

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”.

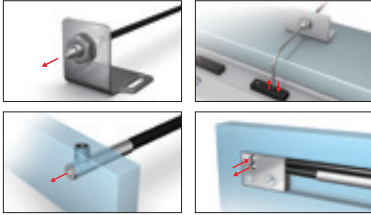


# Easy

## "Mounts Anywhere"

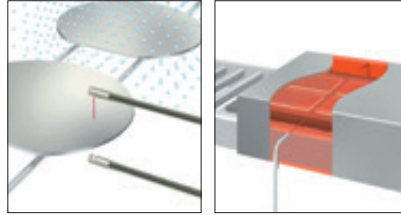
### Wide Variety

Variiously-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.



Press the **TUNE** button  
**once** with a workpiece and  
**once** without a workpiece

### Automatic Setting of Optimum Values

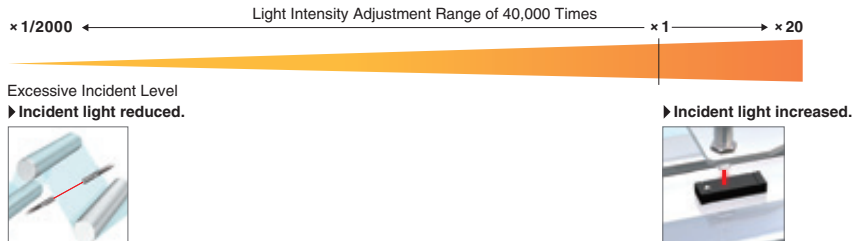
Threshold + Incident Level

5000 9999

Set to the intermediate value between the incident levels with and without a workpiece. Incident level adjustment with and without a workpiece

### 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.



# Fiber

'Easy' and 'Stable' for

Smart Fiber Amplifier Units  
**E3NX-FA**

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Page

# Stable

installation when starting production.

Fiber Amplifier Units with easy optimum setting

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  $\mu\text{m}$  dia.**

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

\*Compared to E3X-ZV.

Sensor Communications Units

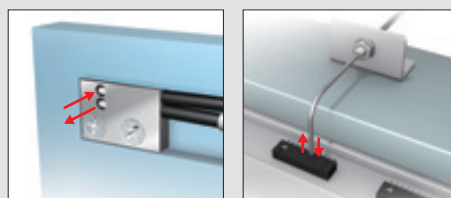
## E3NW

 **EtherCAT**  
 **CC-Link V2**

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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

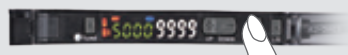
Set the threshold by a sensitivity  
adjuster / Check the operation by  
an indicator.



- 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.

Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power  
Narrow  
viewRetro-  
reflective  
Limited-  
reflectiveChemical-  
resistant,  
Oil-resistant  
Bending  
Heat-  
resistantArea  
Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
SolarSelection 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  
Unit71,87  
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.

## &lt;Specifications on Each Fiber Unit Category Page&gt;

| Appearance (mm) | Bending radius of cable | Sensing distance (mm) | Optical axis diameter (minimum sensing object) | Models      | Dim |
|-----------------|-------------------------|-----------------------|------------------------------------------------|-------------|-----|
|                 |                         | E3X-ZV                | E3NX-FA                                        |             |     |
|                 |                         | GIGA-HS Other note    | GIGA-HS Other note                             |             |     |
|                 |                         | 2,000 87 1,300        | 3,000 87 1,300                                 |             |     |
|                 |                         | 840 840 200           | 1,260 840 200                                  | E32-T11R 2W |     |

**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                                                                                                       |
| Sensor Communications Unit application | Minimum sensing object                                   | E32-T11R | 5 μm dia.                                                                          | 2 μm dia.                                                                                                      |
|                                        | 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 (E3NC-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

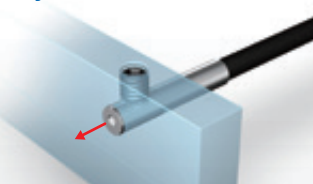
#### Hex-shaped Models



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

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#### Cylindrical Models



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

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### Saving Space

#### Flat Models



Mount directly in limited spaces without using special mounting brackets.

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#### Sleeve Models (Close-range Detection)



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

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### Beam Improvements

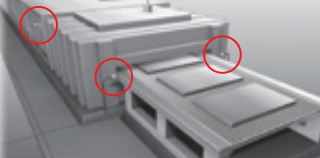
#### Small-Spot, Reflective (Minute Object Detection)



Small-spot to accurately detect small objects.

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

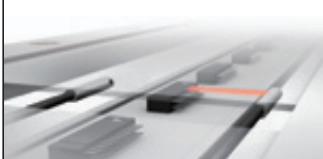


Suitable for detection on large equipment, of large objects, and in environments with airborne particles.

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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.

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#### Detection without Background Interference

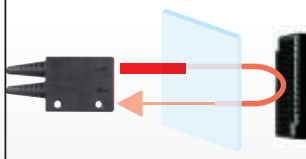


Detect only objects in the sensing range, and not in the background.

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Page

### Transparent Object Detection

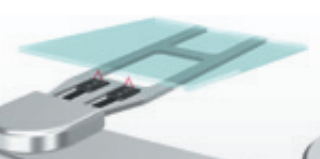
#### Retro-reflective



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

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Page

#### Limited-reflective (Glass Detection)



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

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Page

### Environmental Immunity

#### Chemical-resistant, Oil-resistant



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

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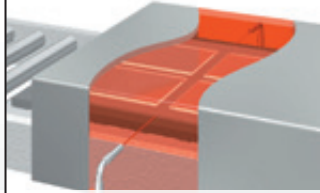
#### Bending-resistant, Disconnection-resistant



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

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Page

#### Heat-resistant



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

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### Special Applications

#### Area Beam (Area Detection)



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

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#### Liquid-level Detection



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

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Page

#### Vacuum-resistant



Can be used under high vacuums of up to 10<sup>-5</sup> Pa.

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Page

#### FPD, Semiconductors, and Solar Cells



Designed specifically to reliably detect glass substrates and wafers.

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Page

Fiber Sensor  
Features

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Fiber Units

Threaded  
Hex-shaped  
Cylindrical

Flat  
Sleeved

Small Spot

High Power

Narrow  
view

BGS

Retro-  
reflective

Limited-  
reflective

Chemical-  
resistant,  
Oil-resistant

Bending

Heat-  
resistant

Area  
Detection

Liquid-level

Vacuum

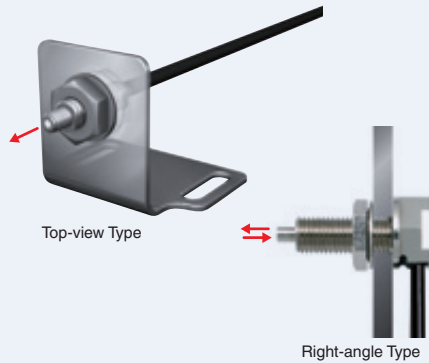
FPD,  
Semi,  
Solar

Installation  
Information

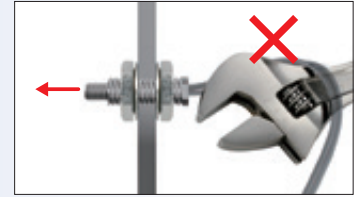
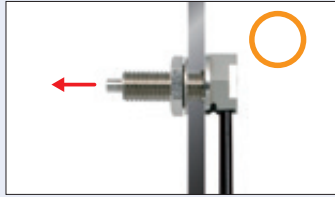
Fiber Amplifiers,  
Communications  
Unit, and  
Accessories

Technical  
Guide and  
Precautions

Model Index

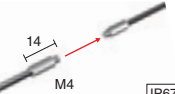
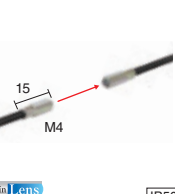


- Standard configuration. These Fiber Units are mounted into a hole drilled in a bracket and secured with nuts.
- The Right-angle Model prevents snagging on the cable because the cable runs along the mounting surface.



## Specifications

### Through-beam Fiber Units

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

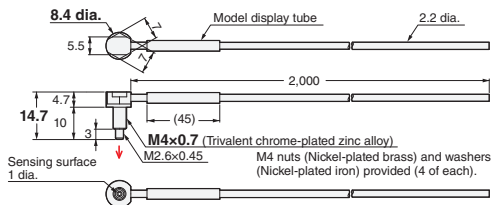
4. The E3X-HD Series offers the same sensing distance as the E3X-ZV.

### Dimensions

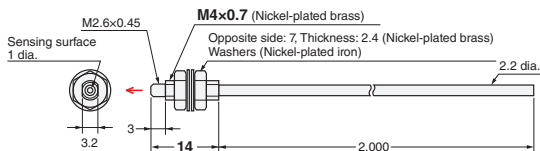
Installation Information → 62 to 66 Page

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

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

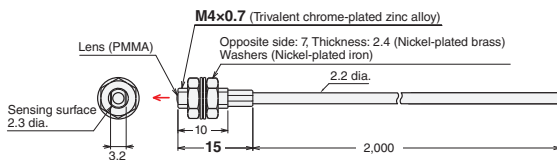


##### (07-B) E32-T11R 2M (Free Cutting)



##### (07-C) E32-LT11 2M (Free Cutting)

##### E32-LT11R 2M (Free Cutting)



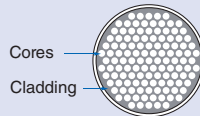
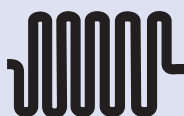
### - Reference Information for Model Selection -

#### 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.

#### 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.



Cores  
Cladding

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.

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#### 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.

#### 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.)

Fiber Sensor  
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Fiber Units

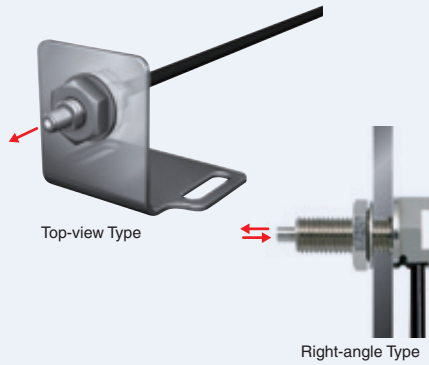
| Threaded                          | Standard Installation  |
|-----------------------------------|------------------------|
| Hex-shaped                        |                        |
| Cylindrical                       |                        |
| Flat                              | Saving Space           |
| Sleeved                           |                        |
| Small Spot                        | Beam Improvements      |
| High Power                        |                        |
| Narrow view                       |                        |
| BGS                               |                        |
| Retro-reflective                  | Transparent Objects    |
| Limited-reflective                |                        |
| Chemical-resistant, Oil-resistant | Environmental Immunity |
| Bending                           |                        |
| Heat-resistant                    |                        |
| Area Detection                    | Applications           |
| Liquid-level                      |                        |
| Vacuum                            |                        |
| FPD, Semi, Solar                  |                        |

Installation  
Information

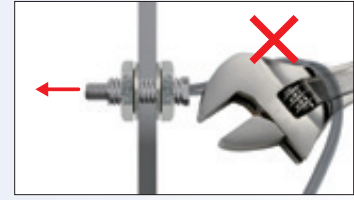
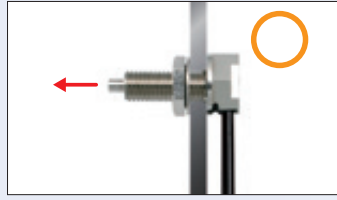
Fiber Amplifiers,  
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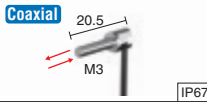
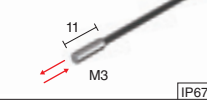
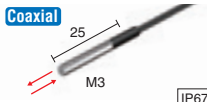
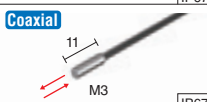
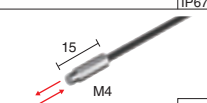
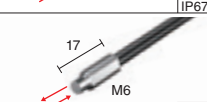


- Standard configuration. These Fiber Units are mounted into a hole drilled in a bracket and secured with nuts.
- The Right-angle Model prevents snagging on the cable because the cable runs along the mounting surface.



## Specifications

## Reflective Fiber Units

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

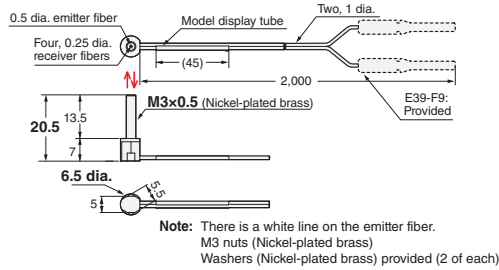
5. The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

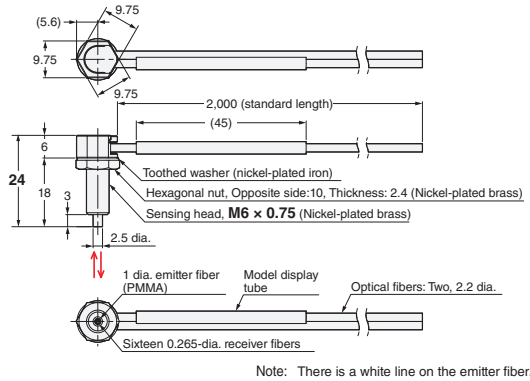
Installation Information → 62 to 66 Page

### Reflective Fiber Units

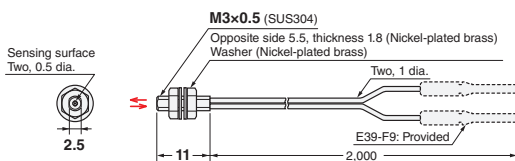
#### 09-A E32-C31N 2M (Free Cutting)



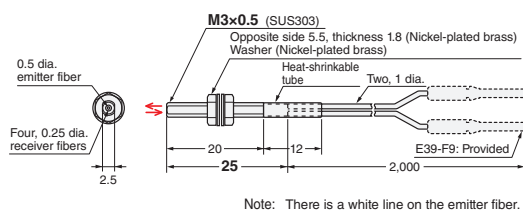
#### 09-B E32-C91N 2M (Free Cutting)



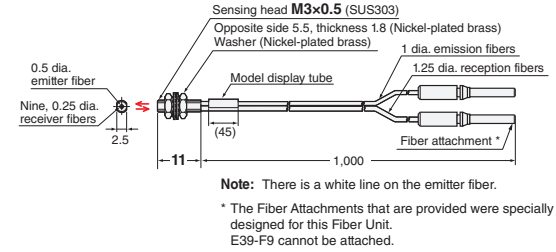
#### 09-C E32-D21R 2M (Free Cutting)



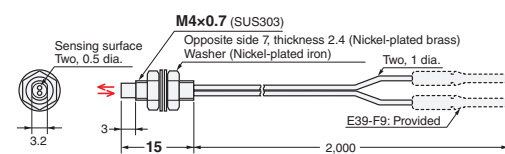
#### 09-D E32-C31 2M (Free Cutting)



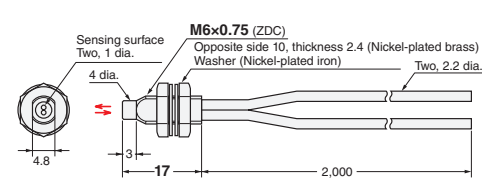
#### 09-E E32-C31M 1M (Free Cutting)



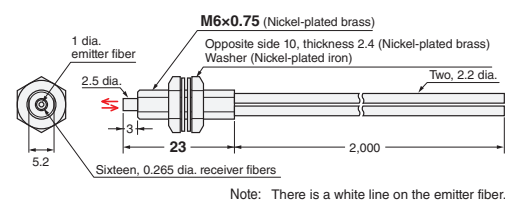
#### 09-F E32-D211R 2M (Free Cutting)



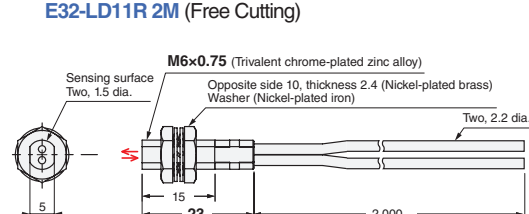
#### 09-G E32-D11R 2M (Free Cutting)



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



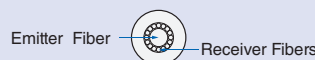
#### 09-I E32-LD11 2M (Free Cutting)



## - 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.

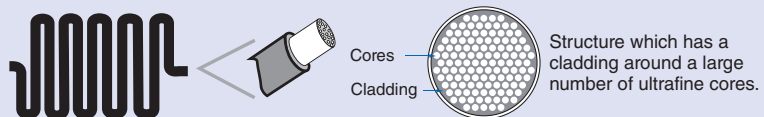


### Features of the Right-angle Type

- 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.

And

### Breaking Due to Snagging or Shock

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

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Fiber Sensor  
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Fiber Units

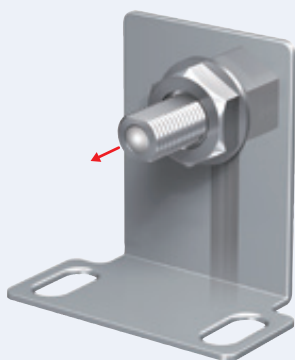
| Threaded                          | Standard Installation  |
|-----------------------------------|------------------------|
| Hex-shaped                        |                        |
| Cylindrical                       |                        |
| Flat                              | Saving Space           |
| Sleeved                           |                        |
| Small Spot                        | Beam Improvements      |
| High Power                        |                        |
| Narrow view                       |                        |
| BGS                               |                        |
| Retro-reflective                  | Transparent Objects    |
| Limited-reflective                |                        |
| Chemical-resistant, Oil-resistant | Environmental Immunity |
| Bending                           |                        |
| Heat-resistant                    |                        |
| Area Detection                    | Applications           |
| Liquid-level                      |                        |
| Vacuum                            |                        |
| FPD, Semi, Solar                  |                        |

Installation  
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Fiber Amplifiers,  
Communications  
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Accessories

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Precautions

Model Index



- 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.

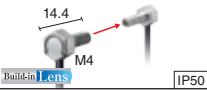


### Build-in Lens

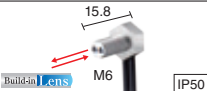
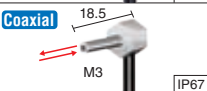
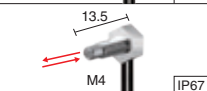
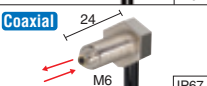
A Fiber Unit with Build-in Lens is the new standard in fiber units. We recommend this new standard Fiber Unit that achieves stable detection with a high-power beam. You don't have to worry about the lens falling off and getting lost. Through-beam Flat Fiber Units are also available. (→ 16 page)

## Specifications

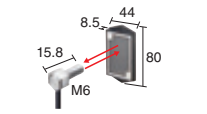
### Through-beam Fiber Units

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

### Reflective Fiber Units

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

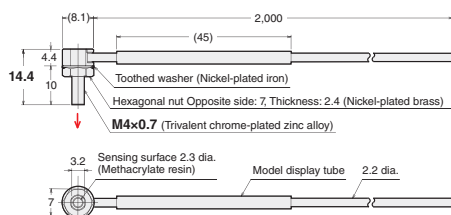
5. The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

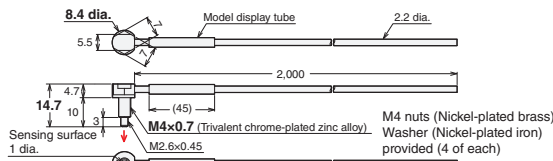
Installation Information → 62 to 66 Page

### Through-beam Fiber Units

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

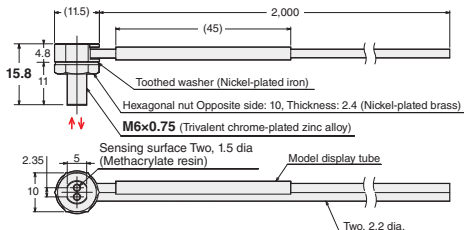


#### 11-B E32-T11N 2M (Free Cutting)

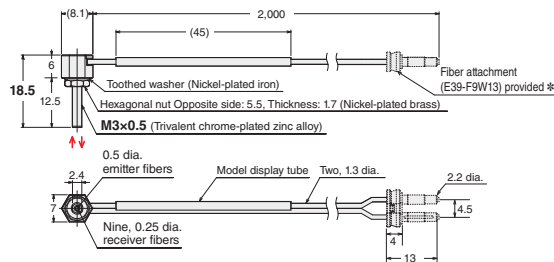


### Reflective Fiber Units

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



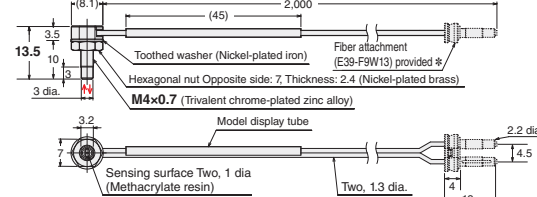
#### 11-D E32-C21N 2M (Free Cutting)



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

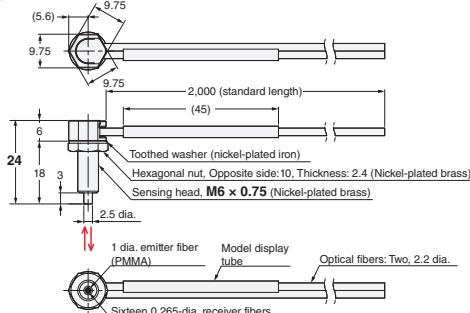
\* Applicable Fiber Amplifier Units: E3NX-FA, E3NX-CA, and E3X-HD. Use the enclosed E39-F9-7 Fiber Attachment for other models, such as the E3X-SD, E3X-NA, and other models that have an 8-mm space between the emitter and receiver fiber insertion holes.

#### 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.

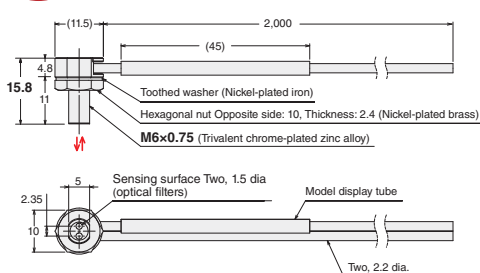
#### 11-F E32-C91N 2M (Free Cutting)



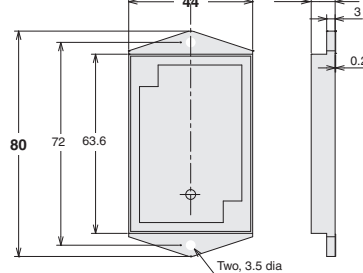
Note: There is a white line on the emitter fiber.

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

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



#### E39-RP1

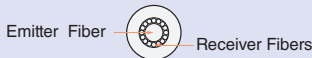


Material:  
-Reflective surface-  
Methacrylate resin  
-Back- ABS

## - Reference Information for Model Selection -

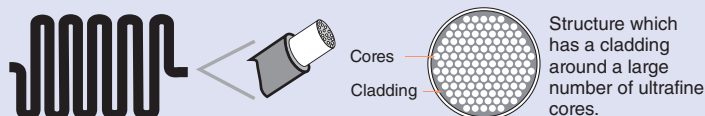
### Features of Coaxial Reflective Type

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.



### 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

Fiber Sensor Features

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Fiber Units

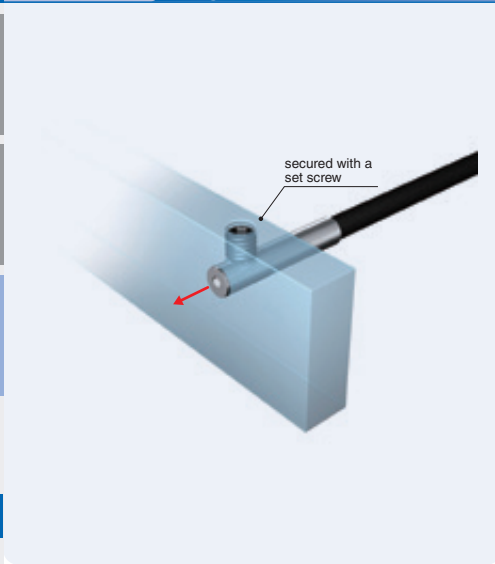
| Threaded              | Hex-shaped | Cylindrical | Flat | Sleeved      | Small Spot        | High Power | Narrow view | BGS | Retro-reflective    | Limited-reflective     | Chemical-resistant, Oil-resistant | Bending | Heat-resistant | Area Detection | Liquid-level | Vacuum | FPD, Semi, Solar |
|-----------------------|------------|-------------|------|--------------|-------------------|------------|-------------|-----|---------------------|------------------------|-----------------------------------|---------|----------------|----------------|--------------|--------|------------------|
| Standard Installation |            |             |      | Saving Space | Beam Improvements |            |             |     | Transparent Objects | Environmental Immunity |                                   |         |                |                |              |        |                  |

Installation Information

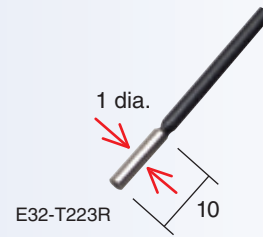
Fiber Amplifiers, Communications Unit, and Accessories

Technical Guide and Precautions

Model Index



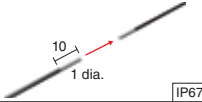
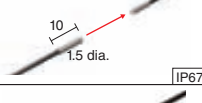
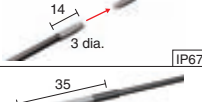
- Inserted where space is limited.  
(Secured using a set screw.)
- Ultraminate space-saving by micro-fiber head. (1 dia. × 10 mm)



- 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)                                                                                                                                                              |                                                                                                                                                                                      |                                                                                                                                                                                        |                                                                                                                                                                                          |                                       |                                     | Optical axis diameter (minimum sensing object) | Models | 13 Page Dimensions No. |
|----------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-------------------------------------|------------------------------------------------|--------|------------------------|
|          |                                                                                     |                                                                                     |                                                                                                                                                                                    | E3X-ZV                                                                                                                                                                             |                                                                                                                                                                                      |                                                                                                                                                                                        | E3NX-FA                                                                                                                                                                                  |                                       |                                     |                                                |        |                        |
|          |                                                                                     |                                                                                     |                                                                                                                                                                                    | ■ GIGA ■ HS                                                                                                                                                                        | Other modes                                                                                                                                                                          |                                                                                                                                                                                        | ■ GIGA ■ HS                                                                                                                                                                              | Other modes                           |                                     |                                                |        |                        |
| 1 dia.   | Top-view                                                                            |   | Flexible, R1                                                                                                                                                                       |  450<br> 150    | ST : 250<br>SHS: 60                                                                                                                                                                  |  670<br> 220      | ST : 370<br>SHS: 60                                                                                                                                                                      | 0.5 dia.<br>(5 μm dia./<br>2 μm dia.) | E32-T223R 2M                        | 13-A                                           |        |                        |
| 1.5 dia. |                                                                                     |  | Bendresistant, R4                                                                                                                                                                  |  680<br> 220 | ST : 400<br>SHS: 90                                                                                                                                                                  |  1,020<br> 330 | ST : 600<br>SHS: 90                                                                                                                                                                      |                                       | E32-T22B 2M                         | 13-B                                           |        |                        |
| 3 dia.   |                                                                                     | Side-view                                                                           |                                                                                                 | Flexible, R1                                                                                                                                                                       |  2,000<br> 700 | ST : 1,000<br>SHS: 280                                                                                                                                                                 |  3,000<br> 1,050 | ST : 1,500<br>SHS: 280                | 1 dia.<br>(5 μm dia./<br>2 μm dia.) | E32-T12R 2M                                    | 13-C   |                        |
|          |  |                                                                                     |  750<br> 260 |                                                                                                                                                                                    | ST : 450<br>SHS: 100                                                                                                                                                                 |  1,120<br> 390 | ST : 670<br>SHS: 100                                                                                                                                                                     | 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.

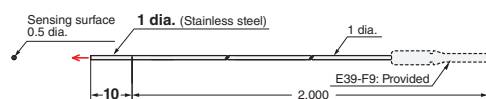
4. The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

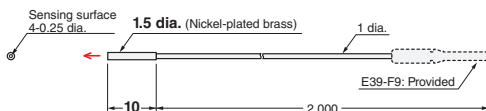
Installation Information → 62 to 66 Page

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

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



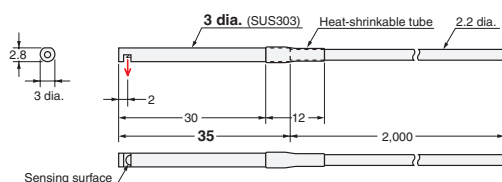
#### 13-B E32-T22B 2M (Free Cutting)



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



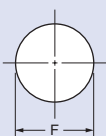
#### 13-D E32-T14LR 2M (Free Cutting)



## - 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 <sup>+0.5</sup> <sub>0</sub> dia. | 1.7 <sup>+0.5</sup> <sub>0</sub> dia. | 3.2 <sup>+0.5</sup> <sub>0</sub> dia. |

Fiber Sensor  
Features

Selection  
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Fiber Units

Threaded  
Hex-shaped  
**Cylindrical**

Standard Installation

Flat  
Sleeved

Saving Space

Small Spot  
High Power  
Narrow view  
BGS

Beam Improvements

Retro-reflective  
Limited-reflective

Transparent Objects

Chemical-resistant,  
Oil-resistant  
Bending  
Heat-resistant

Environmental Immunity

Area Detection  
Liquid-level  
Vacuum  
FPD, Semi, Solar

Applications

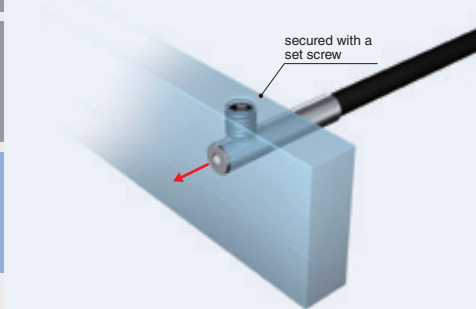
Installation  
Information

Fiber Amplifiers,  
Communications  
Unit, and  
Accessories

Technical  
Guide and  
Precautions

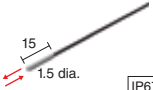
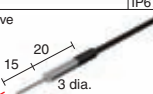
Model Index

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

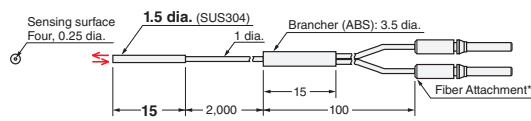
## Dimensions

Installation Information → 62 to 66 Page



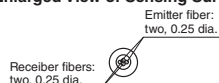
### Reflective Fiber Units

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

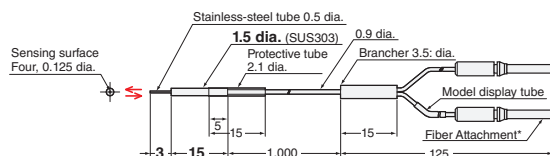


\* Attached with adhesive and cannot be removed.

#### Enlarged View of Sensing Surface



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

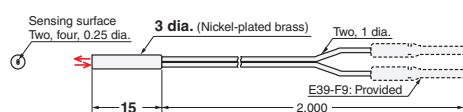


\* Attached with adhesive and cannot be removed.

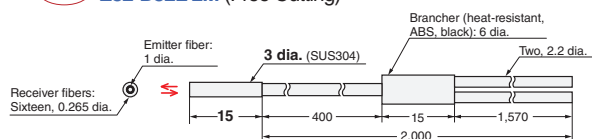
#### 15-C E32-D22R 2M (Free Cutting)



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

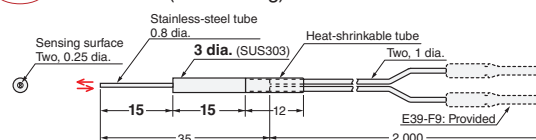


#### 15-E E32-D32L 2M (Free Cutting)

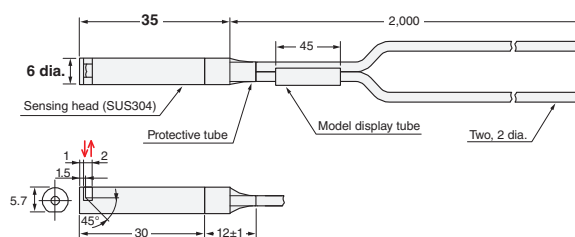


Note: There is a yellow dotted line on the Emitter fiber.

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



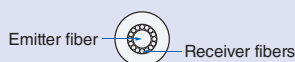
#### 15-G E32-D14LR 2M (Free Cutting)



## - Reference Information for Model Selection -

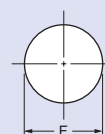
### Features of Coaxial Reflective Type

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 <sup>+0.5</sup> <sub>0</sub> dia. | 3.2 <sup>+0.5</sup> <sub>0</sub> dia. |

Fiber Sensor Features

Selection Guide

Fiber Units

Threaded  
Hex-shaped  
Cylindrical

Standard Installation

Flat  
Sleeved

Saving Space

Small Spot  
High Power  
Narrow view  
BGS

Beam Improvements

Retro-reflective  
Limited-reflective

Transparent Objects

Chemical-resistant, Oil-resistant  
Bending  
Heat-resistant

Environmental Immunity

Area Detection  
Liquid-level  
Vacuum  
FPD, Semi, Solar

Applications

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Fiber Amplifiers, Communications Unit, and Accessories

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Threaded  
Hex-shaped  
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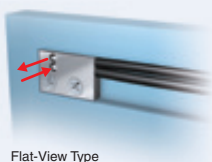
Flat  
Sleeved

Small Spot  
High Power  
Narrow view  
BGS

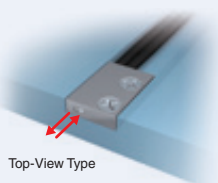
Retro-reflective  
Limited-reflective

Chemical-resistant,  
Oil-resistant  
Bending  
Heat-resistant

Area Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar



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) |                        |                |                        | Optical axis diameter (minimum sensing object) | Models       | 17 Page Dimensions No. |
|-------------------|-----------------|-------------------------|-----------------------|------------------------|----------------|------------------------|------------------------------------------------|--------------|------------------------|
|                   |                 |                         | E3X-ZV                |                        | E3NX-FA        |                        |                                                |              |                        |
|                   |                 |                         | GIGA  HS              | Other modes            | GIGA  HS       | Other modes            |                                                |              |                        |
| Top-view          |                 | Flexible, R1            | 2,000<br>700          | ST : 1,000<br>SHS: 280 | 3,000<br>1,050 | ST : 1,500<br>SHS: 280 | 1 dia.<br>(5 μm dia./ 2 μm dia.)               | E32-T15XR 2M |                        |
|                   |                 |                         | 450<br>150            | ST : 250<br>SHS: 60    | 670<br>220     | ST : 370<br>SHS: 60    | 0.5 dia.<br>(5 μm dia./ 2 μm dia.)             | E32-T25XR 2M |                        |
| Side-view         |                 |                         | 750<br>260            | ST : 450<br>SHS: 100   | 1,120<br>390   | ST : 670<br>SHS: 100   | 1 dia.<br>(5 μm dia./ 2 μm dia.)               | E32-T15YR 2M |                        |
|                   |                 |                         | 170<br>50             | ST : 100<br>SHS: 20    | 250<br>70      | ST : 150<br>SHS: 20    | 0.5 dia.<br>(5 μm dia./ 2 μm dia.)             | E32-T25YR 2M |                        |
| Flat-view         |                 |                         | 750<br>260            | ST : 450<br>SHS: 20    | 1,120<br>390   | ST : 670<br>SHS: 100   | 1 dia.<br>(5 μm dia./ 2 μm dia.)               | E32-T15ZR 2M |                        |
|                   |                 |                         | 170<br>50             | ST : 100<br>SHS: 20    | 250<br>70      | ST : 150<br>SHS: 20    | 0.5 dia.<br>(5 μm dia./ 2 μm dia.)             | E32-T25ZR 2M |                        |
|                   |                 |                         | 2,400<br>800          | ST : 1,200<br>SHS: 300 | 3,600<br>1,200 | ST : 1,800<br>SHS: 300 | 3 dia.<br>(0.1 dia./ 0.03 dia.)                | E32-LT35Z 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.

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

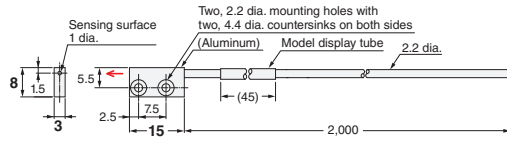
5. The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

Installation Information → 62 to 66 Page

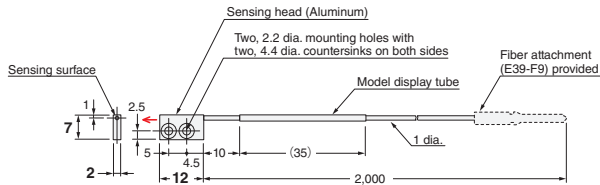
### Through-beam Fiber Units (Set of 2)

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



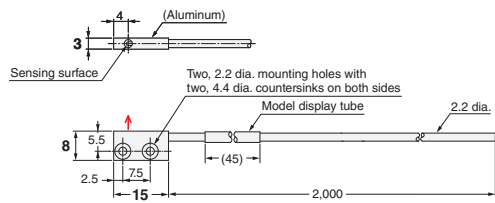
Note: 1. Set of two symmetrically shaped Fiber Units.  
2. Four, M2 x 8 stainless steel countersunk mounting screws are provided.

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



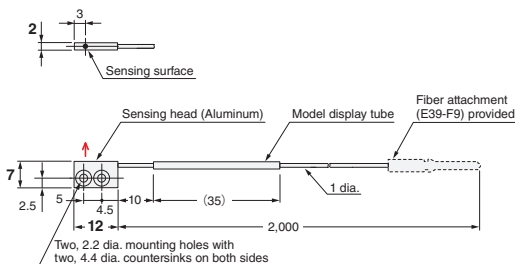
Note: 1. Set of two symmetrically shaped Fiber Units.  
2. Four, M2 x 8 stainless steel countersunk mounting screws are provided.

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



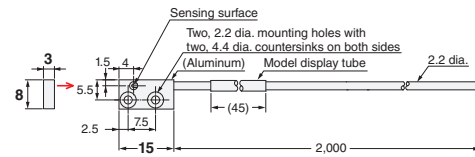
Note: 1. Set of two symmetrically shaped Fiber Units.  
2. Four, M2 x 8 stainless steel countersunk mounting screws are provided.

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



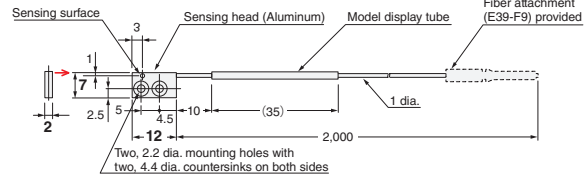
Note: 1. Set of two symmetrically shaped Fiber Units.  
2. Four, M2 x 8 stainless steel countersunk mounting screws are provided.

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



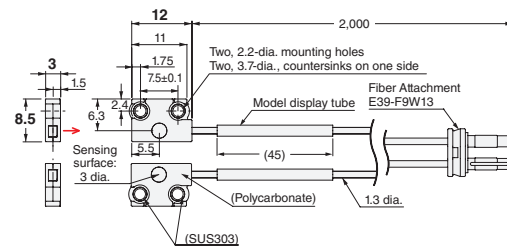
Note: 1. Set of two symmetrically shaped Fiber Units.  
2. Four, M2 x 8 stainless steel countersunk mounting screws are provided.

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



Note: 1. Set of two symmetrically shaped Fiber Units.  
2. Four, M2 x 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.

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Fiber Units

Threaded  
Hex-shaped  
Cylindrical

Flat  
Sleeved

Small Spot  
High Power  
Narrow view  
BGS

Retro-reflective  
Limited-reflective

Chemical-resistant,  
Oil-resistant  
Bending  
Heat-resistant

Area Detection  
Liquid-level  
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Hex-shaped  
Cylindrical

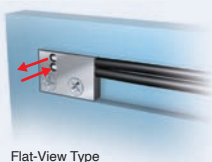
Flat  
Sleeved

Small Spot  
High Power  
Narrow view  
BGS

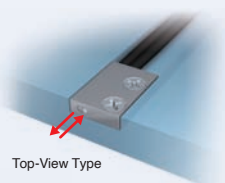
Retro-reflective  
Limited-reflective

Chemical-resistant,  
Oil-resistant  
Bending  
Heat-resistant

Area Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar



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          |                 | Flexible, R1            | 840                   | ST : 350    | 1,260       | ST : 520     | (5 μm dia./ 2 μm dia.)                         | E32-D15XR 2M | 19-A                   |
|                   | 240             |                         | SHS: 100              | 360         | SHS: 100    | E32-D25XR 2M |                                                | 19-B         |                        |
| Side-view         |                 |                         | 140                   | ST : 60     | 210         | ST : 90      |                                                | E32-D15YR 2M | 19-C                   |
|                   | 40              |                         | SHS: 16               | 60          | SHS: 16     | E32-D25YR 2M |                                                | 19-D         |                        |
| Flat-view         |                 |                         | 200                   | ST : 100    | 300         | ST : 150     |                                                | E32-D15ZR 2M | 19-E                   |
|                   |                 |                         | 52                    | SHS: 24     | 78          | SHS: 24      |                                                | 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.

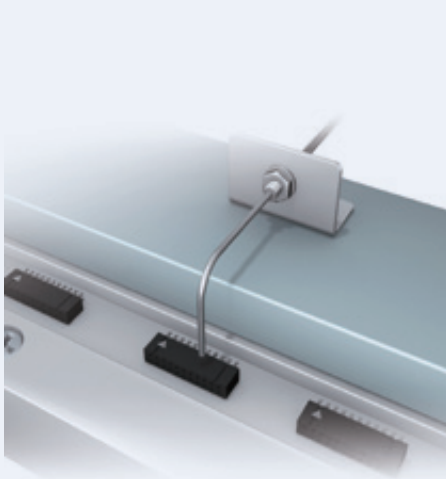
The first value is for the E3X-ZV and the second value is for the E3NX-FA.

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

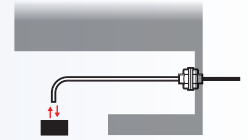
4. The sensing distances for E3NX-FA are values for E3NX-FA□ models. The distances for E3NX-FAH□ infrared models are different.

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





- 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) |                        |                    |                        |                                        |                | Optical axis diameter (minimum sensing object) | Models | 21 Page Dimensions No. |
|-------------------|-----------------|-------------------------|-----------------------|------------------------|--------------------|------------------------|----------------------------------------|----------------|------------------------------------------------|--------|------------------------|
|                   |                 |                         | E3X-ZV                |                        |                    | E3NX-FA                |                                        |                |                                                |        |                        |
|                   |                 |                         | ■GIGA ■HS             | Other modes            | ■GIGA ■HS          | Other modes            |                                        |                |                                                |        |                        |
| Side-view         |                 | Flexible, R1            | ■ 170<br>■ 50         | ST : 100<br>SHS: 20    | ■ 250<br>■ 75      | ST : 150<br>SHS: 20    | 0.5 dia.<br>(5 μm dia./<br>2 μm dia.)  | E32-T24R 2M    | 21-A                                           |        |                        |
|                   |                 |                         | ■ 450<br>■ 150        | ST : 250<br>SHS: 60    | ■ 670<br>■ 220     | ST : 370<br>SHS: 60    |                                        | E32-T24E 2M    | 21-B                                           |        |                        |
| Top-view          |                 | R10                     | ■ 150<br>■ 50         | ST : 90<br>SHS: 20     | ■ 220<br>■ 75      | ST : 130<br>SHS: 20    | 0.25 dia.<br>(5 μm dia./<br>2 μm dia.) | E32-T33 1M     | 21-C                                           |        |                        |
|                   |                 |                         | ■ 510<br>■ 170        | ST : 300<br>SHS: 68    | ■ 760<br>■ 250     | ST : 450<br>SHS: 68    | 0.5 dia.<br>(5 μm dia./<br>2 μm dia.)  | E32-T21-S1 2M  | 21-D                                           |        |                        |
|                   |                 | Flexible, R1            | ■ 2,000<br>■ 700      | ST : 1,000<br>SHS: 280 | ■ 3,000<br>■ 1,050 | ST : 1,500<br>SHS: 280 | 1 dia.<br>(5 μm dia./<br>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.

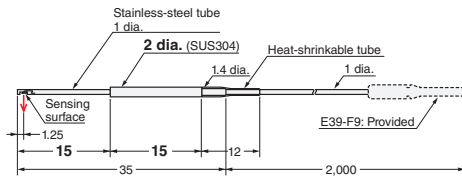
## Dimensions

Installation Information → 62 to 66 Page

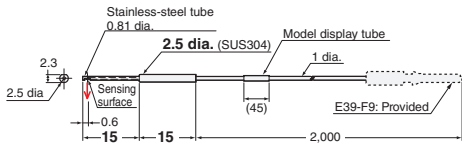


### Through-beam Fiber Units (Set of 2)

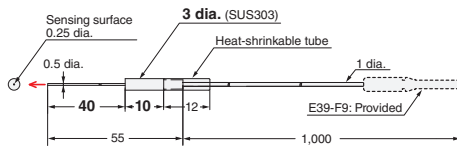
#### (21-A) E32-T24R 2M (Free Cutting)



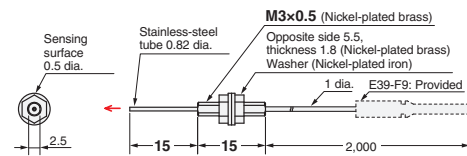
#### (21-B) E32-T24E 2M (Free Cutting)



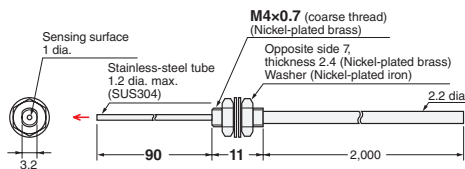
#### (21-C) E32-T33 1M (Free Cutting)



#### (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 |

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Fiber Units

Threaded  
Hex-shaped  
Cylindrical

Standard Installation

Flat  
Sleeved

Saving Space

Small Spot  
High Power  
Narrow view  
BGS

Beam Improvements

Retro-reflective  
Limited-reflective

Transparent Objects

Chemical-resistant, Oil-resistant  
Bending  
Heat-resistant

Environmental Immunity

Area Detection  
Liquid-level  
Vacuum  
FPD, Semi, Solar

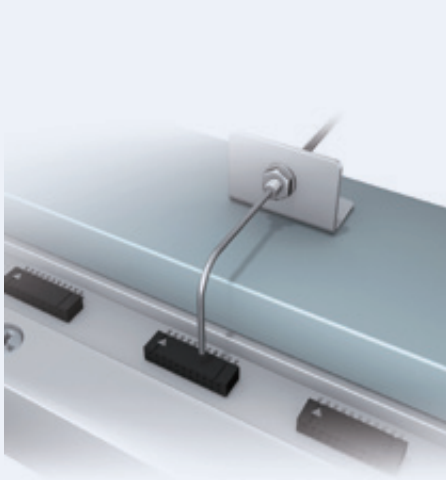
Applications

Installation  
Information

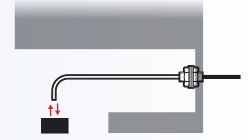
Fiber Amplifiers,  
Communications  
Unit, and  
Accessories

Technical  
Guide and  
Precautions

Model Index



- 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) |                      |              |                      |                           |                 | Optical axis diameter (minimum sensing object) | Models | 23 Page Dimensions No. |
|-------------------|-----------------|-------------------------|-----------------------|----------------------|--------------|----------------------|---------------------------|-----------------|------------------------------------------------|--------|------------------------|
|                   |                 |                         | E3X-ZV                |                      |              | E3NX-FA              |                           |                 |                                                |        |                        |
|                   |                 |                         | ■GIGA ■HS             | Other modes          |              | ■GIGA ■HS            | Other modes               |                 |                                                |        |                        |
| Side-view         |                 | Flexible, R1            | 70<br>20              | ST : 30<br>SHS: 8    | 100<br>30    | ST : 45<br>SHS: 8    |                           | E32-D24R 2M     | 23-A                                           |        |                        |
|                   |                 | R25                     | 120<br>45             | ST : 53<br>SHS: 14   | 180<br>67    | ST : 79<br>SHS: 14   |                           | E32-D24-S2 2M   | 23-B                                           |        |                        |
| Top-view          |                 | R4                      | 28<br>8               | ST : 12<br>SHS: 4    | 42<br>12     | ST : 18<br>SHS: 4    |                           | E32-D43M 1M     | 23-C                                           |        |                        |
|                   |                 |                         | 14<br>4               | ST : 6<br>SHS: 2     | 21<br>6      | ST : 9<br>SHS: 2     |                           | E32-D331 2M     | 23-D                                           |        |                        |
|                   |                 | R25                     | 70<br>20              | ST : 30<br>SHS: 8    | 100<br>30    | ST : 45<br>SHS: 8    |                           | E32-D33 2M      | 23-E                                           |        |                        |
|                   |                 | R4                      | 63<br>18              | ST : 27<br>SHS: 7    | 94<br>27     | ST : 40<br>SHS: 7    | (5 μm dia./<br>2 μm dia.) | E32-D32-S1 0.5M | 23-F                                           |        |                        |
|                   |                 |                         | 18<br>M3              | ST : 27<br>SHS: 7    | 27           | ST : 9<br>SHS: 2     |                           | E32-D31-S1 0.5M | 23-G                                           |        |                        |
|                   |                 | Flexible, R1            | 140<br>40             | ST : 60<br>SHS: 16   | 210<br>60    | ST : 90<br>SHS: 16   |                           | E32-DC200F4R 2M | 23-H                                           |        |                        |
|                   |                 | R10                     | 250<br>72             | ST : 110<br>SHS: 30  | 370<br>100   | ST : 160<br>SHS: 30  |                           | E32-D22-S1 2M   | 23-I                                           |        |                        |
|                   |                 |                         | 72<br>M4              | ST : 110<br>SHS: 30  | 370<br>100   | ST : 160<br>SHS: 30  |                           | E32-D21-S3 2M   | 23-J                                           |        |                        |
|                   |                 | Flexible, R1            | 840<br>240            | ST : 350<br>SHS: 100 | 1,260<br>360 | ST : 520<br>SHS: 100 |                           | E32-DC200BR 2M  | 23-K                                           |        |                        |
|                   |                 | R10                     | 250<br>72             | ST : 110<br>SHS: 30  | 370<br>100   | ST : 160<br>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.

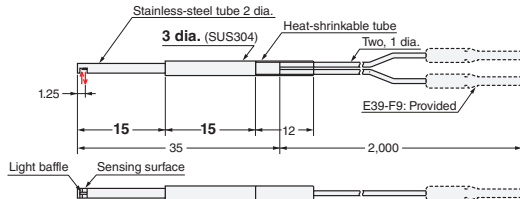
**5.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

### Dimensions

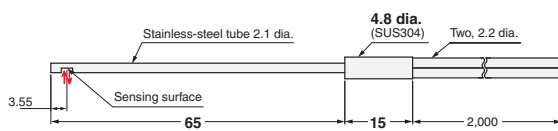
Installation Information → 62 to 66 Page

### Reflective Fiber Units

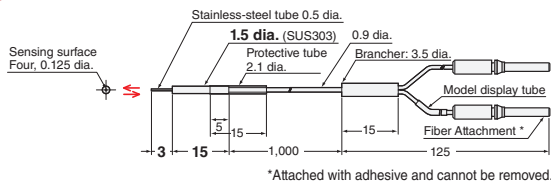
**23-A E32-D24R 2M (Free Cutting)**



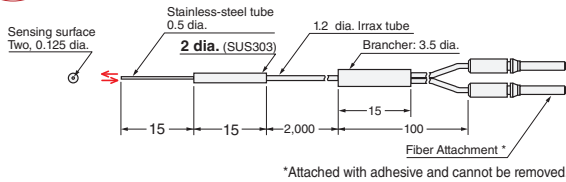
**23-B E32-D24-S2 2M (Free Cutting)**



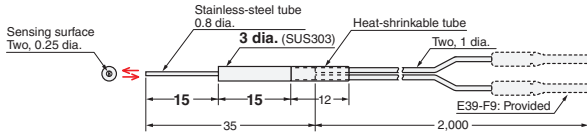
**23-C E32-D43M 1M (No Cutting)**



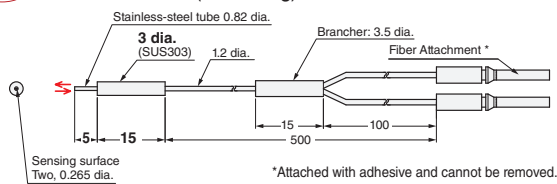
**23-D E32-D331 2M (No Cutting)**



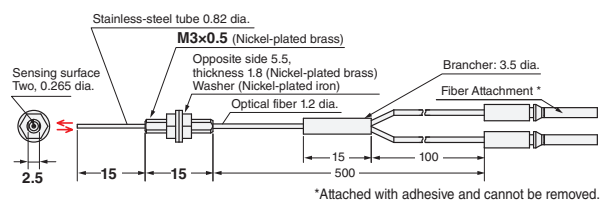
**23-E E32-D33 2M (Free Cutting)**



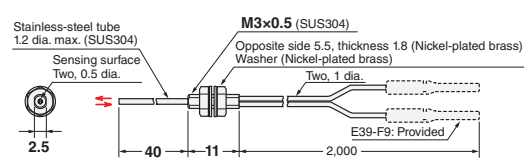
**23-F E32-D32-S1 0.5M (No Cutting)**



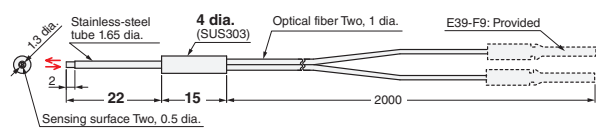
**23-G E32-D31-S1 0.5M (No Cutting)**



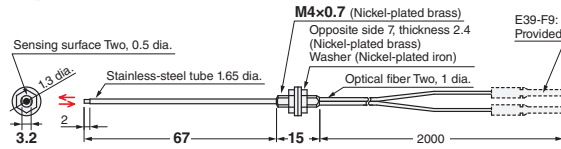
**23-H E32-DC200F4R 2M (Free Cutting)**



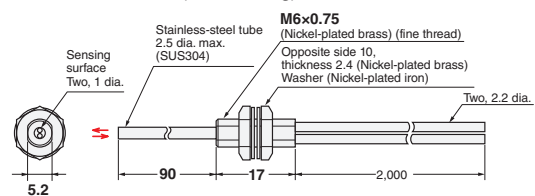
**23-I E32-D22-S1 2M (Free Cutting)**



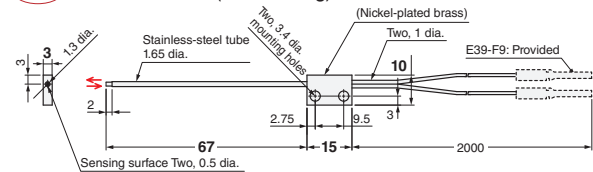
**23-J E32-D21-S3 2M (Free Cutting)**



**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 |

Fiber Sensor Features

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Fiber Units

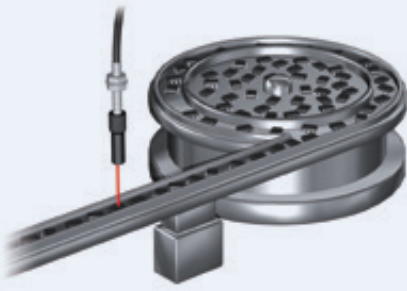
|                                   |                        |
|-----------------------------------|------------------------|
| Threaded                          | Standard Installation  |
| Hex-shaped                        |                        |
| Cylindrical                       |                        |
| Flat                              | Saving Space           |
| Sleeved                           |                        |
| Small Spot                        | Beam Improvements      |
| High Power                        |                        |
| Narrow view                       |                        |
| BGS                               |                        |
| Retro-reflective                  | Transparent Objects    |
| Limited-reflective                |                        |
| Chemical-resistant, Oil-resistant | Environmental Immunity |
| Bending                           |                        |
| Heat-resistant                    |                        |
| Area Detection                    | Applications           |
| Liquid-level                      |                        |
| Vacuum                            |                        |
| FPD, Semi, Solar                  |                        |

Installation Information

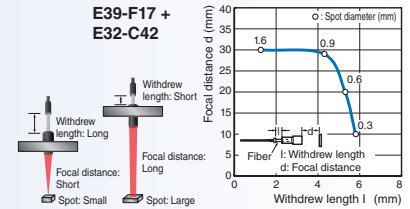
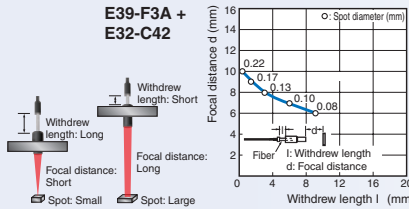
Fiber Amplifiers, Communications Unit, and Accessories

Technical Guide and Precautions

Model Index



- 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.



\* 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     | Lens Units + Fiber Units | Fiber Unit              |                   | 25 Page Dimensions No. |
|---------------|-----------------|----------------------|----------------|--------------------------|-------------------------|-------------------|------------------------|
|               |                 |                      | Models         | Appearance (mm)          | Bending radius of cable | Model             |                        |
| Variable spot | 0.1 to 0.6 dia. | 6 to 15              | <b>E39-F3A</b> |                          | R25                     | <b>E32-C42 1M</b> | <b>25-A</b>            |
|               | 0.3 to 1.6 dia. | 10 to 30             | <b>E39-F17</b> |                          |                         |                   | <b>25-B</b>            |

#### Parallel-light-spot types

##### Lens Units + Fiber Unit

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

#### 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                    | <br>Lens: unnecessary | R25                     | <b>E32-C42S 1M</b> | <b>25-E</b>            |
| Long-distance, Small-spot  | 6 dia.        | 50                   | <br>Lens: unnecessary |                         | <b>E32-L15 2M</b>  | <b>25-F</b>            |

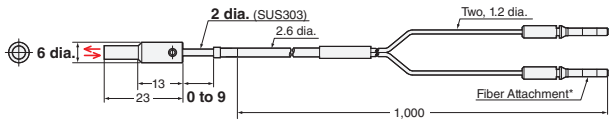
\* The spot diameter and the center distance are the same when using with E3X-ZV series or E3NX-FA□ series. The distance for E3NX-FAH□ infrared models varies.

Dimensions

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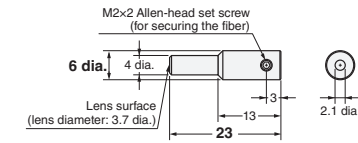
Reflective Fiber Units

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



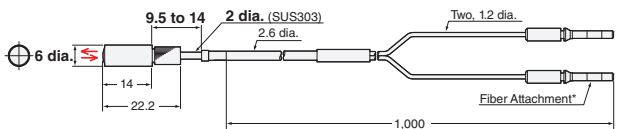
\* Attached with adhesive and cannot be removed.  
Note: There is a white tube on the emitter fiber.

E39-F3A



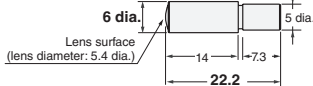
**Material:** Aluminum for body and optical glass for lens.  
Note: This is the Lens Unit for the E32-C42.

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



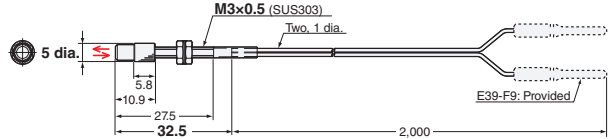
\* Attached with adhesive and cannot be removed.  
Note: There is a white tube on the emitter fiber.

E39-F17



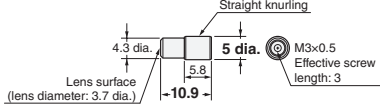
**Material:** Aluminum for body and optical glass for lens.

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



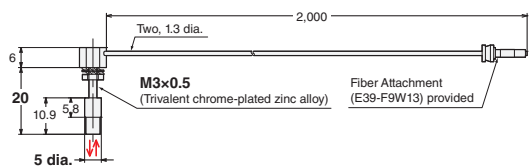
Note: There is a white line on the emitter fiber.

E39-F3C



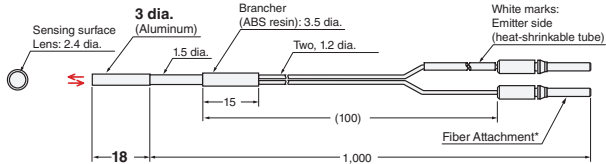
**Material:** Aluminum for body and optical glass for lens.  
Note: This is the Lens Unit for the E32-C31 and E32-C31N.

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



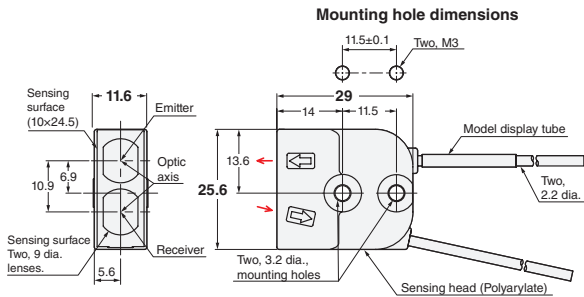
Note: There is a white line on the emitter fiber.

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<br>+ E32-C41 | E39-F3B<br>+ E32-C41 | E39-F3A-5<br>+ E32-C31<br>E32-C21N | E39-F3B<br>+ E32-C31<br>E32-C21N | E39-F18<br>+ E32-CC200<br>E32-C31<br>E32-C21N | E39-F3C | E32-L15 |

\* Refer to page 26 for details.

Fiber Sensor Features

Selection Guide

Fiber Units

Threaded  
Hex-shaped  
Cylindrical  
Flat  
Sleeved

Standard Installation  
Saving Space

Small Spot  
High Power  
Narrow view  
BGS

Beam Improvements

Retro-reflective  
Limited-reflective

Transparent Objects

Chemical-resistant, Oil-resistant  
Bending  
Heat-resistant

Environmental Immunity

Area Detection  
Liquid-level  
Vacuum

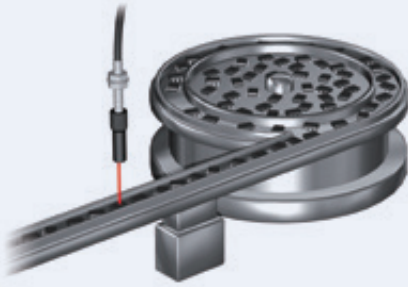
Applications

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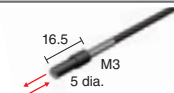
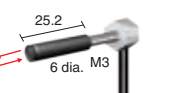
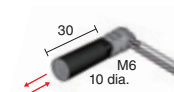
- Small-spot is ideal for detecting minute objects.  
Select the Fiber Unit that is best suited for the workpiece size and installation distance.  
(Refer to Reference Information for Model Selection)

## 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           |
| 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           |
| Long-distance, small-spot   | 3 dia.        | 50                   | E39-F18    |  | R25                     | E32-CC200 2M                                                                         | 27-G                   |
|                             |               |                      |            |  | Flexible, R4            | E32-C91N 2M                                                                          | 27-H                   |

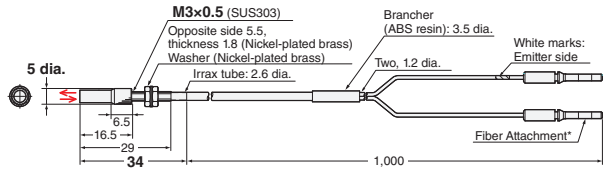
\* The spot diameter and the center distance are the same when using with E3X-ZV series or E3NX-FA□ series. The distance for E3NX-FAH□ infrared models varies.

Dimensions

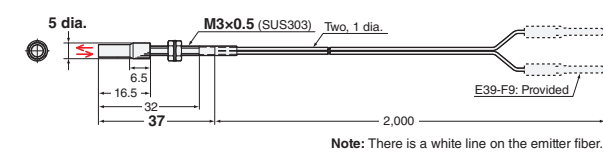
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Reflective Fiber Units

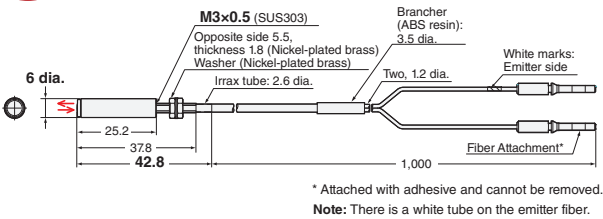
27-A E32-C41 1M (No Cutting) + E39-F3A-5



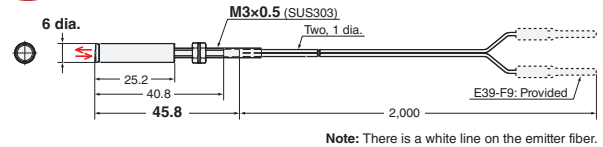
27-B E32-C31 2M (Free Cutting) + E39-F3A-5



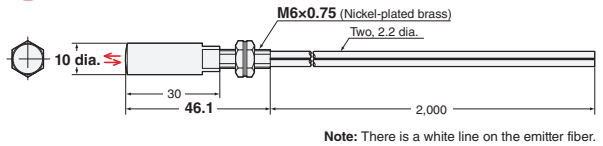
23-D E32-C41 1M (No Cutting) + E39-F3B



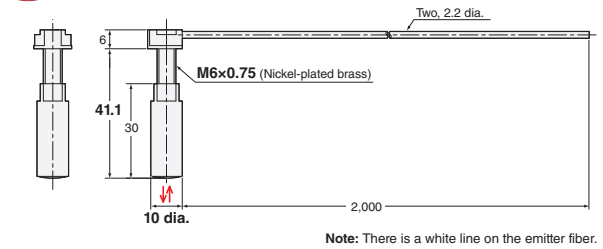
27-E E32-C31 2M (Free Cutting) + E39-F3B



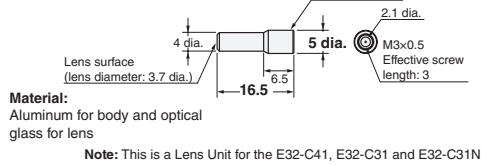
27-G E32-CC200 2M (Free Cutting) + E39-F18



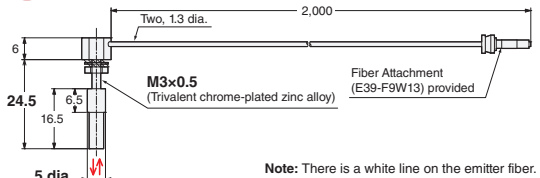
27-H E32-C91N 2M (Free Cutting) + E39-F18



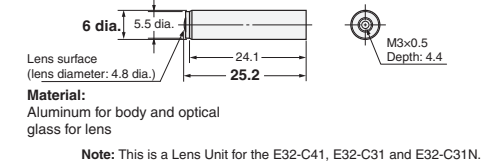
E39-F3A-5



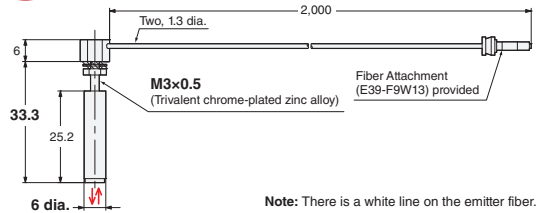
27-C E32-C21N 2M (Free Cutting) + E39-F3A-5



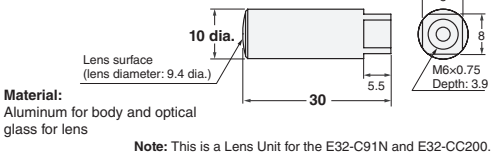
E39-F3B



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



E39-F18



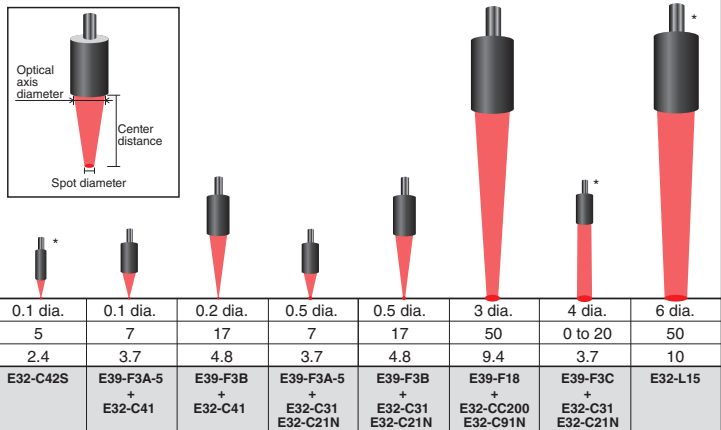
- Reference Information for Model Selection -

Model Selection Tips

- Select the best model by following these steps.
  - 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.
  - Select the model based on the allowable installation distance and center distance.

<Map of Spot Diameters and Center Distances>

(Unit: mm)



\* Refer to page 24 for details.

Fiber Sensor Features

Selection Guide

Fiber Units

Threaded  
Hex-shaped  
Cylindrical

Flat  
Sleeved

Small Spot  
High Power  
Narrow view  
BGS

Retro-reflective  
Limited-reflective

Chemical-resistant, Oil-resistant  
Bending  
Heat-resistant

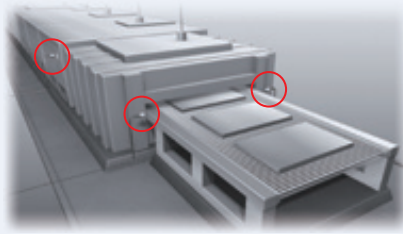
Area Detection  
Liquid-level  
Vacuum  
FPD, Semi, Solar

Installation Information

Fiber Amplifiers, Communications Unit, and Accessories

Technical Guide and Precautions

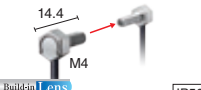
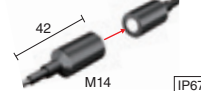
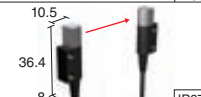
Model Index

Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power  
Narrow view  
BGSRetro-reflective  
Limited-reflectiveChemical-resistant,  
Oil-resistant  
Bending  
Heat-resistantArea  
Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

- 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)                                                                         |                                                                                                |                                                                                                |             | Optical axis diameter (minimum sensing object) | Models       | 29 Page Dimensions No.                                                                |
|-------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------|------------------------------------------------|--------------|---------------------------------------------------------------------------------------|
|                   |                                                                                               |                                                                                     |                         | E3X-ZV                                                                                        |                                                                                                | E3NX-FA                                                                                        |             |                                                |              |                                                                                       |
|                   |                                                                                               |                                                                                     |                         | ■GIGA ■HS                                                                                     | Other modes                                                                                    | ■GIGA ■HS                                                                                      | Other modes |                                                |              |                                                                                       |
| Right-angle       | 15°                                                                                           |   | Flexible, R2            |  4,000 *1    | ST : 3,500                                                                                     |  4,000 *1    | ST : 4,000  | 2.3 dia.<br>(0.1 dia./0.03 dia.)               | E32-LT11N 2M |    |
|                   |                                                                                               |                                                                                     |                         |  2,300      | SHS: 920                                                                                       |  3,450      | SHS: 920    |                                                |              |                                                                                       |
| Top-view          | 10°                                                                                           |  | R25                     |  20,000 *2 | ST : 20,000                                                                                    |  20,000 *2 | ST : 20,000 | 10 dia.                                        | E32-T17L 10M |  |
|                   |  20,000 *2 |                                                                                     |                         | SHS: 8,000                                                                                    |  20,000 *2 | SHS: 8,000                                                                                     |             |                                                |              |                                                                                       |
|                   | 15°                                                                                           |  | Flexible, R1            |  4,000 *1  | ST : 4,000                                                                                     |  4,000 *1  | ST : 4,000  | 2.3 dia.<br>(0.1 dia./0.03 dia.)               | E32-LT11 2M  |  |
|                   |                                                                                               |                                                                                     |                         |  2,700     | SHS: 1,080                                                                                     |  4,000 *1  | SHS: 1,080  |                                                |              |                                                                                       |
|                   |                                                                                               |                                                                                     |                         |  4,000 *1  | ST : 3,500                                                                                     |  4,000 *1  | ST : 4,000  |                                                | E32-LT11R 2M |                                                                                       |
|                   |                                                                                               |                                                                                     |                         |  2,300     | SHS: 920                                                                                       |  3,450     | SHS: 920    |                                                |              |                                                                                       |
| Side-view         | 30°                                                                                           |  | R25                     |  4,000 *1  | ST : 4,000                                                                                     |  4,000 *1  | ST : 4,000  | 4 dia.<br>(0.1 dia./0.03 dia.)                 | E32-T14 2M   |  |
|                   |                                                                                               |                                                                                     |                         |  4,000 *1  | SHS: 1,800                                                                                     |  4,000 *1  | SHS: 1,800  |                                                |              |                                                                                       |

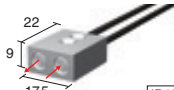
\*1 The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.

\*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)                                                                                                                                                                                  |                                    |                                                                                                                                                                                                            |                                    | Optical axis diameter (minimum sensing object) | Model      | 29 Page Dimensions No.                                                                |
|-------------------|----------------|-------------------------------------------------------------------------------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|------------------------------------------------|------------|---------------------------------------------------------------------------------------|
|                   |                |                                                                                     |                         | E3X-ZV                                                                                                                                                                                                 |                                    | E3NX-FA                                                                                                                                                                                                    |                                    |                                                |            |                                                                                       |
|                   |                |                                                                                     |                         | ■ GIGA ■ HS                                                                                                                                                                                            | Other modes                        | ■ GIGA ■ HS                                                                                                                                                                                                | Other modes                        |                                                |            |                                                                                       |
| Top-view          | 4°             |  | Bendresistant, R4       | 40 to 2,800<br><br>40 to 900<br> | ST : 40 to 1,400<br>SHS: 40 to 480 | 40 to 4,200<br><br>40 to 1,350<br> | ST : 40 to 2,100<br>SHS: 40 to 720 | —                                              | E32-D16 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.

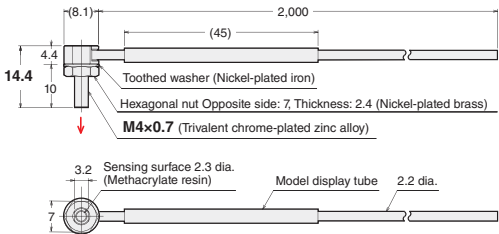
4. The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.

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

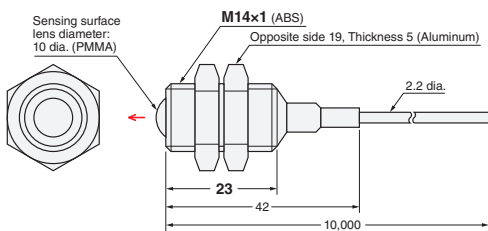
Dimensions

Through-beam Fiber Units (Set of 2)

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

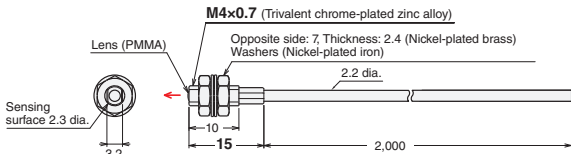


(29-B) E32-T17L 10M (Free Cutting)

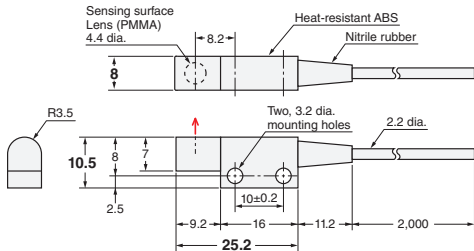


(29-C) E32-LT11 2M (Free Cutting)

E32-LT11R 2M (Free Cutting)

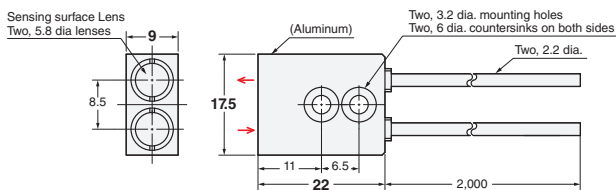


(29-D) E32-T14 2M (Free Cutting)



Reflective Fiber Units

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

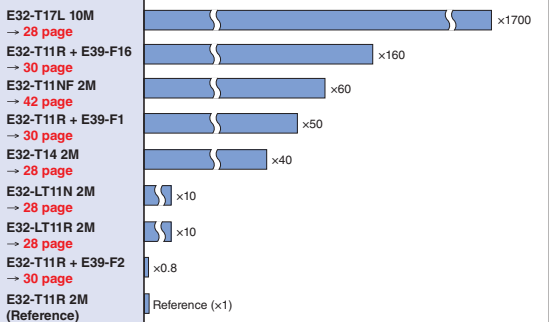


- Reference Information for Model Selection -

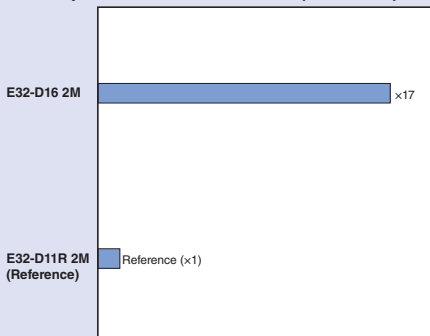
Comparisons of incident level

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)



|                                   |                        |
|-----------------------------------|------------------------|
| Threaded                          | Standard Installation  |
| Hex-shaped                        |                        |
| Cylindrical                       |                        |
| Flat                              | Saving Space           |
| Sleeved                           |                        |
| Small Spot                        | Beam Improvements      |
| High Power                        |                        |
| Narrow view                       |                        |
| BGS                               |                        |
| Retro-reflective                  | Transparent Objects    |
| Limited-reflective                |                        |
| Chemical-resistant, Oil-resistant | Environmental Immunity |
| Bending                           |                        |
| Heat-resistant                    |                        |
| Area Detection                    | Applications           |
| Liquid-level                      |                        |
| Vacuum                            |                        |
| FPD, Semi, Solar                  |                        |

Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power

BGS

Retro-  
reflective  
Limited-  
reflective

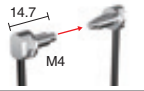
Bending

Liquid-level

FPD,  
Semi,  
Solar

## 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                                     |  |                  |  |                  |  |                  |                          |              |                        |                |                        |
|             |                                                                                   | Aperture angle                                 | Approx. 12°                                                                       |                  | Approx. 6°                                                                          |                  | Approx. 60°                                                                         |                  |                          |              |                        |                |                        |
|             |                                                                                   | Optical axis diameter (minimum sensing object) | 4 dia. (0.1 dia.)                                                                 |                  | 7.2 dia.                                                                            |                  | 3 dia. (0.1 dia.)                                                                   |                  |                          |              |                        |                |                        |
| Fiber Units |                                                                                   |                                                |                                                                                   |                  |                                                                                     |                  |                                                                                     |                  |                          |              |                        |                |                        |
| 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*<br>4,000*                               | ST : 4,000<br>SHS: 2,000                                                          | 4,000*<br>4,000* | ST : 4,000<br>SHS: 2,000                                                            | 4,000*<br>4,000* | ST : 4,000<br>SHS: 3,600                                                            | 4,000*<br>4,000* | ST : 4,000<br>SHS: 3,600 | —            | —                      | —              | —                      |
| E32-T11R 2M |  | 4,000*<br>4,000*                               | ST : 4,000<br>SHS: 2,000                                                          | 4,000*<br>4,000* | ST : 4,000<br>SHS: 2,000                                                            | 4,000*<br>4,000* | ST : 4,000<br>SHS: 3,600                                                            | 4,000*<br>4,000* | ST : 4,000<br>SHS: 3,600 | 1,450<br>500 | ST : 800<br>SHS: 200   | 2,170<br>750   | ST : 1,200<br>SHS: 200 |
| E32-T11 2M  |  | 4,000*<br>4,000*                               | ST : 4,000<br>SHS: 1,860                                                          | 4,000*<br>4,000* | ST : 4,000<br>SHS: 1,860                                                            | 4,000*<br>4,000* | ST : 4,000<br>SHS: 4,000                                                            | 4,000*<br>4,000* | ST : 4,000<br>SHS: 4,000 | 2,300<br>860 | ST : 1,320<br>SHS: 320 | 3,450<br>1,290 | ST : 1,980<br>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.

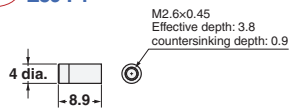
4. The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

Installation Information → 62 to 66 Page

## Lens Units (Set of 2)

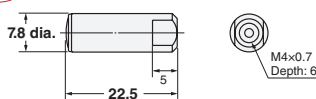
## 30-A E39-F1



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

**Note:** Two per set.

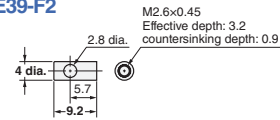
## 30-B E39-F16



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

**Note:** Two per set.

## 30-C E39-F2



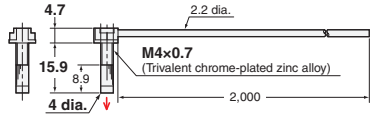
**Material:**  
Brass for the body and optical glass for the lens itself.

**Note:** Two per set.

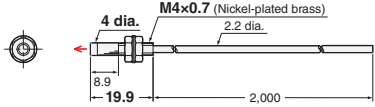
Dimensions

Through-beam Fiber Units (Set of 2)

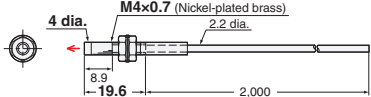
31-A E32-T11N 2M (Free Cutting) + E39-F1



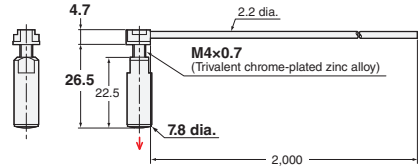
31-B E32-T11R 2M (Free Cutting) + E39-F1



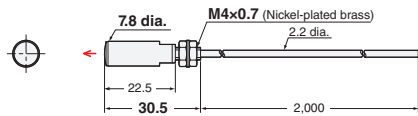
31-C E32-T11 2M (Free Cutting) + E39-F1



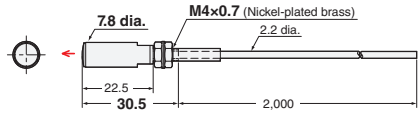
31-D E32-T11N 2M (Free Cutting) + E39-F16



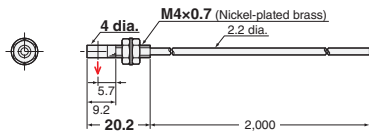
31-E E32-T11R 2M (Free Cutting) + E39-F16



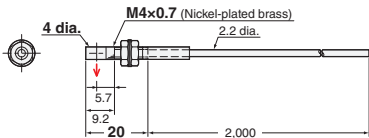
31-F E32-T11 2M (Free Cutting) + E39-F16



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



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

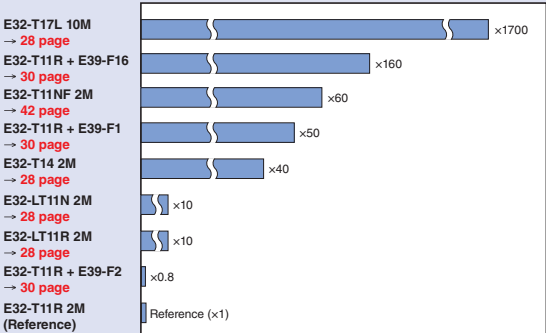


- Reference Information for Model Selection -

Comparisons of incident level

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

Comparisons of incident level (Through-beam)

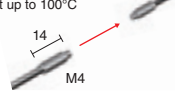


|                                   |                        |
|-----------------------------------|------------------------|
| Threaded                          | Standard Installation  |
| Hex-shaped                        |                        |
| Cylindrical                       |                        |
| Flat                              | Saving Space           |
| Sleeved                           |                        |
| Small Spot                        | Beam Improvements      |
| High Power                        |                        |
| Narrow view                       |                        |
| BGS                               | Transparent Objects    |
| Retro-reflective                  |                        |
| Limited-reflective                |                        |
| Chemical-resistant, Oil-resistant | Environmental Immunity |
| Bending                           |                        |
| Heat-resistant                    |                        |
| Area Detection                    | Applications           |
| Liquid-level                      |                        |
| Vacuum                            |                        |
| FPD, Semi, Solar                  |                        |

Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power  
Narrow  
viewRetro-reflective  
Limited-reflectiveChemical-resistant,  
Oil-resistant  
Bending  
Heat-resistantArea  
Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

## 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                                     |  |         |  |         |  |         |             |         |             |         |             |
|               |                                                                                   | Aperture angle                                 | Approx. 12°                                                                       |         | Approx. 6°                                                                          |         | Approx. 60°                                                                         |         |             |         |             |         |             |
|               |                                                                                   | Optical axis diameter (minimum sensing object) | 4 dia. (0.1 dia.)                                                                 |         | 7.2 dia.                                                                            |         | 3 dia. (0.1 dia.)                                                                   |         |             |         |             |         |             |
| Fiber Units   |                                                                                   |                                                |                                                                                   |         |                                                                                     |         |                                                                                     |         |             |         |             |         |             |
| 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   |  | 4,000*                                         | ST : 4,000*                                                                       | 4,000*  | ST : 4,000*                                                                         | 4,000*  | ST : 4,000*                                                                         | 4,000*  | ST : 4,000* | 1,400   | ST : 720    | 2,100   | ST : 1,080  |
|               |                                                                                   | 3,900                                          | SHS: 1,500                                                                        | 4,000*  | SHS: 1,500                                                                          | 4,000*  | SHS: 4,000*                                                                         | 4,000*  | SHS: 4,000* | 500     | SHS: 200    | 750     | SHS: 200    |
| E32-T81R-S 2M |  | 4,000*                                         | ST : 4,000*                                                                       | 4,000*  | ST : 4,000*                                                                         | 4,000*  | ST : 4,000*                                                                         | 4,000*  | ST : 4,000* | 1,000   | ST : 550    | 1,500   | ST : 820    |
|               |                                                                                   | 2,700                                          | SHS: 1,000                                                                        | 4,000*  | SHS: 1,000                                                                          | 4,000*  | SHS: 1,800                                                                          | 4,000*  | SHS: 1,800  | 360     | SHS: 140    | 540     | SHS: 140    |
| E32-T61-S 2M  |  | 4,000*                                         | ST : 4,000*                                                                       | 4,000*  | ST : 4,000*                                                                         | 4,000*  | ST : 4,000*                                                                         | 4,000*  | ST : 4,000* | 1,680   | ST : 900    | 2,520   | ST : 1,350  |
|               |                                                                                   | 4,000*                                         | SHS: 1,800                                                                        | 4,000*  | SHS: 1,800                                                                          | 4,000*  | SHS: 3,100                                                                          | 4,000*  | SHS: 3,100  | 600     | SHS: 240    | 900     | 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)

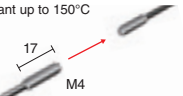
2. The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values. The first value is for the E3X-ZV and the second value is for the E3NX-FA.

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.

| Fiber Units |                                                                                                                                      | Lens Units                                     |               | Type                                                                                                 |             | High-power (incident level: 50 times)                                                                  |             | Ultra-high-power (incident level: 160 times) |             |             |             |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|---------------|------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------|-------------|-------------|-------------|
|             |                                                                                                                                      | Models                                         |               | E39-F1-33                                                                                            |             | E39-F16                                                                                                |             |                                              |             |             |             |
|             |                                                                                                                                      | Appearance                                     |               | <br><b>(32-D)</b> |             | <br><b>(32-B)</b> |             |                                              |             |             |             |
|             |                                                                                                                                      | Aperture angle                                 |               | Approx. 12°                                                                                          |             | Approx. 6°                                                                                             |             |                                              |             |             |             |
|             |                                                                                                                                      | 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  | <div>Heat-resistant up to 150°C</div> <div></div> |                                                | 4,000*        | ST : 4,000*                                                                                          | 4,000*      | ST : 4,000*                                                                                            | 4,000*      | ST : 4,000*                                  | 4,000*      | ST : 4,000* |             |
|             |                                                                                                                                      |                                                | 2,300         | SHS: 1,400                                                                                           | 3,450       | SHS: 1,400                                                                                             | 4,000*      | SHS: 4,000                                   | 4,000*      | SHS: 4,000  |             |
|             |                                                                                                                                      |                                                | <b>(33-J)</b> |                                                                                                      |             | <b>(33-K)</b>                                                                                          |             |                                              |             |             |             |

\* 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)

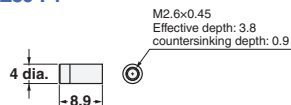
[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 μs)

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

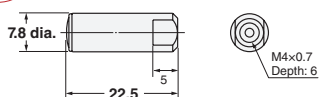
Installation Information → 62 to 66 Page

## Lens Units (Set of 2)

**(32-A) E39-F1**

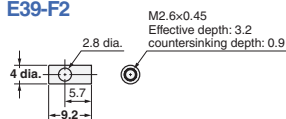
**Material:**  
Brass for the body and optical glass for the lens itself.

**Note:** Two per set.

**(32-B) E39-F16**

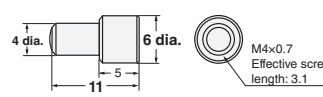
**Material:**  
SUS303 for the body and optical glass for the lens itself.

**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.

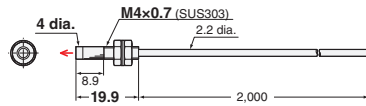
**Note 2:** This is the Lens Unit for the E32-T51.

## Dimensions

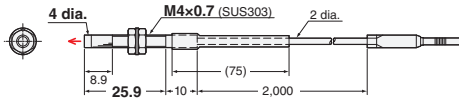
Installation Information → 62 to 66 Page

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

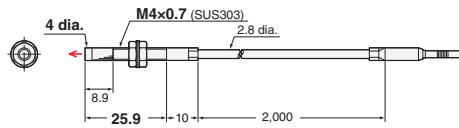
**(33-A) E32-T51R 2M (Free Cutting) + E39-F1**



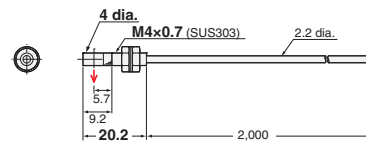
**(33-B) E32-T81R-S 2M (No Cutting) + E39-F1**



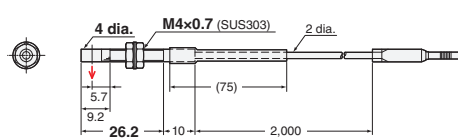
**(33-C) E32-T61-S 2M (No Cutting) + E39-F1**



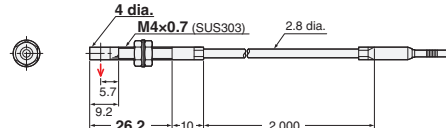
**(33-G) E32-T51R 2M (Free Cutting) + E39-F2**



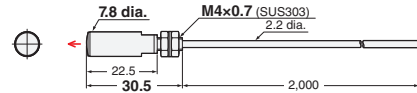
**(33-H) E32-T81R-S 2M (No Cutting) + E39-F2**



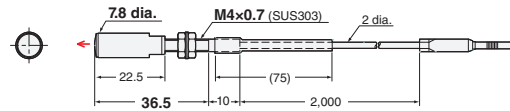
**(33-I) E32-T61-S 2M (No Cutting) + E39-F2**



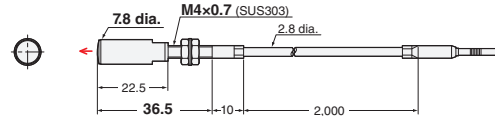
**(33-D) E32-T51R 2M (Free Cutting) + E39-F16**



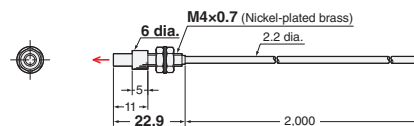
**(33-E) E32-T81R-S 2M (No Cutting) + E39-F16**



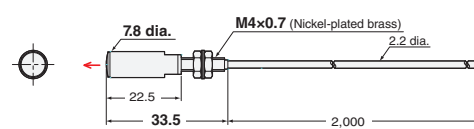
**(33-F) E32-T61-S 2M (No Cutting) + E39-F16**



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



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

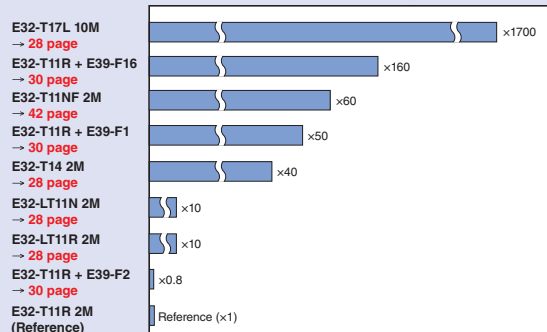


## - Reference Information for Model Selection -

### Comparisons of incident level

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

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



Fiber Sensor Features

Selection Guide

Fiber Units

Threaded  
Hex-shaped  
Cylindrical

Standard Installation

Flat  
Sleeved

Saving Space

Small Spot

High Power

Beam Improvements

Narrow view

BGS

Retro-reflective

Limited-reflective

Transparent Objects

Chemical-resistant, Oil-resistant

Environmental Immunity

Bending

Heat-resistant

Environmental Immunity

Area Detection

Liquid-level

Applications

Vacuum

FPD, Semi, Solar

Applications

Installation Information

Fiber Amplifiers, Communications Unit, and Accessories

Technical Guide and Precautions

Model Index

Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High PowerNarrow  
view

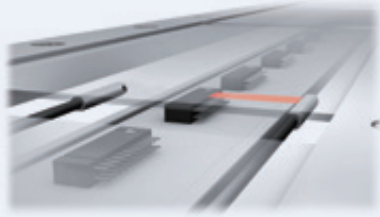
BGS

Retro-  
reflective  
Limited-  
reflectiveChemical-  
resistant,  
Oil-resistant

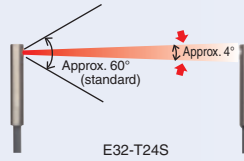
Bending

Heat-  
resistantArea  
Detection  
Liquid-level

Vacuum

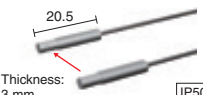
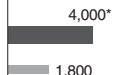
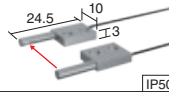
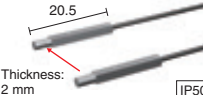
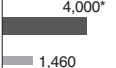
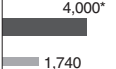
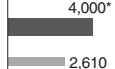
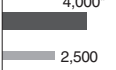
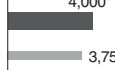
FPD,  
Semi,  
Solar

- 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°                                                                                                   | <br>Thickness: 3 mm<br>IP50  | Flexible, R1                                                                                                | <br>3,220         | ST : 1,780<br>SHS: 500                                                                                  | <br>4,000*<br>2,670 | 2 dia.<br>(0.1 dia./<br>0.03 dia.)                                                                      | E32-A03 2M                                                                            |  |                                                                                       |
|                   |                                                                                                        | <br>IP50                    | R10                                                                                                         | <br>1,200        |                                                                                                         | <br>1,800          |                                                                                                         |                                                                                       | E32-A03-1 2M                                                                        |  |
|                   | 3.4°                                                                                                   | <br>Thickness: 2 mm<br>IP50 | R10                                                                                                         | <br>1,280<br>450 | ST : 680<br>SHS: 200                                                                                    | <br>1,920<br>670   | ST : 1,020<br>SHS: 200                                                                                  | 1.2 dia.<br>(0.1 dia./<br>0.03 dia.)                                                  | E32-A04 2M                                                                          |  |
|                   |                                                                                                        | 4°                                                                                                             | <br>3.5 dia.<br>IP50     | Flexible, R1                                                                                        | <br>4,000*<br>1,460  | ST : 2,200<br>SHS: 580                                                                                 | <br>4,000*<br>2,190 | ST : 3,300<br>SHS: 580                                                                | 2 dia.<br>(0.1 dia./<br>0.03 dia.)                                                  | E32-T24SR 2M                                                                          |
| R10               | <br>4,000*<br>1,740 |                                                                                                                |                                                                                                             | ST : 2,600<br>SHS: 700                                                                              | <br>4,000*<br>2,610 | ST : 3,900<br>SHS: 700                                                                                 | E32-T24S 2M                                                                                             |  |                                                                                     |                                                                                       |
|                   | Top-view                                                                                               |                                                                                                                | <br>15<br>3 dia.<br>IP50 | R10                                                                                                 | <br>4,000*<br>2,500  | ST : 3,800<br>SHS: 1,000                                                                               | <br>4,000*<br>3,750 | ST : 4,000<br>SHS: 1,000                                                              | 1.7 dia.<br>(0.1 dia./<br>0.03 dia.)                                                | E32-T22S 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 the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.

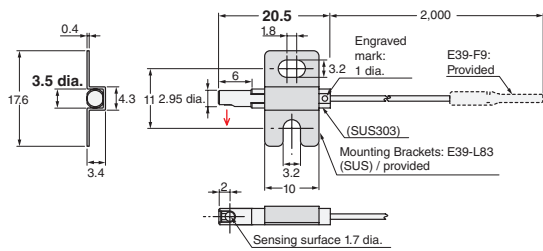
4. The E3X-HD Series offers the same sensing distance as the E3X-ZV.

Dimensions

Installation Information → 62 to 66 Page

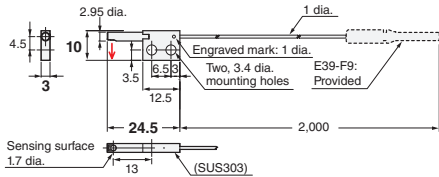
Through-beam Fiber Units (Set of 2)

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



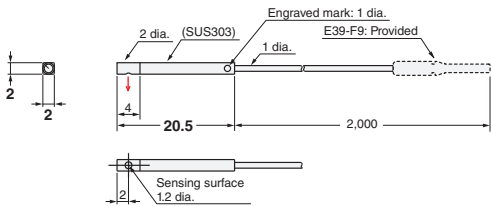
Note: Use the engraved surface and its opposing surface as installation (reference) surfaces.

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



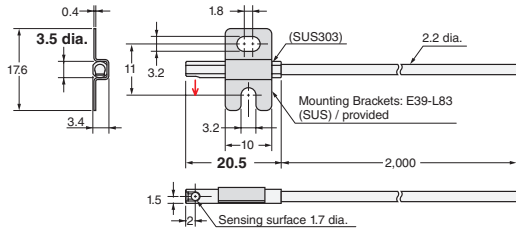
Note 1: Use the engraved surface and its opposing surface as installation (reference) surfaces.  
Note 2: Set of two symmetrically shaped Fiber Units.

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

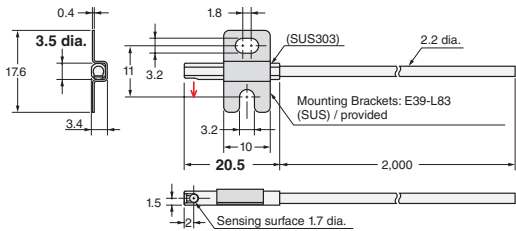


Note: Use the engraved surface and its opposing surface as installation (reference) surfaces.

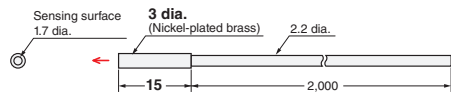
35-D E32-T24SR 2M (Free Cutting)



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



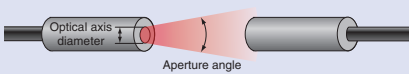
35-F E32-T22S 2M (Free Cutting)



- 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.



Fiber Sensor Features

Selection Guide

Fiber Units

Threaded  
Hex-shaped  
Cylindrical

Flat  
Sleeved

Small Spot  
High Power

Narrow view  
BGS

Retro-reflective  
Limited-reflective

Chemical-resistant, Oil-resistant  
Bending

Heat-resistant

Area Detection  
Liquid-level

Vacuum  
FPD, Semi, Solar

Installation Information

Fiber Amplifiers, Communications Unit, and Accessories

Technical Guide and Precautions

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Threaded  
Hex-shaped  
Cylindrical

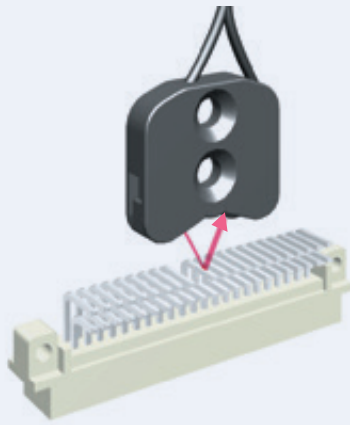
Flat  
Sleeved

Small Spot  
High Power  
Narrow view  
**BCS**

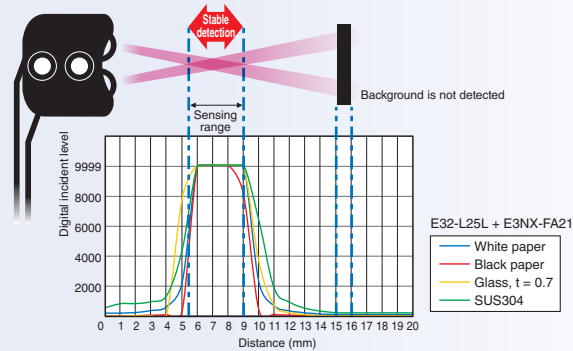
Retro-reflective  
Limited-reflective

Chemical-resistant,  
Oil-resistant  
Bending  
Heat-resistant

Area  
Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar



- 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                     | <br>0 to 15                  | ST : 0 to 15<br>SHS: 0 to 12                   | <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                     | <br>0 to 4                   | ST : 0 to 4<br>SHS: 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         |                 |                         | <br>5.4 to 9<br>(Center 7.2) | ST : 5.4 to 9<br>SHS: 5.4 to 9<br>(Center 7.2) | <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.

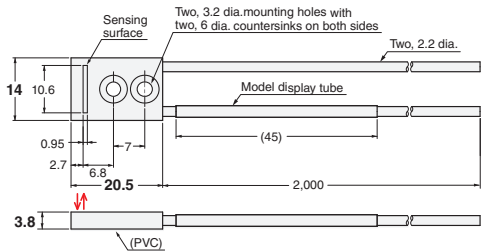
**6.** The E3X-HD Series offers the same sensing distance as the E3X-ZV.

Dimensions

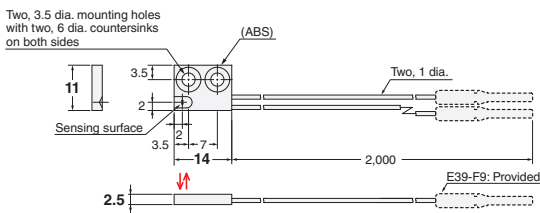
Installation Information → 62 to 66 Page

Limited-reflective Fiber Units

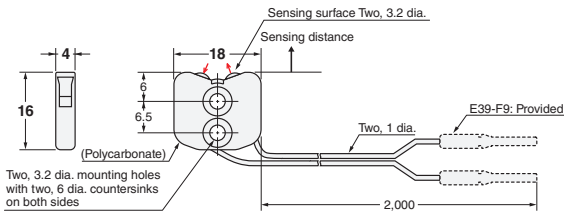
37-A E32-L16-N 2M (Free Cutting)



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



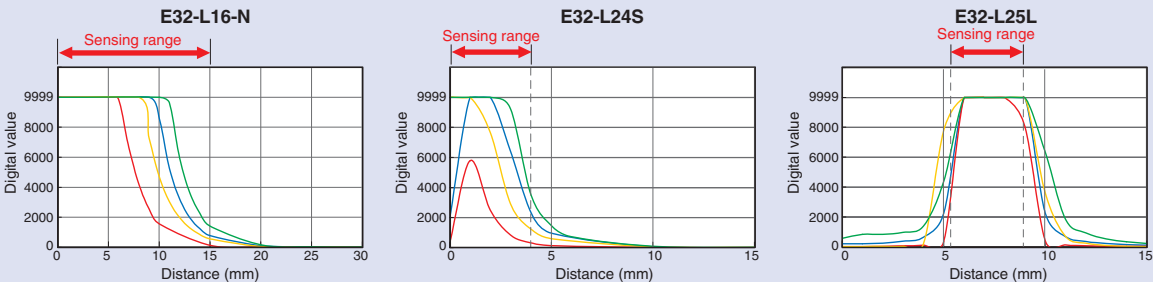
37-C E32-L25L 2M (Free Cutting)



- 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

Fiber Sensor Features

Selection Guide

Fiber Units

Threaded  
Hex-shaped  
Cylindrical

Flat  
Sleeved

Small Spot  
High Power

Narrow view  
BGS

Retro-reflective  
Limited-reflective

Chemical-resistant, Oil-resistant  
Bending

Heat-resistant  
Area Detection

Liquid-level  
Vacuum

FPD, Semi, Solar

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Model Index

Threaded  
Hex-shaped  
Cylindrical

Flat  
Sleeved

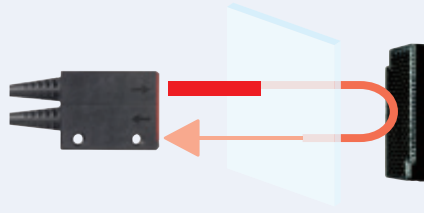
Small Spot  
High Power  
Narrow view  
BGS

Retro-reflective  
Limited-reflective

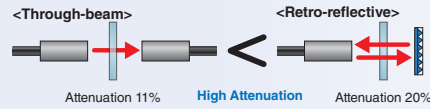
Chemical-resistant,  
Oil-resistant

Bending  
Heat-resistant

Area  
Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

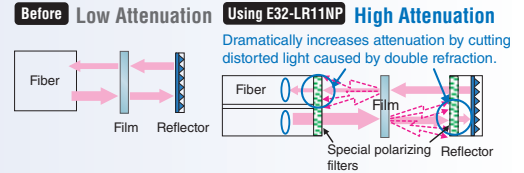
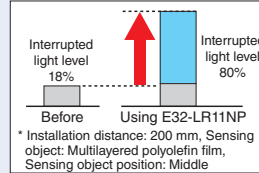


- Retro-reflective Fiber Units are ideal for detecting transparent objects. The light beam passes through the object twice, this model interrupts light more than Through-beam model.



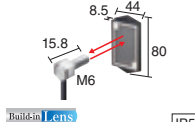
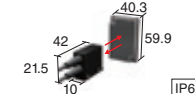
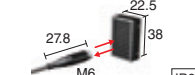
- Excellent detection performance with transparent films.  
(E32-LR11NP + E39-RP1)

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.                                                                |
|------------------|------|-------------------------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------------------------------------------------|-------------------------------|---------------------------------------------------------------------------------------|
| Features         | Size |                                                                                     |                         | E3X-ZV                                                                                                                                                                                               |                                        | E3NX-FA                                                                                                                                                                                              |                                        |                                                |                               |                                                                                       |
|                  |      |                                                                                     |                         |  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<br>+<br>E39-RP1 |   |
| 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./<br>0.07 dia.)                       | E32-R16 2M                    |  |
| 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./<br>0.03 dia.)                       | E32-R21 2M                    |  |

\* 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.

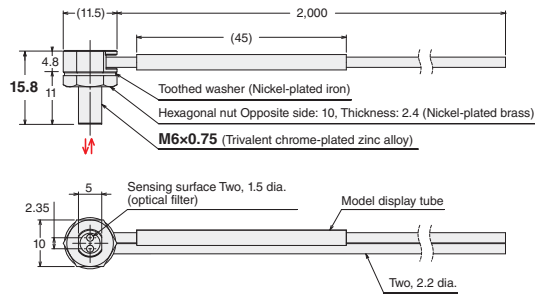
5. The E3X-HD Series offers the same sensing distance as the E3X-ZV.

### Dimensions

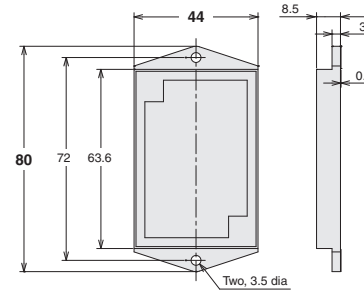
Installation Information → 62 to 66 Page

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

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

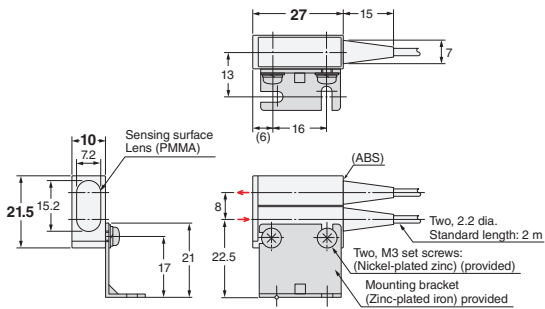


#### E39-RP1

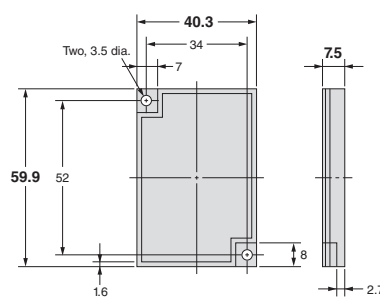


**Material:**  
<Reflective surface>  
Methacrylate resin  
<Back> ABS

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

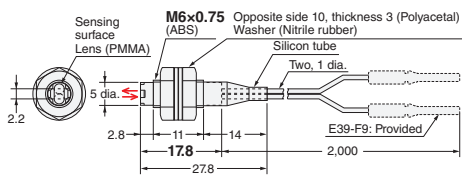


#### E39-R1 (Provided)

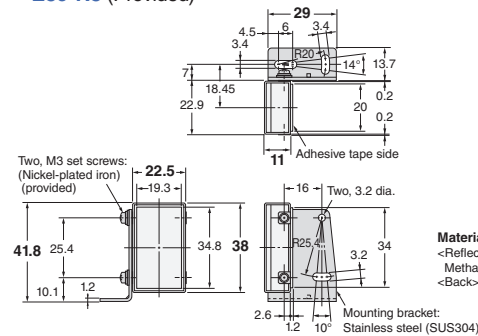


**Material:**  
<Reflective surface>  
Methacrylate resin  
<Back> ABS

#### 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          | Film wrapper on cigarette packs | PET bottles | Glass bottles | Plate glass, t: 0.7 |
|-------------------------|---------------------------------|-------------|---------------|---------------------|
| <b>Models</b>           |                                 |             |               |                     |
| 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<br>(mm)                                                             | Sensing distance (mm) (reference values)                                                                                                                                           |                      |                                                                                                                                                                                    |                      | Models          |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------|
|                                                                                     | E3X-ZV                                                                                                                                                                             |                      | E3NX-FA                                                                                                                                                                            |                      |                 |
|                                                                                     | ■ GIGA ■ HS                                                                                                                                                                        | Other modes          | ■ GIGA ■ HS                                                                                                                                                                        | Other modes          |                 |
|  |  550<br> 430 | ST : 500<br>SHS: 250 |  820<br> 640 | ST : 750<br>SHS: 250 | <b>E39-RSP1</b> |
|  |  210<br> 160 | ST : 190<br>-        |  310<br> 240 | ST : 280<br>-        | <b>E39-RP37</b> |

Fiber Sensor Features

Selection Guide

Fiber Units

Threaded  
Hex-shaped  
Cylindrical

Flat  
Sleeved

Small Spot  
High Power

Narrow view  
BGS

Retro-reflective  
Limited-reflective

Chemical-resistant, Oil-resistant  
Bending

Heat-resistant  
Area Detection

Liquid-level  
Vacuum

FPD, Semi, Solar

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Threaded  
Hex-shaped  
Cylindrical

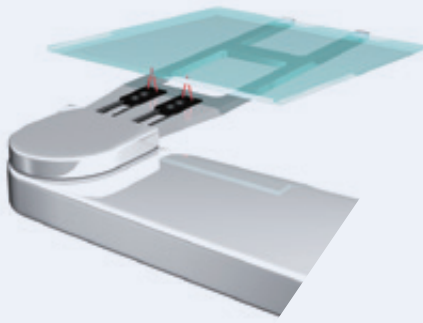
Flat  
Sleeved

Small Spot  
High Power  
Narrow view  
BGS

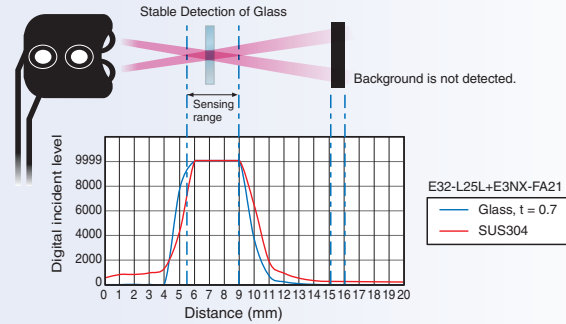
Retro-reflective  
Limited-reflective

Chemical-resistant,  
Oil-resistant  
Bending  
Heat-resistant

Area Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar



- 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                            |                     | Appearance (mm)                                                                                                  | Bending radius of cable | Sensing distance (mm)                 |                                             |                                       |                                             | Standard sensing object (minimum sensing object)                                   | Models       | 41 Page Dimensions No. |
|---------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------------------|---------------------------------------------|---------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------|--------------|------------------------|
| Features                        | Detection direction |                                                                                                                  |                         | E3X-ZV                                |                                             | E3NX-FA                               |                                             |                                                                                    |              |                        |
|                                 |                     |                                                                                                                  |                         | ■GIGA ■HS                             | Other modes                                 | ■GIGA ■HS                             | Other modes                                 |                                                                                    |              |                        |
| Small size                      | Flat-view           | <br>14<br>2.5<br>11<br>IP50    | 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./<br>2 μm dia.)                                                          | E32-L24S 2M  | 41-A                   |
| Standard                        |                     | <br>20.5<br>3.8<br>14<br>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 | 41-B                   |
| Glass-substrate alignment, 70°C |                     | <br>24.5<br>5.1<br>14<br>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   | 41-C                   |
| Standard long distance          |                     | <br>24.5<br>5.1<br>14<br>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   | 41-D                   |
| Side View form                  | Side-view           | <br>18<br>4<br>16<br>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./<br>2 μm dia.)                                                          | E32-L25L 2M  | 41-E                   |
| Glass-substrate Mapping, 70°C   | Top-view            | <br>23<br>9<br>20<br>IP40     | R25                     | 15 to 38<br>15 to 38 (Center 25)      | ST : 15 to 38 (Center 25)<br>SHS: -         | 15 to 38<br>15 to 38 (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.

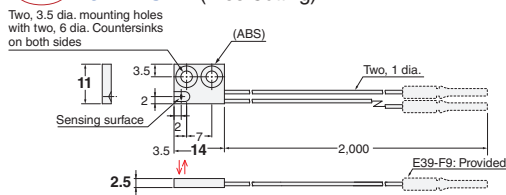
## Dimensions

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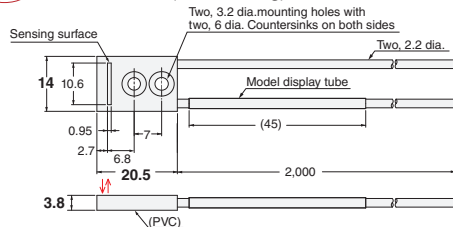


## Limited-reflective Fiber Units

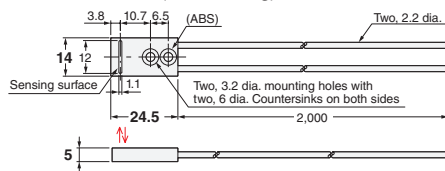
### (41-A) E32-L24S 2M (Free Cutting)



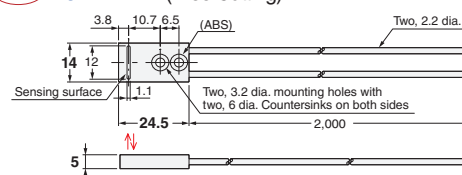
### (41-B) E32-L16-N 2M (Free Cutting)



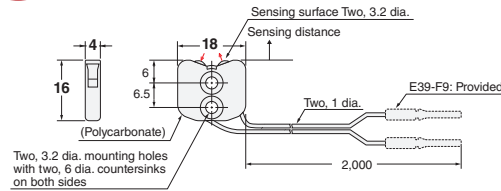
### (41-C) E32-A08 2M (Free Cutting)



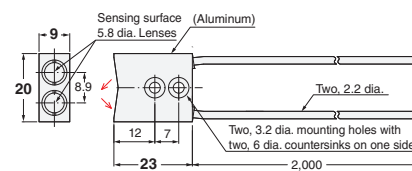
### (41-D) E32-A12 2M (Free Cutting)



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



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



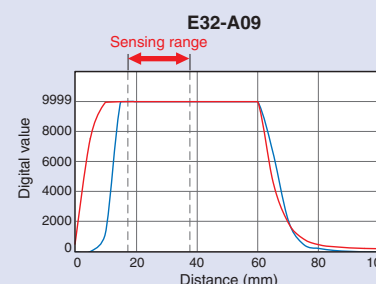
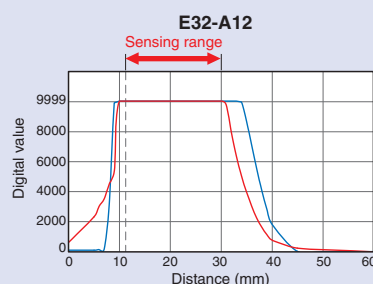
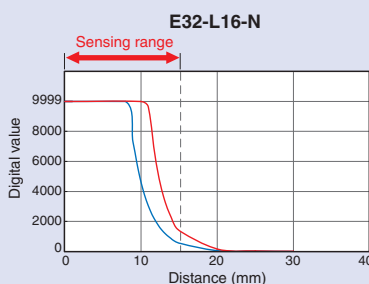
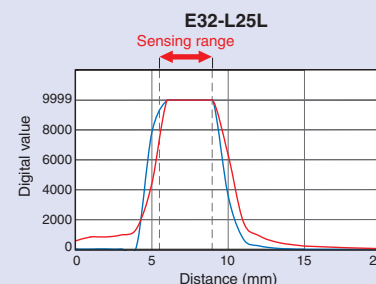
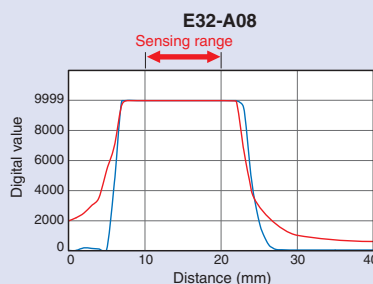
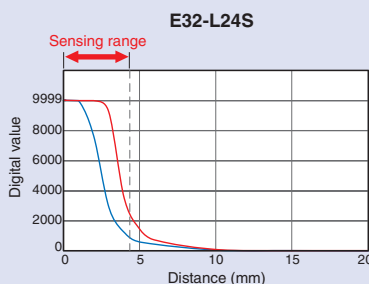
## - Reference Information for Model Selection -

### 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).

— Glass,  $t = 0.7$   
— SUS304



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

Fiber Sensor  
Features

Selection  
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Fiber Units

|             |                       |
|-------------|-----------------------|
| Threaded    | Standard Installation |
| Hex-shaped  |                       |
| Cylindrical |                       |
| Flat        | Saving Space          |
| Sleeved     |                       |
| Small Spot  | Beam Improvements     |
| High Power  |                       |
| Narrow view |                       |
| BGS         |                       |

|                    |                     |
|--------------------|---------------------|
| Retro-reflective   | Transparent Objects |
| Limited-reflective |                     |

|                                   |                        |
|-----------------------------------|------------------------|
| Chemical-resistant, Oil-resistant | Environmental Immunity |
| Bending                           |                        |
| Heat-resistant                    |                        |

|                  |              |
|------------------|--------------|
| Area Detection   | Applications |
| Liquid-level     |              |
| Vacuum           |              |
| FPD, Semi, Solar |              |

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Threaded  
Hex-shaped  
Cylindrical

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High Power  
Narrow view

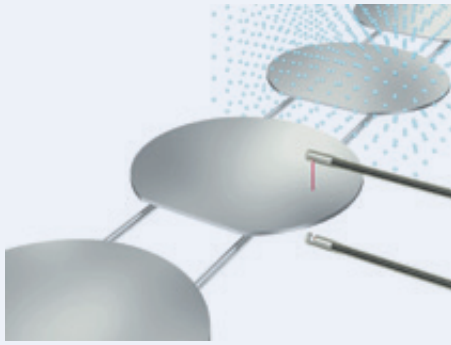
Retro-reflective  
Limited-reflective

Chemical-resistant,  
Oil-resistant  
Bending  
Heat-resistant

Area  
Detection

Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

Model Index



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

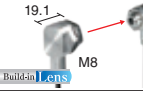
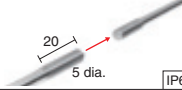
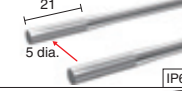
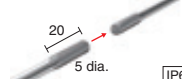
Chemical-resistant Data for Fluororesin (Reference)

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

Note: Results depend on concentration.

## Specifications

### Through-beam Fiber Units

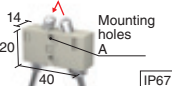
| Type                            | Sensing direction | Appearance (mm)                                                                     | Bending radius of cable | Sensing distance (mm) |                                |                      |                                | Optical axis diameter (minimum sensing object) | Models        | 43 Page Dimensions No. |
|---------------------------------|-------------------|-------------------------------------------------------------------------------------|-------------------------|-----------------------|--------------------------------|----------------------|--------------------------------|------------------------------------------------|---------------|------------------------|
|                                 |                   |                                                                                     |                         | E3X-ZV                |                                | E3NX-FA              |                                |                                                |               |                        |
|                                 |                   |                                                                                     |                         | ■GIGA ■HS             | Other modes                    | ■GIGA ■HS            | Other modes                    |                                                |               |                        |
| Oil-resistant                   | Right-angle       |    | Flexible, R1            | 4,000 *1<br>4,000 *1  | *1<br>ST : 4,000<br>SHS: 2,200 | 4,000 *1<br>4,000 *1 | *1<br>ST : 4,000<br>SHS: 2,200 | 4 dia.<br>(0.1 dia./0.03 dia.)                 | E32-T11NF 2M  | 43-A                   |
|                                 |                   |    | Flexible, R1            | 2,200<br>730          | ST : 1,100<br>SHS: 270         | 3,300<br>1,100       | ST : 1,600<br>SHS: 270         | 2 dia.<br>(0.1 dia./0.03 dia.)                 | E32-T11NFS 2M | 43-A2                  |
| Chemical/oil resistant          | Top-view          |   | R40                     | 4,000 *1<br>4,000 *1  | *1<br>ST : 4,000<br>SHS: 1,600 | 4,000 *1<br>4,000 *1 | *1<br>ST : 4,000<br>SHS: 1,600 | 4 dia.<br>(0.1 dia./0.03 dia.)                 | E32-T12F 2M   | 43-B                   |
|                                 |                   |  | R4                      | 4,000 *1<br>2,600     | *1<br>ST : 4,000<br>SHS: 1,000 | 4,000 *1<br>3,900    | *1<br>ST : 4,000<br>SHS: 1,000 |                                                | E32-T11F 2M   | 43-C                   |
|                                 | Side-view         |  | R40                     | 1,400<br>500          | ST : 800<br>SHS: 200           | 2,100<br>750         | ST : 1,200<br>SHS: 200         | 3 dia.<br>(0.1 dia./0.03 dia.)                 | E32-T14F 2M   | 43-D                   |
| Chemical/oil resistant 150°C *2 | Top-view          |  | R40                     | 4,000 *1<br>1,800     | ST : 2,800<br>SHS: 700         | 4,000 *1<br>2,700    | *1<br>ST : 4,000<br>SHS: 700   | 4 dia.<br>(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)                                                                                                                                       |                      |                |                         | Standard sensing object (minimum sensing object) | Models       | 43 Page Dimensions No. |  |
|---------------------------------------------------------|-------------------|-------------------------------------------------------------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------|-------------------------|--------------------------------------------------|--------------|------------------------|--|
|                                                         |                   |                                                                                     |                         | E3X-ZV                                                                                                                                                      |                      |                | E3NX-FA                 |                                                  |              |                        |  |
|                                                         |                   |                                                                                     |                         | ■ GIGA ■ HS Other modes                                                                                                                                     |                      |                | ■ GIGA ■ HS Other modes |                                                  |              |                        |  |
| Semiconductors: Cleaning, developing, and etching, 60°C | Top-view          |  | R40                     | 8 to 20 mm from tip of lens<br>(Recommended sensing distance: 11 mm)<br>19 to 31 mm from center of mounting hole A<br>(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<br>(Recommended sensing distance: 11 mm)<br>32 to 44 mm from center of mounting hole A<br>(Recommended sensing distance: 35 mm) |                      |                |                         |                                                  | E32-L11FS 2M | 43-G                   |  |
| Chemical/oil resistant                                  |                   |  |                         | GIGA –<br>130                                                                                                                                               | ST : 190<br>SHS: 60  | GIGA –<br>190  | ST : 280<br>SHS: 60     | (5 μm dia./<br>2 μm dia.)                        | E32-D12F 2M  | 43-H                   |  |
| Only cable: chemical resistant                          |                   |  | R4                      | ■ 840<br>1240                                                                                                                                               | ST : 350<br>SHS: 100 | ■ 1,260<br>360 | ST : 520<br>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)

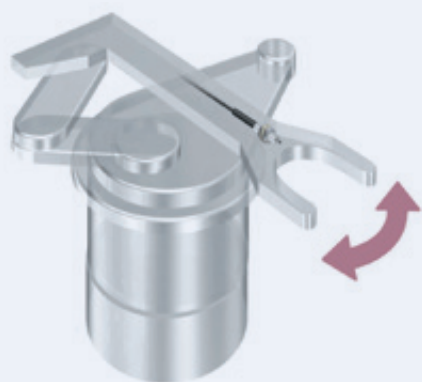
2. The values for the minimum sensing object are reference values that indicate values obtained in standard mode with the sensing distance and sensitivity set to the optimum values.

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.

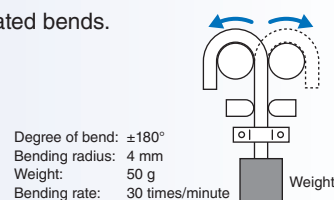
4. The sensing distances for the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.

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



Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power  
Narrow view  
BGSRetro-reflective  
Limited-reflectiveChemical-resistant,  
Oil-resistant  
Bending  
Heat-resistantArea Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

- 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       |                       | ST : 400    |           | ST : 600    | 0.5 dia.<br>(5 μm dia./<br>2 μm dia.)          | E32-T22B 2M | 45-A                   |
| M3       |                 |                         |                       | SHS: 90     |           | SHS: 90     |                                                | E32-T21 2M  | 45-B                   |
| M4       |                 |                         |                       | ST : 1,350  |           | ST : 2,020  | 1 dia.<br>(5 μm dia./<br>2 μm dia.)            | E32-T11 2M  | 45-C                   |
| Square   |                 |                         |                       | ST : 300    |           | ST : 450    |                                                |             |                        |
|          |                 |                         | SHS: 70               |             | SHS: 70   |             |                                                |             |                        |

**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/<br>E32-LT11 2M/E32-LT11R 2M/<br>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.

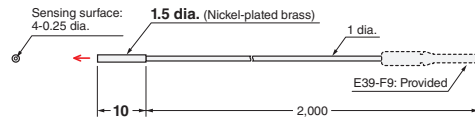
## Dimensions

Installation Information → 62 to 66 Page

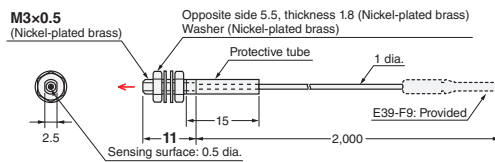


### Through-beam Fiber Units (Set of 2)

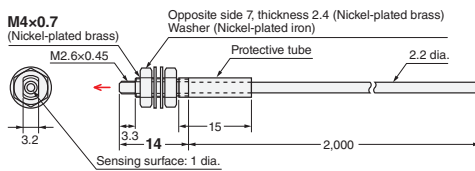
#### (45-A) E32-T22B 2M (Free Cutting)



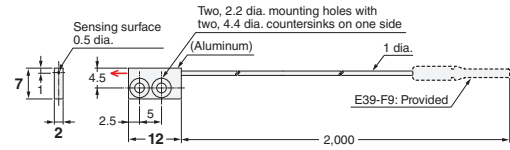
#### (45-B) E32-T21 2M (Free Cutting)



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



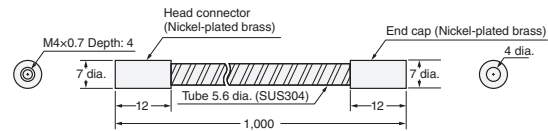
#### (45-D) E32-T25XB 2M (Free Cutting)



**Note 1:** Set of two symmetrically shaped Fiber Units.

**Note 2:** Four, M2 x 8 stainless steel countersunk mounting screws are provided.

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



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

Fiber Sensor  
Features

Selection  
Guide

Fiber Units

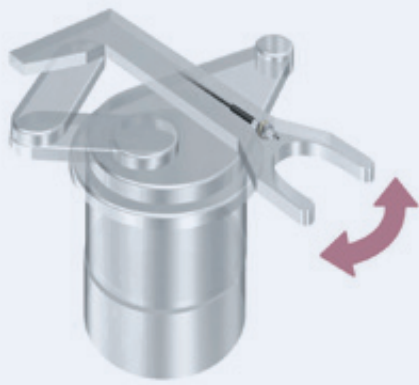
|                                   |                        |
|-----------------------------------|------------------------|
| Threaded                          | Standard Installation  |
| Hex-shaped                        |                        |
| Cylindrical                       |                        |
| Flat                              | Saving Space           |
| Sleeved                           |                        |
| Small Spot                        | Beam Improvements      |
| High Power                        |                        |
| Narrow view                       |                        |
| BGS                               |                        |
| Retro-reflective                  | Transparent Objects    |
| Limited-reflective                |                        |
| Chemical-resistant, Oil-resistant | Environmental Immunity |
| Bending                           |                        |
| Heat-resistant                    |                        |
| Area Detection                    | Applications           |
| Liquid-level                      |                        |
| Vacuum                            |                        |
| FPD, Semi, Solar                  |                        |

Installation  
Information

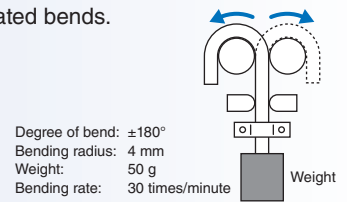
Fiber Amplifiers,  
Communications  
Unit, and  
Accessories

Technical  
Guide and  
Precautions

Model Index



- Capable of withstanding one million repeated bends.



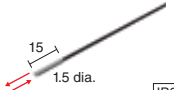
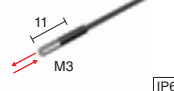
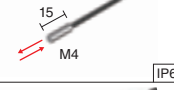
- A large number of independent fine fibers ensures good flexibility. Suitable for use on moving parts without easily breaking.



- 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                 | ST : 60     | ■ 210       | ST : 90     | (5 μm dia./<br>2 μm dia.)                      | E32-D22B 2M  | 47-A                   |
| M3       |  |                         | ■ 40                  | SHS: 16     | ■ 60        | SHS: 16     |                                                | E32-D21 2M   | 47-B                   |
| 3 dia.   |  |                         | ■ 300                 | ST : 140    | ■ 450       | ST : 210    |                                                | E32-D221B 2M | 47-C                   |
| M4       |  |                         | ■ 90                  | SHS: 40     | ■ 130       | SHS: 40     |                                                | E32-D21B 2M  | 47-D                   |
| M6       |  |                         | ■ 840                 | ST : 350    | ■ 1,260     | ST : 520    |                                                | E32-D11 2M   | 47-E                   |
| Square   |  |                         | ■ 240                 | ST : 100    | ■ 360       | ST : 150    |                                                | E32-D25XB 2M | 47-F                   |
|          |                                                                                     |                         | ■ 60                  | SHS: 30     | ■ 90        | SHS: 30     |                                                |              |                        |

**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/<br>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/<br>E32-D11 2M/E32-D51R 2M/<br>E32-D51 2M | E39-F32D 1M | 1 piece  |                        |

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

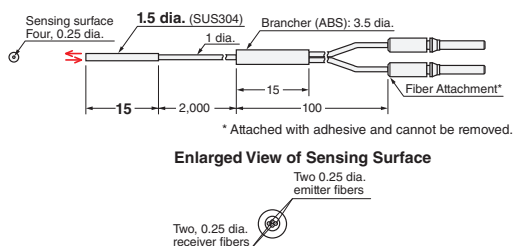
## Dimensions

Installation Information → 62 to 66 Page

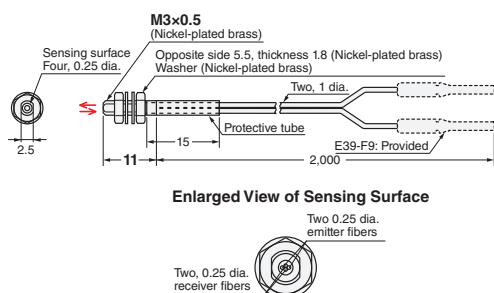


### Limited-reflective Fiber Units

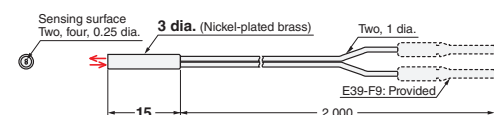
#### 47-A E32-D22B 2M (No Cutting)



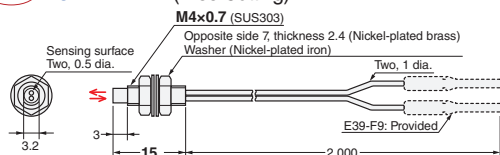
#### 47-B E32-D21 2M (Free Cutting)



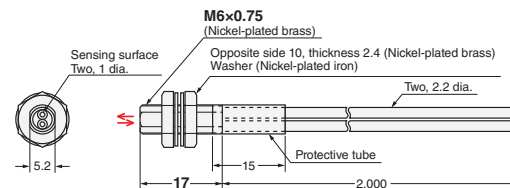
#### 47-C E32-D221B 2M (Free Cutting)



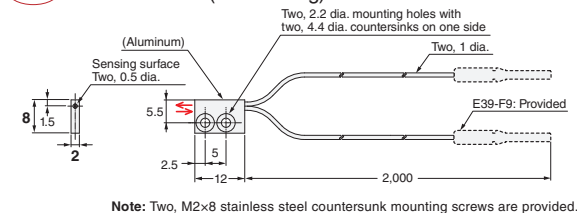
#### 47-D E32-D21B 2M (Free Cutting)



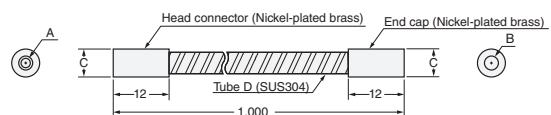
#### 47-E E32-D11 2M (Free Cutting)



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



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



| Models      | A                | B      | C        | D          |
|-------------|------------------|--------|----------|------------|
| E39-F32A 1M | M3x0.5 Depth: 4  | 3 dia. | 6 dia.   | (4.6 dia.) |
| E39-F32C 1M | M4x0.7 Depth: 4  | 4 dia. | 7 dia.   | (5.6 dia.) |
| E39-F32D 1M | M6x0.75 Depth: 4 | 5 dia. | 8.5 dia. | (7 dia.)   |

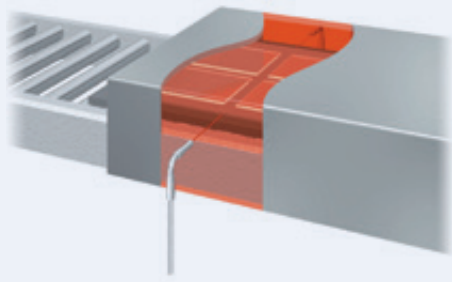
**Note:** Saddles (two (four for the E39-F32C 1M), trivalent chromate-plated iron) are provided.

Fiber Sensor  
Features

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Fiber Units

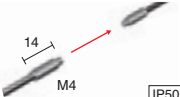
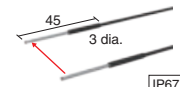
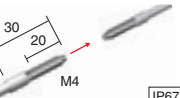
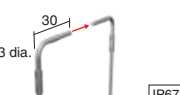
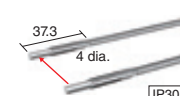
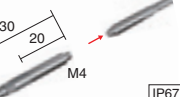
|                                                        |                        |
|--------------------------------------------------------|------------------------|
| Threaded                                               | Standard Installation  |
| Hex-shaped                                             |                        |
| Cylindrical                                            |                        |
| Flat                                                   | Saving Space           |
| Sleeved                                                |                        |
| Small Spot                                             | Beam Improvements      |
| High Power                                             |                        |
| Narrow view                                            |                        |
| BGS                                                    |                        |
| Retro-reflective                                       | Transparent Objects    |
| Limited-reflective                                     |                        |
| Chemical-resistant, Oil-resistant                      | Environmental Immunity |
| Bending                                                |                        |
| Heat-resistant                                         |                        |
| Area Detection                                         | Applications           |
| Liquid-level                                           |                        |
| Vacuum                                                 |                        |
| FPD, Semi, Solar                                       |                        |
| Installation Information                               |                        |
| Fiber Amplifiers, Communications Unit, and Accessories |                        |
| Technical Guide and Precautions                        |                        |
| Model Index                                            |                        |



- 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            | <br>1,600<br><br>560         | ST : 800<br>SHS: 225   | <br>2,400<br><br>840          | ST : 1,200<br>SHS: 225 | 1 dia.<br>(0.1 dia./0.03 dia.)                 | E32-T51R 2M                       | 49-A                   |
| 150°C *2                   |  | R35                     | <br>2,800<br><br>1,000    | ST : 1,500<br>SHS: 400 | <br>4,000 *5<br><br>1,500 | ST : 2,250<br>SHS: 400 | 1.5 dia.<br>(0.1 dia./0.03 dia.)               | E32-T51 2M                        | 49-B                   |
| 150°C *2                   |  | R35                     | <br>840<br><br>300        | ST : 450<br>SHS: 120   | <br>1,260<br><br>450      | ST : 670<br>SHS: 120   | 1.5 dia.<br>(0.1 dia./0.03 dia.)               | E32-T54 2M                        | 49-C                   |
| 200°C *3                   |  | R10                     | <br>1,000<br><br>360      | ST : 550<br>SHS: 140   | <br>1,500<br><br>540      | ST : 820<br>SHS: 140   | 0.7 dia.<br>(5 µm dia./2 µm dia.)              | E32-T61R-S 2M                     | 49-D                   |
| 200°C                      |  | R25                     | <br>4,000 *5<br><br>1,740 | ST : 2,600<br>SHS: 700 | <br>4,000 *5<br><br>2,610 | ST : 3,900<br>SHS: 700 | 1.7 dia.<br>(0.1 dia./0.03 dia.)               | E32-T64S-S 2M                     | 49-E                   |
| 300°C                      |  | R25                     | <br>360<br><br>120        | ST : 190<br>SHS: 50    | <br>540<br><br>180        | ST : 290<br>SHS: 70    | —                                              | E32-T64-2 2M                      | 49-F                   |
| 350°C *4                   |  | R25                     | <br>1,680<br><br>600      | ST : 900<br>SHS: 240   | <br>2,520<br><br>900      | ST : 1,350<br>SHS: 240 | 1 dia.<br>(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.

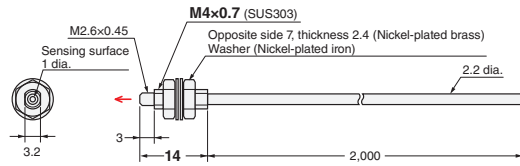
4. The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

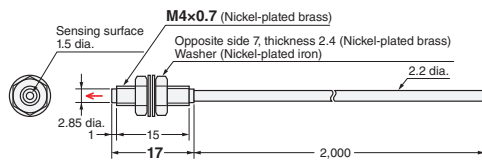
Installation Information → 62 to 66 Page

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

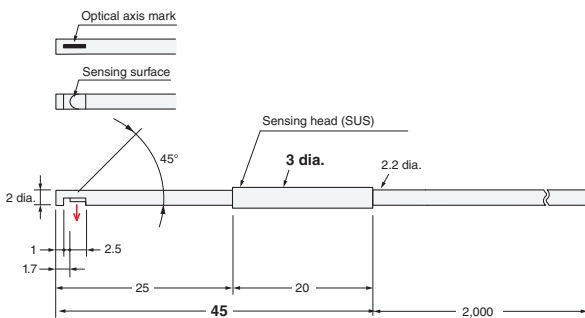
**49-A E32-T51R 2M** (Free Cutting)



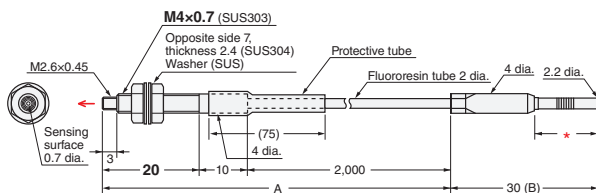
**49-B E32-T51 2M** (Free Cutting)



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

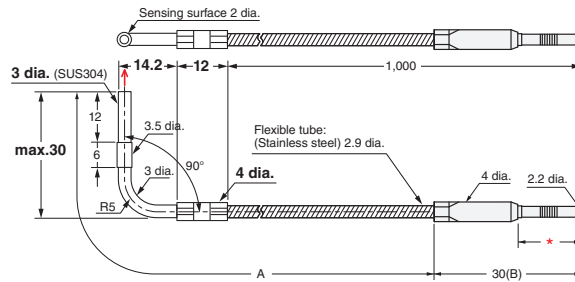


**49-D E32-T81R-S 2M** (No Cutting)



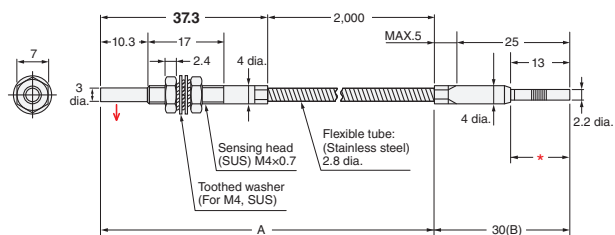
**Note:** The maximum allowable temperatures for sections A and B are 200°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by \*) must be maintained within the Amplifier Unit's operating temperature range.

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



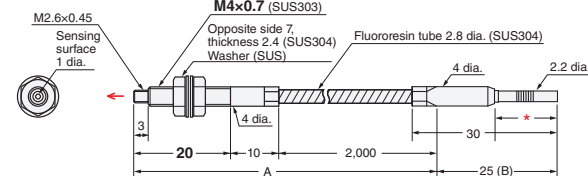
**Note:** The maximum allowable temperatures for sections A and B are 200°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by \*) must be maintained within the Amplifier Unit's operating temperature range.

**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

Fiber Sensor  
Features

Selection  
Guide

Fiber Units

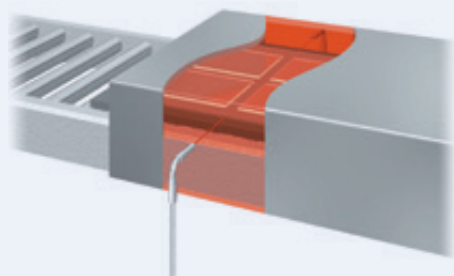
|                                   |                        |
|-----------------------------------|------------------------|
| Threaded                          | Standard Installation  |
| Hex-shaped                        |                        |
| Cylindrical                       |                        |
| Flat                              | Saving Space           |
| Sleeved                           |                        |
| Small Spot                        | Beam Improvements      |
| High Power                        |                        |
| Narrow view                       |                        |
| BGS                               |                        |
| Retro-reflective                  | Transparent Objects    |
| Limited-reflective                |                        |
| Chemical-resistant, Oil-resistant | Environmental Immunity |
| Bending                           |                        |
| Heat-resistant                    |                        |
| Area Detection                    | Applications           |
| Liquid-level                      |                        |
| Vacuum                            |                        |
| FPD, Semi, Solar                  |                        |

Installation  
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Fiber Amplifiers,  
Communications  
Unit, and  
Accessories

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Precautions

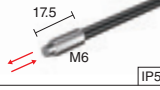
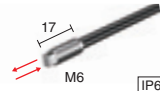
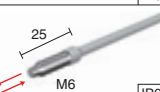
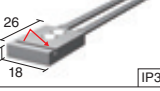
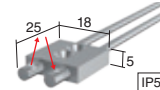
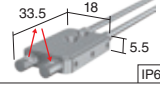
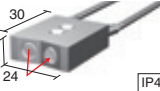
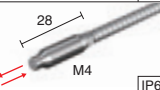
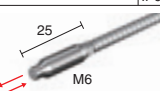
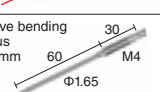
Model Index

Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power  
Narrow view  
BGSRetro-reflective  
Limited-reflectiveChemical-resistant,  
Oil-resistant  
Bending  
Heat-resistantArea  
Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

- 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) |                              |                      |                              | Standard sensing object (minimum sensing object)                                   | Models                            | 51 Page Dimensions No. |
|----------------------------|-------------------------------------------------------------------------------------|-------------------------|-----------------------|------------------------------|----------------------|------------------------------|------------------------------------------------------------------------------------|-----------------------------------|------------------------|
|                            |                                                                                     |                         | E3X-ZV                |                              | E3NX-FA              |                              |                                                                                    |                                   |                        |
|                            |                                                                                     |                         | GIGA HS               | Other modes                  | GIGA HS              | Other modes                  |                                                                                    |                                   |                        |
| 100℃ *1                    |   | Flexible, R2            | 670<br>190            | ST : 280<br>SHS: 80          | 1,000<br>280         | ST : 420<br>SHS: 80          | (5 μm dia./<br>2 μm dia.)                                                          | E32-D51R 2M                       | 51-A                   |
| 150℃ *2                    |  | R35                     | 1,120<br>320          | ST : 450<br>SHS: 144         | 1,680<br>480         | ST : 670<br>SHS: 144         |                                                                                    | E32-D51 2M                        | 51-B                   |
| 200℃ *3                    |  | R10                     | 420<br>120            | ST : 180<br>SHS: 54          | 630<br>180           | ST : 270<br>SHS: 54          |                                                                                    | E32-D81R-S 2M                     | 51-C                   |
| 300℃ *3                    |  | R25                     | 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: -      | Soda glass with reflection factor of 7%                                            | E32-A08H2 2M                      | 51-D                   |
|                            |  |                         | 1 to 5<br>1 to 5      | ST : 1 to 5<br>SHS: -        | 1 to 5<br>1 to 5     | ST : 1 to 5<br>SHS: -        | -                                                                                  | E32-L64 2M                        | 51-E                   |
| 200℃ *3                    |  | R25                     | 4 to 10<br>4 to 10    | ST : 4 to 10<br>SHS: 4 to 10 | 4 to 10<br>4 to 10   | ST : 4 to 10<br>SHS: 4 to 10 | (5 μm dia./<br>2 μm dia.)                                                          | E32-L86 2M                        | 51-F                   |
| 300℃ *3                    |  |                         | 20 to 30<br>20 to 30  | ST : 20 to 30<br>SHS: -      | 20 to 30<br>20 to 30 | ST : 20 to 30<br>SHS: -      | End surface of soda glass with reflection factor of 7% (t = 0.7 mm, rounded edges) | E32-A09H2 2M                      | 51-G                   |
| 350℃ *3                    |  |                         | 420<br>120            | ST : 180<br>SHS: 54          | 630<br>180           | ST : 270<br>SHS: 54          | (5 μm dia./<br>2 μm dia.)                                                          | E32-D611-S 2M                     | 51-H                   |
|                            |  |                         |                       |                              |                      | E32-D61-S 2M                 |                                                                                    | 51-I                              |                        |
| 400℃ *3                    |  |                         | 280<br>80             | ST : 120<br>SHS: 36          | 420<br>120           | ST : 180<br>SHS: 36          | E32-D73-S 2M                                                                       | 51-J                              |                        |
| 70℃                        |                                                                                     |                         | —                     |                              |                      |                              |                                                                                    | 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.

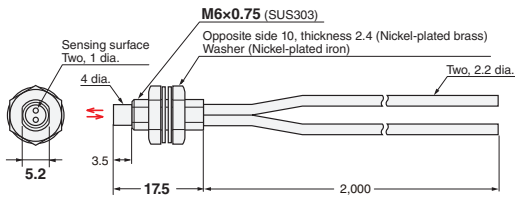
5. The E3X-HD Series offers the same sensing distance as the E3X-ZV.

## Dimensions

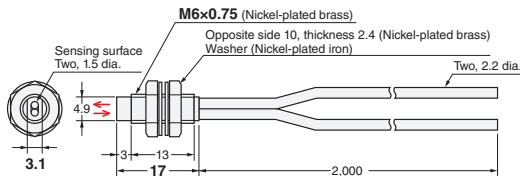
Installation Information → 62 to 66 Page

### Reflective Fiber Units

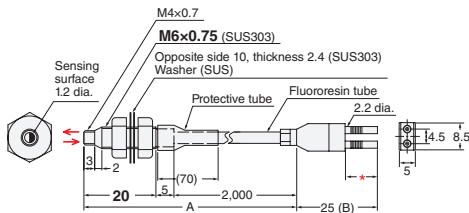
**51-A E32-D51R 2M (Free Cutting)**



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

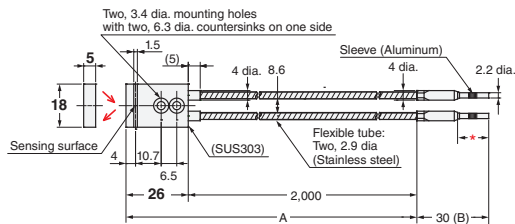


**51-C E32-D81R-S 2M (No Cutting)**

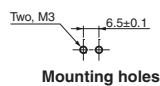


**Note:** The maximum allowable temperatures for sections A and B are 200°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by \*) must be maintained within the Amplifier Unit's operating temperature range.

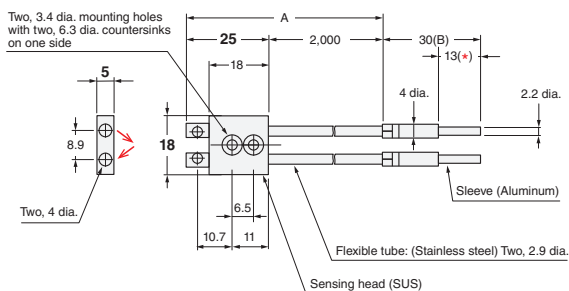
**51-D E32-A08H2 2M (No Cutting)**



**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.

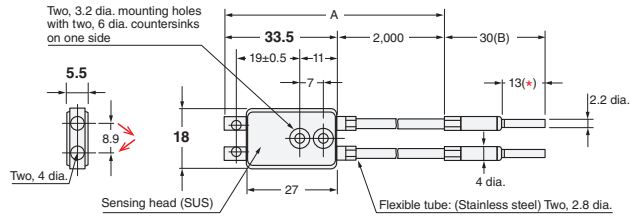


**51-E E32-L64 2M (No Cutting)**



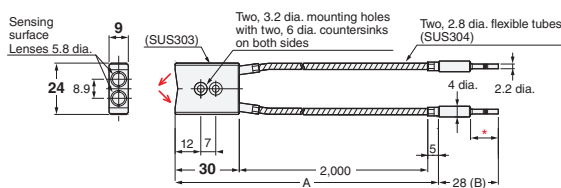
**Note:** The maximum allowable temperatures for sections A and B are 300°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by \*) must be maintained within the Amplifier Unit's operating temperature range.

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



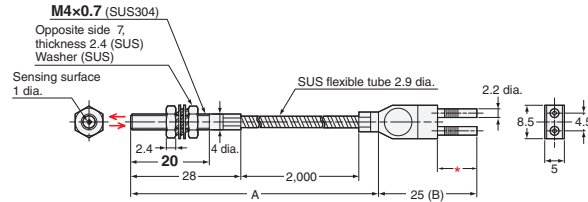
**Note:** The maximum allowable temperatures for sections A and B are 200°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by \*) must be maintained within the Amplifier Unit's operating temperature range.

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



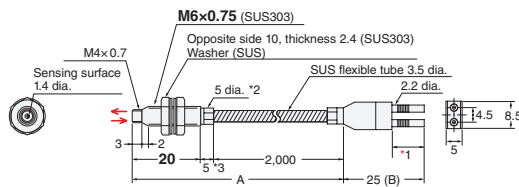
**Note:** The maximum allowable temperatures for sections A and B are 300°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by \*) must be maintained within the Amplifier Unit's operating temperature range.

**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.

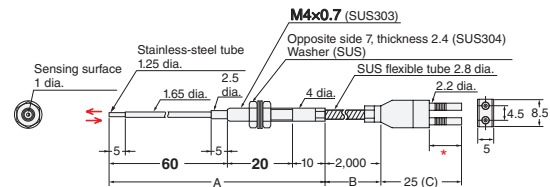
**51-I E32-D61-S 2M (No Cutting)**



- \*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 \*) 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.

Fiber Sensor Features

Selection Guide

Fiber Units

| Threaded                          | Standard Installation  |
|-----------------------------------|------------------------|
| Hex-shaped                        |                        |
| Cylindrical                       |                        |
| Flat                              | Saving Space           |
| Sleeved                           |                        |
| Small Spot                        | Beam Improvements      |
| High Power                        |                        |
| Narrow view                       |                        |
| BGS                               |                        |
| Retro-reflective                  | Transparent Objects    |
| Limited-reflective                |                        |
| Chemical-resistant, Oil-resistant | Environmental Immunity |
| Bending                           |                        |
| Heat-resistant                    |                        |
| Area Detection                    | Applications           |
| Liquid-level                      |                        |
| Vacuum                            |                        |
| FPD, Semi, Solar                  |                        |

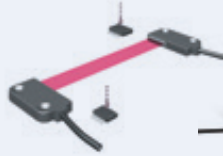
Installation Information

Fiber Amplifiers, Communications Unit, and Accessories

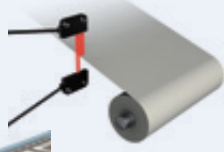
Technical Guide and Precautions

Model Index

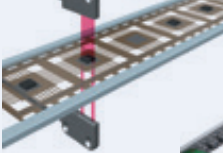
Detection of falling workpieces



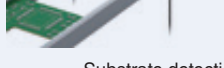
Meander detection



Detection of workpieces with holes

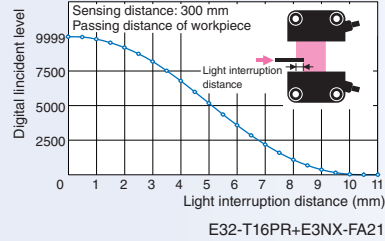


Substrate detection



- 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 detection because it outputs the digital value in a linear relation to the interrupted light distance.

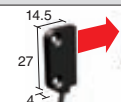
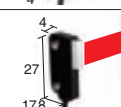
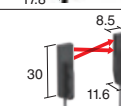
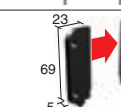
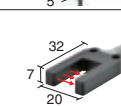
Characteristics of Light Interruption (Reference Value)



E32-T16PR+E3NX-FA21

## Specifications

## Through-beam Fiber Units

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

\*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) |                     |                  |                     |                           |              | Optical axis diameter (minimum sensing object)                                        | Model | 53 Page Dimensions No. |
|-------|---------------|-------------------------------------------------------------------------------------|-------------------------|-----------------------|---------------------|------------------|---------------------|---------------------------|--------------|---------------------------------------------------------------------------------------|-------|------------------------|
|       |               |                                                                                     |                         | E3X-ZV                |                     |                  | E3NX-FA             |                           |              |                                                                                       |       |                        |
|       |               |                                                                                     |                         | ■GIGA ■HS             | Other modes         | ■GIGA ■HS        | Other modes         |                           |              |                                                                                       |       |                        |
| Array | 11 mm         |  | Bend-resistant, R4      | ■ 700<br>■ 200        | ST : 300<br>SHS: 90 | ■ 1,050<br>■ 300 | ST : 450<br>SHS: 90 | (5 μm dia./<br>2 μm dia.) | E32-D36P1 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 the E3NX-FA are values for E3NX-FA□ devices. The distance for E3NX-FAH□ infrared models varies.

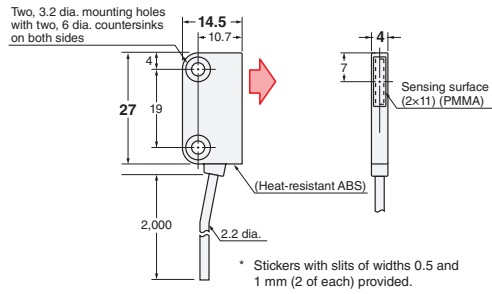
4. The E3X-HD Series offers the same sensing distance as the E3X-ZV.

Dimensions

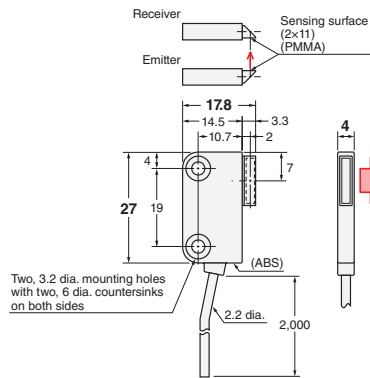
Installation Information → 62 to 66 Page

Through-beam Fiber Units (Set of 2)

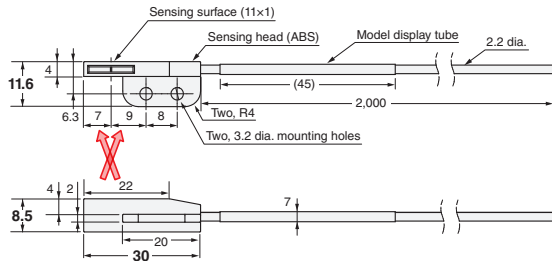
53-A E32-T16PR 2M (Free Cutting)



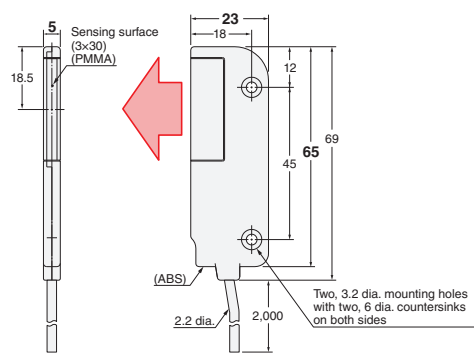
53-B E32-T16JR 2M (Free Cutting)



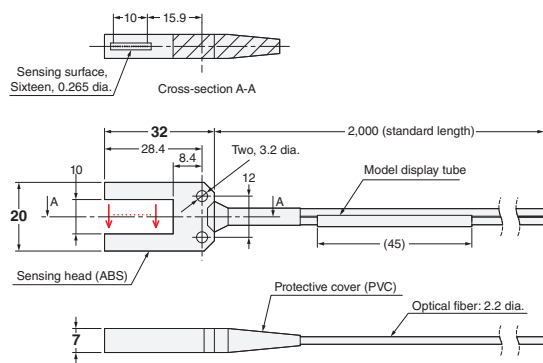
53-C E32-A13 2M (Free Cutting)



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

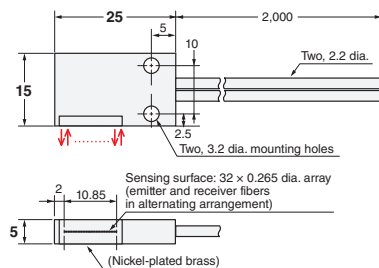


53-E E32-G16 2M



Through-beam Fiber Units (Set of 2)

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



Fiber Sensor  
Features

Selection  
Guide

Fiber Units

Threaded  
Hex-shaped  
Cylindrical

Standard Installation

Flat  
Sleeved

Saving Space

Small Spot  
High Power  
Narrow view  
BGS

Beam Improvements

Retro-reflective  
Limited-reflective

Transparent Objects

Chemical-resistant,  
Oil-resistant  
Bending  
Heat-resistant

Environmental Immunity

Area  
Detection

Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

Applications

Installation  
Information

Fiber Amplifiers,  
Communications  
Unit, and  
Accessories

Technical  
Guide and  
Precautions

Model Index



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

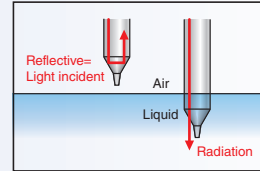
### ▶ Tube-mounting Types

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. | <ul style="list-style-type: none"> <li>Resistant to bubbles and droplets</li> <li>Residual quantity detection</li> </ul>    |                 | 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       | <ul style="list-style-type: none"> <li>Usable on large diameter tubes</li> <li>Resistant to bubbles and droplets</li> </ul> |                 | 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 -

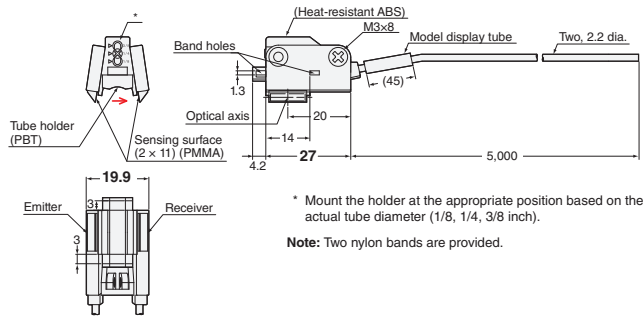
### Determining the Best Model for Tube-mounted Types

| Mounting and conditions                           | Recommended Unit | Features                                                                                                                                                                                                                                                                                             |
|---------------------------------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| When bubbles and the water droplets are generated | E32-A01          | <p>This is a Through-beam Model, so the incident light will differ greatly between with and without of liquid.</p> <p>It also uses an area beam, which is less prone to false detection by bubbles and droplets.</p> <div> <div> <p>With liquid</p> </div> <div> <p>Without liquid</p> </div> </div> |
| 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         | <p>This model has no restrictions on the tube diameter, so it can be mounted on many different tube sizes.</p> <p>It also uses an area beam, which is less prone to false detection by bubbles and droplets.</p> <div> <div> <p>With liquid</p> </div> <div> <p>Without liquid</p> </div> </div>     |

## Dimensions

Installation Information → 62 to 66 Page

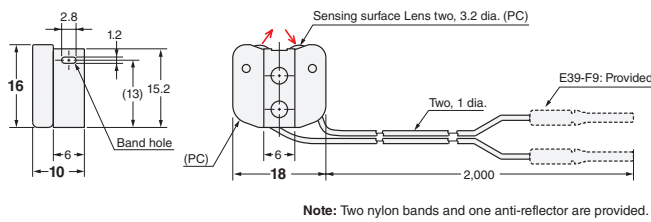
### 55-A E32-A01 5M (Free Cutting)



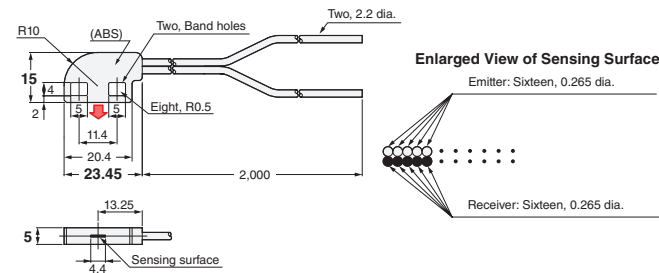
### Tube-mounting Examples



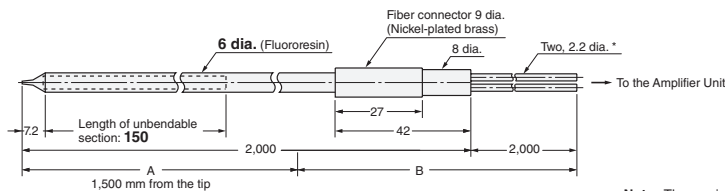
### 55-B E32-L25T 2M (Free Cutting)



### 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.

Fiber Sensor Features

Selection Guide

Fiber Units

Threaded  
Hex-shaped  
Cylindrical

Flat  
Sleeved

Small Spot  
High Power

Narrow view  
BGS

Retro-reflective  
Limited-reflective

Chemical-resistant, Oil-resistant

Bending  
Heat-resistant

Area Detection  
Liquid-level

Vacuum  
FPD, Semi, Solar

Installation Information

Fiber Amplifiers, Communications Unit, and Accessories

Technical Guide and Precautions

Model Index

- Threaded
- Hex-shaped
- Cylindrical

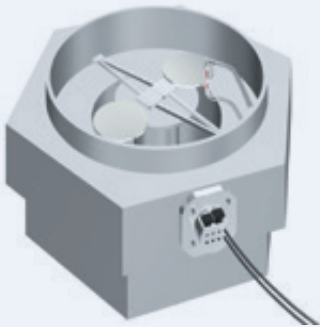
- Flat
- Sleeved

- Small Spot
- High Power
- Narrow view
- BGS

- Retro-reflective
- Limited-reflective

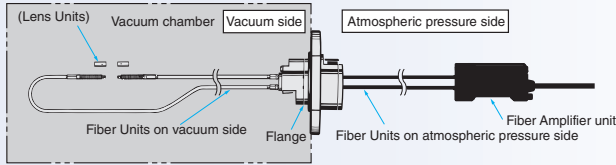
- Chemical-resistant, Oil-resistant
- Bending
- Heat-resistant

- Area Detection
- Liquid-level
- Vacuum



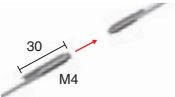
- Can be used under high vacuums of up to 10<sup>-5</sup> Pa.
- Available in models with heat resistant up to 120 or 200°C.

Configuration Example for using under vacuum



### Specifications

#### Through-beam Fiber Units

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

\* 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)

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

### Flange

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

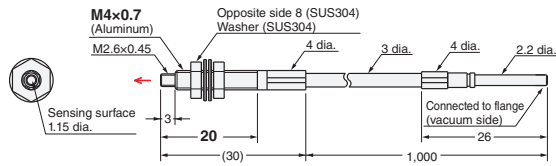
## Dimensions

Installation Information → 62 to 66 Page

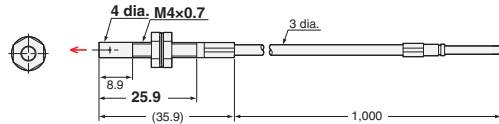


### Through-beam Fiber Units (Set of 2)

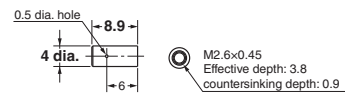
#### 57-A E32-T51V 1M (No Cutting)



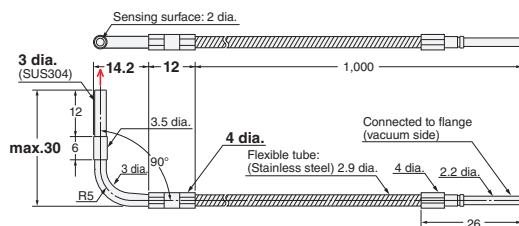
#### 57-B E32-T51V 1M (No Cutting) + E39-F1V



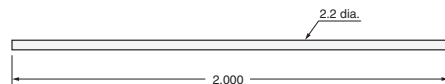
#### E39-F1V



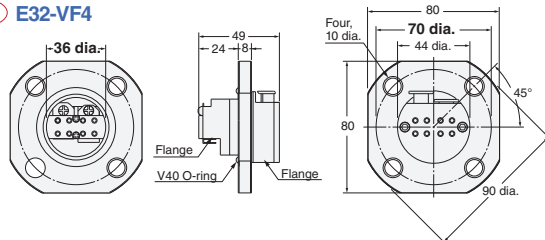
#### 57-C E32-T84SV 1M (No Cutting)



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

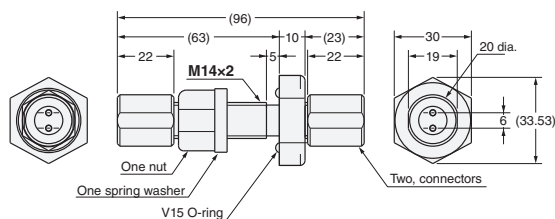


#### 57-E E32-VF4



- 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.  $\pm 0.5$  mm  
**3.** The maximum tightening torque is 9.8 N-m.  
**4.** A V40 O-ring is provided.

#### 53-F E32-VF1

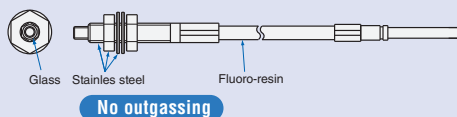


- Note 1.** Mount the Flange so that the V15 O-ring is on the atmospheric-pressure side of the vacuum chamber wall.  
**2.** Mounting-hole dimensions: 14.5 dia.  $\pm 0.2$  mm  
**3.** The maximum tightening torque is 14.7 N-m for the clamp nut and 1.5 N-m for the connector.  
**4.** A V15 O-ring, nut, 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.



Fiber Sensor Features

Selection Guide

Fiber Units

|                                   |                        |
|-----------------------------------|------------------------|
| Threaded                          | Standard Installation  |
| Hex-shaped                        |                        |
| Cylindrical                       |                        |
| Flat                              | Saving Space           |
| Sleeved                           |                        |
| Small Spot                        | Beam Improvements      |
| High Power                        |                        |
| Narrow view                       |                        |
| BGS                               |                        |
| Retro-reflective                  | Transparent Objects    |
| Limited-reflective                |                        |
| Chemical-resistant, Oil-resistant | Environmental Immunity |
| Bending                           |                        |
| Heat-resistant                    |                        |
| Area Detection                    | Applications           |
| Liquid-level                      |                        |
| Vacuum                            |                        |
| FPD, Semi, Solar                  |                        |
| Installation Information          |                        |

Fiber Amplifiers, Communications Unit, and Accessories

Technical Guide and Precautions

Model Index

Threaded  
Hex-shaped  
Cylindrical

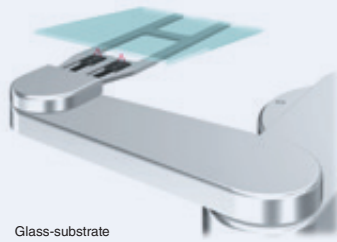
Flat  
Sleeved

Small Spot  
High Power  
Narrow view  
BGS

Retro-reflective  
Limited-reflective

Chemical-resistant,  
Oil-resistant  
Bending  
Heat-resistant

Area  
Detection  
Liquid-level  
Vacuum



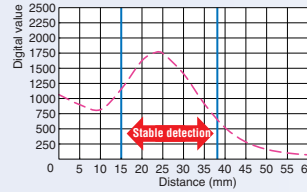
Glass-substrate  
Alignment

### • 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.

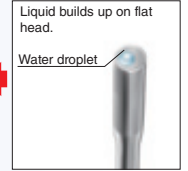
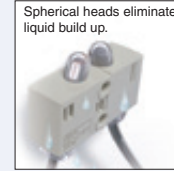
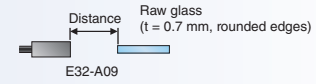
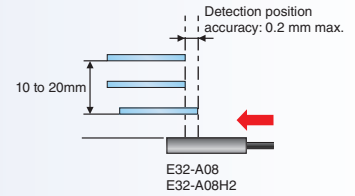
### • Glass-substrate Mapping

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)                                                                                                                                       |                    |               |               | Standard sensing object (minimum sensing object) | Models                                                                             | 59 Page Dimensions No. |              |
|----------------------------------------------------------|---------------------|----------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|---------------|--------------------------------------------------|------------------------------------------------------------------------------------|------------------------|--------------|
|                                                          |                     |                      |                         | E3X-ZV                                                                                                                                                      |                    | E3NX-FA       |               |                                                  |                                                                                    |                        |              |
|                                                          |                     |                      |                         | ■GIGA ■HS                                                                                                                                                   | Other modes        | ■GIGA ■HS     | Other modes   |                                                  |                                                                                    |                        |              |
| Glass presence detection                                 | 70°C                |                      | R25                     | 0 to 15                                                                                                                                                     | ST : 0 to 15       | 0 to 15       | ST : 0 to 15  | Soda glass with reflection factor of 7%          | E32-L16-N 2M *1                                                                    |                        |              |
|                                                          |                     | 0 to 15              |                         | SHS: 0 to 12                                                                                                                                                | 0 to 15            | SHS: 0 to 12  |               |                                                  |                                                                                    |                        |              |
| Glass-substrate Alignment                                | 300°C               |                      |                         | 10 to 20                                                                                                                                                    | ST : 10 to 20      | 10 to 20      | ST : 10 to 20 |                                                  | End surface of soda glass with reflection factor of 7% (t = 0.7 mm, rounded edges) | E32-A08 2M *1          |              |
|                                                          |                     | 10 to 20             |                         | SHS: -                                                                                                                                                      | 10 to 20           | SHS: -        |               |                                                  |                                                                                    |                        |              |
|                                                          | 70°C                |                      |                         | 10 to 20                                                                                                                                                    | ST : 10 to 20      | 10 to 20      | ST : 10 to 20 |                                                  |                                                                                    | E32-A08H2 2M *1        |              |
|                                                          |                     |                      |                         | 12 to 30                                                                                                                                                    | ST : 12 to 30      | 12 to 30      | ST : 12 to 30 |                                                  |                                                                                    |                        |              |
| Mapping of glass substrates                              | 70°C                |                      |                         | 12 to 30                                                                                                                                                    | ST : 12 to 30      | 12 to 30      | ST : 12 to 30 |                                                  | End surface of soda glass with reflection factor of 7% (t = 0.7 mm, rounded edges) | E32-A12 2M             |              |
|                                                          |                     | 12 to 30             |                         | SHS: -                                                                                                                                                      | 12 to 30           | SHS: -        |               |                                                  |                                                                                    |                        |              |
|                                                          | 300°C *2            |                      | 15 to 38                | ST : 15 to 38                                                                                                                                               | 15 to 38           | ST : 15 to 38 | E32-A09 2M    |                                                  |                                                                                    |                        |              |
|                                                          |                     | 15 to 38 (Center 25) | SHS: - (Center 25)      | 15 to 38 (Center 25)                                                                                                                                        | SHS: - (Center 25) |               |               |                                                  |                                                                                    |                        |              |
|                                                          | 300°C *2            |                      | 20 to 30                | ST : 20 to 30                                                                                                                                               | 20 to 30           | ST : 20 to 30 | E32-A09H2 2M  |                                                  |                                                                                    |                        |              |
|                                                          |                     | 20 to 30 (Center 25) | SHS: - (Center 25)      | 20 to 30 (Center 25)                                                                                                                                        | SHS: - (Center 25) |               |               |                                                  |                                                                                    |                        |              |
| Wet processes (Cleaning, Resist developing, and etching) | 60°C                |                      | R40                     | 8 to 20 mm from tip of lens<br>(Recommended sensing distance: 11 mm)<br>19 to 31 mm from center of mounting hole A<br>(Recommended sensing distance: 22 mm) |                    |               |               | Glass (t=0.7mm)                                  | E32-L11FP 2M                                                                       |                        |              |
| Wet processes (Resist stripping)                         | 85°C                |                      |                         | 8 to 20 mm from tip of lens<br>(Recommended sensing distance: 11 mm)<br>32 to 44 mm from center of mounting hole A<br>(Recommended sensing distance: 35 mm) |                    |               |               |                                                  |                                                                                    |                        | E32-L11FS 2M |

<sup>\*1</sup> If operation is affected by the background, perform power tuning to decrease the incident light level.

<sup>\*2</sup> 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.

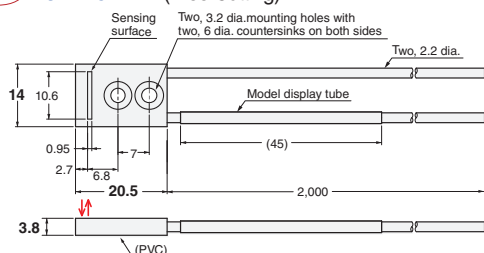
3. The E3X-HD Series offers the same sensing distance as the E3X-ZV.

### Dimensions

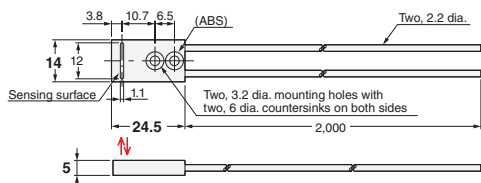
Installation Information → 62 to 66 Page

#### Limited-reflective Fiber Units

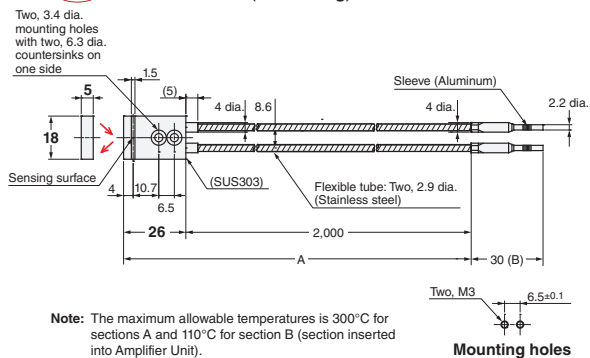
**59-A E32-L16-N 2M (Free Cutting)**



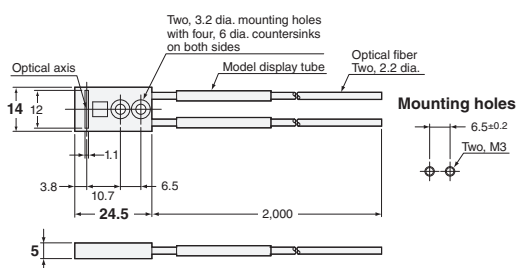
**59-B E32-A08 2M (Free Cutting)**



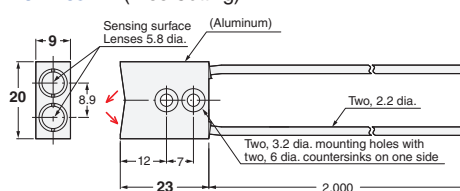
**59-C E32-A08H2 2M (No Cutting)**



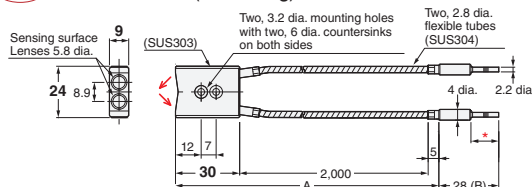
**59-D E32-A12 2M (Free Cutting)**



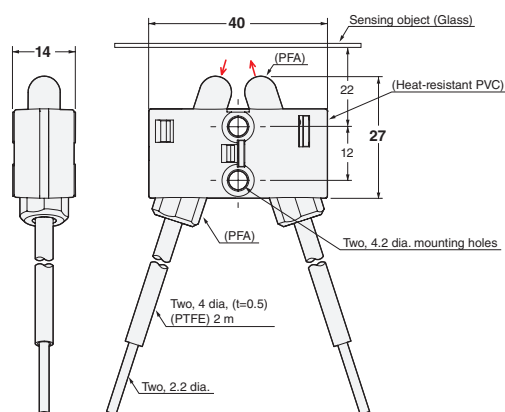
**59-E E32-A09 2M (Free Cutting)**



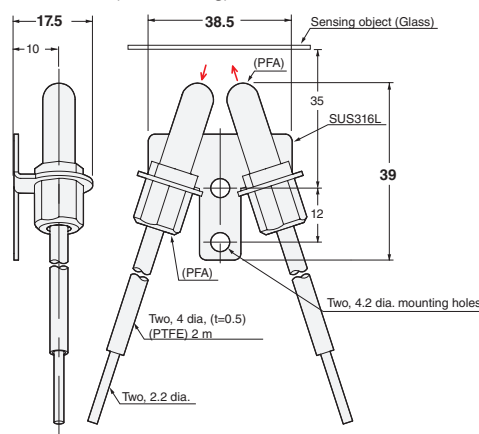
**59-F E32-A09H2 2M (No Cutting)**



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



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



Fiber Sensor Features

Selection Guide

Fiber Units

| Threaded              | Hex-shaped | Cylindrical | Flat         | Sleeved | Small Spot        | High Power | Narrow view | BGS                 | Retro-reflective | Limited-reflective | Chemical-resistant, Oil-resistant | Bending | Heat-resistant | Area Detection | Liquid-level | Vacuum | FPD, Semi, Solar |
|-----------------------|------------|-------------|--------------|---------|-------------------|------------|-------------|---------------------|------------------|--------------------|-----------------------------------|---------|----------------|----------------|--------------|--------|------------------|
| Standard Installation |            |             | Saving Space |         | Beam Improvements |            |             | Transparent Objects |                  |                    | Environmental Immunity            |         |                | Applications   |              |        |                  |

Installation Information

Fiber Amplifiers, Communications Unit, and Accessories

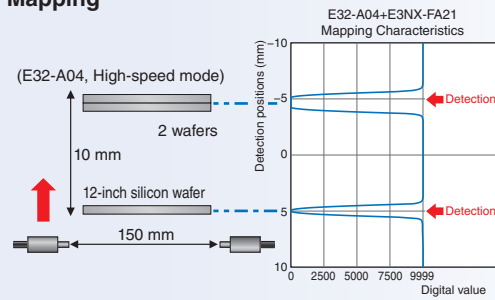
Technical Guide and Precautions

Model Index

Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power  
Narrow view  
BGSRetro-reflective  
Limited-reflectiveChemical-resistant,  
Oil-resistant  
Bending  
Heat-resistantArea  
Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

Wafer Mapping

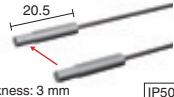
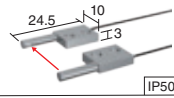
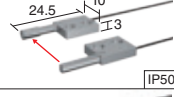
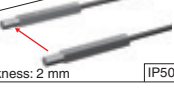
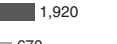
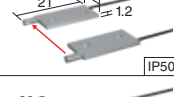
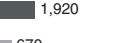
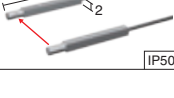
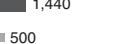
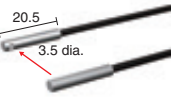
## • Wafer Mapping



- ▶ Thin-profile design enables easy mounting on robot arms.
- ▶ Easy to adjust optical axis.  
(Typical alignment error between mechanical and optical axes is only  $\pm 0.1^\circ$ .)
- ▶ 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)                                                                                   |                                                                                      |                                                                                                          |                                                                                          | Optical axis diameter (minimum sensing object)                                         | Models       | 61 Page Dimensions No.                                                                |
|---------------|---------------------|----------------|----------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------|
|               |                     |                |                                                                                                                |                         | E3X-ZV                                                                                                  |                                                                                      | E3NX-FA                                                                                                  |                                                                                          |                                                                                        |              |                                                                                       |
|               |                     |                |                                                                                                                |                         |  GIGA                  |  HS | Other modes                                                                                              |  GIGA |  HS |              |                                                                                       |
| Wafer Mapping | 70°C                | 1.5°           | <br>Thickness: 3 mm<br>IP50  | Flexible, R1            | <br>3,220            | ST : 1,780                                                                           | <br>4,000 *           | ST : 2,670                                                                               | 2 dia.<br>(0.1 dia./0.03 dia.)                                                         | E32-A03 2M   |    |
|               |                     |                | <br>IP50                    | R10                     | <br>1,200            | SHS: 500                                                                             | <br>1,800            | SHS: 500                                                                                 |                                                                                        | E32-A03-1 2M |  |
|               |                     |                | <br>IP50                    | R10                     | <br>2,500<br>940     | ST : 1,400<br>SHS: 380                                                               | <br>2,500<br>940     | ST : 1,400<br>SHS: 380                                                                   | —                                                                                      | E32-A03-2 2M |  |
|               |                     | 3.4°           | <br>Thickness: 2 mm<br>IP50 | R10                     | <br>1,280<br>450     | ST : 680<br>SHS: 200                                                                 | <br>1,920<br>670     | ST : 1,020<br>SHS: 200                                                                   | 1.2 dia.<br>(0.1 dia./0.03 dia.)                                                       | E32-A04 2M   |  |
|               |                     |                | <br>IP50                    | R10                     | <br>1,280<br>450     | ST : 680<br>SHS: 200                                                                 | <br>1,920<br>670     | ST : 1,020<br>SHS: 200                                                                   |                                                                                        | E32-A04-1 2M |  |
|               |                     |                | <br>IP50                    | R10                     | <br>960<br>335       | ST : 510<br>SHS: 150                                                                 | <br>1,440<br>500     | ST : 760<br>SHS: 150                                                                     | —                                                                                      | E32-A04-8 2M |  |
|               |                     | 4°             | <br>3.5 dia.<br>IP50        | Flexible, R1            | <br>4,000 *<br>1,460 | ST : 2,200                                                                           | <br>4,000 *<br>2,190 | ST : 3,300                                                                               | 2 dia.<br>(0.1 dia./0.03 dia.)                                                         | E32-T24SR 2M |  |
|               |                     |                | <br>IP50                    | R10                     | <br>4,000 *<br>1,740 | ST : 2,600<br>SHS: 700                                                               | <br>4,000 *<br>2,610 | ST : 3,900<br>SHS: 700                                                                   |                                                                                        | E32-T24S 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  $\mu$ s), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (50  $\mu$ s)

[E3NX-FA] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250  $\mu$ s), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30  $\mu$ s)

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.

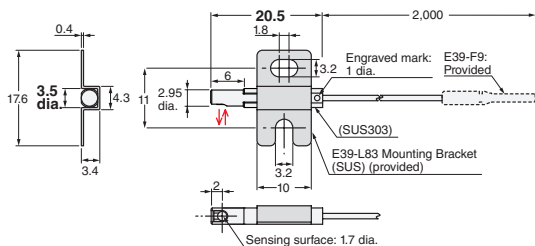
4. The E3X-HD Series offers the same sensing distance as the E3X-ZV.

### Dimensions

Installation Information → 62 to 66 Page

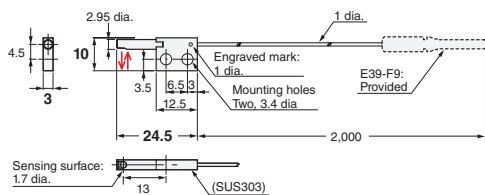
#### Through-beam Fiber Units (Set of 2)

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



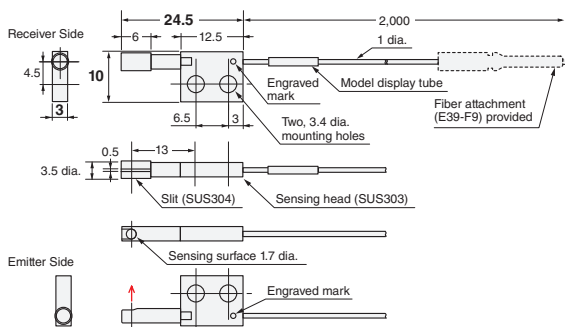
**Note:** Use the engraved surface and its opposing surface as installation (reference) surfaces.

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



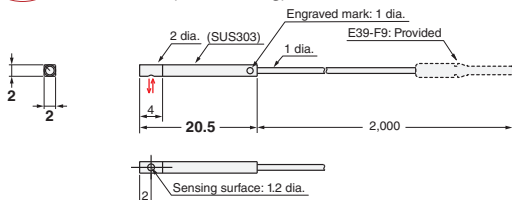
**Note1:** Use the engraved surface and its opposing surface as installation (reference) surfaces.  
**2.** Set of two symmetrical parts.

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



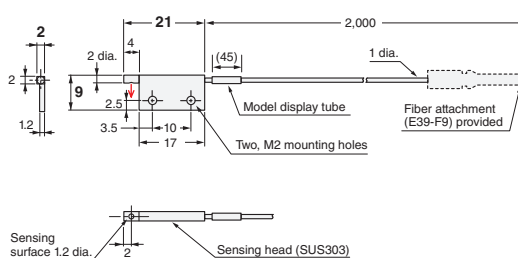
**Note:** Use the engraved surface and its opposing surface as installation (reference) surfaces.

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

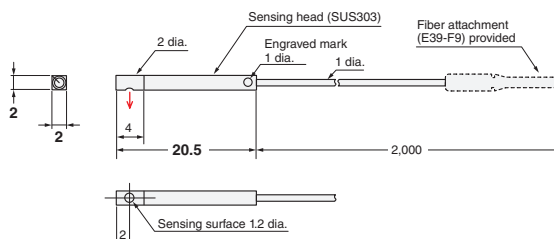


**Note:** Use the engraved surface and its opposing surface as installation (reference) surfaces.

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

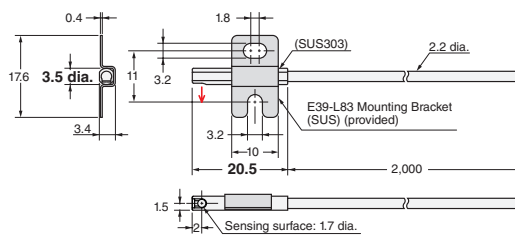


**61-F E32-A04-8 2M (Free Cutting)**

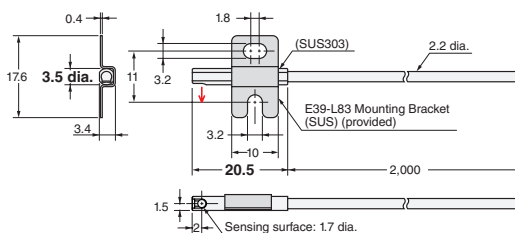


**Note:** Use the engraved surface and its opposing surface as installation (reference) surfaces.

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



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



Fiber Sensor Features

Selection Guide

Fiber Units

|                                   |                        |
|-----------------------------------|------------------------|
| Threaded                          | Standard Installation  |
| Hex-shaped                        |                        |
| Cylindrical                       |                        |
| Flat                              | Saving Space           |
| Sleeved                           |                        |
| Small Spot                        | Beam Improvements      |
| High Power                        |                        |
| Narrow view                       |                        |
| BGS                               |                        |
| Retro-reflective                  | Transparent Objects    |
| Limited-reflective                |                        |
| Chemical-resistant, Oil-resistant | Environmental Immunity |
| Bending                           |                        |
| Heat-resistant                    |                        |
| Area Detection                    | Applications           |
| Liquid-level                      |                        |
| Vacuum                            |                        |
| FPD, Semi, Solar                  |                        |

Installation Information

Fiber Amplifiers, Communications Unit, and Accessories

Technical Guide and Precautions

Model Index

| Models       | Installation           |                      |                                             | Cable             |                        |                     |                         |                  |                                     | Weight<br>(packed<br>state) (g) | Dimensions<br>Page<br>No.        |
|--------------|------------------------|----------------------|---------------------------------------------|-------------------|------------------------|---------------------|-------------------------|------------------|-------------------------------------|---------------------------------|----------------------------------|
|              | Ambient<br>temperature | Tightening<br>torque | Mounting<br>hole                            | Bending<br>radius | Unbendable<br>length*1 | Tensile<br>strength | Sheath<br>material      | Core<br>material | Emitter/receiver<br>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<br>receiver side            | −                               | 61 Page (61-C)                   |
| E32-A04 2M   | −40 to 70°C            | 0.29N・m              | 2.2 <sup>+0.5</sup> <sub>0</sub> 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<br>*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<br>*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 <sup>+0.5</sup> <sub>0</sub> dia.<br>*4 | R2                | 0                      | 9.8N                | Polyethylene            | Plastic          | White line on<br>emitter cable      | 30                              | 11 Page (11-D)                   |
| E32-C31 2M   | −40 to 70°C            | 0.78N・m              | 3.2 <sup>+0.5</sup> <sub>0</sub> dia.<br>*4 | R25               | 10                     | 9.8N                | Polyethylene            | Plastic          | White line on<br>emitter cable      | 40                              | 09 Page (09-D)                   |
| E32-C31M 1M  | −40 to 70°C            | 0.78N・m              | 3.2 <sup>+0.5</sup> <sub>0</sub> dia.<br>*4 | R10               | 10                     | 9.8N                | Polyethylene            | Plastic          | White line on<br>emitter cable      | 40                              | 09 Page (09-E)                   |
| E32-C31N 2M  | −40 to 70°C            | 0.29N・m              | 3.2 <sup>+0.5</sup> <sub>0</sub> dia.<br>*4 | R4                | 0                      | 9.8N                | PVC and<br>Polyethylene | Plastic          | White line on<br>emitter cable      | 40                              | 09 Page (09-A)                   |
| E32-C41 1M   | −40 to 70°C            | 0.78N・m              | 3.2 <sup>+0.5</sup> <sub>0</sub> dia.<br>*4 | R25               | 10                     | 9.8N                | Polyethylene            | Plastic          | White tube on<br>emitter cable      | 30                              | 27 Page (27-A),<br>(27-D)        |
| E32-C42 1M   | −40 to 70°C            | 0.29N・m              | 2.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R25               | 10                     | 9.8N                | Polyethylene            | Plastic          | White tube on<br>emitter cable      | 30                              | 25 Page<br>(25-A), (25-B)        |
| E32-C42S 1M  | −40 to 70°C            | 0.29N・m              | 3.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R25               | 10                     | 4N                  | Polyolefin              | Plastic          | White tube on<br>emitter cable      | 30                              | 25 Page (25-E)                   |
| E32-CC200 2M | −40 to 70°C            | 0.98N・m              | 6.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R25               | 10                     | 29.4N               | Polyethylene            | Plastic          | White line on<br>emitter cable      | 40                              | 09 Page (09-H)                   |
| E32-C91N 2M  | −40 to 70°C            | 0.98N・m              | 6.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R4                | 0                      | 29.4N               | Polyethylene            | Plastic          | White line on<br>emitter cable      | 36                              | 09 Page (09-B)<br>11 Page (11-F) |
| E32-D11 2M   | −40 to 70°C            | 0.98N・m              | 6.2 <sup>+0.5</sup> <sub>0</sub> 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 <sup>+0.5</sup> <sub>0</sub> 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 <sup>+0.5</sup> <sub>0</sub> 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 <sup>+0.5</sup> <sub>0</sub> 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 <sup>+0.5</sup> <sub>0</sub> dia.<br>*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 <sup>+0.5</sup> <sub>0</sub> 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 <sup>+0.5</sup> <sub>0</sub> 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<br>(packed state) (g) | Dimensions<br>Page No.           |
|------------------------|---------------------|-------------------|---------------------------------------------|----------------|---------------------|------------------|-----------------|---------------|-------------------------------------|------------------------------|----------------------------------|
|                        | Ambient temperature | Tightening torque | Mounting hole                               | Bending radius | Unbendable length*1 | Tensile strength | Sheath material | Core material | Emitter/receiver differentiation    |                              |                                  |
| <b>E32-D21N 2M</b>     | −40 to 70°C         | 0.78N · m         | 4.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R2             | 0                   | 9.8N             | Polyethylene    | Plastic       | None                                | 30                           | 11 Page (11-E)                   |
| <b>E32-D21R 2M</b>     | −40 to 70°C         | 0.78N · m         | 3.2 <sup>+0.5</sup> <sub>0</sub> dia.<br>*2 | R1             | 0                   | 9.8N             | Polyethylene    | Plastic       | None                                | 20                           | 09 Page (09-C)                   |
| <b>E32-D21-S3 2M</b>   | −40 to 70°C         | 0.78N · m         | 4.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R10            | 10                  | 9.8N             | Polyethylene    | Plastic       | None                                | 50                           | 23 Page (23-J)                   |
| <b>E32-D221B 2M</b>    | −40 to 70°C         | 0.29N · m         | 3.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R4             | 10                  | 9.8N             | PVC             | Plastic       | None                                | 40                           | 15 Page (15-D)<br>47 Page (47-C) |
| <b>E32-D22B 2M</b>     | −40 to 70°C         | 0.2N · m          | 1.7 <sup>+0.5</sup> <sub>0</sub> dia.       | R4             | 10                  | 9.8N             | PVC             | Plastic       | None                                | 30                           | 15 Page (15-A)<br>47 Page (47-A) |
| <b>E32-D22R 2M</b>     | −40 to 70°C         | 0.29N · m         | 3.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R1             | 0                   | 9.8N             | Polyethylene    | Plastic       | None                                | 40                           | 15 Page (15-C)                   |
| <b>E32-D22-S1 2M</b>   | −40 to 70°C         | 0.29N · m         | 4.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R10            | 10                  | 9.8N             | Polyethylene    | Plastic       | None                                | 45                           | 23 Page (23-I)                   |
| <b>E32-D24R 2M</b>     | −40 to 70°C         | 0.29N · m         | 3.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R1             | 0                   | 9.8N             | Polyethylene    | Plastic       | None                                | 40                           | 23 Page (23-A)                   |
| <b>E32-D24-S2 2M</b>   | −40 to 70°C         | 0.29N · m         | 5 <sup>+0.5</sup> <sub>0</sub> dia.         | R25            | 10                  | 19.6N            | Polyethylene    | Plastic       | None                                | 55                           | 23 Page (23-B)                   |
| <b>E32-D25XB 2M</b>    | −40 to 70°C         | 0.15N · m         | –                                           | R4             | 10                  | 9.8N             | PVC             | Plastic       | None                                | 40                           | 47 Page (47-F)                   |
| <b>E32-D25XR 2M</b>    | −40 to 70°C         | 0.15N · m         | –                                           | R1             | 0                   | 9.8N             | Polyethylene    | Plastic       | None                                | 40                           | 19 Page (19-B)                   |
| <b>E32-D25YR 2M</b>    | −40 to 70°C         | 0.15N · m         | –                                           | R1             | 0                   | 9.8N             | Polyethylene    | Plastic       | None                                | 40                           | 19 Page (19-D)                   |
| <b>E32-D25ZR 2M</b>    | −40 to 70°C         | 0.15N · m         | –                                           | R1             | 0                   | 9.8N             | Polyethylene    | Plastic       | None                                | 40                           | 19 Page (19-F)                   |
| <b>E32-D25-S3 2M</b>   | −40 to 70°C         | 0.29N · m         | –                                           | R10            | 10                  | 9.8N             | Polyethylene    | Plastic       | None                                | 50                           | 23 Page (23-L)                   |
| <b>E32-D31-S1 0.5M</b> | −40 to 70°C         | 0.78N · m         | 3.2 <sup>+0.5</sup> <sub>0</sub> dia.<br>*2 | R4             | 10                  | 9.8N             | Polyolefin      | Plastic       | None                                | 35                           | 23 Page (23-G)                   |
| <b>E32-D32L 2M</b>     | −40 to 70°C         | 0.29N · m         | 3.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R25            | 10                  | 29.4N            | Polyethylene    | Plastic       | Yellow dotted line on emitter cable | 50                           | 15 Page (15-E)                   |
| <b>E32-D32-S1 0.5M</b> | −40 to 70°C         | 0.29N · m         | 3.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R4             | 10                  | 9.8N             | Polyolefin      | Plastic       | None                                | 35                           | 23 Page (23-F)                   |
| <b>E32-D33 2M</b>      | −40 to 70°C         | 0.29N · m         | 3.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R25            | 10                  | 9.8N             | Polyethylene    | Plastic       | None                                | 40                           | 15 Page (15-F)<br>23 Page (23-E) |
| <b>E32-D331 2M</b>     | −40 to 70°C         | 0.29N · m         | 2.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R4             | 10                  | 9.8N             | Polyethylene    | Plastic       | None                                | 30                           | 23 Page (23-D)                   |
| <b>E32-D36P1 2M</b>    | −40 to 70°C         | 0.78N · m         | –                                           | R4             | 10                  | 29.4N            | Polyethylene    | Plastic       | None                                | 60                           | 53 Page (53-F)                   |
| <b>E32-D36T 2M</b>     | −40 to 70°C         | –                 | –                                           | R4             | 10                  | 29.4N            | Polyethylene    | Plastic       | None                                | 190                          | 55 Page (55-C)                   |
| <b>E32-D43M 1M</b>     | −40 to 70°C         | 0.29N · m         | 1.7 <sup>+0.5</sup> <sub>0</sub> dia.       | R4             | 10                  | 9.8N             | Polyethylene    | Plastic       | None                                | 30                           | 15 Page (15-B)<br>23 Page (23-C) |
| <b>E32-D51 2M</b>      | −40 to 150°C<br>*3  | 0.98N · m         | 6.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R35            | 10                  | 29.4N            | Fluororesin     | Plastic       | None                                | 60                           | 51 Page (51-B)                   |
| <b>E32-D51R 2M</b>     | −40 to 100°C<br>*4  | 0.98N · m         | 6.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R2             | 0                   | 29.4N            | Polyurethane    | Plastic       | None                                | 60                           | 51 Page (51-A)                   |
| <b>E32-D61-S 2M</b>    | −60 to 350°C<br>*5  | 0.98N · m         | 6.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R25            | 10                  | 29.4N            | SUS             | Glass         | None                                | 190                          | 51 Page (51-I)                   |
| <b>E32-D611-S 2M</b>   | −60 to 350°C<br>*5  | 0.98N · m         | 4.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R25            | 10                  | 29.4N            | SUS             | Glass         | None                                | 170                          | 51 Page (51-H)                   |
| <b>E32-D73-S 2M</b>    | −40 to 400°C<br>*5  | 0.78N · m         | 4.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R25            | 10                  | 29.4N            | SUS             | Glass         | None                                | 170                          | 51 Page (51-J)                   |
| <b>E32-D81R-S 2M</b>   | −40 to 200°C<br>*5  | 0.78N · m         | 6.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R10            | 10                  | 9.8N             | Fluororesin     | Glass         | None                                | 70                           | 51 Page (51-C)                   |
| <b>E32-D82F1 4M</b>    | −40 to 200°C        | 0.29N · m         | 6.5 <sup>+0.5</sup> <sub>0</sub> dia.       | R25            | 10                  | 29.4N            | Fluororesin     | Plastic       | None                                | 450                          | 55 Page (55-D)                   |
| <b>E32-DC200BR 2M</b>  | −40 to 70°C         | 0.98N · m         | 6.2 <sup>+0.5</sup> <sub>0</sub> dia.       | R1             | 0                   | 29.4N            | PVC             | Plastic       | None                                | 60                           | 23 Page (23-K)                   |
| <b>E32-DC200F4R 2M</b> | −40 to 70°C         | 0.78N · m         | 3.2 <sup>+0.5</sup> <sub>0</sub> dia.<br>*2 | R1             | 0                   | 9.8N             | Polyethylene    | Plastic       | None                                | 40                           | 23 Page (23-H)                   |
| <b>E32-G16 2M</b>      | −40 to 70°C         | 0.53N · m         | –                                           | R5             | 0 *6                | 29.4N            | Polyethylene    | Plastic       | –                                   | 51                           | 53 Page (53-E)                   |
| <b>E32-L11FP 2M</b>    | −10 to 60°C         | 0.78N · m         | –                                           | R40            | 10                  | 9.8N             | Fluororesin     | Plastic       | None                                | 310                          | 43 Page (43-F)<br>59 Page (59-G) |
| <b>E32-L11FS 2M</b>    | −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.

|                                   |                                                        |
|-----------------------------------|--------------------------------------------------------|
| Threaded                          | Standard Installation                                  |
| Hex-shaped                        |                                                        |
| Cylindrical                       |                                                        |
| Flat                              | Saving Space                                           |
| Sleeved                           |                                                        |
| Small Spot                        | Beam Improvements                                      |
| High Power                        |                                                        |
| Narrow view                       |                                                        |
| BGS                               |                                                        |
| Retro-reflective                  | Transparent Objects                                    |
| Limited-reflective                |                                                        |
| Chemical-resistant, Oil-resistant | Environmental Immunity                                 |
| Bending                           |                                                        |
| Heat-resistant                    | Applications                                           |
| Area Detection                    |                                                        |
| Liquid-level                      |                                                        |
| Vacuum                            | Fiber Amplifiers, Communications Unit, and Accessories |
| FPD, Semi, Solar                  |                                                        |

|                       |                     |                        |                        |                                         |
|-----------------------|---------------------|------------------------|------------------------|-----------------------------------------|
| Fiber Sensor Features | Selection Guide     | Fiber Units            | Standard Installation  | Threaded                                |
|                       |                     |                        |                        | Hex-shaped                              |
| Saving Space          | Beam Improvements   | Transparent Objects    | Environmental Immunity | Cylindrical                             |
|                       |                     |                        |                        | Flat                                    |
| Beam Improvements     | Transparent Objects | Environmental Immunity | Applications           | Sleeved                                 |
|                       |                     |                        |                        | Small Spot                              |
| Beam Improvements     | Transparent Objects | Environmental Immunity | Applications           | High Power                              |
|                       |                     |                        |                        | Narrow view                             |
| Beam Improvements     | Transparent Objects | Environmental Immunity | Applications           | BGS                                     |
|                       |                     |                        |                        | Retro-reflective                        |
| Beam Improvements     | Transparent Objects | Environmental Immunity | Applications           | Limited-reflective                      |
|                       |                     |                        |                        | Chemical-resistant, Oil-resistant       |
| Beam Improvements     | Transparent Objects | Environmental Immunity | Applications           | Bending                                 |
|                       |                     |                        |                        | Heat-resistant                          |
| Beam Improvements     | Transparent Objects | Environmental Immunity | Applications           | Area Detection                          |
|                       |                     |                        |                        | Liquid-level                            |
| Beam Improvements     | Transparent Objects | Environmental Immunity | Applications           | Vacuum                                  |
|                       |                     |                        |                        | FPD, Semi, Solar                        |
| Beam Improvements     | Transparent Objects | Environmental Immunity | Applications           | Installation Information                |
|                       |                     |                        |                        | Fiber Amplifiers, Unit, and Accessories |
| Beam Improvements     | Transparent Objects | Environmental Immunity | Applications           | Technical Guide and Precautions         |
|                       |                     |                        |                        | Model Index                             |

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

|                                   |                                                        |
|-----------------------------------|--------------------------------------------------------|
| Threaded                          | Standard Installation                                  |
| Hex-shaped                        |                                                        |
| Cylindrical                       |                                                        |
| Flat                              | Saving Space                                           |
| Sleeved                           |                                                        |
| Small Spot                        | Beam Improvements                                      |
| High Power                        |                                                        |
| Narrow view                       |                                                        |
| BGS                               | Transparent Objects                                    |
| Retro-reflective                  |                                                        |
| Limited-reflective                |                                                        |
| Chemical-resistant, Oil-resistant | Environmental Immunity                                 |
| Bending                           |                                                        |
| Heat-resistant                    |                                                        |
| Area Detection                    | Applications                                           |
| Liquid-level                      |                                                        |
| Vacuum                            |                                                        |
| FPD, Semi, Solar                  | Fiber Amplifiers, Communications Unit, and Accessories |

| Models      | Installation        |                   |               | Cable          |                     |                  |                 |               |                                  | Weight<br>(packed state) (g) | Dimensions<br>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<br>(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<br>(27-A), (27-B), (27-C)                                                      |
| E39-F3B     | −25 to 55°C         | −                 | −             | −              | −                   | −                | −               | −             | −                                | 2                            | 27 Page<br>(27-D), (27-E), (27-F)                                                      |
| E39-F3C     | −25 to 55°C         | −                 | −             | −              | −                   | −                | −               | −             | −                                | 1                            | 25 Page<br>(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

Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power  
Narrow  
view  
BGSRetro-reflective  
Limited-reflectiveChemical-resistant,  
Oil-resistant  
Bending  
Heat-resistantArea  
Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

## Smart Fiber Amplifier Units

### E3NX-FA Series

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

#### 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\*

**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.

#### Achieve Easy Detection in Many Applications Advanced Smart Tuning

Just press the **E-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.



#### Automatic Setting of Optimum Values

Threshold + Incident Level

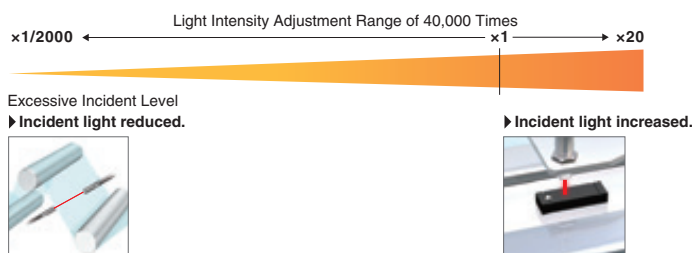
5000 9999

Set to the intermediate value between the incident levels with and without a workpiece.

Incident level adjustment with and without a workpiece.

#### 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.

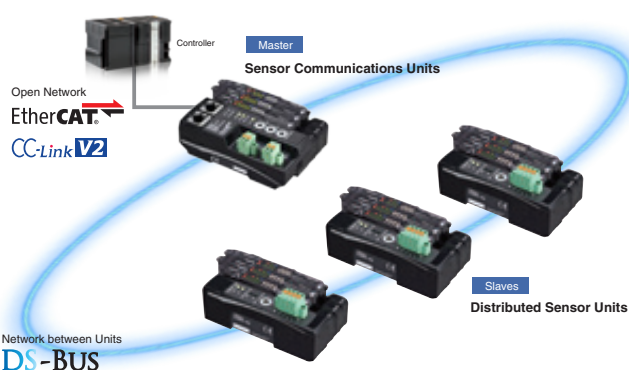


## Sensor Communications Units for E3NX-FA

### E3NW Series

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

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.



EtherCAT  
CC-Link V2

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## Smart Fiber Amplifier Units

### E3X-ZV Series

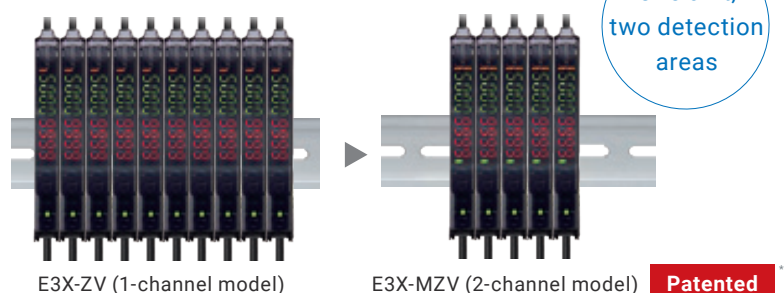
**Affordable Amplifier Units with Simple Operation and Stable Detection Capabilities**



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#### 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.



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 $\mu$ s /250 $\mu$ s/1 ms/16 ms (Default: 250 $\mu$ s)                           | 30 $\mu$ s (32 $\mu$ s)/250 $\mu$ s/1 ms/16 ms (Default: 250 $\mu$ s)                                           |
|                                        | 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 $\mu$ m dia.                                                             | 2 $\mu$ m 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

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Fiber Sensor Features

Selection Guide

Fiber Units

Threaded  
Hex-shaped  
Cylindrical  
Standard Installation

Flat  
Sleeved  
Saving Space

Small Spot  
High Power  
Narrow view  
BGS  
Beam Improvements

Retro-reflective  
Limited-reflective  
Transparent Objects

Chemical-resistant, Oil-resistant  
Bending  
Heat-resistant  
Environmental Immunity

Area Detection  
Liquid-level  
Vacuum  
FPD, Semi, Solar  
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Installation Information

Fiber Amplifiers, Communications Unit, and Accessories

Technical Guide and Precautions

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Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power  
Narrow viewRetro-reflective  
Limited-reflectiveChemical-resistant,  
Oil-resistant  
Bending  
Heat-resistantArea Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

## E3NX-FA Fiber Amplifier Units and Related Products

## Fiber Amplifier Units E3NX-FA Series

| Type                                                                                | Appearance                                                                          | Connecting method                                                                   | Inputs/<br>outputs                                             | Models                |                       | Ratings and<br>Specifications | Dimensions               |                          |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------|-----------------------|-----------------------|-------------------------------|--------------------------|--------------------------|
|                                                                                     |                                                                                     |                                                                                     |                                                                | NPN output            | PNP output            |                               |                          |                          |
| Standard<br>models                                                                  |    | Pre-wired (2 m)                                                                     | 1 output                                                       | <b>E3NX-FA11 2M</b>   | <b>E3NX-FA41 2M</b>   | Page 72                       | Page 76<br><b>(76-A)</b> |                          |
|                                                                                     |    | Wire-saving Connector                                                               | 1 output                                                       | <b>E3NX-FA6</b>       | <b>E3NX-FA8</b>       |                               | Page 76<br><b>(76-B)</b> |                          |
| Advanced<br>models                                                                  |    | Pre-wired (2 m)                                                                     | 2 outputs<br>+<br>1 input                                      | <b>E3NX-FA21 2M</b>   | <b>E3NX-FA51 2M</b>   |                               | Page 76<br><b>(76-A)</b> |                          |
|                                                                                     |    | Wire-saving Connector                                                               | 1 output<br>+<br>1 input                                       | <b>E3NX-FA7</b>       | <b>E3NX-FA9</b>       |                               | Page 76<br><b>(76-B)</b> |                          |
|                                                                                     |                                                                                     |                                                                                     | 2 outputs                                                      | <b>E3NX-FA7TW</b>     | <b>E3NX-FA9TW</b>     |                               |                          |                          |
|                                                                                     |    | M8 Connector                                                                        | 1 output<br>+<br>1 input                                       | <b>E3NX-FA24</b>      | <b>E3NX-FA54</b>      |                               | Page 77<br><b>(77-A)</b> |                          |
|                                                                                     |                                                                                     |                                                                                     | 2 outputs                                                      | —                     | <b>E3NX-FA54TW</b>    |                               |                          |                          |
|                                                                                     | Infrared models                                                                     |   | Pre-wired (2 m)                                                | 1 output              | <b>E3NX-FAH11 2M</b>  |                               | <b>E3NX-FAH41 2M</b>     | Page 76<br><b>(76-A)</b> |
|  |                                                                                     | Wire-saving Connector                                                               | 1 output                                                       | <b>E3NX-FAH6</b>      | <b>E3NX-FAH8</b>      |                               | Page 76<br><b>(76-B)</b> |                          |
| Analog output<br>models                                                             |  | Pre-wired (2 m)                                                                     | 2 output                                                       | <b>E3NX-FA11AN 2M</b> | <b>E3NX-FA41AN 2M</b> |                               | Page 74                  | Page 76<br><b>(76-A)</b> |
| Model for<br>Sensor<br>Communications<br>Unit <sup>*2</sup>                         |  | Connector for Sensor<br>Communications Unit                                         | —                                                              | <b>E3NX-FA0</b>       |                       |                               |                          | Page 77<br><b>(77-B)</b> |
|                                                                                     |                                                                                     |                                                                                     | <b>E3NX-FAH0</b>                                               |                       |                       |                               |                          |                          |
|                                                                                     |                                                                                     |  | Connector for Sensor<br>Communications Unit<br>Pre-wired (2 m) | 1 output              | <b>E3NX-FA10 2M</b>   | <b>E3NX-FA40 2M</b>           |                          | Page 77<br><b>(77-B)</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 | <b>E3NW-ECT</b> | Page 84                    | Page 85<br>(85-A) |
| CC-Link              |  |                                                 | <b>E3NW-CCL</b> | *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                         | <b>E3NW-DS</b> | Page 84                    | Page 85<br><b>(85-B)</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          |
|----------------|
| <b>E39-G27</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 | 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 | <b>E3X-CN21</b> | Page 94<br><b>(94-A)</b>               |
| Slave Connector  |    |              | 2                    |                                                  | <b>E3X-CN22</b> | Page 94<br><b>(94-B)</b>               |
| Master Connector |    |              | 3                    | E3NX-FA6<br>E3NX-FA8<br>E3NX-FAH6<br>E3NX-FAH8   | <b>E3X-CN11</b> | Page 94<br><b>(94-A)</b>               |
| Slave Connector  |  |              | 1                    |                                                  | <b>E3X-CN12</b> | Page 94<br><b>(94-B)</b>               |

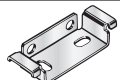
#### Sensor I/O Connectors (Required for models with M8 Connectors.)

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               |
|-------------------------------------------------------------------------------------|--------------|----------------------|------------------------|----------------------------|--------------------------|
|  | 2 m          | 4                    | <b>XS3F-M421-402-A</b> | Page 94                    | Page 94<br><b>(94-C)</b> |
|                                                                                     | 5 m          |                      | <b>XS3F-M421-405-A</b> |                            |                          |
|  | 2 m          |                      | <b>XS3F-M422-402-A</b> |                            | Page 94<br><b>(94-D)</b> |
|                                                                                     | 5 m          |                      | <b>XS3F-M422-405-A</b> |                            |                          |

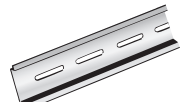
### Mounting Bracket

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

| Appearance                                                                          | Model           | Quantity | Dimensions               |
|-------------------------------------------------------------------------------------|-----------------|----------|--------------------------|
|  | <b>E39-L143</b> | 1        | Page 95<br><b>(95-A)</b> |

### 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   | <b>PFP-100N</b>  | 1        | Page 95<br><b>(95-B)</b> |
|                                                                                     | Shallow type, total length: 0.5 m | <b>PFP-50N</b>   |          |                          |
|                                                                                     | Deep type, total length: 1 m      | <b>PFP-100N2</b> |          | Page 95<br><b>(95-C)</b> |

### End Plate

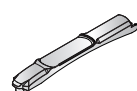
Two End Plates are provided with the Sensor Communications Unit.  
End Plates are not provided with the Fiber Amplifier Unit and must be ordered separately as required.

| Appearance                                                                          | Model        | Quantity | Dimensions               |
|-------------------------------------------------------------------------------------|--------------|----------|--------------------------|
|  | <b>PFP-M</b> | 1        | Page 95<br><b>(95-D)</b> |

### Cover

Attach these Covers to Amplifier Units.

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

| Appearance                                                                          | Model                      | Quantity |
|-------------------------------------------------------------------------------------|----------------------------|----------|
|  | <b>E39-G25 FOR E3NX-FA</b> | 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 (Stdnd)                              | 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 (Stdnd)       | 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 <sup>2</sup> 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                                                                                                                                                                                                                                                                            |                          |                                                                                                       |                                                                                                         |                                                                                                       |                                                                                                         |                            |                                                                                                         |                             |                                                           |
| 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.

|                                   |                          |
|-----------------------------------|--------------------------|
| Threaded                          | Standard Installation    |
| Hex-shaped                        |                          |
| Cylindrical                       |                          |
| Flat                              | Saving Space             |
| Sleeved                           |                          |
| Small Spot                        | Beam Improvements        |
| High Power                        |                          |
| Narrow view                       |                          |
| BGS                               | Transparent Objects      |
| Retro-reflective                  |                          |
| Limited-reflective                |                          |
| Chemical-resistant, Oil-resistant | Environmental Immunity   |
| Bending                           |                          |
| Heat-resistant                    |                          |
| Area Detection                    | Applications             |
| Liquid-level                      |                          |
| Vacuum                            |                          |
| FPD, Semi, Solar                  | Installation Information |
|                                   |                          |

Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power  
Narrow view  
BGSRetro-reflective  
Limited-reflectiveChemical-resistant,  
Oil-resistant  
Bending  
Heat-resistantArea Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

## 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<br>Pre-wired                                                                                                                                                                                                | Connector for Sensor Communications Unit                                     |                                                                                                                                                                                                                                                          |
| Inputs/<br>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<br>(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<br>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,<br>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<br>for mutual<br>interference<br>prevention<br>*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<br>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 (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>Storage: -30 to 70°C (with no icing or condensation) | Operating:<br>Groups of 1 or 2 Amplifier Units: 0 to 55°C,<br>Groups of 3 to 10 Amplifier Units: 0 to 50°C,<br>Groups of 11 to 16 Amplifier Units: 0 to 45°C,<br>Groups of 17 to 30 Amplifier Units: 0 to 40°C<br>Storage: -30 to 70°C (with no icing or condensation) |                                                                                                                         |  |
| Ambient humidity range               |                                                                                                                    | Operating and storage: 35 to 85% (with no condensation) 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 <sup>2</sup> for 3 times each in X, Y, and Z directions                                                                                                                                                                                                                | 150 m/s <sup>2</sup> 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                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                        |                                                                                                                         |  |
| 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.

|                                   |                          |
|-----------------------------------|--------------------------|
| Threaded                          | Standard Installation    |
| Hex-shaped                        |                          |
| Cylindrical                       |                          |
| Flat                              | Saving Space             |
| Sleeved                           |                          |
| Small Spot                        | Beam Improvements        |
| High Power                        |                          |
| Narrow view                       |                          |
| BGS                               | Transparent Objects      |
| Retro-reflective                  |                          |
| Limited-reflective                |                          |
| Chemical-resistant, Oil-resistant | Environmental Immunity   |
| Bending                           |                          |
| Heat-resistant                    |                          |
| Area Detection                    | Applications             |
| Liquid-level                      |                          |
| Vacuum                            |                          |
| FPD, Semi, Solar                  | Installation Information |
|                                   |                          |
|                                   |                          |

Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High PowerNarrow view  
BGSRetro-reflective  
Limited-reflective

Bending

Heat-resistant

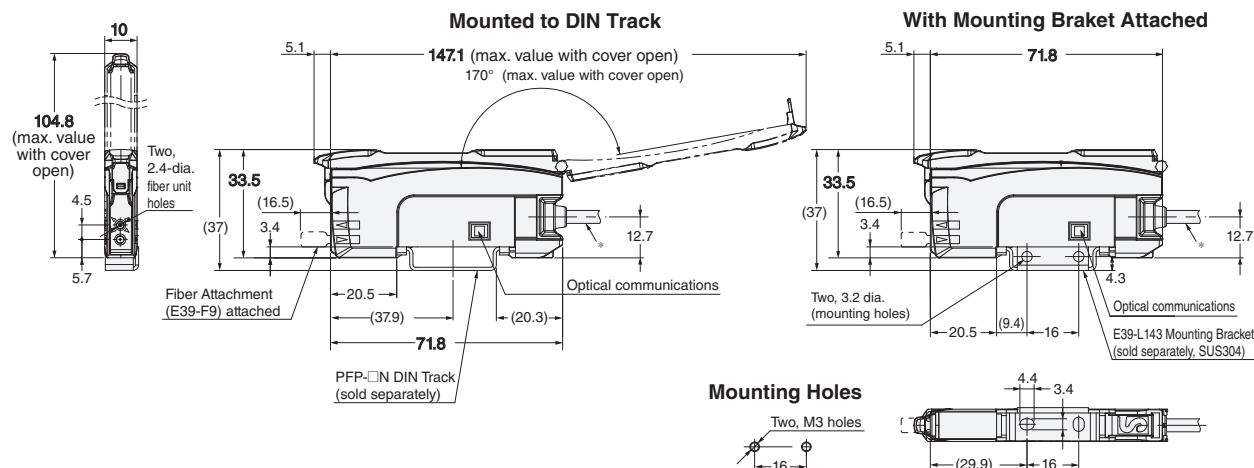
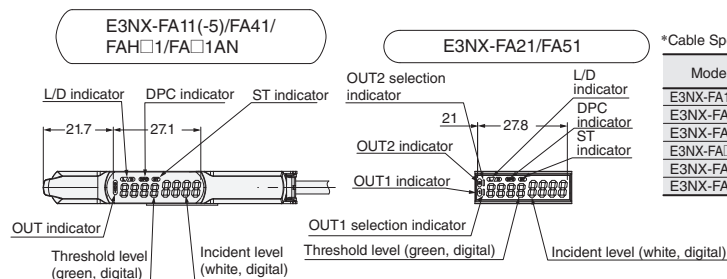
Liquid-level

FPD,  
Semi,  
Solar

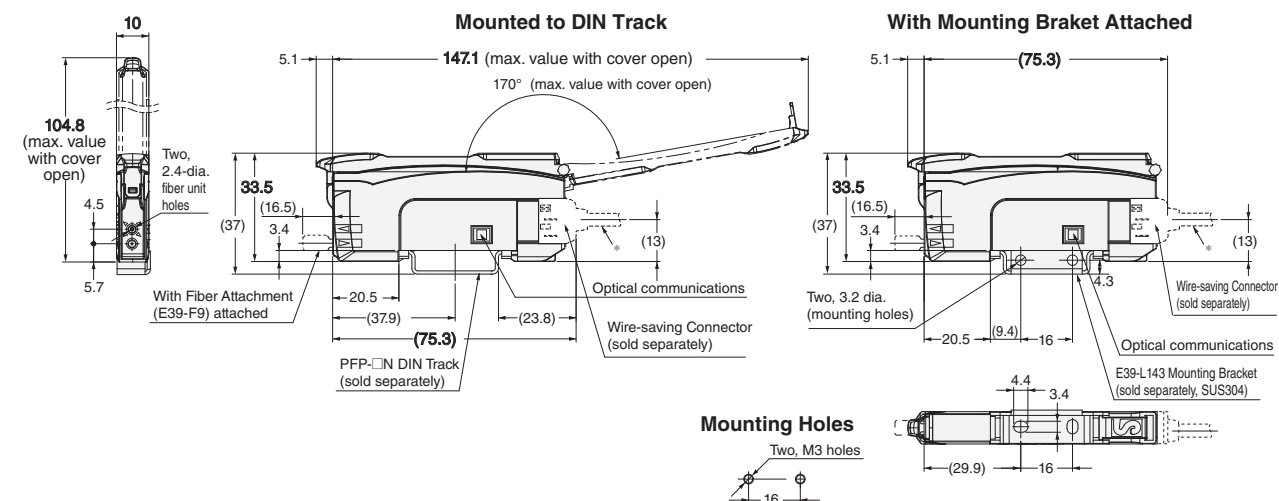
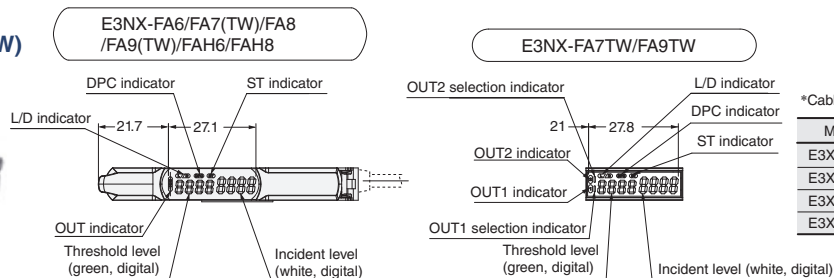
## Dimensions

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

## Pre-wired Amplifier Units

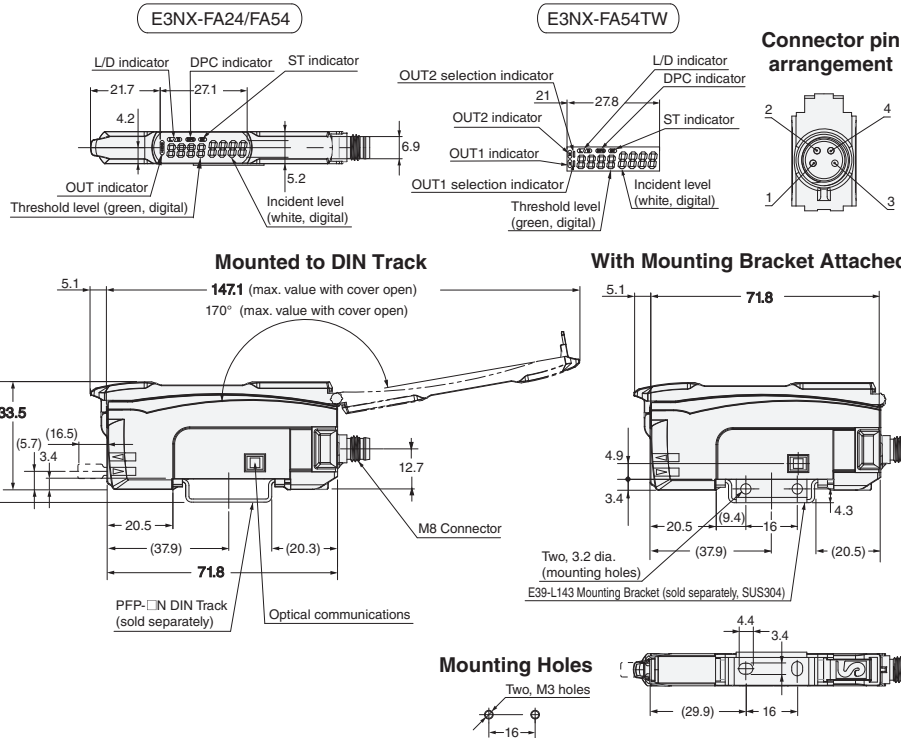
**(76-A)** E3NX-FA□1(-5)  
E3NX-FAH□1  
E3NX-FA□AN

## Amplifier Units with Wire-saving Connectors

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

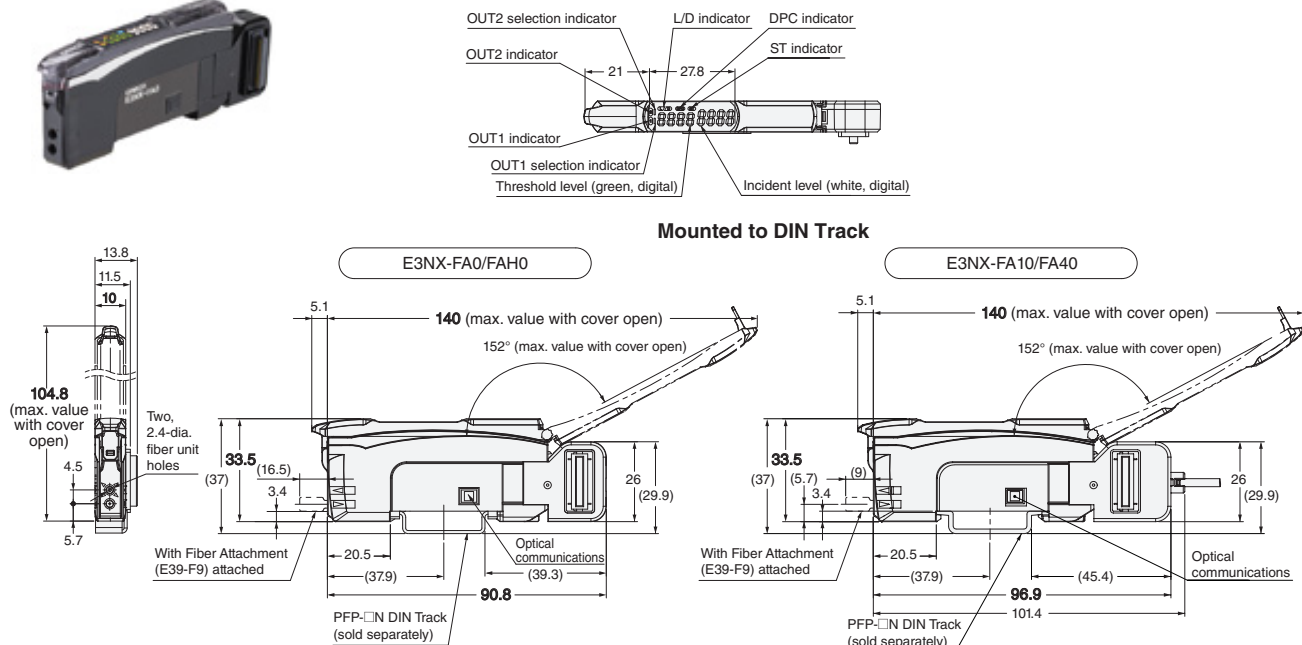
### Amplifier Units with M8 Connector

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



### Amplifier Unit with Connector for Sensor Communications Unit

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



Fiber Sensor  
Features

Selection  
Guide

Fiber Units

|             |                       |
|-------------|-----------------------|
| Threaded    | Standard Installation |
| Hex-shaped  |                       |
| Cylindrical |                       |
| Flat        | Saving Space          |
| Sleeved     |                       |
| Small Spot  | Beam Improvements     |
| High Power  |                       |
| Narrow view |                       |
| BGS         |                       |

|                    |                     |
|--------------------|---------------------|
| Retro-reflective   | Transparent Objects |
| Limited-reflective |                     |

|                                   |                        |
|-----------------------------------|------------------------|
| Chemical-resistant, Oil-resistant | Environmental Immunity |
| Bending                           |                        |
| Heat-resistant                    |                        |

|                  |              |
|------------------|--------------|
| Area Detection   | Applications |
| Liquid-level     |              |
| Vacuum           |              |
| FPD, Semi, Solar |              |

Installation  
Information

Fiber Amplifiers,  
Communications  
Unit, and  
Accessories

Technical  
Guide and  
Precautions

Model Index

Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power  
Narrow view  
BGSRetro-reflective  
Limited-reflectiveChemical-resistant,  
Oil-resistant  
Bending  
Heat-resistantArea  
Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

## 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       | Incident light<br>No incident light<br>OUT indicator Lit<br>(orange) Not lit<br>Output transistor ON<br>OFF<br>Load Set<br>Reset<br>(Between brown and black leads)     | L lit.         |                |
|                                                                 | Dark-ON        | Incident light<br>No incident light<br>OUT indicator Lit<br>(orange) Not lit<br>Output transistor ON<br>OFF<br>Load Set<br>Reset<br>(Between brown and black leads)     | D lit.         |                |
| E3NX-FA21                                                       | Light-ON       | ch1/<br>ch2 No incident light<br>OUT indicator Lit<br>(orange) Not lit<br>Output transistor ON<br>OFF<br>Load Set<br>Reset<br>(Between brown and black (orange) leads)  | L lit.         |                |
|                                                                 | Dark-ON        | ch1/<br>ch2 No incident light<br>OUT indicator Lit<br>(orange) Not lit<br>Output transistor ON<br>OFF<br>Load Set<br>Reset<br>(Between brown and black (orange) leads)  | D lit.         |                |
| E3NX-FA7<br>E3NX-FA24                                           | Light-ON       | Incident light<br>No incident light<br>OUT indicator Lit<br>(orange) Not lit<br>Output transistor ON<br>OFF<br>Load Set<br>Reset<br>(Between brown and black leads)     | L lit.         |                |
|                                                                 | Dark-ON        | Incident light<br>No incident light<br>OUT indicator Lit<br>(orange) Not lit<br>Output transistor ON<br>OFF<br>Load Set<br>Reset<br>(Between brown and black leads)     | D lit.         |                |
| E3NX-FA7TW                                                      | Light-ON       | ch1/<br>ch2 No incident light<br>OUT indicator Lit<br>(orange) Not lit<br>Output transistor ON<br>OFF<br>Load Set<br>Reset<br>(Between brown and black (orange) leads)  | L lit.         |                |
|                                                                 | Dark-ON        | ch1/<br>ch2 No incident light<br>OUT indicator Lit<br>(orange) Not lit<br>Output transistor ON<br>OFF<br>Load Set<br>Reset<br>(Between brown and black (orange) leads)  | D lit.         |                |
| E3NX-FA11AN                                                     | Light-ON       | Incident light<br>No incident light<br>OUT indicator Lit<br>(orange) Not lit<br>Output transistor ON<br>OFF<br>Load Operate<br>Reset<br>(Between brown and black leads) | L lit.         |                |
|                                                                 | Dark-ON        | Incident light<br>No incident light<br>OUT indicator Lit<br>(orange) Not lit<br>Output transistor ON<br>OFF<br>Load Operate<br>Reset<br>(Between brown and black leads) | D lit.         |                |

• M8 Connector Pin Arrangement



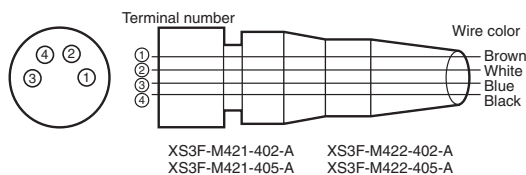
Note. For E3NX-FA6/ FA7/ FA8/ FA9/ FA7TW/ FA9TW/ FAH6/ FAH8, diagram with optional wire-saving connector.

## 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       | Incident light      | lit.           |                                       |
|                                                  | Dark-ON        | Incident light      | lit.           |                                       |
| E3NX-FA51                                        | Light-ON       | ch1/ Incident light | lit.           |                                       |
|                                                  | Dark-ON        | ch1/ Incident light | lit.           |                                       |
| E3NX-FA9<br>E3NX-FA54                            | Light-ON       | Incident light      | lit.           | <p>• M8 Connector Pin Arrangement</p> |
|                                                  | Dark-ON        | Incident light      | lit.           |                                       |
| E3NX-FA9TW<br>E3NX-FA54TW                        | Light-ON       | ch1/ Incident light | lit.           | <p>• M8 Connector Pin Arrangement</p> |
|                                                  | Dark-ON        | ch1/ Incident light | lit.           |                                       |
| E3NX-FA41AN                                      | Light-ON       | Incident light      | lit.           |                                       |
|                                                  | Dark-ON        | Incident light      | lit.           |                                       |

Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power  
Narrow view  
BGSRetro-reflective  
Limited-reflectiveChemical-resistant,  
Oil-resistant  
Bending  
Heat-resistantArea  
Detection  
Liquid-level  
Vacuum

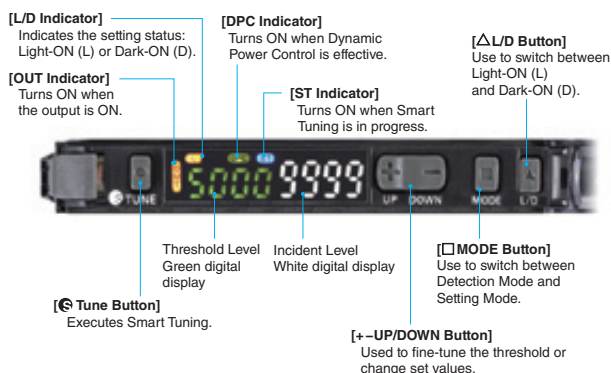
## Plug (Sensor I/O Connector)



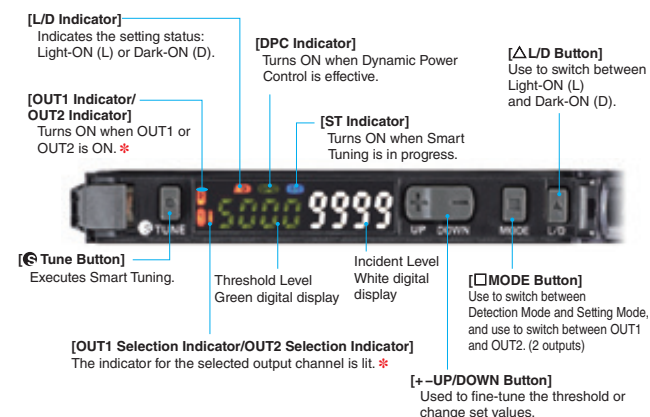
| Wire color | Connection pin | Application             |
|------------|----------------|-------------------------|
| Brown      | 1              | Power supply (+V)       |
| White      | 2              | External input / Output |
| Blue       | 3              | Power supply (0 V)      |
| Black   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

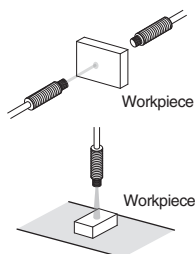
1. Press button.

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.

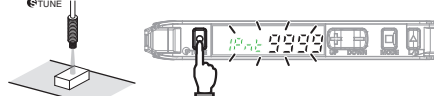


## Smart Tuning [Easy Sensitivity Setting]

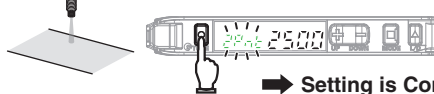
## (1) Detect for Workpiece Presence/Absence

- 2-point Tuning

1. Press button with a workpiece in the detection area.



2. Press 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.

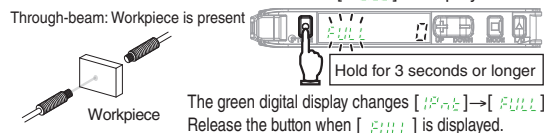


Step 1 and Step 2 can be reversed.

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

- Maximum Sensitivity Tuning

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



➔ 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.

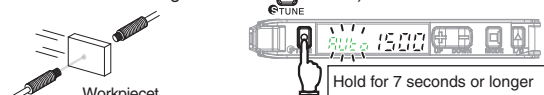
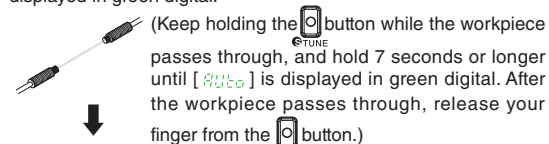


However, the Sensor becomes more susceptible to the influence of background objects.

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

- Full Auto Tuning

1. Hold the button without the presence of a workpiece, and pass the workpiece through while [IPnt] → [FULL] → [Auto] is displayed in green digital.



➔ 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.

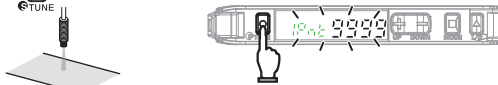
### Basic Settings

#### (4) Determine Workpiece Position

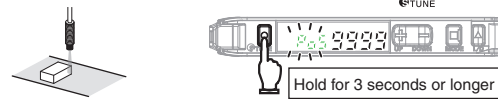
##### ● Position Tuning

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

2. Press button without a workpiece in the area.



3. Place the workpiece at the desired position and hold button.



The green digital display changes [P000] → [Pos].

➡ **Setting is Completed**

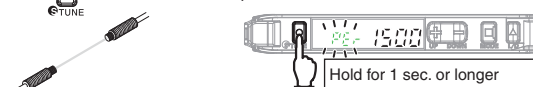
Incident light level setting: The Step 3 incident level is adjusted to half the power tuning level.  
Threshold setting: Set to the same value as the Step 3 incident level.

#### (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 button without a workpiece in the area.



➡ **Setting is Completed**

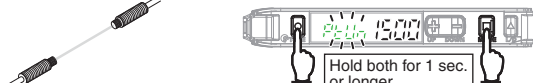
Incident light level setting:  
The Step 2 incident light level is adjusted to the power tuning level.  
Threshold setting:  
Set to the value obtained by (Incident Level at Step 2 × Percentage Tuning Level).

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 and 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.

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>                    | 2-point Tuning<br>Full Auto Tuning           | <ul style="list-style-type: none"> <li>• Change the detection function mode to a slower response time mode.</li> <li>• Reduce the distance between the emitter and receiver. (Through-beam)</li> <li>• Place the Fiber Head closer to the sensing object. (Reflective)</li> </ul> |
| Over Error<br>                    | All                                          | <ul style="list-style-type: none"> <li>• Use a thin-diameter fiber.</li> <li>• Widen the emitter and receiver distance. (Through-beam)</li> <li>• Distance the Fiber Head from the sensing object. (Reflective)</li> </ul>                                                        |
| Incident light level is too high. |                                              |                                                                                                                                                                                                                                                                                   |
| Low Error<br>                     | Tuning other than Maximum Sensitivity Tuning | <ul style="list-style-type: none"> <li>• Reduce the distance between the emitter and receiver. (Through-beam)</li> <li>• Place the Fiber Head closer to the sensing object. (Reflective)</li> </ul>                                                                               |
| Incident light level is too low.  |                                              |                                                                                                                                                                                                                                                                                   |

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

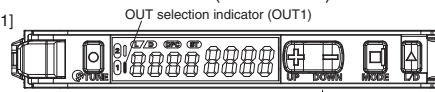
#### Channel switching

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

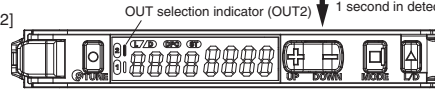
■ The OUT selection indicators and the settings will change.

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

[Output 1]



[Output 2]



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 button to adjust the threshold level.

The threshold level becomes higher.

The threshold level becomes lower.



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)

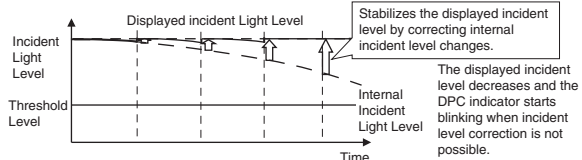
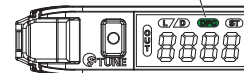
1. Perform Smart Tuning.

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 button and then hold button for 3 seconds or longer.



2. Select [] in and press button.

3. Select [] in and press button.

#### (3) Save or Read Settings

1. Hold button and then hold button for 3 seconds or longer.

- User Save Function

Saves the current settings.

2. Select [] in and press button.

3. Select [] in and press button.

- User Reset Function

Reads out the saved settings.

2. Select [] in and press button.

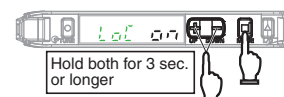
3. Select [] in and press button.

#### (4) Prevent Mistake-operation

- Key Lock Function

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

- Enable/Cancel (This procedure)



\* Press either of UP/DOWN.

Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power  
Narrow  
viewRetro-reflective  
Limited-reflectiveChemical-  
resistant,  
Oil-resistant  
BendingHeat-  
resistantArea  
Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

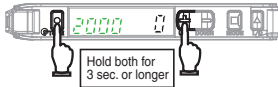
## Convenient Setting Features

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

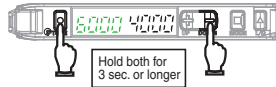
## ● Zero Reset Function

Changes the incident light level to "0".  
The threshold 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

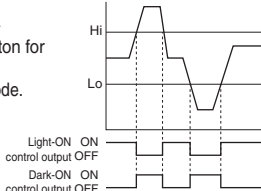
## ● Area Detection Mode

1. Select [SET Mode] – [OUT Mode] – [Area Detection Mode]. Press button for at least 3 seconds to leave the SET mode.

2. Press button in [Detection Mode] to display OUT1 HIGH and OUT 1 LOW. "HIGH" and "LOW" will appear on the green digital display.

3. Press button for the high and low thresholds to execute smart tuning.

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

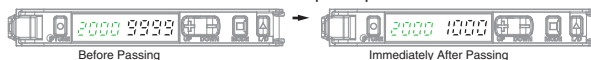
## ● Change Finder

1. Select [SET Mode] → [Digital Display] to set [].

2. Press 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.



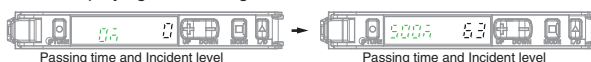
## (8) Determining If the Workpiece Can Be Detected

## ● Solution Viewer

1. Press button and button together for 3 seconds or longer to set []. To clear the setting, press button and button together for 3 seconds or longer to set [].

2. Send a workpiece past the Fiber Unit.

3. Displaying the Passing Time and Difference in Incident Levels.



## Detailed Settings

Hold button for 3 seconds or longer to enter SET mode. The OUT selection indicators show items for output 1 or output 2 individually for each output.

SET mode provides the function settings described hereafter. The initial display shown after transition from one function to another represents the factory default.

| Function Setting                                                                                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |                |                   |                        |        |              |                        |     |        |                    |      |         |                                 |      |           |                                |      |           |
|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------|-------------------|------------------------|--------|--------------|------------------------|-----|--------|--------------------|------|---------|---------------------------------|------|-----------|--------------------------------|------|-----------|
| <b>1. Function Selection</b><br>                                                                  | <b>Changing Functions to Set in SET mode</b><br>[OFF]: Functions 1. to 5. can be set<br>[ON]: Functions 1. to 16. can be set.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |                |                   |                        |        |              |                        |     |        |                    |      |         |                                 |      |           |                                |      |           |
| <b>2. Detection Function</b><br>(Incident Light Level Example)<br>(a)<br>(b)<br>(c)<br>(d)<br>(e) | <b>Changing Light Level and Response Time</b> <table border="1"> <thead> <tr> <th>Detection Function</th> <th>Response Time</th> <th>Light Level</th> </tr> </thead> <tbody> <tr> <td>(a) HS High-speed mode</td> <td>250 μs</td> <td>1 (Standard)</td> </tr> <tr> <td>(b) STND Standard mode</td> <td>1ms</td> <td>1 time</td> </tr> <tr> <td>(c) GIGA Giga mode</td> <td>16ms</td> <td>8 times</td> </tr> <tr> <td>(d) SHS Super High-speed mode*2</td> <td>30μs</td> <td>0.1 times</td> </tr> <tr> <td>(e) SHS2 Super High-speed Mode</td> <td>60μs</td> <td>0.1 times</td> </tr> </tbody> </table> <p>Smart Tuning is canceled if the detection mode is changed.</p> <p>*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</p> <p>The incident light level in SET mode is a reference value. It may be changed when switched to detection mode.</p> | 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 |
| 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          |                |                   |                        |        |              |                        |     |        |                    |      |         |                                 |      |           |                                |      |           |
| <b>3. DPC Function</b><br>                                                                        | <b>Stable Detection Regardless of Incident Light Level Change</b><br>Refer to "Convenient Setting Features"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |                |                   |                        |        |              |                        |     |        |                    |      |         |                                 |      |           |                                |      |           |
| <b>4. Timer Function</b><br>(a)<br>(b)<br>(c)<br>(d)                                              | <b>Setting Output Timer</b><br>(Settings are displayed for both outputs for models with 2 outputs.) <table border="1"> <thead> <tr> <th>Timer Function</th> <th>Incident light</th> <th>No incident light</th> </tr> </thead> <tbody> <tr> <td>(a) Off-delay Timer</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>(b) On-delay Timer</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>(c) One-shot Timer</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>(d) ON/OFF-delay Timer</td> <td>ON</td> <td>OFF</td> </tr> </tbody> </table> <p>A timer value can be set after pressing  button when a timer menu (other display than "----") is displayed. Use  button to set the time. (1 to 9999 ms in 1 ms steps; the initial value: 10 ms)</p>                                                                                                                                                                                                                                                               | Timer Function     | Incident light | No incident light | (a) Off-delay Timer    | ON     | OFF          | (b) On-delay Timer     | ON  | OFF    | (c) One-shot Timer | ON   | OFF     | (d) ON/OFF-delay Timer          | ON   | OFF       |                                |      |           |
| Timer Function                                                                                    | Incident light                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | No incident light  |                |                   |                        |        |              |                        |     |        |                    |      |         |                                 |      |           |                                |      |           |
| (a) Off-delay Timer                                                                               | ON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | OFF                |                |                   |                        |        |              |                        |     |        |                    |      |         |                                 |      |           |                                |      |           |
| (b) On-delay Timer                                                                                | ON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | OFF                |                |                   |                        |        |              |                        |     |        |                    |      |         |                                 |      |           |                                |      |           |
| (c) One-shot Timer                                                                                | ON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | OFF                |                |                   |                        |        |              |                        |     |        |                    |      |         |                                 |      |           |                                |      |           |
| (d) ON/OFF-delay Timer                                                                            | ON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | OFF                |                |                   |                        |        |              |                        |     |        |                    |      |         |                                 |      |           |                                |      |           |
| <b>5. Power Tuning Level</b><br>                                                                  | <b>Changing the Target Incident Light Level (Power Tuning Level)</b><br>Use  button to set the power tuning level.<br>[100 to 9999 in 1 steps; the initial value: 9999]<br>Refer to "Convenient Setting Features"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |                |                   |                        |        |              |                        |     |        |                    |      |         |                                 |      |           |                                |      |           |
| <b>6. BANK Switching</b><br>                                                                      | <b>Saving Settings in Each Bank</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                    |                |                   |                        |        |              |                        |     |        |                    |      |         |                                 |      |           |                                |      |           |

| Threaded                          | Standard Installation  |
|-----------------------------------|------------------------|
| Hex-shaped                        |                        |
| Cylindrical                       |                        |
| Flat                              | Saving Space           |
| Sleeved                           |                        |
| Small Spot                        | Beam Improvements      |
| High Power                        |                        |
| Narrow view                       |                        |
| BGS                               | Transparent Objects    |
| Retro-reflective                  |                        |
| Limited-reflective                |                        |
| Chemical-resistant, Oil-resistant | Environmental Immunity |
| Bending                           |                        |
| Heat-resistant                    | Applications           |
| Area Detection                    |                        |
| Liquid-level                      |                        |
| Vacuum                            |                        |
| FPD, Semi, Solar                  |                        |
| Installation Information          |                        |

### Function Setting

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

Power Tuning ON Setting

Power Tuning OFF Setting

**8. Percentage Tuning**

PER OFF

PER ON

**9. Output 1 Mode**

Normal Detection Mode

Area Detection Mode

**10. Output 2 Mode**

Normal Detection Mode

Alarm Output Mode\*1

Error Output Mode

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

**11. External Input**

Input-OFF

Tuning

Power Tuning

Laser OFF

Zero Reset

BANK Switching OFF : 1, ON : 2

Sensor OFF

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.

**12. Batch Tuning Settings**

Batch tuning function OFF

Batch percent tuning

Batch power percent tuning

### Description

**Setting ON or OFF Incident Level Adjustment when 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"

**Changing the Output Mode for Output 1**

**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.

**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.

**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

**13. Digital Display**

(a) d SP PER

(b) d SP P-b

(c) d SP bAr

(d) d SP PER

(e) d SP CH

(f) d SP CFd

**14. Inverted Display**

OFF

ON

**15. Eco Function**

OFF

ON

LO

**16. Hysteresis width**

Standard Setting

User Setting

User Setting (Displayed for models with 2 outputs.)

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

ON

OFF

### Description

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

Checking a Margin Against Threshold

| Threshold | Light Level Ratio |
|-----------|-------------------|
| 2000      | 150%              |

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

| Peak Light Level | Bottom Light Level |
|------------------|--------------------|
| 2000             | 2000               |

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

| Threshold | 120% | 100% | 80%  |
|-----------|------|------|------|
| 2000      | 2000 | 2000 | 2000 |

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

Adjusting Optical Axis

| Peak Light Level | Light Level |
|------------------|-------------|
| 2000             | 2000        |

Holds the peak incident light level and displays it in green digital figures.

Checking the Channel No. in Group Mounting

| Ch. No. | Light Level |
|---------|-------------|
| 1ch     | 2000        |

Checking the Channel No. in Group Mounting.

Checking the Light Level of Fast Moving Workpiece

| Threshold | Light level when the workpiece passes |
|-----------|---------------------------------------|
| 2000      | 2000                                  |

Light level when the workpiece passes is displayed in white digital figures for 0.5 seconds.

**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.

**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.

**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.

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

Press [MODE] button with [HUS-] displayed and then set the hysteresis width with [UP/DOWN] button. (0 to 9999)

**Turning ON and OFF Writing to EEPROM**

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

- Threaded
- Hex-shaped
- Cylindrical

- Flat
- Sleeved

- Small Spot
- High Power
- Narrow view
- BGS

- Retro-reflective
- Limited-reflective

- Chemical-resistant, Oil-resistant
- Bending
- Heat-resistant

- Area Detection
- Liquid-level
- Vacuum
- FPD, Semi, Solar

Ratings and Specifications

| Item                                         | Models                                                                                                                                                                      | E3NW-ECT | E3NW-DS                                                                                                              |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------------------------------------------------------------------------------------------------------|
| Connectable Sensor Amplifier Units           | N-Smart                                                                                                                                                                     |          |                                                                                                                      |
|                                              | Smart Fiber Amplifier Unit: E3NX-FA0/FA10/FA40                                                                                                                              |          |                                                                                                                      |
|                                              | Smart Fiber Amplifier Unit (Infrared models): E3NX-FAH0                                                                                                                     |          |                                                                                                                      |
|                                              | Color Fiber Amplifier Unit: E3NX-CA0 *1                                                                                                                                     |          |                                                                                                                      |
|                                              | Smart Laser Amplifier Unit: E3NC-LA0                                                                                                                                        |          |                                                                                                                      |
|                                              | Smart Laser Amplifier Unit (CMOS type): E3NC-SA0                                                                                                                            |          |                                                                                                                      |
|                                              | 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),<br>PWR Indicator (Green), RUN Indicator (Green), ERROR<br>Indicator (Red),and SS (Sensor Status) indicator (Green/Red) |          | RUN Indicator (Green),<br>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/s <sup>2</sup> for 1.5 hours each in X, Y, and Z directions                                                   |          |                                                                                                                      |
| Shock resistance (destruction)               | Destruction: 150 m/s <sup>2</sup> 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,<br>DIN Track End Plates (2) and Instruction manual                                                             |          | Power supply/communications connector,<br>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.

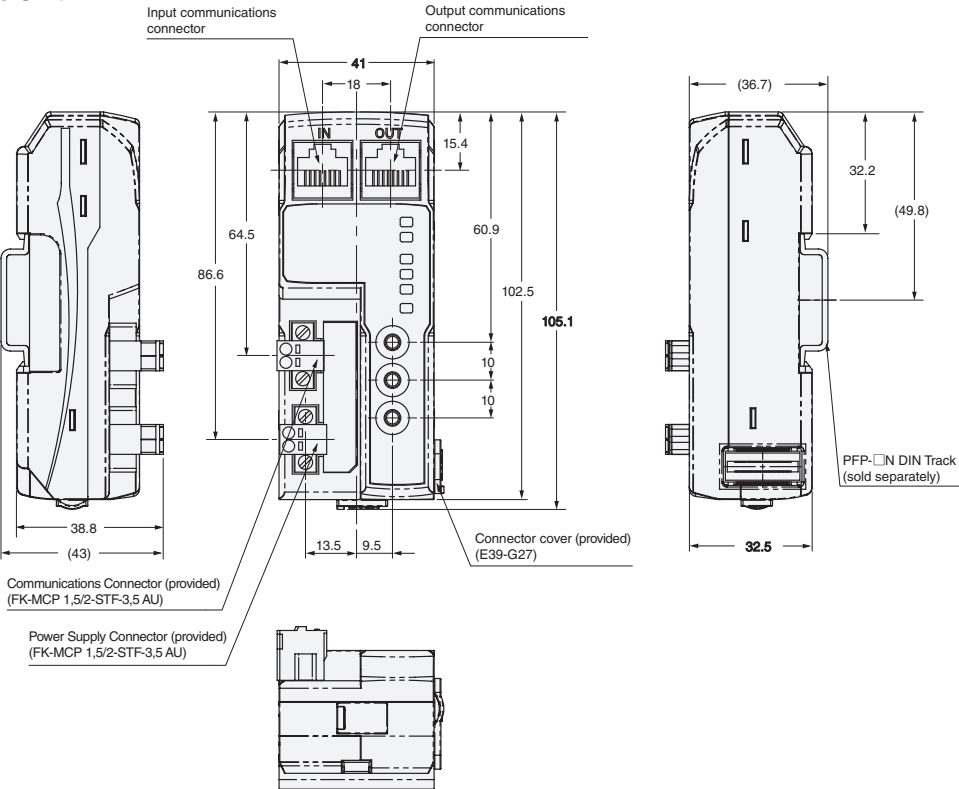
CC-Link-compatible products are also available. Refer to your OMRON website for details.

Dimensions

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

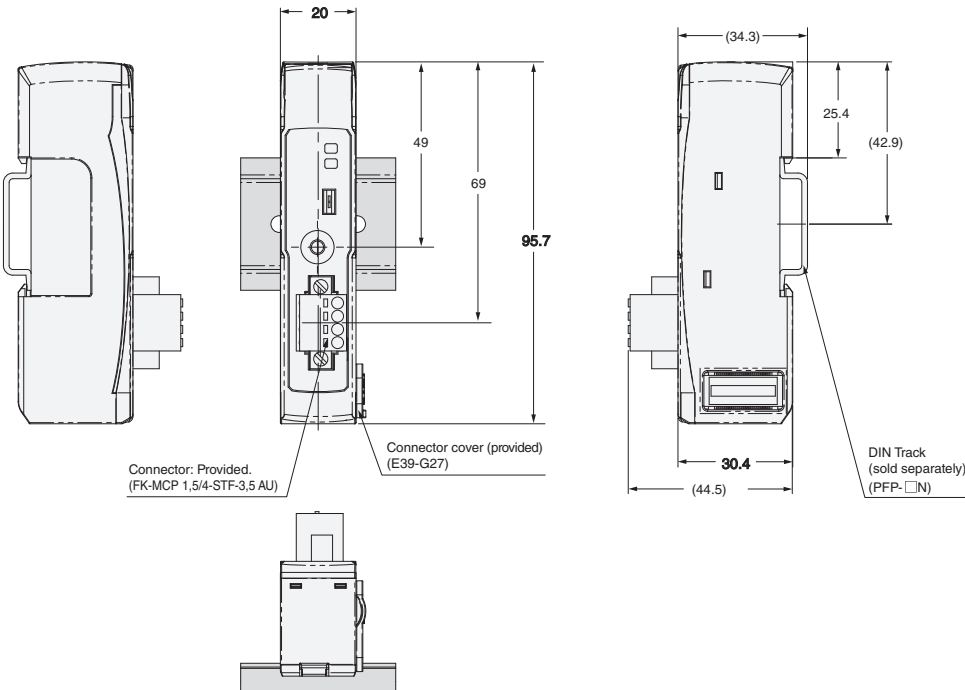
Sensor Communications Unit

85-A E3NW-ECT



Distributed Sensor Unit

85-B E3NW-DS



Fiber Sensor  
Features

Selection  
Guide

Fiber Units

|                                   |                          |
|-----------------------------------|--------------------------|
| Threaded                          | Standard Installation    |
| Hex-shaped                        |                          |
| Cylindrical                       |                          |
| Flat                              | Saving Space             |
| Sleeved                           |                          |
| Small Spot                        | Beam Improvements        |
| High Power                        |                          |
| Narrow view                       |                          |
| BGS                               | Transparent Objects      |
| Retro-reflective                  |                          |
| Limited-reflective                |                          |
| Chemical-resistant, Oil-resistant | Environmental Immunity   |
| Bending                           |                          |
| Heat-resistant                    |                          |
| Area Detection                    | Applications             |
| Liquid-level                      |                          |
| Vacuum                            |                          |
| FPD, Semi, Solar                  | Installation Information |
|                                   |                          |

Fiber Amplifiers,  
Communications  
Unit, and  
Accessories

Technical  
Guide and  
Precautions

Model Index

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)       | <b>E3X-ZV11 2M</b> | <b>E3X-ZV41 2M</b> | Page 88                    | Page 89<br><b>89-A</b> |
|                 |  | Wire-saving Connector | <b>E3X-ZV6</b>     | <b>E3X-ZV8</b>     |                            | Page 89<br><b>89-B</b> |

## Accessories (sold separately)

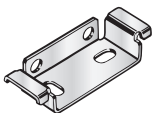
### Wire-saving connectors (Required for models for Wire-saving Connectors.)

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                    | <b>E3X-CN11</b> | Page 94                    | Page 94<br><b>94-A</b> |
| Slave Connector  |  |              | 1                    | <b>E3X-CN12</b> |                            | Page 94<br><b>94-B</b> |

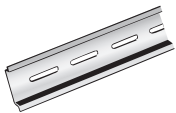
### Mounting Bracket

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

| Appearance                                                                        | Model           | Quantity | Dimensions             |
|-----------------------------------------------------------------------------------|-----------------|----------|------------------------|
|  | <b>E39-L143</b> | 1        | Page 95<br><b>95-A</b> |

### 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   | <b>PFP-100N</b>  | 1        | Page 95<br><b>95-B</b> |
|                                                                                     | Shallow type, total length: 0.5 m | <b>PFP-50N</b>   |          |                        |
|                                                                                     | Deep type, total length: 1 m      | <b>PFP-100N2</b> |          | Page 86<br><b>95-C</b> |

### 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             |
|-------------------------------------------------------------------------------------|--------------|----------|------------------------|
|  | <b>PFP-M</b> | 1        | Page 95<br><b>95-D</b> |

Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power  
Narrow  
viewRetro-  
reflective  
Limited-  
reflectiveChemical-  
resistant,  
Oil-resistant  
Bending  
Heat-  
resistantArea  
Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

## Ratings and Specifications

| Type                                    |                                | Standard models                                                                                                                                                                                                                                                                                                                  |                               |
|-----------------------------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Item                                    | 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 $\pm 10\%$ , 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:<br>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<br>reverse polarity protection                                                                                                                                                                                                              |                               |
| Response<br>time                        | Super-highspeed mode (SHS)     | Operate or reset: 50 $\mu$ s                                                                                                                                                                                                                                                                                                     |                               |
|                                         | High-speed mode (HS)           | Operate or reset: 250 $\mu$ s *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%),<br>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<br>temperature range shown above                                                                                                                                                                                                              |                               |
| Insulation resistance                   |                                | 20 M $\Omega$ 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 <sup>2</sup> 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                                                                                                                                                                                                                                                                                                                              |                               |
| Accessories                             |                                | Instruction manual, Compliance sheet                                                                                                                                                                                                                                                                                             |                               |

\*1.Mutual interference prevention function in the Response Time Priority Mode: 2 units: 350  $\mu$ s; 3 units: 400  $\mu$ s / In the Unit Number  
Priority Mode: 4 units: 700  $\mu$ s

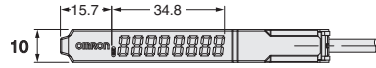
\*2.Mutual interference prevention function in the Unit Number Priority Mode: 4 units: 1.6 ms

## Dimensions

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

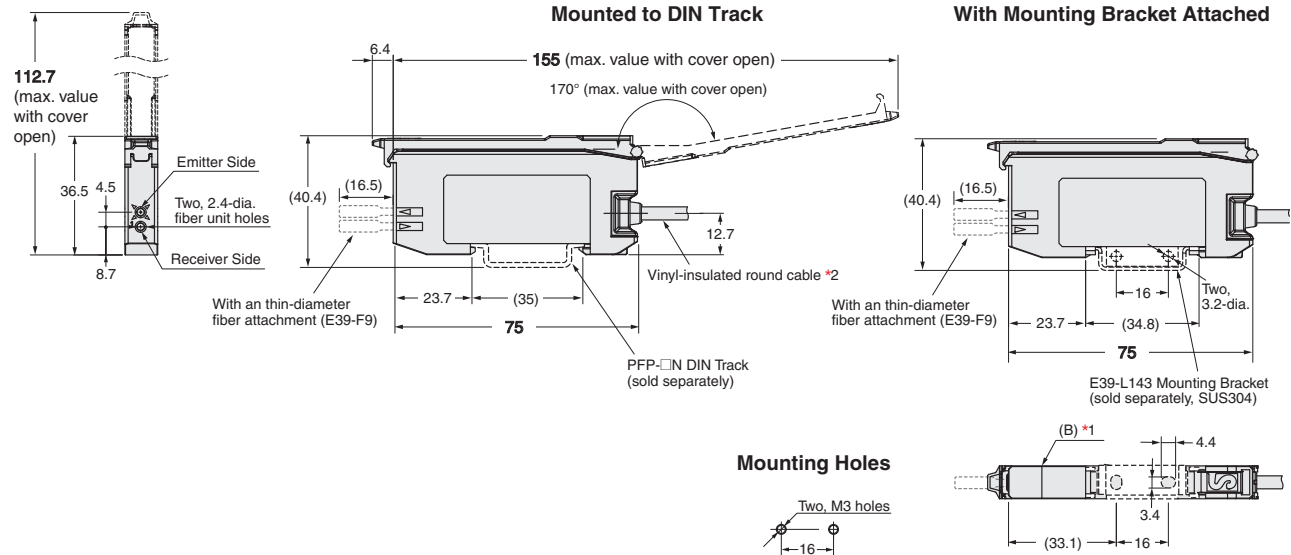
### Pre-wired Amplifier Units

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



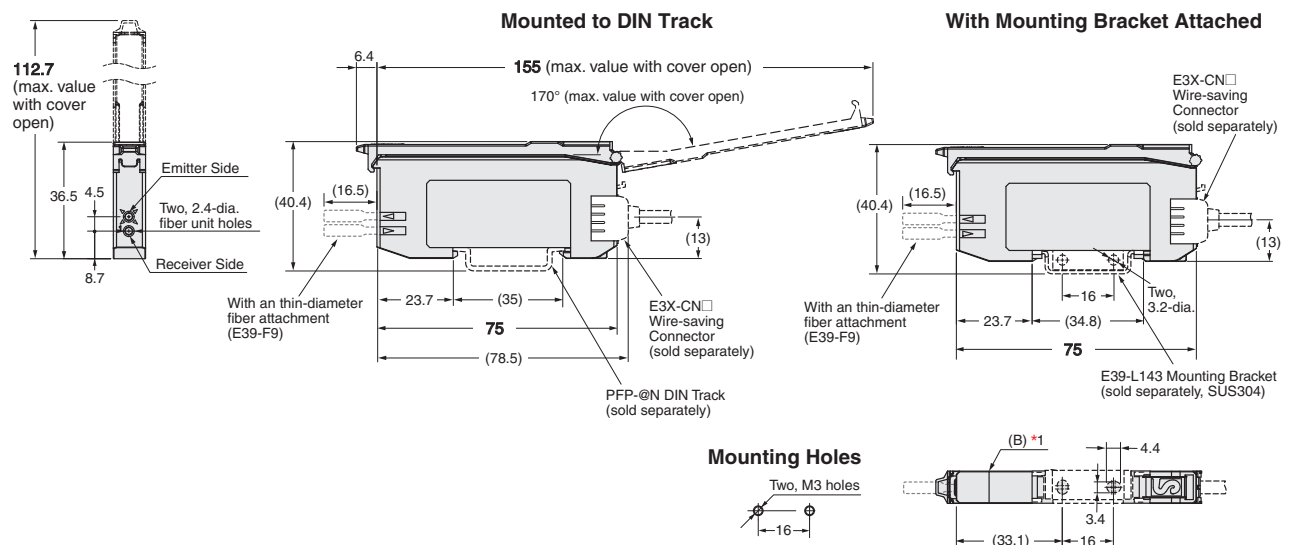
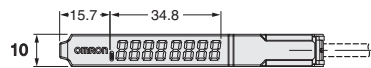
\*1. The Mounting Bracket can also be used on side B.  
\*2. Cable Specifications

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



### Wire-saving Connectors Units

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



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

Fiber Sensor  
Features

Selection  
Guide

Fiber Units

Threaded  
Hex-shaped  
Cylindrical

Flat  
Sleeved

Small Spot  
High Power

Narrow view  
BGS

Retro-reflective  
Limited-reflective

Chemical-resistant,  
Oil-resistant

Bending  
Heat-resistant

Area  
Detection

Liquid-level  
Vacuum

FPD,  
Semi,  
Solar

Installation  
Information

Fiber Amplifiers,  
Communications  
Unit, and  
Accessories

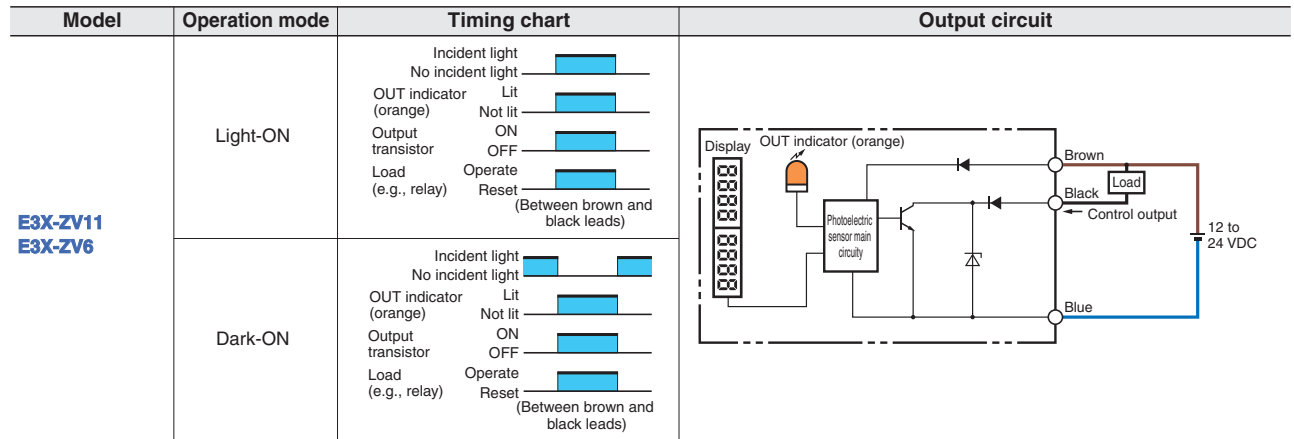
Technical  
Guide and  
Precautions

Model Index

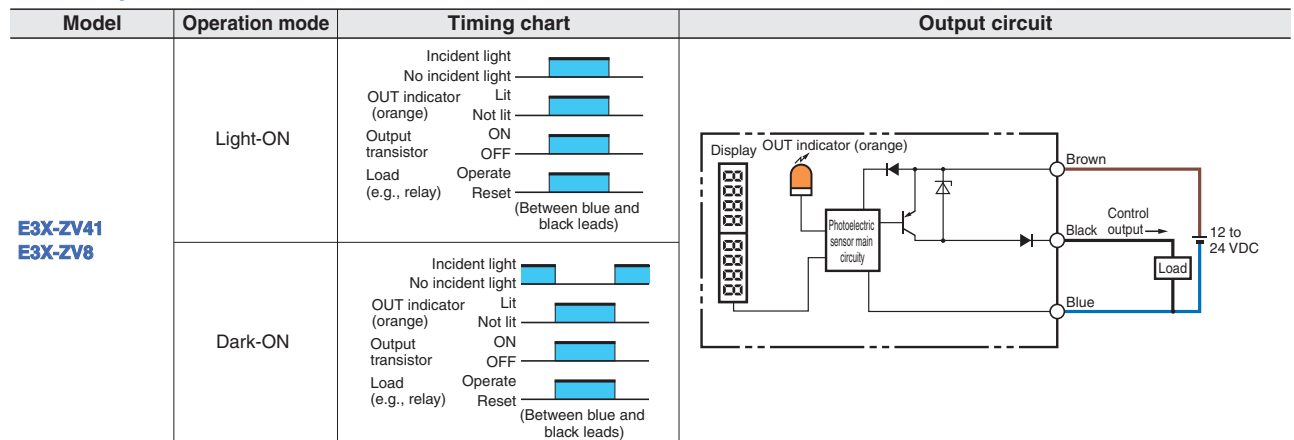
Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power  
Narrow viewRetro-reflective  
Limited-reflectiveChemical-resistant,  
Oil-resistant  
Bending  
Heat-resistantArea  
Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

## I/O Circuit Diagrams

## NPN Output



## PNP Output



## Nomenclature

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

## [Output Indicator: Orange]

Turns ON when the output is ON.

Threshold Level (Green) Incident Light Level (Red)

## [Smart Tuning Indicator: Green]

Lit up after normal completion of Smart Tuning. Put out when the detection function is changed or a tuning error occurs.



Digital display part

[+ / - Button]  
Used to tune the threshold.[Tuning button]  
Executes Smart Tuning.[MODE Button]  
Use to switch between Detection Mode and Setting Mode.

## Operating Procedures

### Basic Settings

#### Output switching

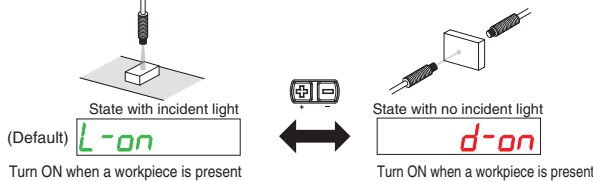
##### Selection of Light ON (L-ON) or Dark ON (D-ON)

###### • Output switching

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

In the case of diffuse reflection type or limited reflection type

In the case of through-beam type or regressive reflection type



3. Press the  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.



Hold the key for high-speed level adjustment.



## Initialization

### Initializing Settings

###### • Setting Reset

Initialize all settings to the factory-set defaults.

1. Hold the  button for 3 seconds or longer to enter the SET Mode.
2. Press the  button twice. 
3. Press the  button once.  Initialization selected
4. Press the  button once.  Initialization completed



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.

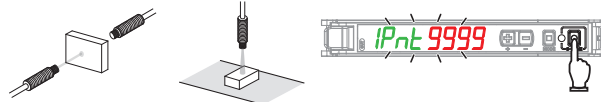
### Basic Smart Tuning Method

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

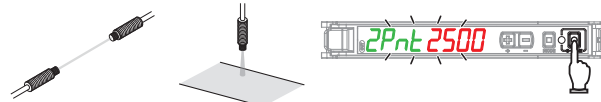
#### Most Basic Setting Method

###### • 2-point Tuning

1. Press the  button with a workpiece in the detection area.



2. Press the  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.



Step 1 and Step 2 can be reversed.

### Making Received Light Intensity Uniform

###### • Power Tuning

1. Hold the  and  buttons for 1 second or longer and release the button when [ PTLn ] 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.



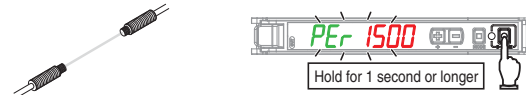
Perform the procedure with a workpiece in the area for reflective model setting. If the setting is made after position tuning, set both the through-beam model and reflective model with a workpiece.

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. 
2. Hold the  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].



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).

|                                   |                        |
|-----------------------------------|------------------------|
| Threaded                          | Standard Installation  |
| Hex-shaped                        |                        |
| Cylindrical                       |                        |
| Flat                              | Saving Space           |
| Sleeved                           |                        |
| Small Spot                        | Beam Improvements      |
| High Power                        |                        |
| Narrow view                       |                        |
| BGS                               |                        |
| Retro-reflective                  | Transparent Objects    |
| Limited-reflective                |                        |
| Chemical-resistant, Oil-resistant | Environmental Immunity |
| Bending                           |                        |
| Heat-resistant                    |                        |
| Area Detection                    | Applications           |
| Liquid-level                      |                        |
| Vacuum                            |                        |
| FPD, Semi, Solar                  |                        |
| Installation Information          |                        |

## 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  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  button pressed is adjusted to "0".  
Threshold setting: The value is set to approx.

7% of the incident light level when the  button pressed.

If the incident light level when the  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  button without the presence of a workpiece, and pass the workpiece through while [ **IPnt** ] → [ **FULL** ] → [ **Auto** ] is displayed in green digital. (Keep holding the  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  button.)

Incident light level setting: Adjust the max. incident light level while pressing the  button as the power tuning level.

Threshold setting: Set to the middle between max. and min. incident light levels while pressing the  button.

##### Determine Workpiece Position

###### • Position Tuning

- Press the  button without a workpiece in the area.  
The green digital display changes [ **IPnt** ].
- Place the workpiece at the desired position and hold the  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.

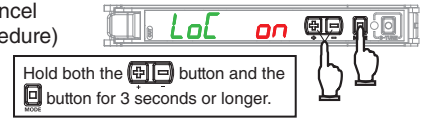
#### Convenient Settings

##### Preventing Malfunction

###### • Key Lock Function

Enable / Cancel  
(Same procedure)

Disables all button operations.



\* Press either of the + or - button.

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

###### • Zero Reset Function

Enable



Hold both the  button and the  button for 3 seconds or longer.



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  button for 3 seconds or longer.



When released, [ **0r5t OFF** ] is displayed.  
The threshold also changes accordingly. The lower threshold limit is -1999.

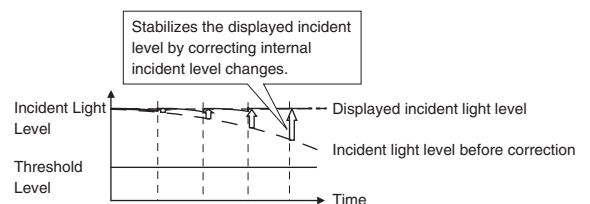
##### For Stable Detection Regardless of Received Light Intensity Changed due to Dust or Dirt

###### • 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



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.



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  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.

**1. Output Switching** Switching between Light ON (L-ON) and Dark ON (D-ON)

Press and hold the  button for 3 seconds or longer in the setting mode to switch to the detection mode.

**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 |

HS High-speed Mode    STND Standard Mode    GIGA Giga Mode    SHS Super High-speed Mode

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

Long-press the  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

Function Selection: [EASY]    PRO Mode

**5. Delay Timer Function** Setting Output Timer

After pressing the  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

Power tuning adjustment ON    Power tuning setting on power-up ON    Power tuning adjustment OFF

**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  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

DPC OFF    DPC ON    ATC (Function) ON

**10. Mutual Interference Prevention Function** Installing multiple Fiber Heads next to each other

Mutual interference prevention function OFF    Unit Number Priority Mode    Response Time Priority Mode

When 4 units installed next to each other    When up to 3 units installed next to each other

Emission cycle settings 1 to 4    Emission cycle settings 1 to 3

Set the first unit, the second unit, the third unit and the fourth unit to [a-F1], [a-F2], [a-F3] and [a-F4], respectively.    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 | Detection Function STND |
|------------------------|-----------------------|-------------------------|
| a-F1 to a-F4 (4 Units) | 700 µs                | 1.6 ms                  |

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 the 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.

Normal detection mode    Differential output mode 1    Differential output mode 2    Differential output mode 3    Differential output mode 4    Differential output mode 5

**12. External Input** Changing the type of external input (External input models only.)

Input OFF    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   |

**13. Emission Level Adjustment Function** Increasing / decreasing emission power

Emission Level    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)

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 result of 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  button and the  button for 3 seconds or longer in the Detection Mode.

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

Threshold / Receiving light amount    (a) To see the reserve of the light intensity level for the threshold    (b) To set the threshold with a microscopic object or fast-moving object    (c) To see the intuitive and easy to follow display    (d) To adjust the beam

(Display Example)

(a) 2000 150P    (b) 8000 2000    (c) 100% 100%    (d) 3500 3000    (e) F-F 19999

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.

Normal    Reverse    Threshold and light intensity are displayed on green digital and red digital respectively.

**16. Eco Function** Saving Power Consumption

Eco function OFF    (a) Eco function ON    (b) Eco function Standby

(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

This can be selected when 12. External Input is "oFF".

**17. User Save / Reset Functions** Saving / Reading Settings

User Save (Saving of settings)    User Reset (Reading of 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.

Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power  
Narrow  
view  
BGSRetro-reflective  
Limited-reflectiveChemical-resistant,  
Oil-resistant  
Bending  
Heat-resistantArea  
Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

## 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.)<br>(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

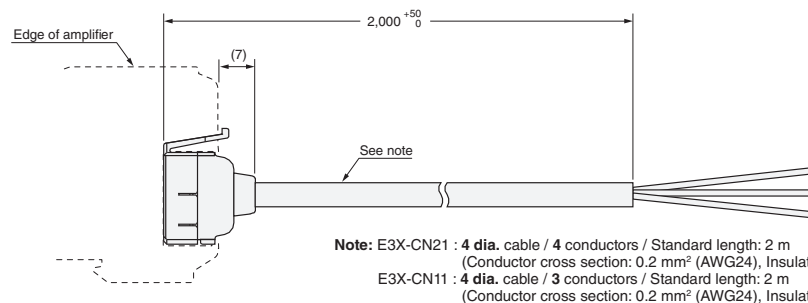
| Item                 | Models | XS3F-M42□-40□-A                           |
|----------------------|--------|-------------------------------------------|
| Number of conductors |        | 4                                         |
| Diameter of cable    |        | 4 dia.                                    |
| Rated current        |        | 1A                                        |
| Rated voltage        |        | 125VDC                                    |
| Contact resistance   |        | 40 mΩ max.<br>(20 mVDC max., 100 mA max.) |
| Number of insertions |        | Destruction: 200 times                    |

## Dimensions

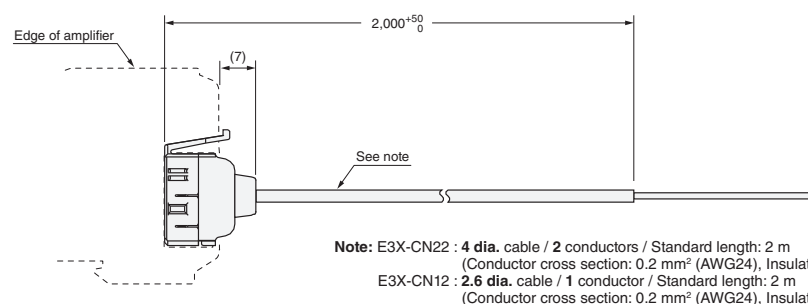
(Unit: mm)  
Tolerance class IT16 applies to demmensions in this date sheet unless otherwise specified.

## Wire-saving Connectors (for Models with Wire-saving Connectors)

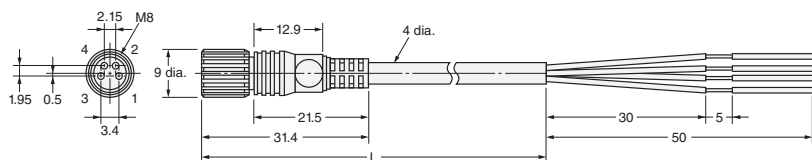
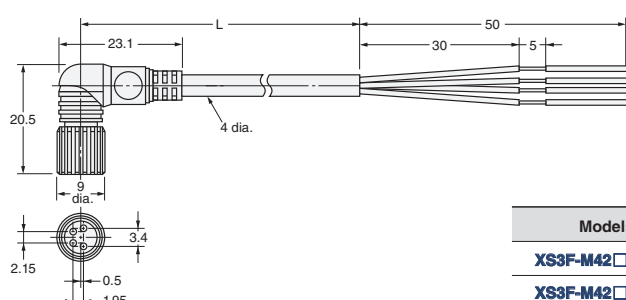
## Master Connector

(94-A) E3X-CN21  
E3X-CN11

## Slave Connector

(94-B) E3X-CN22  
E3X-CN12

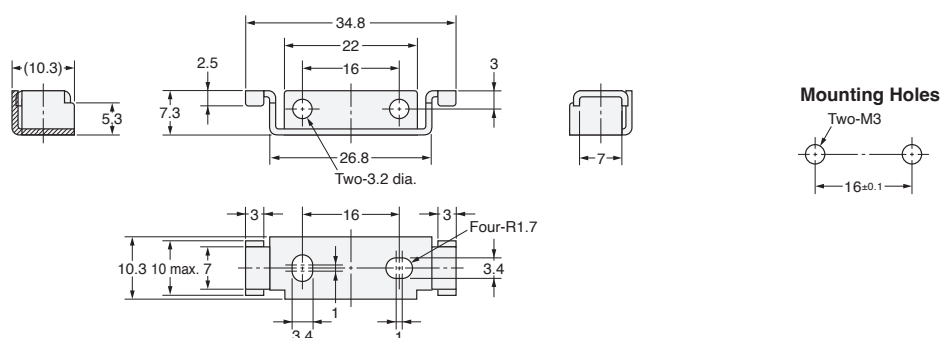
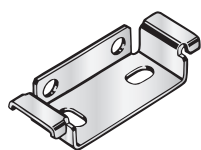
## Sensor I/O Connectors (for Models with M8 Connectors)

(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                  |

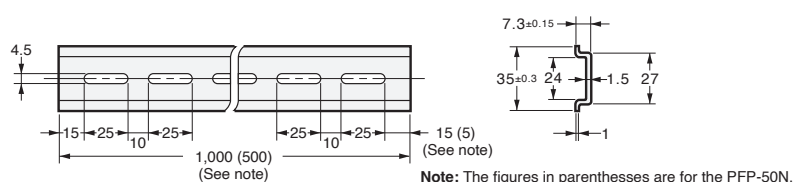
### Mounting Brackets

95-A E39-L143



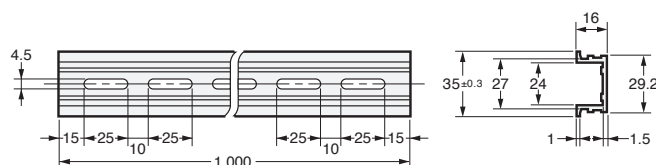
### DIN track

95-B PFP-100N  
PFP-50N



Material: Aluminum

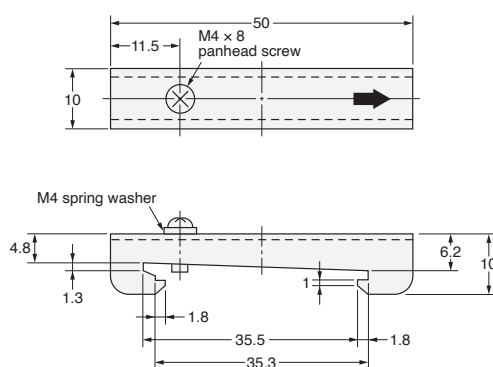
95-C PFP-100N2



Material: Aluminum

### End Plate

95-D PFP-M



Material: Iron, zinc plating

Fiber Sensor  
Features

Selection  
Guide

Fiber Units

|                                   |                        |
|-----------------------------------|------------------------|
| Threaded                          | Standard Installation  |
| Hex-shaped                        |                        |
| Cylindrical                       |                        |
| Flat                              | Saving Space           |
| Sleeved                           |                        |
| Small Spot                        | Beam Improvements      |
| High Power                        |                        |
| Narrow view                       |                        |
| BGS                               | Transparent Objects    |
| Retro-reflective                  |                        |
| Limited-reflective                |                        |
| Chemical-resistant, Oil-resistant | Environmental Immunity |
| Bending                           |                        |
| Heat-resistant                    |                        |
| Area Detection                    | Applications           |
| Liquid-level                      |                        |
| Vacuum                            |                        |
| FPD, Semi, Solar                  |                        |
| Installation Information          |                        |

Fiber Amplifiers,  
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## Reference Information for Fiber Units

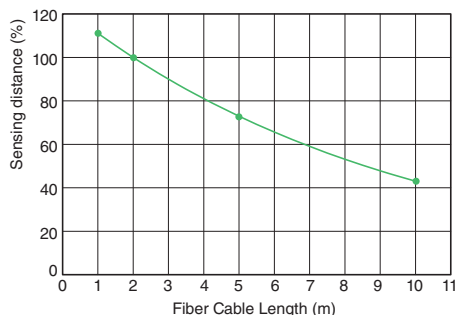
### Influence of Fiber Cable Length

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.

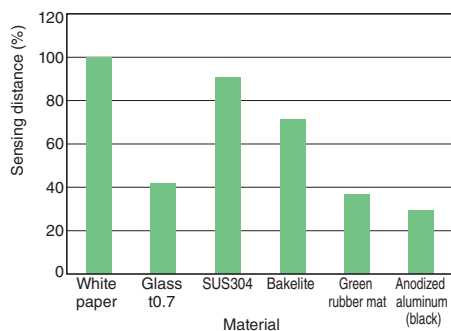


\* The 100% value is for a fiber cable with a length of 2 m (same for Through-beam and Reflective Models).

### 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

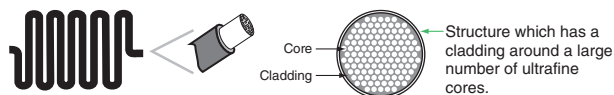
This section describes the features of different types of fiber cables.

(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 definition is given, a standard cable is used.)

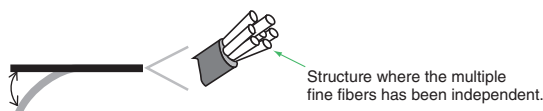
#### ● Flexible Fibers

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

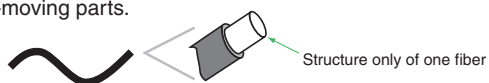
This fiber is resistant to repeated bends for use on moving parts.



#### ● Standard Fibers

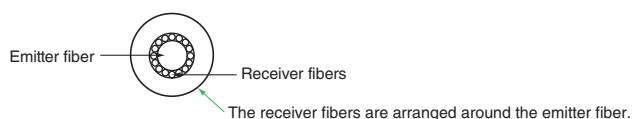
This fiber have a large bending radius compared with bend-resistant or flexible fiber.

Use this fiber where the bending radius is large, or on non-moving parts.

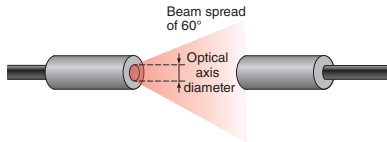
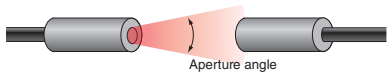


#### ● Coaxial Reflective Fibers

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?                                                 | <p>The optical axis diameter is the beam size that the Through-beam Fiber Unit uses for detection.</p> <p>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.</p> <p>The incident level may fluctuate, however, if the workpiece passes the beam at high speed.</p> <p>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.</p>  <p>The diagram shows a cross-section of a fiber unit with a red cone representing the beam spread. The cone is labeled 'Beam spread of 60°'. The diameter of the cone at the fiber tip is labeled 'Optical axis diameter'.</p> |
|                       | Are there any differences between the Fiber Units that are used for emitter and receiver?                                      | <p>With Through-beam Fiber Units, there is no difference between emitter fibers and receiver fibers.</p> <p>With Reflective Fiber Units, the emitter fibers and receiver fibers are different on Coaxial Reflective Models.</p> <p>Emitter fiber cables have identification marks. Refer to the individual dimensions diagrams of Fiber Units for details.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                       | 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. Ask your OMRON representative for details.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                       | What is the aperture angle?                                                                                                    | <p>The aperture angle is the angle at which the emitter beam spreads out.</p>  <p>The diagram shows a cross-section of a fiber unit with a red cone representing the beam spread. The angle of the cone is labeled 'Aperture angle'.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                       | 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. Depending on the country in which the Fiber Units are used and how they are used, certification may be required. Check the relevant laws and regulations before use.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Fiber Amplifier Units |  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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                       | 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).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

Threaded  
Hex-shaped  
Cylindrical

Flat  
Sleeved

Small Spot  
High Power

Narrow  
view  
BGS

Retro-  
reflective  
Limited-  
reflective

Chemical-  
resistant,  
Oil-resistant  
Bending

Area  
Detection  
Liquid-level

FPD,  
Semi,  
Solar

Area  
Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

Area  
Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

For common precautions, refer to [www.ia.omron.com](http://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

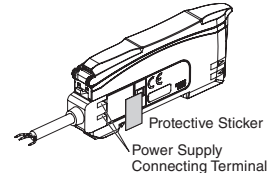
The following precautions must be observed to ensure safe operation of the product. Doing so may cause damage or fire.

- (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.

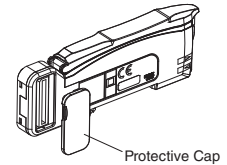
### Precautions for Correct Use

- (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<sup>2</sup> 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.

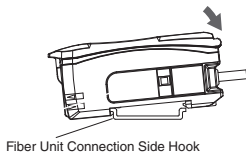
Be sure to use a cable of at least 0.3 mm<sup>2</sup> for extension.

- (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, benzene, acetone, and lamp oil for cleaning.

Mounting the Fiber Amplifier Units

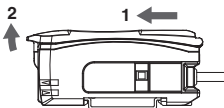
■ Mounting on DIN Track

- 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

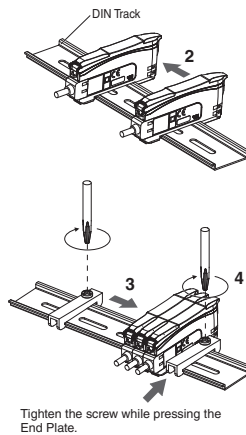
- 1. Push the unit in the direction 1.
- 2. Lift it up in the direction 2.



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.



- 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                                                     |                                  |                                                  |
| With E3X-ECT                                                | 30                               | 10                                               |
| With E3X-CRT                                                | 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.

Mounting Fiber Units

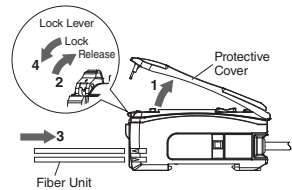
■ Use Fiber Cutter

Cut a thin fiber as follows.  
For standard fibers, insert to the desired cutting position and cut.

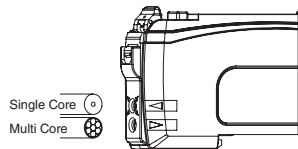
|                                                                                |  |
|--------------------------------------------------------------------------------|--|
| (1) The fiber is shipped loosely tightened as shown in the figure at the right |  |
| (2) Adjust the fiber to the desired length and fully tighten.                  |  |
| (3) Insert the Fiber Unit into E39-F4 and cut it.                              |  |
| (4) Finished state. (Correctly cut end)                                        |  |

■ 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.



- 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.



Threaded  
Hex-shaped  
CylindricalFlat  
SleevedSmall Spot  
High Power  
Narrow  
viewRetro-  
reflective  
Limited-  
reflectiveChemical-  
resistant,  
Oil-resistant  
Bending  
Heat-  
resistantArea  
Detection  
Liquid-level  
Vacuum  
FPD,  
Semi,  
Solar

## 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

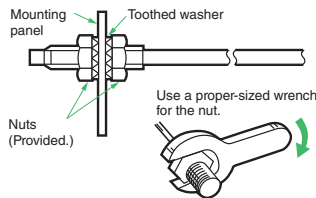
Do not use the Fiber Unit in atmospheres or environments that exceed product ratings.

## • Mounting

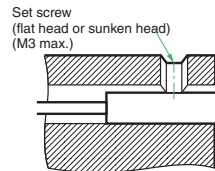
## Tightening Force

Refer to pages 62 to 66 for the tightening torque to apply when mounting a Fiber Unit.

## &lt;Threaded Models&gt;



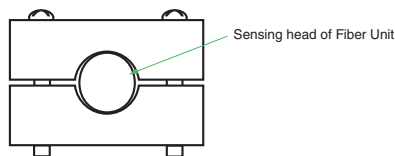
## &lt;Cylindrical Models&gt;



## &lt;Chemical and Oil-resistant Models&gt;

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.

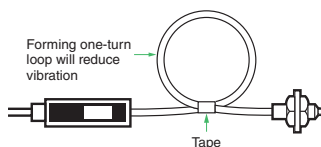


## Connections

- 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.

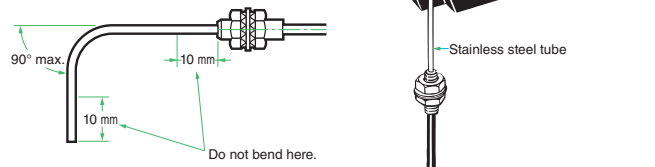


- The method shown below is an effective way to prevent the Fiber Unit from breaking due to vibration.



## 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))

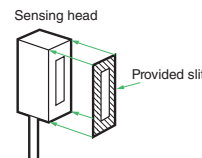
The fibers of these Units cannot be extended using the E39-F10 Fiber Connector.

## 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.

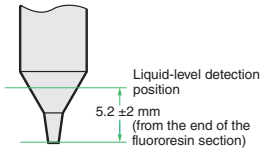
Fiber Units

● 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.

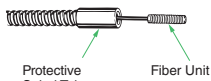
Accessories

Use of E39-R3 Reflector Provided with E32-R21

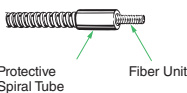
1. Use detergent to remove any dust or oil from the surfaces where tape is applied. Adhesive tape will not be attached properly if oil or dust remains on the surface.
2. The E39-R3 cannot be used in areas that are exposed to oil or chemicals.

Mounting method of Disconnection-resistant Protective Spiral Tubes (E39-F32□)

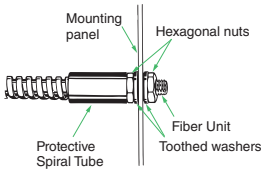
1. Insert the Fiber Unit into the Protective Spiral Tube from the head connector (threaded).



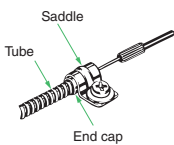
2. Push the fiber into the Protective Spiral Tube. The tube must be straight so that the fiber enters without twisting. Turn the Protective Spiral Tube, not the fiber.



3. Secure the Protective Spiral Tube to the mounting panel with the provided nuts.



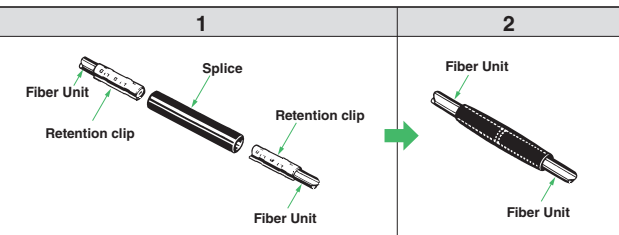
4. Use the provided saddle to secure the end cap of the Protective Spiral Tube.  
(To secure the Protective Spiral Tube at a position other than the end cap, apply tape to the tube so that the portion becomes thicker in diameter.)



Attaching the E39-F10 Fiber Connector

Attach the Fiber Connector 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.

Fiber Sensor Features

Selection Guide

Fiber Units

|                                   |                        |
|-----------------------------------|------------------------|
| Threaded                          | Standard Installation  |
| Hex-shaped                        |                        |
| Cylindrical                       |                        |
| Flat                              | Saving Space           |
| Sleeved                           |                        |
| Small Spot                        | Beam Improvements      |
| High Power                        |                        |
| Narrow view                       |                        |
| BGS                               |                        |
| Retro-reflective                  | Transparent Objects    |
| Limited-reflective                |                        |
| Chemical-resistant, Oil-resistant | Environmental Immunity |
| Bending                           |                        |
| Heat-resistant                    |                        |
| Area Detection                    | Applications           |
| Liquid-level                      |                        |
| Vacuum                            |                        |
| FPD, Semi, Solar                  |                        |

Installation Information

Fiber Amplifiers, Communications Unit, and Accessories

Technical Guide and Precautions

Model Index

| Models        | Specifica-<br>tions | 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<br>(P.24, 26)  | P.11 (11-D)<br>(P.25, 27)       |
| E32-C31 2M    | P.08<br>(P.24, 26)  | P.09 (09-D)<br>(P.25, 27)       |
| 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)<br>(27-D)           |
| E32-C42 1M    | P.24                | P.25 (25-A)<br>(25-B)           |
| E32-C42S 1M   | P.24                | P.25 (25-E)                     |
| E32-CC200 2M  | P.08<br>(P.26)      | P.09 (09-H)<br>(P.27)           |
| E32-C91N 2M   | P.08<br>P.10        | P.09 (09-B)<br>(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 (20-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)<br>P.46 P.47 (47-C) |
| E32-D22B 2M   | P.14                | P.15 (15-A)<br>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          | Specifica-<br>tions | 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-Q)                                         |
| 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)<br>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)<br>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)<br>P.58 P.59 (59-G)                     |
| E32-L11FS 2M    | P.42                | P.43 (43-G)<br>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)<br>P.40 P.41 (41-B)<br>P.58 P.59 (59-A) |
| E32-L24S 2M     | P.36                | P.37 (37-B)<br>P.40 P.41 (41-A)                     |
| E32-L25L 2M     | P.36                | P.37 (37-C)<br>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)<br>P.10 P.11 (11-Q)                     |
| E32-LT11 2M     | P.06                | P.07 (07-C)<br>P.28 P.29 (29-C)                     |
| E32-LT11N 2M    | P.28                | P.29 (29-A)<br>P.10 P.11 (11-A)                     |
| E32-LT11R 2M    | P.06                | P.07 (07-C)<br>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<br>(P.30)      | P.45 (45-C)<br>(P.31)                               |
| E32-T11F 2M     | P.42                | P.43 (43-C)                                         |
| E32-T11N 2M     | P.06<br>(P.30)      | P.07 (07-A)<br>(P.31)                               |
| E32-T11NF 2M    | P.42                | P.43 (43-A)                                         |
| E32-T11NFS 2M   | P.42                | P.43 (43-A2)                                        |
| E32-T11R 2M     | P.06<br>(P.30)      | P.07 (07-B)<br>(P.29, 31)                           |

| Models         | Specifica-<br>tions | 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)<br>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)<br>P.60 P.61 (61-H) |
| E32-T24SR 2M   | P.34                | P.35 (35-D)<br>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<br>(P.32)      | P.49 (49-B)<br>(P.33)           |
| E32-T51F 2M    | P.42                | P.43 (43-E)                     |
| E32-T51R 2M    | P.48<br>(P.32)      | P.49 (49-A)<br>(P.33)           |
| E32-T51V 1M    | P.56                | P.57 (57-A)                     |
| E32-T54 2M     | P.48                | P.49 (49-C)                     |
| E32-T61-S 2M   | P.48<br>(P.32)      | P.49 (49-G)<br>(P.33)           |
| E32-T64-2 2M   | P.48                | P.49 (49-F)                     |
| E32-T81R-S 2M  | P.48<br>(P.32)      | P.49 (49-D)<br>(P.33)           |
| 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)<br>(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)<br>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)<br>(27-B)<br>(27-C) |

| Models          | Specifica-<br>tions | Dimensions                      |
|-----------------|---------------------|---------------------------------|
| E39-F3B         | P.26                | P.27 (27-D)<br>(27-E)<br>(27-F) |
| E39-F3C         | P.24                | P.25 (25-C)<br>(25-D)           |
| E39-R           |                     |                                 |
| E39-R1          | —                   | P.39 (39-B)                     |
| E39-R3          | —                   | P.39 (39-C)                     |
| E39-RP1         | P.38                | P.39 (39-A)<br>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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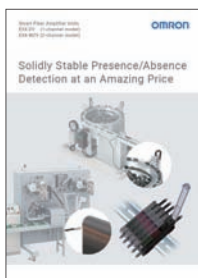
## Smart Fiber Amplifier Units

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Smart Fiber Amplifier Units  
E3NX-FA Series

Cat. No. E426



Smart Fiber Amplifier Units  
E3X-ZV Series

Cat. No. E600

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