bending radius.
  Refer to pages 62 to 66 for bending radius ratings and length of unbendable sections at the base of the Fiber Unit.
- Do not compress or place heavy loads on the fibers.

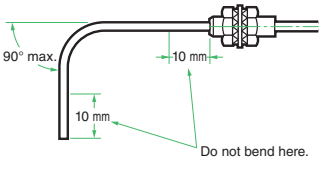


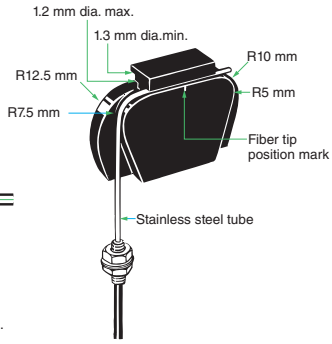

- The method shown below is an effective way to prevent the Fiber Unit from breaking due to vibration.




#### Sleeve Bender (E39-F11)

- The bending radius of the stainless steel tube should be as large as possible. The smaller the bending radius is, the shorter the sensing distance will be.
- Insert the tip of the stainless steel tube in the Sleeve Bender and slowly bend the tube along the curve of the Sleeve Bender.



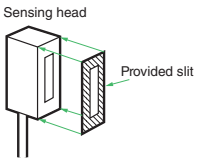

#### Heat-resistant Fiber Units (E32-D51(R) and E32-T51(R))

The fibers of these Units cannot be extended using the E39-F10 Fiber Connector.

#### E32-T14

These Units may enter the light-ON state if there are reflective objects at the end of the lenses.
If reflection is a problem, attach the black stickers provided to the ends of the lenses.

#### E32-T16PR




To use the provided slit, peel off the backing sheet, align the slit with the edges of the sensing surface, and attach it to the sensing head.
Use the slit in applications where saturation occurs (i.e., changes in incident level cannot be detected) due to short sensing distances.

#### Vacuum-resistant Fiber Units (E32- □V)

Although the Flanges, the Fiber Units on the vacuum side, and the Lens Units have been cleaned, as an extra precaution, clean these with alcohol before using them in high-vacuum environments to ensure that they are properly degreased.

#### Liquid-level Detection Fiber Unit (E32-D82F1)

- Secure the Fiber Unit using the unbendable section.
  Otherwise, the liquid-level detection position may be displaced.

#### Liquid-level Detection Fiber Units (Tube-mounting Models)

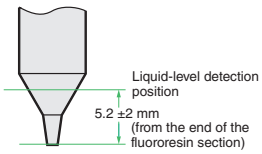
- Make sure that the tube is not deformed when using a band to secure the Fiber Unit.

## Fiber Units

### Adjustment

#### Detection Position for Liquid-level Detection Fiber Unit (E32-D82F1)

The liquid-level detection position is 5.2 ±2 mm from the end of the fluororesin section. (Refer to the diagram on the right.)
The liquid-level detection position varies with the surface tension of the liquid and the degree of wetness at the Fiber Unit's detection position.




### Other Precautions

#### Liquid-level Detection Fiber Unit (E32-D82F1)

- Operation may become unstable in the following cases:
  1. Bubbles stick to the cone of the sensing head.
  2. Solute deposits on the cone of the sensing head.
  3. The liquid has a high viscosity.
- There are some liquids, such as milky white liquids, for which detection is not possible.
- Do not let the end of the fluororesin section bump into other objects.
  Damage to or deformation of the sensing head may cause unstable operation.
- The product shall be used in the following conditions.
  Ambient pressure: -50 to +500 kPa
- To use one-point teach mode (without object)
  Please carry out teaching where the detecting head is sunk into liquid. The sensitivity is set to 10% upper to the incident level in the liquid. This setting method is effective in high degree of viscosity, because it becomes stable to the fluctuation of incident level when the liquid drops from the tip.
- To use two-point teach mode (with/without object)
  Please teach where the detecting head is pulled up from liquid and next teach where it is sunk into liquid. This setting method is effective to a liquid which is easy to bubble at high temperature.
- Don't use maximum sensitivity mode because a liquid may be undetectable.

#### Chemical and Oil-resistant, Liquid-level Detection Fiber Unit (E32-D82F1)

Fluororesin shows strong chemical-resistant properties but is permeable if exposed to atmospheres with gaseous chemicals or water vapors, resulting in failure or damage.
Confirm applicability sufficiently before using the Fiber Unit in these environments.

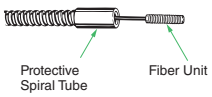
## Accessories

#### Use of E39-R3 Reflector Provided with E32-R21

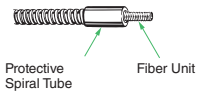
1. Use detergent to remove any dust or oil from the surfaces where tape is applied. Adhesive tape will not be attached properly if oil or dust remains on the surface.
2. The E39-R3 cannot be used in areas that are exposed to oil or chemicals.

#### Mounting method of Disconnection-resistant Protective Spiral Tubes (E39-F32□)

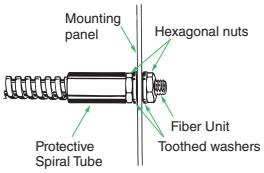
1. Insert the Fiber Unit into the Protective Spiral Tube from the head connector (threaded).



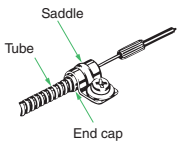

2. Push the fiber into the Protective Spiral Tube. The tube must be straight so that the fiber enters without twisting. Turn the Protective Spiral Tube, not the fiber.




3. Secure the Protective Spiral Tube to the mounting panel with the provided nuts.

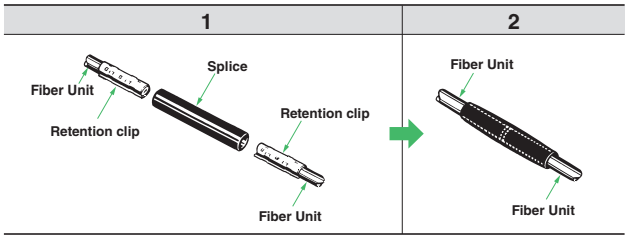



4. Use the provided saddle to secure the end cap of the Protective Spiral Tube.
   (To secure the Protective Spiral Tube at a position other than the end cap, apply tape to the tube so that the portion becomes thicker in diameter.)




#### Attaching the E39-F10 Fiber Connector

Attach the Fiber Connecter as shown in the following figures.
1. Insert the Fiber Unit in the retention clip.
2. Insert the retention clip into the splice.




- The Fiber Units should be as close as possible when they are connected.
  The sensing distance is reduced by approximately 25% when Fiber Units are extended by the connector.
- Only 2.2-mm-diameter fibers can be connected.

# Model Index

## Selection by Model



| Models | Specifications | Dimensions |
|---|---|---|
| **E32-A** | | |
| E32-A01 5M | P.54 | P.55 55-A |
| E32-A03 2M | P.34 | P.35 35-A |
| | P.60 | P.61 61-A |
| E32-A03-1 2M | P.34 | P.35 35-B |
| | P.60 | P.61 61-B |
| E32-A03-2 2M | P.60 | P.61 61-C |
| E32-A04 2M | P.34 | P.35 35-C |
| | P.60 | P.61 61-D |
| E32-A04-1 2M | P.60 | P.61 61-E |
| E32-A04-8 2M | P.60 | P.61 61-F |
| E32-A08 2M | P.40 | P.41 41-C |
| | P.58 | P.59 59-B |
| E32-A08H2 2M | P.50 | P.51 51-D |
| | P.58 | P.59 59-C |
| E32-A09 2M | P.40 | P.41 41-F |
| | P.58 | P.59 59-E |
| E32-A09H2 2M | P.50 | P.51 51-G |
| | P.58 | P.59 59-F |
| E32-A12 2M | P.40 | P.41 41-D |
| | P.58 | P.59 59-D |
| E32-A13 2M | P.52 | P.53 53-C |
| **E32-C** | | |
| E32-C21N 2M | P.10 (P.24, 26) | P.11 (P.25, 27) 11-D |
| E32-C31 2M | P.08 (P.24, 26) | P.09 (P.25, 27) 09-D |
| E32-C31M 1M | P.08 | P.09 09-E |
| E32-C31N 2M | P.08 | P.09 09-A |
| E32-C41 1M | P.26 | P.27 27-A |
| | | 27-D |
| E32-C42 1M | P.24 | P.25 25-A |
| | | 25-B |
| E32-C42S 1M | P.24 | P.25 25-E |
| E32-CC200 2M | P.08 (P.26) | P.09 (P.27) 09-H |
| E32-C91N 2M | P.08 | P.09 09-B |
| | P.10 | P.11 11-F |
| **E32-D** | | |
| E32-D11 2M | P.46 | P.47 47-E |
| E32-D11R 2M | P.08 | P.09 09-G |
| E32-D11U 2M | P.42 | P.43 43-I |
| E32-D12F 2M | P.42 | P.43 43-H |
| E32-D14LR 2M | P.14 | P.15 15-G |
| E32-D15XR 2M | P.18 | P.19 19-A |
| E32-D15YR 2M | P.18 | P.19 19-C |
| E32-D15ZR 2M | P.18 | P.19 19-E |
| E32-D16 2M | P.28 | P.29 29-E |
| E32-D21 2M | P.46 | P.47 47-B |
| E32-D211R 2M | P.08 | P.09 09-F |
| E32-D21B 2M | P.46 | P.47 47-D |
| E32-D21N 2M | P.10 | P.11 11-E |
| E32-D21R 2M | P.08 | P.09 09-C |
| E32-D21-S3 2M | P.22 | P.23 23-J |
| E32-D221B 2M | P.14 | P.15 15-D |
| | P.46 | P.47 47-C |
| E32-D22B 2M | P.14 | P.15 15-A |
| | P.46 | P.47 47-A |
| E32-D22R 2M | P.14 | P.15 15-C |
| E32-D22-S1 2M | P.22 | P.23 23-I |
| E32-D24R 2M | P.22 | P.23 23-A |
| E32-D24-S2 2M | P.22 | P.23 23-B |
| E32-D25XB 2M | P.46 | P.47 47-F |
| E32-D25XR 2M | P.18 | P.19 19-B |
| E32-D25YR 2M | P.18 | P.19 19-D |

| Models | Specifications | Dimensions |
|---|---|---|
| E32-D25ZR 2M | P.18 | P.19 19-F |
| E32-D25-S3 2M | P.22 | P.23 23-L |
| E32-D31-S1 0.5M | P.22 | P.23 23-G |
| E32-D32L 2M | P.14 | P.15 15-E |
| E32-D32-S1 0.5M | P.22 | P.23 23-F |
| E32-D33 2M | P.14 | P.15 15-F |
| | P.22 | P.23 23-E |
| E32-D331 2M | P.22 | P.23 23-D |
| E32-D36P1 2M | P.52 | P.53 53-F |
| E32-D36T 2M | P.54 | P.55 55-C |
| E32-D43M 1M | P.14 | P.15 15-B |
| | P.22 | P.23 23-C |
| E32-D51 2M | P.50 | P.51 51-B |
| E32-D51R 2M | P.50 | P.51 51-A |
| E32-D61-S 2M | P.50 | P.51 51-I |
| E32-D611-S 2M | P.50 | P.51 51-H |
| E32-D73-S 2M | P.50 | P.51 51-J |
| E32-D81R-S 2M | P.50 | P.51 51-C |
| E32-D82F1 4M | P.54 | P.55 55-D |
| E32-DC200BR 2M | P.22 | P.23 23-K |
| E32-DC200F4R 2M | P.22 | P.23 23-H |
| **E32-G** | | |
| E32-G16 2M | P.52 | P.53 53-E |
| **E32-L** | | |
| E32-L11FP 2M | P.42 | P.43 43-F |
| | P.58 | P.59 59-G |
| E32-L11FS 2M | P.42 | P.43 43-G |
| | P.58 | P.59 59-H |
| E32-L15 2M | P.24 | P.25 25-F |
| E32-L16-N 2M | P.36 | P.37 37-A |
| | P.40 | P.41 41-B |
| | P.58 | P.59 59-A |
| E32-L24S 2M | P.36 | P.37 37-B |
| | P.40 | P.41 41-A |
| E32-L25L 2M | P.36 | P.37 37-C |
| | P.40 | P.41 41-E |
| E32-L25T 2M | P.54 | P.55 55-B |
| E32-L64 2M | P.50 | P.51 51-E |
| E32-L86 2M | P.50 | P.51 51-F |
| E32-LD11 2M | P.08 | P.09 09-I |
| E32-LD11N 2M | P.10 | P.11 11-C |
| E32-LD11R 2M | P.08 | P.09 09-I |
| E32-LR11NP 2M | P.38 | P.39 39-A |
| | P.10 | P.11 11-G |
| E32-LT11 2M | P.06 | P.07 07-C |
| | P.28 | P.29 29-C |
| E32-LT11N 2M | P.28 | P.29 29-A |
| | P.10 | P.11 11-A |
| E32-LT11R 2M | P.06 | P.07 07-C |
| | P.28 | P.29 29-C |
| E32-LT35Z 2M | P.16 | P.17 17-G |
| **E32-R** | | |
| E32-R16 2M | P.38 | P.39 39-B |
| E32-R21 2M | P.38 | P.39 39-C |
| **E32-T** | | |
| E32-T10V 2M | P.56 | P.57 57-D |
| E32-T11 2M | P.44 (P.30) | P.45 (P.31) 45-C |
| E32-T11F 2M | P.42 | P.43 43-C |
| E32-T11N 2M | P.06 (P.30) | P.07 (P.31) 07-A |
| E32-T11NF 2M | P.42 | P.43 43-A |
| E32-T11NFS 2M | P.42 | P.43 43-A2 |
| E32-T11R 2M | P.06 (P.30) | P.07 (P.29, 31) 07-B |

| Models | Specifications | Dimensions |
|---|---|---|
| E32-T12F 2M | P.42 | P.43 43-B |
| E32-T12R 2M | P.12 | P.13 13-C |
| E32-T14 2M | P.28 | P.29 29-D |
| E32-T14F 2M | P.42 | P.43 43-D |
| E32-T14LR 2M | P.12 | P.13 13-D |
| E32-T15XR 2M | P.16 | P.17 17-A |
| E32-T15YR 2M | P.16 | P.17 17-C |
| E32-T15ZR 2M | P.16 | P.17 17-E |
| E32-T16JR 2M | P.52 | P.53 53-B |
| E32-T16PR 2M | P.52 | P.53 53-A |
| E32-T16WR 2M | P.52 | P.53 53-D |
| E32-T17L 10M | P.28 | P.29 29-B |
| E32-T21 2M | P.44 | P.45 45-B |
| E32-T21-S1 2M | P.20 | P.21 21-D |
| E32-T223R 2M | P.12 | P.13 13-A |
| E32-T22B 2M | P.12 | P.13 13-B |
| | P.44 | P.45 45-A |
| E32-T22S 2M | P.34 | P.35 35-F |
| E32-T24E 2M | P.20 | P.21 21-B |
| E32-T24R 2M | P.20 | P.21 21-A |
| E32-T24S 2M | P.34 | P.35 35-E |
| | P.60 | P.61 61-H |
| E32-T24SR 2M | P.34 | P.35 35-D |
| | P.60 | P.61 61-G |
| E32-T25XB 2M | P.44 | P.45 45-D |
| E32-T25XR 2M | P.16 | P.17 17-B |
| E32-T25YR 2M | P.16 | P.17 17-D |
| E32-T25ZR 2M | P.16 | P.17 17-F |
| E32-T33 1M | P.20 | P.21 21-C |
| E32-T51 2M | P.48 (P.32) | P.49 (P.33) 49-B |
| E32-T51F 2M | P.42 | P.43 43-E |
| E32-T51R 2M | P.48 (P.32) | P.49 (P.33) 49-A |
| E32-T51V 1M | P.56 | P.57 57-A |
| E32-T54 2M | P.48 | P.49 49-C |
| E32-T61-S 2M | P.48 (P.32) | P.49 (P.33) 49-G |
| E32-T64-2 2M | P.48 | P.49 49-F |
| E32-T81R-S 2M | P.48 (P.32) | P.49 (P.33) 49-D |
| E32-T84SV 1M | P.56 | P.57 57-C |
| E32-T84S-S 2M | P.48 | P.49 49-E |
| E32-TC200BR 2M | P.20 | P.21 21-E |
| **E32-V** | | |
| E32-VF1 | P.56 | P.57 57-F |
| E32-VF4 | P.56 | P.57 57-E |
| **E39-F** | | |
| E39-F1 | P.30, 32 | P.30 30-A |
| E39-F1-33 | P.32 | P.32 32-D |
| E39-F11 | P.21 | —— |
| E39-F16 | P.30, 32 | P.30 30-B |
| E39-F17 | P.24 | P.25 25-B |
| E39-F18 | P.26 | P.27 27-G |
| | | 27-H |
| E39-F1V | P.56 | P.57 57-B |
| E39-F2 | P.30, 32 | P.30 30-C |
| E39-F32A 1M | P.46 | P.47 47-G |
| E39-F32C 1M | P.44 | P.45 45-E |
| | P.46 | P.47 47-G |
| E39-F32D 1M | P.46 | P.47 47-G |
| E39-F3A | P.24 | P.25 25-A |
| E39-F3A-5 | P.26 | P.27 27-A |
| | | 27-B |
| | | 27-C |

| Models | Specifications | Dimensions |
|---|---|---|
| E39-F3B | P.26 | P.27 27-D |
| | | 27-E |
| | | 27-F |
| E39-F3C | P.24 | P.25 25-C |
| | | 25-D |
| **E39-R** | | |
| E39-R1 | —— | P.39 39-B |
| E39-R3 | —— | P.39 39-C |
| E39-RP1 | P.38 | P.39 39-A |
| | P.10 | P.11 11-G |
| E39-RP37 | P.39 | —— |
| E39-RSP1 | P.39 | —— |
| **E39-L** | | |
| E39-L143 | —— | P.95 95-A |
| **E3NW** | | |
| E3NW-DS | P.84 | P.85 85-B |
| E3NW-ECT | P.84 | P.85 85-A |
| **E3NX-FA** | | |
| E3NX-FA0 | P.74 | P.77 77-B |
| E3NX-FA10 2M | P.74 | P.77 77-B |
| E3NX-FA11 2M | P.72 | P.76 76-A |
| E3NX-FA11-5 2M | P.72 | P.76 76-A |
| E3NX-FA11AN 2M | P.72 | P.76 76-A |
| E3NX-FA21 2M | P.72 | P.76 76-A |
| E3NX-FA24 | P.72 | P.77 77-A |
| E3NX-FA40 2M | P.74 | P.77 77-B |
| E3NX-FA41 2M | P.72 | P.76 76-A |
| E3NX-FA41AN 2M | P.74 | P.76 76-A |
| E3NX-FA51 2M | P.72 | P.76 76-A |
| E3NX-FA54 | P.72 | P.77 77-A |
| E3NX-FA54TW | P.72 | P.77 77-A |
| E3NX-FA6 | P.72 | P.76 76-B |
| E3NX-FA7 | P.72 | P.76 76-B |
| E3NX-FA7TW | P.72 | P.76 76-B |
| E3NX-FA8 | P.72 | P.76 76-B |
| E3NX-FA9 | P.72 | P.76 76-B |
| E3NX-FA9TW | P.72 | P.76 76-B |
| E3NX-FAH0 | P.74 | P.77 77-B |
| E3NX-FAH11 2M | P.72 | P.76 76-A |
| E3NX-FAH41 2M | P.72 | P.76 76-A |
| E3NX-FAH6 | P.72 | P.76 76-B |
| E3NX-FAH8 | P.72 | P.76 76-B |
| **E3X-CN** | | |
| E3X-CN11 | P.94 | P.94 94-A |
| E3X-CN12 | P.94 | P.94 94-B |
| E3X-CN21 | P.94 | P.94 94-A |
| E3X-CN22 | P.94 | P.94 94-B |
| **E3X-ZV** | | |
| E3X-ZV11 2M | P.88 | P.89 89-A |
| E3X-ZV41 2M | P.88 | P.89 89-A |
| E3X-ZV6 | P.88 | P.89 89-B |
| E3X-ZV8 | P.88 | P.89 89-B |
| **PFP** | | |
| PFP-100N | —— | P.95 95-B |
| PFP-100N2 | —— | P.95 95-C |
| PFP-50N | —— | P.95 95-B |
| PFP-M | —— | P.95 95-D |
| **XS3F** | | |
| XS3F-M421-402-A | P.94 | P.94 94-C |
| XS3F-M421-405-A | P.94 | P.94 94-C |
| XS3F-M422-402-A | P.94 | P.94 94-D |
| XS3F-M422-405-A | P.94 | P.94 94-D |

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