Start with Smart!

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

New Product Information

NEW
E32-T11NF Oil-resistant Fiber Unit

→ 38 Page

Smart Fiber Amplifier Units
E3NX-FA

Sensor Communications Units
E3NW
**Fiber Sensor**

**Easy**

**“Mounts Anywhere”**
Wide Variety
Variously-shaped, compact heads allow installation in any small space.

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

**“Achieve Easy Detection in Many Applications”**
Smart Tuning
Just press the button to set the optimum incident level and threshold. Consistent settings are achieved for all users with this ultra-easy procedure.

Optimum Light Intensity Adjustment from Transparent Objects to Black Workpieces
The incident level is optimized to enable stable detection even for saturated or insufficient incident levels.

Light Intensity Adjustment Range of 40,000 Times

**“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 Sensor Features**

**Optimal Fiber Sensor for additional installation when starting production.**

**Fiber Units for various Installation Conditions,**

**Fiber Amplifier Units with easy optimum setting**

**'Easy' and 'Stable' for Minimal Cost Process.**

**Achieve Easy Detection in Many Applications**

Press the button once with a workpiece and once without a workpiece.

**Automatic Setting of Optimum Values**

<table>
<thead>
<tr>
<th>Threshold</th>
<th>Incident Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000</td>
<td>9999</td>
</tr>
</tbody>
</table>

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

**Excessive Incident Level**
- Incident light reduced.

**Incident light increased.**

**“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 Sensor Features**

**Improved Basic Performance**

**Expanded Application Response Capabilities**

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

**Smart Fiber Amplifier Units**

**E3NX-FA**

**62, 64 Page**

**Due Network**

**TUNE**

**Automatic Setting of Optimum Values**

5000 9999

ST

**Controller**

**Sensor Communications Units**

**Master**

**Slaves**

**Open Network**

**Wide Variety**

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**Suitable for Harsh Environments**

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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.

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Light Intensity Adjustment Range of 40,000 Times

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**Smart Fiber Amplifier Units**

**E3NX-FA**

**62, 64 Page**

**Due Network**

**TUNE**

**Automatic Setting of Optimum Values**

5000 9999

ST

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**Sensor Communications Units**

**Master**

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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.

Light Intensity Adjustment Range of 40,000 Times

**“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.
Installation when starting production.
Fiber Amplifier Units with easy optimum setting.

Fiber Units

**E32**

**Stable**

“Expanded Application Response Capabilities”

**Improved Basic Performance**

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

<table>
<thead>
<tr>
<th>1.5 Times the Sensing Distance*</th>
<th>1/10th the Minimum Sensing Object*</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 m</td>
<td>0.3 µm dia.</td>
</tr>
</tbody>
</table>

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

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

*Compared to E3X-HD.

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
  - 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.

**NEW**

Sensor Communications Units

**E3NW**

EtherCAT
CompoNet
CC-Link V2

Sensor

Minimal Cost Process.
Selection Guide

Selection by Category

STEP 1
Select a Fiber Unit.

Select a category.  
Fiber Unit Index  
Page 05

Select a model.  
Category Pages  
Page 06 to 61

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.

Fiber Amplifier Unit Series

<table>
<thead>
<tr>
<th>Fiber Amplifier Unit specifications</th>
<th>E3X-HD Series</th>
<th>E3NX-FA Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>1 output</td>
<td>1 or 2 outputs (depending on the model)</td>
</tr>
<tr>
<td>External input</td>
<td>Not supported</td>
<td>Supported or not supported (depending on the model)</td>
</tr>
<tr>
<td>Response time</td>
<td>50 μs (55 μs)/250 μs/1 ms/16 ms (Default: 250 μs)</td>
<td>30 μs (32 μs)/250 μs/1 ms/16 ms (Default: 250 μs)</td>
</tr>
<tr>
<td>Sensing distance (Giga-power mode)</td>
<td>E32-T11R</td>
<td>E32-D11R</td>
</tr>
<tr>
<td>Minimum sensing object</td>
<td>E32-T11R</td>
<td>2 μm dia.</td>
</tr>
</tbody>
</table>

Sensor Communications Unit application

<table>
<thead>
<tr>
<th>Communications method (Sensor Communications Unit model)</th>
<th>EtherCAT (E3X-ECT)</th>
<th>EtherCAT (E3NW-ECT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable Sensors</td>
<td>Fiber Sensor (E3X-HD0)</td>
<td>Fiber Sensor (E3NX-FA0)</td>
</tr>
<tr>
<td></td>
<td>Fiber Sensor (E3X-MDA0)</td>
<td>Laser Sensors (E3NC-LA0, E3NC-SA0)</td>
</tr>
<tr>
<td></td>
<td>Laser Photoelectric Sensor (E3C-LDA0)</td>
<td>Contact Type Sensor (E3NC-TA0)*</td>
</tr>
</tbody>
</table>

Page listings

<table>
<thead>
<tr>
<th>Ordering Information</th>
<th>78 Page</th>
<th>64 Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratings and Specifications</td>
<td>80 Page</td>
<td>66 Page</td>
</tr>
<tr>
<td>Dimensions</td>
<td>80 Page</td>
<td>68 Page</td>
</tr>
</tbody>
</table>

* E3NW-CRT Sensor Communications Units (CompoNet) cannot be used.

Selection by Model

STEP 1
Search for the page in the model index.  
Page 98

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 Unit is mounted into a drilled hole and secured with nuts.
  - Page 06
- **Cylindrical Models**
  - Ideal for installation in narrow spaces. The Fiber Unit is secured with a set screw.
  - Page 10
- **Flat Models**
  - Mount directly in limited spaces without using special mounting brackets.
  - Page 14
- **Sleeve Models** (Close-range Detection)
  - Suitable for close-range detection. Ideal for detecting minute objects in areas with limited space.
  - Page 16

#### Beam Improvements

- **Small-Spot, Reflective** (Minute Object Detection)
  - Small-spot to accurately detect small objects.
  - Page 20
- **High-power Beam** (Long-distance Installation, Dust-resistant)
  - Suitable for detection on large equipment, of large objects, and in environments with airborne particles.
  - Page 24
- **Narrow View** (Detection Across Clearance)
  - The Fiber Unit emits a non-spreading beam to prevent false detection of light reflected off surrounding objects.
  - Page 30
- **Detection without Background Interference**
  - Detect only objects in the sensing range, and not in the background.
  - Page 32

#### Transparent Object Detection

- **Retro-reflective** (Glass Detection)
  - Detect transparent objects reliably because the beam passes through the object twice, resulting in greater light interruption.
  - Page 34
- **Limited-reflective**
  - The limited-reflective optical system provides stable detection of specular reflective glass.
  - Page 36

#### Environmental Immunity

- **Chemical-resistant, Oil-resistant**
  - Made from materials that are resistant to various oils and chemicals.
  - Page 38
- **Bending-resistant, Disconnection-resistant**
  - Resistant to repeated bending on moving parts and breaking from snapping or shock.
  - Page 40
- **Heat-resistant**
  - Can be used in high-temperature environments at up to 400°C.
  - Page 44

#### Special Applications

- **Area Beam** (Area Detection)
  - Detect across areas for meandering materials or falling workpieces whose position vary.
  - Page 48
- **Liquid-level Detection**
  - Detect only liquid when being mounted on tubes or in liquid.
  - Page 50
- **Vacuum-resistant**
  - Can be used under high vacuums of up to 10⁻⁸ Pa.
  - Page 52
- **FPD, Semiconductors, and Solar Cells**
  - Designed specifically to reliably detect glass substrates and wafers.
  - Page 54
### Specifications

<table>
<thead>
<tr>
<th>Sensing direction (Aperture angle)</th>
<th>Size</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm) E3X-HD</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>07 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Right-angle (Approx. 90°)</strong></td>
<td>M4</td>
<td>Flexible, R1</td>
<td>ST: 1,300</td>
<td>2,000</td>
<td>ST: 1,000</td>
<td>E32-T11N 2M</td>
<td>07-A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHS: 280</td>
<td>3,000</td>
<td>SHS: 280</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Top-view (Approx. 90°)</strong></td>
<td>M4</td>
<td>Flexible, R1</td>
<td>ST: 1,300</td>
<td>2,000</td>
<td>ST: 1,000</td>
<td>E32-T11R 2M</td>
<td>07-B</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHS: 280</td>
<td>3,000</td>
<td>SHS: 280</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Top-view (Approx. 15°)</strong></td>
<td>M4</td>
<td>Flexible, R1</td>
<td>ST: 1,300</td>
<td>2,000</td>
<td>ST: 1,000</td>
<td>E32-LT11 2M</td>
<td>07-C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SHS: 280</td>
<td>3,000</td>
<td>SHS: 280</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

**Note**

1. (E3X-HD) GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (NPN output: 50 μs, PNP output: 55 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.

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

![Through-beam Fiber Units](image)

- 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.

Hex-shaped Fiber Units with Build-in Lenses have been added to the series. (They have a right-angle shape like that of the E32-T11N shown below.)

→ 96 Page

### Through-beam Fiber Units

- **Through-beam → This Page**
- **Reflective → 08 Page**

---

*Standard Installation*
- 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.

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.

Long-distance Sensing Applications

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

→ 26 Page

Breaking Due to Snagging or Shock

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

→ 40 Page (Excluding the E32-T11N 2M.)
### Specifications

#### Reflective Fiber Units

<table>
<thead>
<tr>
<th>Sensing direction (Aperture angle)</th>
<th>Size</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M3</td>
<td>Flexible, R4</td>
<td>46</td>
<td>110 ST : 55</td>
<td>ST : 75</td>
<td>E32-C31N 2M</td>
<td>09-A</td>
</tr>
<tr>
<td></td>
<td>M6</td>
<td>Flexible, R4</td>
<td>220</td>
<td>780 ST : 350</td>
<td>ST : 530</td>
<td>E32-C31N 2M</td>
<td>09-B</td>
</tr>
<tr>
<td></td>
<td>M4</td>
<td>Flexible, R1</td>
<td>100</td>
<td>140 ST : 60</td>
<td>ST : 90</td>
<td>E32-C31 2M</td>
<td>09-D</td>
</tr>
<tr>
<td>Right-angle (Approx. 60°)</td>
<td>M6</td>
<td>Flexible, R1</td>
<td>220</td>
<td>840 ST : 350</td>
<td>ST : 530</td>
<td>E32-C31M 1M</td>
<td>09-E</td>
</tr>
<tr>
<td></td>
<td>M4</td>
<td>Flexible, R1</td>
<td>100</td>
<td>840 ST : 350</td>
<td>ST : 530</td>
<td>E32-D211R 2M</td>
<td>09-F</td>
</tr>
<tr>
<td>Top-view (Approx. 60°)</td>
<td>M6</td>
<td>Flexible, R1</td>
<td>220</td>
<td>840 ST : 350</td>
<td>ST : 530</td>
<td>E32-D211R 2M</td>
<td>09-G</td>
</tr>
<tr>
<td></td>
<td>M6</td>
<td>Flexible, R1</td>
<td>220</td>
<td>840 ST : 350</td>
<td>ST : 530</td>
<td>E32-CD200 2M</td>
<td>09-H</td>
</tr>
</tbody>
</table>

**Note:** The following mode numbers and response times apply to the modes given in the Sensing distance column.

1. [E3X-HD] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (NPN output: 50 μs, PNP output: 55 μs)

2. [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.

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

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.)

---

- 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.
- 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.

**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.

→ 42 Page
- Inserted where space is limited. (Secured using a set screw.)
- Ultramate space-saving by micro-fiber head. (1 dia. x 10 mm)

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

### Specifications

#### Through-beam Fiber Units

<table>
<thead>
<tr>
<th>Size</th>
<th>Sensing direction</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis (minimum sensing object)</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GIGA</td>
<td>Other modes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HS</td>
<td>Other modes</td>
<td></td>
</tr>
<tr>
<td>1 dia.</td>
<td>Top-view</td>
<td>Flexible, R1</td>
<td>10.4 dia.</td>
<td>450 ST 250, 670 ST 370, 220 SHS 60</td>
<td>0.5 dia. (5 μm dia.)</td>
<td>E32-T223R 2M</td>
</tr>
<tr>
<td>1.5 dia.</td>
<td>Top-view</td>
<td>Bendresistant, R4</td>
<td>10.4 dia.</td>
<td>680 ST 450, 1,020 ST 690, 220 SHS 90</td>
<td>0.5 dia. (2 μm dia.)</td>
<td>E32-T22B 2M</td>
</tr>
<tr>
<td>3 dia.</td>
<td>Side-view</td>
<td>Flexible, R1</td>
<td>14.4 dia.</td>
<td>2,000 ST 1,300, 3,000 ST 1,530, 700 SHS 280</td>
<td>1 dia. (5 μm dia.)</td>
<td>E32-T12R 2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>750 ST 450, 1,120 ST 670, 260 SHS 100</td>
<td></td>
<td>E32-T14LR 2M</td>
</tr>
</tbody>
</table>

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.

*E3X-HD* 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)

*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 (50 μs)

**Note 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-HD and the second value is for the E3NX-FA.
- Reference Information for Model Selection -

Recommended Mounting Hole Dimensions

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

<table>
<thead>
<tr>
<th>Outer diameter of Fiber Unit</th>
<th>1 dia.</th>
<th>1.5 dia.</th>
<th>3 dia.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension F</td>
<td>1.2 ±0.3 dia</td>
<td>1.7 ±0.3 dia</td>
<td>3.2 ±0.3 dia</td>
</tr>
</tbody>
</table>
### Specifications

#### Reflective Fiber Units

<table>
<thead>
<tr>
<th>Size</th>
<th>Sensing direction</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 dia.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-D22B 2M</td>
</tr>
<tr>
<td>1.5 dia. +</td>
<td>Flexible, R1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-D22R 2M</td>
</tr>
<tr>
<td>0.5 dia.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-D22B 2M</td>
</tr>
<tr>
<td>3 dia.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-D22R 2M</td>
</tr>
<tr>
<td>3 dia. +</td>
<td>Flexible, R4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-D22B 2M</td>
</tr>
<tr>
<td>0.8 dia.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-D22B 2M</td>
</tr>
</tbody>
</table>

#### Note

1. The following mode names and response times apply to the modes given in the Sensing distance column:
   - E3X-HD: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), SHS: Super-high-speed mode (30 μs)
   - E3NX-FA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), SHS: Super-high-speed mode (30 μs)
   - E39-F9: Provided

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-HD and the second value is for the E3NX-FA.

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

<table>
<thead>
<tr>
<th>Fiber Unit</th>
<th>Diameter (mm)</th>
<th>Inner Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-D32L 2M</td>
<td>2.1</td>
<td>0.2</td>
</tr>
<tr>
<td>E32-D33 2M</td>
<td>1.7</td>
<td>0.2</td>
</tr>
<tr>
<td>E32-D33L 2M</td>
<td>2.5</td>
<td>0.2</td>
</tr>
</tbody>
</table>

(Unit: mm)
### Specifications

#### Through-beam Fiber Units

<table>
<thead>
<tr>
<th>Sensing direction</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>15 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top-view</td>
<td></td>
<td></td>
<td>E3X-HD</td>
<td>E3NX-FA NEW</td>
<td>GIGA → HS Other modes</td>
<td>GIGA → HS Other modes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2,000</td>
<td>3,000</td>
<td>3,000</td>
<td>3,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>700</td>
<td>1,050</td>
<td>1,050</td>
<td>1,050</td>
</tr>
<tr>
<td>Side-view</td>
<td>Flexible, R1</td>
<td></td>
<td>750</td>
<td>1,200</td>
<td>1,120</td>
<td>1,120</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>260</td>
<td>390</td>
<td>390</td>
<td>390</td>
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<tr>
<td>Flat-view</td>
<td></td>
<td></td>
<td>2,400</td>
<td>3,600</td>
<td>2,400</td>
<td>2,400</td>
</tr>
</tbody>
</table>

#### Reflective Fiber Units

<table>
<thead>
<tr>
<th>Sensing direction</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>15 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top-view</td>
<td></td>
<td></td>
<td>E3X-HD</td>
<td>E3NX-FA NEW</td>
<td>GIGA → HS Other modes</td>
<td>GIGA → HS Other modes</td>
</tr>
<tr>
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<tr>
<td></td>
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<td></td>
<td>240</td>
<td>360</td>
<td>360</td>
<td>360</td>
</tr>
<tr>
<td>Side-view</td>
<td>Flexible, R1</td>
<td></td>
<td>200</td>
<td>300</td>
<td>300</td>
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<td></td>
<td>52</td>
<td>78</td>
<td>52</td>
<td>52</td>
</tr>
</tbody>
</table>

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.

- [E3X-HD] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (NPN output: 56 μs, PNP output: 55 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 (36 μs)

**Note 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.

**Note 3.** The first value is for the E3X-HD and the second value is for the E3NX-FA.

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

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

**15-A** E32-T15XR 2M (Free Cutting)

<table>
<thead>
<tr>
<th>Model</th>
<th>Sensing surface (mm)</th>
<th>Two, 2.2 dia. mounting holes with 4.4 dia. countersinks on both sides</th>
<th>2.2 dia. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-T15XR 2M</td>
<td>3</td>
<td></td>
<td>2,000</td>
</tr>
</tbody>
</table>

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

**15-B** E32-T15YR 2M (Free Cutting)

<table>
<thead>
<tr>
<th>Model</th>
<th>Sensing surface (mm)</th>
<th>Two, 2.2 dia. mounting holes with 4.4 dia. countersinks on both sides</th>
<th>2.2 dia. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-T15YR 2M</td>
<td>3</td>
<td></td>
<td>2,000</td>
</tr>
</tbody>
</table>

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

**15-C** E32-T15ZR 2M (Free Cutting)

<table>
<thead>
<tr>
<th>Model</th>
<th>Sensing surface (mm)</th>
<th>Two, 2.2 dia. mounting holes with 4.4 dia. countersinks on both sides</th>
<th>2.2 dia. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-T15ZR 2M</td>
<td>3</td>
<td></td>
<td>2,000</td>
</tr>
</tbody>
</table>

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

**15-D** E32-LT3Y 2M (Free Cutting)

<table>
<thead>
<tr>
<th>Model</th>
<th>Sensing surface (mm)</th>
<th>Two, 2.2 dia. mounting holes with 4.4 dia. countersinks on one side</th>
<th>2.2 dia. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-LT3Y 2M</td>
<td>3</td>
<td></td>
<td>2,000</td>
</tr>
</tbody>
</table>

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.

### Reflective Fiber Units

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

<table>
<thead>
<tr>
<th>Model</th>
<th>Sensing surface (mm)</th>
<th>Two, 2.2 dia. mounting holes with 4.4 dia. countersinks on both sides</th>
<th>2.2 dia. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-D15XR 2M</td>
<td>3</td>
<td></td>
<td>2,000</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Model</th>
<th>Sensing surface (mm)</th>
<th>Two, 2.2 dia. mounting holes with 4.4 dia. countersinks on both sides</th>
<th>2.2 dia. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-D15YR 2M</td>
<td>3</td>
<td></td>
<td>2,000</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Model</th>
<th>Sensing surface (mm)</th>
<th>Two, 2.2 dia. mounting holes with 4.4 dia. countersinks on both sides</th>
<th>2.2 dia. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-D15ZR 2M</td>
<td>3</td>
<td></td>
<td>2,000</td>
</tr>
</tbody>
</table>

Note: Two, M2 x 8 stainless steel countersunk mounting screws are provided.
• Sleeve Fiber Units allow detection away from the point of installation for stable close-range detection of small objects.
• The shape of sleeve can be changed freely. (Refer to the sleeve bending specifications in the Appearance column of the specifications table.)

### Specifications

<table>
<thead>
<tr>
<th>Sensing direction</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>17 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side-view</td>
<td></td>
<td>Flexibile, R1</td>
<td>E3X-HD</td>
<td>E3NX-FA NEW</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GIGA</td>
<td>GIGA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ST : 100</td>
<td>ST : 150</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HS : 20</td>
<td>HS : 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>250</td>
<td>0.5 dia. (5 μm dia.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E32-T24R 2M</td>
<td>17-A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E32-T24E 2M</td>
<td>17-B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E32-T33 1M</td>
<td>17-C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-T21-S1 2M</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E32-TC200BR 2M</td>
<td>17-D</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E32-T3200R 2M</td>
<td>17-E</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.
- E3X-HD: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (NPN output: 50 μs, PNP output: 55 μs)
- E3NX-FA: 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-HD and the second value is for the E3NX-FA.
**Dimensions**

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

1. **17-A E32-T24R 2M (Free Cutting)**
   - Stainless-steel tube (5 μm dia.)
   - Heat-shrinkable tube
   - Sensing surface: 15
   - Dimensions: 15, 12, 2,000

2. **17-B E32-T24E 2M (Free Cutting)**
   - Stainless-steel tube (5 μm dia.)
   - Heat-shrinkable tube
   - Sensing surface: 15
   - Dimensions: 15, 12, 2,000

3. **17-C E32-T33 1M (Free Cutting)**
   - Stainless-steel tube (5 μm dia.)
   - Heat-shrinkable tube
   - Sensing surface: 10
   - Dimensions: 10, 12, 1,000

4. **17-D E32-T21-S1 2M (Free Cutting)**
   - Stainless-steel tube (5 μm dia.)
   - Model display tube
   - Sensing surface: 7
   - Dimensions: 11, 15, 2,000

5. **17-E E32-TC200BR 2M (Free Cutting)**
   - Stainless-steel tube (5 μm dia.)
   - M4×0.7 (coarse thread) Nickel-plated brass
   - Washer (Nickel-plated iron)
   - Dimensions: 90, 11, 2,000

---

**- 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)**

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Applicable Fiber Units</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E32-TC200BR</td>
<td>E39-F11</td>
</tr>
</tbody>
</table>
- 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

<table>
<thead>
<tr>
<th>Sensing direction</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>19 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side-view</td>
<td></td>
<td></td>
<td>E3X-HD</td>
<td>E3X-FA NEW</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GIGA = HS Other modes</td>
<td>GIGA = HS Other modes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flexible, R1</td>
<td>15</td>
<td>20</td>
<td>ST : 30</td>
<td>100</td>
<td>ST : 45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>20</td>
<td>SHS : 8</td>
<td>30</td>
<td>HS : 8</td>
</tr>
<tr>
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<td>R25</td>
<td>15</td>
<td>20</td>
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<td>100</td>
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<td>15</td>
<td>20</td>
<td>SHS : 8</td>
<td>30</td>
<td>HS : 8</td>
</tr>
<tr>
<td></td>
<td>Flexible, R4</td>
<td>15</td>
<td>20</td>
<td>ST : 45</td>
<td>100</td>
<td>ST : 45</td>
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<tr>
<td></td>
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<td>20</td>
<td>SHS : 8</td>
<td>30</td>
<td>HS : 8</td>
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<tr>
<td></td>
<td>R25</td>
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<td>20</td>
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<tr>
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<td>20</td>
<td>SHS : 8</td>
<td>30</td>
<td>HS : 8</td>
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<td>Flexible, R4</td>
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<td>ST : 45</td>
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<td>ST : 45</td>
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<td></td>
<td>15</td>
<td>20</td>
<td>SHS : 8</td>
<td>30</td>
<td>HS : 8</td>
</tr>
<tr>
<td>Top-view</td>
<td></td>
<td></td>
<td>E3X-HD</td>
<td>E3X-FA NEW</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GIGA = HS Other modes</td>
<td>GIGA = HS Other modes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flexible, R1</td>
<td>15</td>
<td>20</td>
<td>ST : 30</td>
<td>100</td>
<td>ST : 45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>20</td>
<td>SHS : 8</td>
<td>30</td>
<td>HS : 8</td>
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<tr>
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<td>R10</td>
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<td>20</td>
<td>ST : 30</td>
<td>100</td>
<td>ST : 45</td>
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<td></td>
<td>15</td>
<td>20</td>
<td>SHS : 8</td>
<td>30</td>
<td>HS : 8</td>
</tr>
<tr>
<td></td>
<td>Flexible, R1</td>
<td>15</td>
<td>20</td>
<td>ST : 30</td>
<td>100</td>
<td>ST : 45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>20</td>
<td>SHS : 8</td>
<td>30</td>
<td>HS : 8</td>
</tr>
</tbody>
</table>

### Note
1. The following mode names and response times apply to the modes given in the Sensing distance column.
   - E3X-HD: GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (55 μs)
   - E3X-FA: 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-HD and the second value is for the E3X-FA.
**Dimensions**

### Reflective Fiber Units

19-A E32-D24R 2M (Free Cutting)

Stainless steel tube 2.1 dia.

3.65

65

15

Sensing surface

1.25

15

35

12

2,000

Light baffle

19-B E32-D24-S2 2M (Free Cutting)

Stainless steel tube 2.1 dia.

4.8 dia.

2,2 dia.

Sensing surface

22

19

67

15

Sensing surface

2.5

15

11

40

2,000

*Attached with adhesive and cannot be removed.

19-C E32-D33M 1M (No Cutting)

Stainless steel tube 0.5 dia.

1.5 dia.

3 dia.

2 dia.

Sensing surface

15

15

1.2 dia. tube

3 dia.

15

2.5 dia.

15

BGS view

19-D E32-D33 2M (Free Cutting)

Stainless steel tube 0.8 dia.

3 dia.

15

15

12

2,000

Model display tube

19-E E32-D32-S1 0.5M (No Cutting)

Stainless steel tube 0.82 dia.

3 dia.

(SUS303)

1.2 dia.

Brancher: 3.5 dia.

2,3 dia.

Fiber Attachment

19-F E32-D32-S1 0.5M (No Cutting)

Stainless steel tube 0.82 dia.

3 dia.

(SUS303)

1.2 dia.

Brancher: 3.5 dia.

2000

19-G E32-D31-S1 0.5M (No Cutting)

Stainless steel tube 0.82 dia.

M3×0.5

(Nickel-plated brass)

15

15

12

500

Opposite side 5.5, thickness 1.8 (Nickel-plated brass)

Washer (Nickel-plated iron)

Brancher: 3.5 dia.

2,000

19-H E32-DC200F4R 2M (Free Cutting)

Stainless steel tube 1.2 dia. max. (SUS303)

M3×0.5

(SUS304)

15

15

12

100

Opposite side 5.5, thickness 1.8 (Nickel-plated brass)

Washer (Nickel-plated iron)

Brancher: 3.5 dia.

2,000

19-J E32-D22-S1 2M (Free Cutting)

Stainless steel tube 1.65 dia.

4 dia.

(SUS303)

15

15

3 dia. (SUS303)

2,000

19-K E32-DC200BR 2M (Free Cutting)

Stainless steel tube 1.65 dia.

M4×0.7

(Nickel-plated brass)

15

15

4 dia.

125

1,000

Opposite side 10, thickness 2.4 (Nickel-plated brass)

Washer (Nickel-plated iron)

Brancher: 3.5 dia.

2,000

19-L E32-D25-S3 2M (Free Cutting)

Stainless steel tube 1.65 dia.

M5×0.75

(Nickel-plated brass)

15

15

10

90

17

2,000

*Attached with adhesive and cannot be removed.

### 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)**

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Applicable Fiber Units</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uses for the bending of the sleeve.</td>
<td>E32-DC200F4R</td>
<td>E32-D21-S3</td>
</tr>
</tbody>
</table>
### Beam Improvements
#### Small-Spot, Reflective (Minute Object Detection)

- 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.

![Diagram showing the relation between withdrew length, focal distance, and spot diameter.](image)

### Specifications
#### Reflective Fiber Units

**Variable-spot types**

<table>
<thead>
<tr>
<th>Lens Units + Fiber Unit</th>
<th>21 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lens Units</strong></td>
<td><strong>Lens Units + Fiber Units</strong></td>
</tr>
<tr>
<td><strong>Models</strong></td>
<td><strong>Appearance (mm)</strong></td>
</tr>
<tr>
<td>E39-F3A</td>
<td>6 to 15</td>
</tr>
<tr>
<td>E39-P17</td>
<td>10 to 30</td>
</tr>
</tbody>
</table>

**Parallel-light-spot types**

<table>
<thead>
<tr>
<th>Lens Units + Fiber Unit</th>
<th>21 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lens Units</strong></td>
<td><strong>Lens Units + Fiber Units</strong></td>
</tr>
<tr>
<td><strong>Models</strong></td>
<td><strong>Appearance (mm)</strong></td>
</tr>
<tr>
<td>E39-F3C</td>
<td>0 to 20</td>
</tr>
<tr>
<td>E32-C31 2M</td>
<td>Flexible, R2</td>
</tr>
</tbody>
</table>

**Small-spot types**

<table>
<thead>
<tr>
<th>Integrated Lens</th>
<th>21 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance (mm)</strong></td>
<td><strong>Bending radius of cable</strong></td>
</tr>
<tr>
<td>Short-distance, Small-spot</td>
<td>0.1 dia.</td>
</tr>
<tr>
<td>Long-distance, Small-spot</td>
<td>6 dia.</td>
</tr>
</tbody>
</table>

Note: The spot diameter and the center distance are the same when using with E3X-HD series or E3NX-FA series.
### Installation Information → 58, 59 and 61 Page

#### 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.**

#### Dimensions

**Reflective Fiber Units**

- **21-A** E32-C42 1M (No Cutting) + E39-F3A
- **21-B** E32-C42 1M (No Cutting) + E39-F17
- **21-C** E32-C31 2M (Free Cutting) + E39-F3C
- **21-D** E32-C21N 2M (Free Cutting) + E39-F3C
- **21-E** E32-C42S 1M (No Cutting)
- **21-F** E32-L15 2M (Free Cutting)

#### Reference Information for Model Selection

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

<table>
<thead>
<tr>
<th>Spot diameter</th>
<th>Center distance</th>
<th>Optical axis diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 dia.</td>
<td>5</td>
<td>2.4</td>
</tr>
<tr>
<td>0.1 dia.</td>
<td>7</td>
<td>3.7</td>
</tr>
<tr>
<td>0.2 dia.</td>
<td>17</td>
<td>4.8</td>
</tr>
<tr>
<td>0.5 dia.</td>
<td>17</td>
<td>4.8</td>
</tr>
<tr>
<td>0.5 dia.</td>
<td>50</td>
<td>4.8</td>
</tr>
<tr>
<td>3 dia.</td>
<td>0</td>
<td>3.7</td>
</tr>
<tr>
<td>4 dia.</td>
<td>10</td>
<td>3.7</td>
</tr>
</tbody>
</table>

* Refer to page 22 for details.
Small-spot is ideal for detecting minute objects. Select the Fiber Unit that is best suited for the workpiece size and installation distance. (Refer to Reference Information for Model Selection)

### Specifications

#### Reflective Fiber Units

<table>
<thead>
<tr>
<th>Small-spot Models</th>
<th>Lens Units + Fiber Units</th>
<th>Fiber Units</th>
<th>23 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td><strong>Spot diameter</strong></td>
<td><strong>Center distance (mm)</strong></td>
<td><strong>Lens Units</strong></td>
</tr>
<tr>
<td>Short-distance, small-spot</td>
<td>0.1 dia.</td>
<td>7</td>
<td>E39-F3A-5</td>
</tr>
<tr>
<td></td>
<td>0.5 dia.</td>
<td>50</td>
<td>E39-F3B</td>
</tr>
<tr>
<td>Medium-distance, small-spot</td>
<td>0.2 dia.</td>
<td>17</td>
<td>E39-F3B</td>
</tr>
<tr>
<td>Long-distance, small-spot</td>
<td>3 dia.</td>
<td>50</td>
<td>E39-F18</td>
</tr>
</tbody>
</table>

* The spot diameter and the center distance are the same when using E3X-HD series or E3NX-FA series.
Installation Information → 58, 61 Page

### Beam Improvements

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

#### 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.

#### Reference Information for Model Selection

<table>
<thead>
<tr>
<th>Spot diameter</th>
<th>0.1 dia.</th>
<th>0.1 dia.</th>
<th>0.2 dia.</th>
<th>0.5 dia.</th>
<th>0.5 dia.</th>
<th>0.5 dia.</th>
<th>0.5 dia.</th>
<th>0.5 dia.</th>
<th>3 dia.</th>
<th>3 dia.</th>
<th>4 dia.</th>
<th>6 dia.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical axis distance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Center distance</td>
<td>5</td>
<td>7</td>
<td>17</td>
<td>17</td>
<td>50</td>
<td>0 to 20</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optical axis distance</td>
<td>2.4</td>
<td>3.7</td>
<td>4.8</td>
<td>3.7</td>
<td>4.8</td>
<td>9.4</td>
<td>3.7</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Refer to page 20 for details.
Beam Improvements

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

- 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. (*→ 26 to 29 pages)

**Specifications**

### Through-beam Fiber Units

<table>
<thead>
<tr>
<th>Sensing direction</th>
<th>Aperture angle</th>
<th>Appearance (mm)</th>
<th>Sensing radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right-angle</td>
<td>15°</td>
<td>14.4</td>
<td>Flexible, R2</td>
<td>GIGA: 4,000 *1</td>
<td>ST: 2,300</td>
<td>E32-LT11NF 2M NEW</td>
<td>25-D</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ST: 3,500</td>
<td>SHS: 500</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E3X-HD</td>
<td>ST: 4,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10°</td>
<td>40</td>
<td>R25</td>
<td>GIGA: 20,000 *2</td>
<td>ST: 20,000</td>
<td>E32-LT11 2M NEW</td>
<td>25-B</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ST: 20,000</td>
<td>SHS: 8,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E3X-HD</td>
<td>ST: 4,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top-view</td>
<td>15°</td>
<td>15</td>
<td>Flexible, R1</td>
<td>GIGA: 4,000 *1</td>
<td>ST: 2,700</td>
<td>E32-LT11M NEW</td>
<td>25-C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ST: 3,500</td>
<td>SHS: 1,080</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E3X-HD</td>
<td>ST: 4,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side-view</td>
<td>30°</td>
<td>10.5</td>
<td>R25</td>
<td>GIGA: 4,000 *1</td>
<td>ST: 2,300</td>
<td>E32-T14 2M</td>
<td>25-D</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ST: 3,500</td>
<td>SHS: 1,080</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E3X-HD</td>
<td>ST: 4,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*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.

### Reflective Fiber Units

<table>
<thead>
<tr>
<th>Sensing direction</th>
<th>Aperture angle</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Model</th>
<th>Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top-view</td>
<td>4°</td>
<td>17.5</td>
<td>Bent resistant, R4</td>
<td>GIGA: 40 to 2,800</td>
<td>ST: 40 to 2,800</td>
<td>E32-D16 2M</td>
<td>25-E</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ST: 40 to 1,400</td>
<td>SHS: 40 to 480</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E3X-HD</td>
<td>E3X-HD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note**

The following mode names and response times apply to the modes given in the Sensing distance column.

1. [E3X-HD] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (NPN output: 50 μs, PNP output: 55 μs)
2. [E3NX-FA] 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 sensing distances for Reflective Fiber Units are for white paper.
**Dimensions**

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

**25-A** E32-LT11 2M (Free Cutting)

![Diagram of Through-beam Fiber Units](image)

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

![Diagram of Through-beam Fiber Units](image)

**Reflective Fiber Units**

**25-C** E32-LT11 2M (Free Cutting)

![Diagram of Reflective Fiber Units](image)

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

![Diagram of Reflective Fiber Units](image)

---

**Comparisons of incident level for Model Selection**

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

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

<table>
<thead>
<tr>
<th>Model</th>
<th>Incident Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-T17L 10M</td>
<td>1.700</td>
</tr>
<tr>
<td>E32-T11R + E39-F16</td>
<td>1.60</td>
</tr>
<tr>
<td>E32-T11NF 2M</td>
<td>1.60</td>
</tr>
<tr>
<td>E32-T11R + E39-F1</td>
<td>1.60</td>
</tr>
<tr>
<td>E32-T14 2M</td>
<td>1.00</td>
</tr>
<tr>
<td>E32-LT11N 2M</td>
<td>1.00</td>
</tr>
<tr>
<td>E32-LT11R 2M</td>
<td>1.00</td>
</tr>
<tr>
<td>E32-T11R + E39-F2</td>
<td>1.00</td>
</tr>
<tr>
<td>E32-T11R 2M</td>
<td>Reference</td>
</tr>
</tbody>
</table>

**Comparisons of incident level (Reflective)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Incident Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-D16 2M</td>
<td>1.17</td>
</tr>
<tr>
<td>E32-D11R 2M</td>
<td>Reference (+1)</td>
</tr>
</tbody>
</table>

---

**Installation Information**

- **Reference Information for Model Selection**
- **High-power Beam (Long-distance Installation, Dust-resistant)**
- **Fiber Amplifiers, Applications**
- **Transparent Objects Beam Improvements**
- **Technical Guide and Precautions**
- **Installation Information**

---

**Lens (to 200°C) → 28 Page**

**High-power Beam**

- **Fiber Sensor Unit, and Accessories**
- **Area resistant**
- **Heat-resistant**
- **Bending resistant**, **Chemical-resistant**, **Oil-resistant**
- **Limited-reflective**, **Retro-reflective**
- **Small Spot**, **Narrow view**, **Narrow view**
- **High Power**, **Bend**
- **Environmental Immunity**
- **Vacuum**, **FPD, Semi, Solar**
- **Installation Information**
- **Fiber Amplifiers, Communications Unit, and Accessories**
- **Technical Guide and Precautions**
- **Model Index**

---
### Specifications

#### Through-beam Fiber Units

<table>
<thead>
<tr>
<th>Fiber Units</th>
<th>Lens Units</th>
<th>Type</th>
<th>Sensing distance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>High-power (incident level: 50 times)</td>
<td>Ultra-high-power (incident level: 190 times)</td>
</tr>
<tr>
<td></td>
<td>Models</td>
<td>Ultra modes</td>
<td>Other modes</td>
</tr>
<tr>
<td></td>
<td>Appearance</td>
<td>Approx. 12°</td>
<td>Approx. 6°</td>
</tr>
</tbody>
</table>

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.

- GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (NPW output: 50 μs, PNP output: 55 μs)
- 
- E3X-HD (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))

**Note 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-HD, and the second value is for the E3NX-FA.

### Dimensions

#### Lens Units (Set of 2)

**E39-F1**
- 4 dia. (0.1 dia.) countersinking depth: 0.9
- Material: Brass for the body and optical glass for the lens itself.
- Note: Two per set.

**E39-F2**
- 2.8 dia. (0.1 dia.) countersinking depth: 0.9
- Material: Brass for the body and optical glass for the lens itself.
- Note: Two per set.
- 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)

<table>
<thead>
<tr>
<th>Model</th>
<th>Incident Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-T11N 10M</td>
<td>1,700</td>
</tr>
<tr>
<td>E32-T11R + E39-F10</td>
<td>100</td>
</tr>
<tr>
<td>E32-T11NF 2M</td>
<td>90</td>
</tr>
<tr>
<td>E32-T11F 2M</td>
<td>10</td>
</tr>
<tr>
<td>E32-T11R + E39-F1</td>
<td>40</td>
</tr>
<tr>
<td>E32-T14 2M</td>
<td>10</td>
</tr>
<tr>
<td>E32-T17L 10M</td>
<td>10</td>
</tr>
<tr>
<td>E32-T11R + E39-F16</td>
<td>10</td>
</tr>
<tr>
<td>E32-T11N 2M</td>
<td>10</td>
</tr>
</tbody>
</table>

* Reference (+1)
Specifications

Through-beam Fiber Units (Heat-resistant)

<table>
<thead>
<tr>
<th>Lens Units</th>
<th>Type</th>
<th>High-power (incident level: 50 times)</th>
<th>Ultra-high-power (incident level: 160 times)</th>
<th>Side-View (incident level: 0.8 times)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Models</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E39-F1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E39-F16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E39-F2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Features
- Heat-resistant up to 100°C
- Heat-resistant up to 200°C
- Heat-resistant up to 350°C

* 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-HD] 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)
- [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)

Note 2. 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.

Note 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-HD and the second value is for the E3NX-FA.

Note 4. The following mode names and response times apply to the modes given in the Sensing distance column.

- 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.

Note 5. The first value is for the E3X-HD and the second value is for the E3NX-FA.

Dimensions

Lens Units (Set of 2)

<table>
<thead>
<tr>
<th>Lens Units</th>
<th>28-A</th>
<th>E39-F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material:</td>
<td>Brass for the body and optical glass for the lens itself.</td>
<td></td>
</tr>
<tr>
<td>Note:</td>
<td>Two per set.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lens Units</th>
<th>28-B</th>
<th>E39-F16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material:</td>
<td>SUS303 for the body and optical glass for the lens itself.</td>
<td></td>
</tr>
<tr>
<td>Note:</td>
<td>Two per set.</td>
<td></td>
</tr>
</tbody>
</table>

Material: Brass for the body and optical glass for the lens itself.
Note: Two per set.
### Comparison of Incidence Level

Select the model based on the comparison of incidence level against Standard Fiber Units.

<table>
<thead>
<tr>
<th>Model</th>
<th>Incidence Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-T11R 2M</td>
<td>D20</td>
</tr>
<tr>
<td>E32-T11R + E39-F16</td>
<td>D20</td>
</tr>
<tr>
<td>E32-T11R + E39-F1-33</td>
<td>D20</td>
</tr>
<tr>
<td>E32-T11R + E39-F16</td>
<td>D20</td>
</tr>
<tr>
<td>E32-T81R-S 2M</td>
<td>D20</td>
</tr>
<tr>
<td>E32-T81R-S 2M + E39-F2</td>
<td>D20</td>
</tr>
<tr>
<td>E32-T81R-S 2M + E39-F2</td>
<td>D20</td>
</tr>
<tr>
<td>E32-T81R-S 2M + E39-F2</td>
<td>D20</td>
</tr>
<tr>
<td>E32-T81R-S 2M + E39-F2</td>
<td>D20</td>
</tr>
<tr>
<td>E32-T81R-S 2M + E39-F2</td>
<td>D20</td>
</tr>
</tbody>
</table>

- **Reference Information for Model Selection** -
**Specifications**

### Through-beam Fiber Units

<table>
<thead>
<tr>
<th>Sensing direction</th>
<th>Aperture angle</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>31 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>E3X-HD</strong></td>
<td><strong>E3NX-FA</strong></td>
<td>Other modes</td>
<td><strong>E3X-HD</strong></td>
</tr>
<tr>
<td>Narrow view</td>
<td>1.5°</td>
<td>Flexible, R1</td>
<td>20.5 x 24.5 x 10</td>
<td>3.220</td>
<td>4.000°</td>
<td>2 dia. (0.1 dia./0.03 dia.)</td>
<td>E32-A03 2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thickness: 3 mm</td>
<td></td>
<td>1.200</td>
<td>ST: 1.760</td>
<td>SHS: 500</td>
<td>E32-A03-1 2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.800</td>
<td>ST: 2.670</td>
<td>SHS: 500</td>
<td>E32-A04 2M</td>
</tr>
<tr>
<td>Side-view</td>
<td>3.4°</td>
<td>R10</td>
<td>20.5 x 24.5 x 10</td>
<td>1.280</td>
<td>1.920</td>
<td>1.2 dia. (0.1 dia./0.03 dia.)</td>
<td>E32-T24SR 2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thickness: 3 mm</td>
<td></td>
<td>1.260</td>
<td>ST: 660</td>
<td>SHS: 670</td>
<td>E32-T24S 2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.920</td>
<td>ST: 1.020</td>
<td>SHS: 200</td>
<td>E32-T22SR 2M</td>
</tr>
<tr>
<td>Top-view</td>
<td>4°</td>
<td>Flexible, R1</td>
<td>20.5 x 24.5 x 10</td>
<td>1.460</td>
<td>2.190</td>
<td>2 dia. (0.1 dia./0.03 dia.)</td>
<td>E32-T24SR 2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thickness: 3 mm</td>
<td></td>
<td>1.460</td>
<td>ST: 2,660</td>
<td>SHS: 670</td>
<td>E32-T24S 2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.190</td>
<td>ST: 3.300</td>
<td>SHS: 590</td>
<td>E32-T22S 2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.000°</td>
<td>ST: 1.760</td>
<td>SHS: 500</td>
<td>E32-A03 2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.000°</td>
<td>ST: 2.670</td>
<td>SHS: 500</td>
<td>E32-A03-1 2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.000°</td>
<td>ST: 3.300</td>
<td>SHS: 590</td>
<td>E32-A04 2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.000°</td>
<td>ST: 1.760</td>
<td>SHS: 500</td>
<td>E32-A03 2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.000°</td>
<td>ST: 2.670</td>
<td>SHS: 500</td>
<td>E32-A03-1 2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.000°</td>
<td>ST: 3.300</td>
<td>SHS: 590</td>
<td>E32-A04 2M</td>
</tr>
</tbody>
</table>

* 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-HD** 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)
- **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)

**Note 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-HD and the second value is for the E3NX-FA.
- 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.
**Limited-reflective Fiber Units**

<table>
<thead>
<tr>
<th>Sensing direction</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Standard sensing object (minimum sensing object)</th>
<th>Models</th>
<th>33 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>E3X-HD</strong></td>
<td><strong>E3NX-FA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flat-view</td>
<td>20.5 14 3.8</td>
<td>R25</td>
<td>0 to 15</td>
<td>ST: 0 to 15, SHS: 0 to 15</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14 14 2.5</td>
<td>R10</td>
<td>0 to 4</td>
<td>ST: 0 to 4, SHS: 0 to 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>GIGA</strong> HS Other modes</td>
<td><strong>GIGA</strong> HS Other modes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side-view</td>
<td>18 16 4.3</td>
<td>R25</td>
<td>5.4 to 9</td>
<td>ST: 5.4 to 9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.4 to 9</td>
<td>ST: 5.4 to 9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Note 1.** If operation is affected by the background, perform power tuning or use the ECO Mode to decrease the incident light level.
- **Note 2.** The following mode names and response times apply to the modes given in the Sensing distance column.
  - [E3X-HD] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (NPN output: 50 μs, PNP output: 55 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)
- **Note 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-HD and the second value is for the E3NX-FA.
- **Note 4.** The sensing distances for Reflective Fiber Units are for white paper.

**Detection without Background Interference**

- 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.
### Limited-reflective Fiber Units

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

- Sensing surface: Two, 3.2 dia. mounting holes with two, 6 dia. countersinks on both sides.
- Sensing distance: Two, 1 dia.
- Detection: Provided

**33-B** E32-L24S 2M (Free Cutting)

- Sensing surface: Two, 3.2 dia. mounting holes with two, 6 dia. countersinks on both sides.
- Sensing distance: Two, 1 dia.
- Detection: Provided

**33-C** E32-L25L 2M (Free Cutting)

- Sensing surface: Two, 3.2 dia.
- Sensing distance: Two, 1 dia.
- Detection: Provided

---

**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*
## Transparent Object Detection

### Retro-reflective

- **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)

<table>
<thead>
<tr>
<th>Type</th>
<th>Features</th>
<th>Size</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>35 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Film detection</strong></td>
<td>M6</td>
<td></td>
<td></td>
<td></td>
<td>E3X-HD GIGA HS Other modes</td>
<td>ST : 1,350, 1,000, 2,020 Other modes</td>
<td>ST : 1,800, 1,500, 3,040</td>
<td>E32-LR11NP 2M + E39-RP1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Square</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E3X-HD GIGA HS Other modes</td>
<td>ST : 1,350, 1,000, 2,020 Other modes</td>
<td>ST : 1,800, 1,500, 3,040</td>
<td>E32-R16 2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Threaded Models</strong></td>
<td>M6</td>
<td></td>
<td></td>
<td></td>
<td>E3X-HD GIGA HS Other modes</td>
<td>ST : 1,350, 1,000, 2,020 Other modes</td>
<td>ST : 1,800, 1,500, 3,040</td>
<td>E32-R21 2M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*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-HD 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)
   - E3X-HD 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))
   - E39-RP1: Provided

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-HD and the second value is for the E3X-HD FA.
- Reference Information for Model Selection -

**Performance Comparison of Transparent Object Detection**

For detecting transparent objects, consider using the 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.

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

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

<table>
<thead>
<tr>
<th>Reflector shape (mm)</th>
<th>Sensing distance (mm) (reference values)</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G3X-HD</td>
<td>G3X-FA</td>
</tr>
<tr>
<td>30</td>
<td>550</td>
<td>620</td>
</tr>
<tr>
<td></td>
<td>430</td>
<td>540</td>
</tr>
<tr>
<td>15</td>
<td>210</td>
<td>310</td>
</tr>
<tr>
<td></td>
<td>160</td>
<td>240</td>
</tr>
</tbody>
</table>

For more information, refer to the installation guide on page 58, 59, and 61.
**Specifications**

### Limited-reflective Fiber Units

<table>
<thead>
<tr>
<th>Features</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Standard sensing object (minimum sensing object)</th>
<th>Models</th>
<th>37 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>E3X-HD</strong> GIGA HS</td>
<td><strong>E3NX-FA</strong> NEW GIGA HS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other modes</td>
<td>Other modes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small size</td>
<td>14 2.5 11</td>
<td></td>
<td>R10 0 0 4 ST : E10 0 /4</td>
<td>ST : 10 0 /4 SHS : 10 0 /4</td>
<td>(5 μm dia. / 2 μm dia.)</td>
<td>E32-L24S 2M</td>
</tr>
<tr>
<td></td>
<td>20.5 3.8 14</td>
<td></td>
<td>R25 0 0 15 ST : 10 0 /20</td>
<td>ST : 10 0 /20 /20 SHS : 12 0 /20</td>
<td>Soda glass with reflection factor of 7%</td>
<td>E32-L16-N 2M</td>
</tr>
<tr>
<td></td>
<td>23 1.5 20</td>
<td></td>
<td>End surface of soda glass with reflection factor of 7% (0.077 mm, rounded edges)</td>
<td>End surface of soda glass with reflection factor of 7% (0.077 mm, rounded edges)</td>
<td></td>
<td>E32-A09 2M</td>
</tr>
</tbody>
</table>

* 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.

- **E32-A09** Giga-power mode (16 μs), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (55 μs)
- **E32-A12** Giga-power mode (16 μs), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (55 μs)

**Note 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.

**Note 3.** The sensing distances for Reflective Fiber Units are for white paper.
Limited-reflective Fiber Units

**Limited-reflective Fiber Units**

- Reference Information for Model Selection -

**Sensing Distance vs. Digital Selection**

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).

**Digital Value**

- Glass, \( t = 0.7 \)  
- SUS304

**Sensing Distance**

- E32-L24S  
- E32-A08  
- E32-L25L  
- E32-L16-N  
- E32-A12  
- E32-A09

* E3NX-FA21 used in high-speed (HS) mode.
Environmental Immunity
Chemical-resistant, Oil-resistant

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

<table>
<thead>
<tr>
<th>Material</th>
<th>Fluororesin</th>
<th>Acryl</th>
<th>ABS</th>
<th>Polycarbonate</th>
<th>Polyethylene</th>
<th>PVC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric acid</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Methyl alcohol</td>
<td>☐</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>Acetone</td>
<td>☐</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Toluene</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Benzene</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Note: Results depend on concentration.

**Specifications**

---

**Through-beam Fiber Units**

<table>
<thead>
<tr>
<th>Type</th>
<th>Sensing direction</th>
<th>Appearance (mm)</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>39 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil-resistant</td>
<td>Right-angle</td>
<td>4 dia.</td>
<td>4.0 dia.</td>
<td>4 dia. (0.1 dia./0.03 dia.)</td>
<td>E32-T11NF 2M</td>
<td>39-A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-T11F 2M</td>
<td>39-B</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-T11F 2M</td>
<td>39-C</td>
</tr>
<tr>
<td>Chemical/oil resistant</td>
<td>Top-view</td>
<td>4 dia.</td>
<td>4.0 dia.</td>
<td>3 dia. (0.1 dia./0.03 dia.)</td>
<td>E32-T14F 2M</td>
<td>39-D</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-T11F 2M</td>
<td>39-E</td>
</tr>
</tbody>
</table>

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 IP66 indicates the degree of protection which is defined according to the IEC, and the G indicates that a device has resistance to oil. Padded OMRON's Oil-resistant Component Evaluation Standards (OMRON's own durability evaluation standards) (Cutting of type specified in ABS K2241:2000; Temperature: 38°C max.)

**Reflective Fiber Units**

<table>
<thead>
<tr>
<th>Type</th>
<th>Sensing direction</th>
<th>Appearance (mm)</th>
<th>Sensing distance (mm)</th>
<th>Standard sensing object (minimum sensing object)</th>
<th>Models</th>
<th>39 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semiconductors:</td>
<td>Top-view</td>
<td>4 dia.</td>
<td>4.0 dia.</td>
<td>Glass (20 µm)</td>
<td>E32-L11F 2M</td>
<td>39-F</td>
</tr>
<tr>
<td>Cleaning, developing, and etching, 60°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-L11F 2M</td>
<td>39-G</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-D12F 2M</td>
<td>39-H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-D11U 2M</td>
<td>39-I</td>
</tr>
</tbody>
</table>

Note 1. The following mode names and response times apply to the modes given in the Sensing distance column.
- [E3X-HD] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 µs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (NPN output: 50 µs, PNP output: 55 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-HD and the second value is for the E3NX-FA.
- The sensing distances for Reflective Fiber Units are for white paper.
- Reference Information for Model Selection -

Oil-resistance performance of the E32-T11NF

Fluoresin Outer Cable Sheath
The fluoro resin that covers the entire surface of the cable sheath (fiber covering) prevents the penetration of cutting oil.

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

Mechanical Seal Structure

- Alumnum ring bushing
- Set screw
- Fluoro resin
- Fiber core

Structure Around Sensing Surface Also Resists Cutting Oil and Cutting Chips

- Spherical glass lens resists oils adhered
- Shape that prevents accumulation of oil drops and cutting chips

- Reference Information for Model Selection -

Oil-resistance performance of the E32-T11NF

Fluoresin Outer Cable Sheath
The fluoro resin that covers the entire surface of the cable sheath (fiber covering) prevents the penetration of cutting oil.

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

Mechanical Seal Structure

- Alumnum ring bushing
- Set screw
- Fluoro resin
- Fiber core

Structure Around Sensing Surface Also Resists Cutting Oil and Cutting Chips

- Spherical glass lens resists oils adhered
- Shape that prevents accumulation of oil drops and cutting chips

- Reference Information for Model Selection -

Oil-resistance performance of the E32-T11NF

Fluoresin Outer Cable Sheath
The fluoro resin that covers the entire surface of the cable sheath (fiber covering) prevents the penetration of cutting oil.

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

Mechanical Seal Structure

- Alumnum ring bushing
- Set screw
- Fluoro resin
- Fiber core

Structure Around Sensing Surface Also Resists Cutting Oil and Cutting Chips

- Spherical glass lens resists oils adhered
- Shape that prevents accumulation of oil drops and cutting chips

- Reference Information for Model Selection -

Oil-resistance performance of the E32-T11NF

Fluoresin Outer Cable Sheath
The fluoro resin that covers the entire surface of the cable sheath (fiber covering) prevents the penetration of cutting oil.

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

Mechanical Seal Structure

- Alumnum ring bushing
- Set screw
- Fluoro resin
- Fiber core

Structure Around Sensing Surface Also Resists Cutting Oil and Cutting Chips

- Spherical glass lens resists oils adhered
- Shape that prevents accumulation of oil drops and cutting chips

- Reference Information for Model Selection -

Oil-resistance performance of the E32-T11NF

Fluoresin Outer Cable Sheath
The fluoro resin that covers the entire surface of the cable sheath (fiber covering) prevents the penetration of cutting oil.

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

Mechanical Seal Structure

- Alumnum ring bushing
- Set screw
- Fluoro resin
- Fiber core

Structure Around Sensing Surface Also Resists Cutting Oil and Cutting Chips

- Spherical glass lens resists oils adhered
- Shape that prevents accumulation of oil drops and cutting chips

- Reference Information for Model Selection -

Oil-resistance performance of the E32-T11NF

Fluoresin Outer Cable Sheath
The fluoro resin that covers the entire surface of the cable sheath (fiber covering) prevents the penetration of cutting oil.

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

Mechanical Seal Structure

- Alumnum ring bushing
- Set screw
- Fluoro resin
- Fiber core

Structure Around Sensing Surface Also Resists Cutting Oil and Cutting Chips

- Spherical glass lens resists oils adhered
- Shape that prevents accumulation of oil drops and cutting chips

- Reference Information for Model Selection -

Oil-resistance performance of the E32-T11NF

Fluoresin Outer Cable Sheath
The fluoro resin that covers the entire surface of the cable sheath (fiber covering) prevents the penetration of cutting oil.

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

Mechanical Seal Structure

- Alumnum ring bushing
- Set screw
- Fluoro resin
- Fiber core

Structure Around Sensing Surface Also Resists Cutting Oil and Cutting Chips

- Spherical glass lens resists oils adhered
- Shape that prevents accumulation of oil drops and cutting chips

- Reference Information for Model Selection -

Oil-resistance performance of the E32-T11NF

Fluoresin Outer Cable Sheath
The fluoro resin that covers the entire surface of the cable sheath (fiber covering) prevents the penetration of cutting oil.

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

Mechanical Seal Structure

- Alumnum ring bushing
- Set screw
- Fluoro resin
- Fiber core

Structure Around Sensing Surface Also Resists Cutting Oil and Cutting Chips

- Spherical glass lens resists oils adhered
- Shape that prevents accumulation of oil drops and cutting chips
Environmental Immunity

Bending-resistant, Disconnection-resistant

Through-beam → This page  Reflective → 42 page

• 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

<table>
<thead>
<tr>
<th>Size</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>41 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 dia.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-T22B 2M</td>
<td>41-A</td>
</tr>
<tr>
<td>M3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-T21 2M</td>
<td>41-B</td>
</tr>
<tr>
<td>M4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-T11 2M</td>
<td>41-C</td>
</tr>
<tr>
<td>Square</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E32-T25XB 2M</td>
<td>41-D</td>
</tr>
</tbody>
</table>

Note: The following mode names and response times apply to the modes given in the Sensing distance column.

1. [E3X-HD] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (10 μs, NPN output: 50 μs, PNP output: 55 μs)
2. [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.

Protective Stainless Spiral Tube (Sold separately)

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

<table>
<thead>
<tr>
<th>Applicable Fiber Units</th>
<th>Model</th>
<th>Quantity</th>
<th>41 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-T11 2M E32-T11 2M</td>
<td>E30-F32C 1M</td>
<td>2 pieces</td>
<td>41-E</td>
</tr>
</tbody>
</table>

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

Bending-resistant, Disconnection-resistant

Installation Information → 60, 61 Page

Dimensions

Through-beam Fiber Units (Set of 2)

<table>
<thead>
<tr>
<th>Model</th>
<th>Sensing Surface</th>
<th>Accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-T22B 2M (Free Cutting)</td>
<td>0.5 dia. (Nickel-plated brass)</td>
<td>Protective tube, Head connector (Nickel-plated brass), End cap (Nickel-plated brass)</td>
</tr>
<tr>
<td>E32-T21 2M (Free Cutting)</td>
<td>1 dia. (Nickel-plated brass)</td>
<td>Protective tube, Head connector (Nickel-plated brass), End cap (Nickel-plated brass)</td>
</tr>
<tr>
<td>E32-T11 2M (Free Cutting)</td>
<td>1 dia. (Nickel-plated brass)</td>
<td>Protective tube, Head connector (Nickel-plated brass), End cap (Nickel-plated brass)</td>
</tr>
</tbody>
</table>

Note:
1. Set of two symmetrically shaped Fiber Units.
2. Four M3 x 8 stainless steel countersunk mounting screws are provided.

Note:
- E32-T11 2M (Free Cutting) is provided with two, 4.4 dia. countersinks on one side.
- Saddles (four, trivalent chromate-plated iron) are provided.

- Model Index
- Technical Guide and Precautions
Environmental Immunity
Bending-resistant, Disconnection-resistant

- 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

<table>
<thead>
<tr>
<th>Reflective Fiber Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size</strong></td>
</tr>
<tr>
<td><strong>E3X-HD</strong></td>
</tr>
<tr>
<td><strong>Sensing distance (mm)</strong></td>
</tr>
<tr>
<td><strong>Models</strong></td>
</tr>
<tr>
<td>1.5 dia.</td>
</tr>
<tr>
<td>M3</td>
</tr>
<tr>
<td>3 dia.</td>
</tr>
<tr>
<td>M4</td>
</tr>
<tr>
<td>M6</td>
</tr>
<tr>
<td>Square</td>
</tr>
</tbody>
</table>

Note: The following mode names and response times apply to the models given in the Sensing distance column.

1. [E3X-HD] 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)
   [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 first value is for the E3X-HD and the second value is for the E3NX-FA.

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

Protective Stainless Spiral Tube (Sold separately)

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

<table>
<thead>
<tr>
<th>Applicable Fiber Units</th>
<th>Models</th>
<th>Quantity</th>
<th>43 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-D21R 2M/E32-C31 2M/ E32-D21 2M</td>
<td>E39-F32A 1M</td>
<td>1 piece</td>
<td></td>
</tr>
<tr>
<td>E32-D211R 2M/E32-D21B 2M</td>
<td>E39-F32C 1M</td>
<td>2 pieces</td>
<td></td>
</tr>
<tr>
<td>E32-D11R 2M/E32-CC200 2M/ E32-D11 2M/E32-D51R 2M/ E32-D51 2M</td>
<td>E39-F32D 1M</td>
<td>1 piece</td>
<td></td>
</tr>
</tbody>
</table>

* This Tube cannot be used if a Lens Unit is being used.
### Limited-reflective Fiber Units

- **E32-D22B 2M (No Cutting)**
  - Sensing surface: 3 dia. (Nickel-plated brass)
  - Emitter fibers: Two, 0.25 dia.
  - Opposite side: Three, 0.25 dia.

- **E32-D21 2M (Free Cutting)**
  - M3×0.5 (Nickel-plated brass)
  - Opposite side: 5.5 dia.
  - Two, 0.25 dia.

- **E32-D22B 2M (Free Cutting)**
  - M4×0.7 (Nickel-plated brass)
  - Opposite side: 7 dia.
  - Two, 0.5 dia.

- **E32-D21B 2M (Free Cutting)**
  - M6×0.75 (Nickel-plated brass)
  - Opposite side: 15 dia.
  - Two, 1 dia.

- **E32-D11 2M (Free Cutting)**
  - M6×0.75 (Nickel-plated brass)
  - Opposite side: 15 dia.
  - Two, 1 dia.

- **E39-F32A 1M/E39-F32C 1M/E39-F32D 1M**
  - Head connector (Nickel-plated brass)
  - Two, 0.25 dia.
  - Emitter fibers: Two, 0.25 dia.

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

**Dimensions**

- **43-A** E32-D22B 2M (No Cutting)
- **43-B** E32-D21 2M (Free Cutting)
- **43-C** E32-D22B 2M (Free Cutting)
- **43-D** E32-D21B 2M (Free Cutting)
- **43-E** E32-D11 2M (Free Cutting)
- **43-F** E32-D25XB 2M (Free Cutting)
- **43-G** E39-F32A 1M/E39-F32C 1M/E39-F32D 1M

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**Environmental Immunity**

- Bending-resistant, Disconnection-resistant

---

**Installation Information → 58, 59 and 61 Page**
Environmental Immunity
Heat-resistant

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

### Specifications

#### Through-beam Fiber Units

<table>
<thead>
<tr>
<th>Heat-resistant temperature</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>45 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>100°C *1</td>
<td>Flexible, R2</td>
<td>1,600</td>
<td>E3X-HD GIGA HS Other modes</td>
<td>2.400 ST : 1,300 SNS: 225 GIGA HS Other modes</td>
<td>E32-T81R 2M</td>
<td>45-A</td>
</tr>
<tr>
<td>150°C *2</td>
<td>R35</td>
<td>2,800</td>
<td>E3NX-FA NEW GIGA HS Other modes</td>
<td>4,000 ST : 1,500 SNS: 400</td>
<td>E32-T51 2M</td>
<td>45-B</td>
</tr>
<tr>
<td>200°C *3</td>
<td>R10</td>
<td>1,000</td>
<td>GIGA HS Other modes</td>
<td>1,500 ST : 1,300 SNS: 400</td>
<td>E32-T81R-S 2M</td>
<td>45-C</td>
</tr>
<tr>
<td>350°C *4</td>
<td>R25</td>
<td>1,680</td>
<td>E3NX-FA NEW GIGA HS Other modes</td>
<td>2,520 ST : 1,500 SNS: 240</td>
<td>E32-T81S 2M</td>
<td>45-D</td>
</tr>
<tr>
<td>70°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Standard Fiber Units can be used.</td>
<td>--</td>
</tr>
</tbody>
</table>

*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-T81-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-HD GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SNS: 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 SNS: Super-high-speed mode (50 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-HD and the second value is for the E3NX-FA.
### Dimensions

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

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

- M4×0.7 (SUS303)
- Thickness: 2.4 (Nickel-plated brass)
- Washer (Nickel-plated iron)
- Diameter: 2.2 dia.
- Length: 2,000

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

- M4×0.7 (Nickel-plated brass)
- Thickness: 2.4 (Nickel-plated brass)
- Washer (Nickel-plated iron)
- Diameter: 2.2 dia.
- Length: 2,000

**45-C** E32-T81R-S 2M (No Cutting)

- M4×0.7 (SUS303)
- Thickness: 2.4 (Nickel-plated brass)
- Washer (SUS)
- Diameter: 2.2 dia.
- Length: 2,000

**45-D** E32-T61-S 2M (No Cutting)

- M4×0.7 (SUS303)
- Thickness: 2.4 (Nickel-plated brass)
- Washer (SUS304)
- Diameter: 2.2 dia.
- Length: 2,000

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.

---

- Reference Information for Model Selection -

And

**Long-distance Sensing Applications**

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

→ 28 page
### Specifications

<table>
<thead>
<tr>
<th>Reflective Fiber Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heat-resistant temperature</strong></td>
</tr>
<tr>
<td><strong>E3X-HD</strong></td>
</tr>
<tr>
<td>100°C *1</td>
</tr>
<tr>
<td>150°C *2</td>
</tr>
<tr>
<td>200°C *3</td>
</tr>
<tr>
<td>300°C</td>
</tr>
<tr>
<td>350°C *3</td>
</tr>
<tr>
<td>400°C *3</td>
</tr>
</tbody>
</table>

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

**Environmental Immunity**

- **Heat-resistant**

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

---

**Environmental Immunity**

Heat-resistant

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

| Note 1. | The following mode names and response times apply to the modes given in the Sensing distance column.
|---------|---|
| [E3X-HD] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (NPN output: 50 μs, PNP output: 55 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-HD and the second value is for the E3NX-FA.
| The sensing distances for Reflective Fiber Units are for white paper.
**Reflective Fiber Units**

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

- **Dimensions**

<table>
<thead>
<tr>
<th>Sensing surface</th>
<th>Opposite side 10, thickness 2.4 (nickel-plated brass)</th>
<th>Washer (nickel-plated iron)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.2</td>
<td>3.5</td>
<td>17.5</td>
</tr>
<tr>
<td>5.2</td>
<td>3.5</td>
<td>2.000</td>
</tr>
</tbody>
</table>

**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.

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

- **Dimensions**

<table>
<thead>
<tr>
<th>Sensing surface</th>
<th>Opposite side 10, thickness 2.4 (nickel-plated brass)</th>
<th>Washer (nickel-plated iron)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>3.1</td>
<td>13</td>
<td>2.000</td>
</tr>
</tbody>
</table>

**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.

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

- **Dimensions**

<table>
<thead>
<tr>
<th>Sensing surface</th>
<th>Protective tube</th>
<th>Fluorine tube</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>275</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

**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.

### 47-D E32-A06H2 2M (No Cutting)

- **Dimensions**

<table>
<thead>
<tr>
<th>Sensing surface</th>
<th>Flexible tube</th>
<th>Stainless steel tube</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>5.8</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>5.8</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The maximum allowable temperatures for sections A, B and C are 400°C, 300°C, and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *) must be maintained within the Amplifier Unit's operating temperature range.
Area beams are optimum for detecting workpieces presented in inconsistent positions, such as falling workpieces, or for meander detection, or for detecting workpieces with holes.

This Fiber Unit is ideal for meander detection because it outputs the digital value in a linear relation to the interrupted light distance.

---

### Specifications

#### Through-beam Fiber Units

**Type** | Sensing width (mm) | Appearance (mm) | Sensing distance (mm) | Optical axis diameter (minimum sensing object) | Models | Dimensions No.
---|---|---|---|---|---|---
**Area** | 11 mm | 14.5 x 27 | E3X-HD: GIGA = HS, Other modes = Other modes | E3NX-FA: GIGA = HS, Other modes = Other modes | E32-T16PR 2M | 49-A

**Area** | 30 mm | 53 x 100 | E3X-HD: GIGA = HS, Other modes = Other modes | E3NX-FA: GIGA = HS, Other modes = Other modes | E32-T16JR 2M | 49-B

**Array** | 10 mm | 32 x 45 | E3X-HD: GIGA = HS, Other modes = Other modes | E3NX-FA: GIGA = HS, Other modes = Other modes | E32-Q16M NEW | 49-D

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.)

---

### Reflective Fiber Units

**Type** | Sensing width (mm) | Appearance (mm) | Sensing distance (mm) | Optical axis diameter (minimum sensing object) | Model | Dimensions No.
---|---|---|---|---|---|---
**Array** | 11 mm | 15 x 56 | E3X-HD: GIGA = HS, Other modes = Other modes | E3NX-FA: GIGA = HS, Other modes = Other modes | E32-O36P1 2M | 49-E

Note 1. The following mode names and response times apply to the modes given in the Sensing distance column:

- E3X-HD: GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (NPN output: 50 μs, PNP output: 55 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-HD and the second value is for the E3NX-FA.
**Dimensions**

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

- **49-A** E32-T16PR 2M (Free Cutting)
  - Sensing surface: 27 × 15 mm
  - Cross-section A-A
  - Model display tube
  - Protective cover (PVC)
  - Optical fiber: 2.2 dia.
  - Sensing head (ABS)
  - Two, 3.2 dia. mounting holes with two, 6 dia. countersinks on both sides.
  - Stickers with slits of widths 0.5 and 1 mm (2 of each) provided.

- **49-B** E32-T16JR 2M (Free Cutting)
  - Receiver
  - Emitter
  - Sensing surface: 17.8 × 14.5 mm
  - (ABS)
  - Two, 3.2 dia. mounting holes with two, 6 dia. countersinks on both sides.

- **49-C** E32-T16WR 2M (Free Cutting)
  - Sensing surface: 23 × 12 mm
  - Cross-section A-A
  - Model display tube
  - Protective cover (PVC)
  - Optical fiber: 2.2 dia.
  - Sensing head (ABS)
  - Two, 3.2 dia. mounting holes with two, 6 dia. countersinks on both sides.

- **49-D** E32-G16
  - Sensing surface: 10.5 × 69 mm
  - Cross-section A-A
  - Model display tube
  - Protective cover (PVC)
  - Optical fiber: 2.2 dia.
  - Sensing head (ABS)

**Installation Information → 60 Page**
### Special Applications

#### Liquid-level Detection

- 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

<table>
<thead>
<tr>
<th>Detection scheme</th>
<th>Tube diameter</th>
<th>Features</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Applicable range</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>51 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube-mounting</td>
<td>3.2, 6.4 and 9.5 dia.</td>
<td>• Resistant to bubbles and droplets • Residual quantity detection</td>
<td>19.5</td>
<td>Bend-resistant, R4</td>
<td>Applicable tube: Transparent tube with a diameter of 3.2, 6.4, or 9.5 dia. and a recommended wall thickness of 1 mm</td>
<td>--</td>
<td>E32-A01 5M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 to 10 dia.</td>
<td>Ideal for mounting at multilevels</td>
<td>18</td>
<td>R10</td>
<td>Applicable tube: Transparent tube with a diameter of 8 to 10 dia. and a recommended wall thickness of 1 mm</td>
<td>--</td>
<td>E32-L25T 2M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No restrictions</td>
<td>• Usable on large diameter tubes • Resistant to bubbles and droplets</td>
<td></td>
<td></td>
<td>Applicable tube: Transparent tube (no restrictions on diameter)</td>
<td>--</td>
<td>E32-D36T 2M</td>
<td></td>
</tr>
</tbody>
</table>

| Liquid contact (heat-resistant up to 200°C) | -- | -- | R4 | Liquid-contact Type *1 | -- | E32-D82F1 4M |

---

*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-HD series or E3NX-FA series is used.

*3 When using a Fiber Amplifier Unit in gigapower mode, level detection may not work depending on the tube diameter. Make sure to confirm operation with the actual tube.

---

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

#### Mounting and conditions

<table>
<thead>
<tr>
<th>Mounting and conditions</th>
<th>Recommended Unit</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>When bubbles and the water droplets are generated</td>
<td>E32-A01</td>
<td>This is a Through-beam Model, so the incident light will differ greatly between with and without liquid. It also uses an area beam, which is less prone to false detection by bubbles and droplets.</td>
</tr>
<tr>
<td>Multilevel installation in limited space</td>
<td>E32-L25T</td>
<td>This model is suitable for mounting at multilevels because of the thin type (height: 10 mm).</td>
</tr>
<tr>
<td>Mounting on large diameter tubes</td>
<td>E32-D36T</td>
<td>This model has no restrictions on the tube diameter, so it can be mounted on many different tube sizes. It also uses an area beam, which is less prone to false detection by bubbles and droplets.</td>
</tr>
</tbody>
</table>
**Installation Information → 58, 59 Page**

**Tube-mounting Examples**

**Dimensions**

**51-A E32-A01 5M (Free Cutting)**

- Tube holder (PTFE)
- Emitter
- Receiver
- Sensing surface

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

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

**51-B E32-L25T 2M (Free Cutting)**

- Sensing surface
- Lens two, 3.2 dia. (PC)

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

**51-C E32-D36T 2M (Free Cutting)**

- Enlarged View of Sensing Surface
- Emitter: Sixteen, 0.285 dia.
- receiver: Sixteen, 0.285 dia.

**51-D E32-D82F1 4M (Free Cutting)**

- Fiber connector 9 dia. (Nickel-plated brass)
- Length of penetrable section 150

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

**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.

<table>
<thead>
<tr>
<th>Situation</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trouble (disconnection)</td>
<td>Light interrupted</td>
</tr>
<tr>
<td>With liquid</td>
<td>Light interrupted</td>
</tr>
<tr>
<td>Without liquid</td>
<td>Light incident</td>
</tr>
</tbody>
</table>

If the failure goes unnoticed, this failsafe design will prevent false detection of liquid when there is no liquid present.
• Can be used under high vacuums of up to $10^{-5}$ Pa.
• Available in models with heat resistant up to 120 or 200°C.

**Configuration Example for using under vacuum**

![Configuration Example](image)

**Specifications**

### Through-beam Fiber Units

<table>
<thead>
<tr>
<th>Type</th>
<th>Heat-resistant temperature</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>S3 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vacuum side</strong></td>
<td>120°C</td>
<td></td>
<td>R30</td>
<td>E3X-HD</td>
<td>ST : 260 ST : 1,080 HS : 130 SHS : 390</td>
<td>E3X-HD-01V 1M</td>
<td><a href="#">S3-A</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E3X-FA <strong>NEW</strong></td>
<td>ST : 1,250 ST : 1,080 HS : 600</td>
<td>E3X-FA-01V 1M</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>NEW</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Atmospheric pressure side</strong></td>
<td>70°C</td>
<td></td>
<td>R25</td>
<td>E3X-HD</td>
<td>ST : 640 ST : 1,760 HS : 280 SHS : 960</td>
<td>E3X-HD-01V 1M</td>
<td><a href="#">S3-B</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E3X-FA <strong>NEW</strong></td>
<td>ST : 1,420 ST : 2,000 HS : 520</td>
<td>E3X-FA-01V 1M</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>NEW</strong></td>
<td></td>
<td>E3X-FA-01V 1M</td>
<td></td>
</tr>
</tbody>
</table>

* 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-HD** 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)
- **E3X-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)

**Note 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-HD and the second value is for the E3NX-FA.
- 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.

[Diagram showing dimensions and features of vacuum-resistant fiber units]

**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: 14.5 dia. ±0.2 mm
3. The maximum tightening torque is 12.7 N·m.
4. A V40 O-ring is provided.

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

- Sensing surface: 2 dia.
- Flexible tube: Stainless steel 2.9 dia.
- Connected to flange (vacuum side)

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

- Sensing surface: 2 dia.
- Flexible tube: Stainless steel 2.9 dia.
- Connected to flange (vacuum side)

**E32-T51V 2M** (Free Cutting)

- Sensing surface: 2 dia.
- Flexible tube: Stainless steel 2.9 dia.
- Connected to flange (vacuum side)

**E39-F1V**

- Sensing surface: 2 dia.
- Flexible tube: Stainless steel 2.9 dia.
- Connected to flange (vacuum side)

**E32-VF4**

- Sensing surface: 2 dia.
- Flexible tube: Stainless steel 2.9 dia.
- Connected to flange (vacuum side)

**E32-VF1**

- Sensing surface: 2 dia.
- Flexible tube: Stainless steel 2.9 dia.
- Connected to flange (vacuum side)

**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: 6 dia. ±0.5 mm
3. The maximum tightening torque is 9.8 N·m.
4. A V15 O-ring is provided.
Special Applications

Environmental Immunity

Threaded
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, Semiconductors, and Solar Cells
Installation Information

Specifications

Limited-reflective Fiber Units

<table>
<thead>
<tr>
<th>Application</th>
<th>Ambient temperature</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Standard sensing object (minimum sensing object)</th>
<th>Models</th>
<th>S5 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass presence detection</td>
<td>70°C</td>
<td></td>
<td></td>
<td>E32-L16-N 2M</td>
<td>Soda glass with reflection factor of 7%</td>
<td>55-A</td>
<td></td>
</tr>
<tr>
<td>Glass-substrate Alignment</td>
<td>300°C</td>
<td></td>
<td></td>
<td>E32-A08 2M</td>
<td></td>
<td>55-B</td>
<td></td>
</tr>
<tr>
<td>Glass-substrate Alignment</td>
<td>70°C</td>
<td></td>
<td></td>
<td>E32-A08H2 2M</td>
<td></td>
<td>55-C</td>
<td></td>
</tr>
<tr>
<td>Mapping of glass substrates</td>
<td>300°C</td>
<td></td>
<td></td>
<td>E32-A12 2M</td>
<td></td>
<td>55-D</td>
<td></td>
</tr>
<tr>
<td>Wet processes (Cleaning, Resist developing, and etching)</td>
<td>60°C</td>
<td></td>
<td></td>
<td>E32-A09 2M</td>
<td></td>
<td>55-E</td>
<td></td>
</tr>
<tr>
<td>Wet processes (Resist stripping)</td>
<td>85°C</td>
<td></td>
<td></td>
<td>E32-A09H2 2M</td>
<td></td>
<td>55-F</td>
<td></td>
</tr>
</tbody>
</table>

Note 1. The following mode names and response times apply to the modes given in the Sensing distance column.

- E32-HD: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 μs)
- E32-FA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (30 μs)

Note 2. The maximum allowable temperature is not the same for all parts of the Fiber Unit. Refer to the dimensions diagrams for details.

Must not be repeatedly subject to rapid temperature changes.
Limited-reflective Fiber Units

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

Two, 3.2 dia. mounting holes with two, 6 dia. countersinks on both sides.

![Diagram of E32-L16-N 2M](image)

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

Two, 3.2 dia. mounting holes with two, 6 dia. countersinks on both sides.

![Diagram of E32-A08 2M](image)

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

Two, 3.4 dia. mounting holes with two, 6 dia. countersinks on one side.

![Diagram of E32-A08H2 2M](image)

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

Two, 3.2 dia. mounting holes with two, 6 dia. countersinks on both sides.

![Diagram of E32-A12 2M](image)

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

Sensing surface Lenses 5.8 dia.

![Diagram of E32-A09 2M](image)

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

Sensing surface Lenses 5.8 dia.

![Diagram of E32-A09H2 2M](image)

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

Sensing object (Glass)

![Diagram of E32-L11FP 2M](image)

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

Sensing object (Glass)

![Diagram of E32-L11FS 2M](image)
### Special Applications

#### FPD, Semiconductors, and Solar Cells

```
Limited-reflective → 54 page
Through-beam → This page
```

---

### Wafer Mapping

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

---

### Specifications

#### Through-beam Fiber Units

<table>
<thead>
<tr>
<th>Application</th>
<th>Ambient temperature</th>
<th>Aperture angle</th>
<th>Appearance (mm)</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>57 Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pentagonal</td>
<td>1.5°</td>
<td>Thickness: 3 mm</td>
<td>Flexible, R1</td>
<td>3.220</td>
<td>ST: 1.780</td>
<td>2 dia.</td>
<td>57-A</td>
</tr>
<tr>
<td>Pentagonal</td>
<td>3.4°</td>
<td>Thickness: 3 mm</td>
<td>R10</td>
<td>1.200</td>
<td>ST: 1.020</td>
<td>1.2 dia.</td>
<td>57-B</td>
</tr>
<tr>
<td>Pentagonal</td>
<td>4°</td>
<td>Thickness: 2 mm</td>
<td>Flexible, R1</td>
<td>4.000</td>
<td>ST: 1.680</td>
<td>2 dia.</td>
<td>57-C</td>
</tr>
</tbody>
</table>

**Note 1.** The following mode names and response times apply to the modes given in the Sensing distance column.

- [E3X-HD] GIGA: Giga-power mode (16 ms), HS: High-speed mode (250 μs), ST: Standard mode (1 ms), and SHS: Super-high-speed mode (NPN output: 50 μs, PNP output: 55 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 (50 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-HD and the second value is for the E3NX-FA.
**Through-beam Fiber Units (Set of 2)**

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

![Diagram of E32-A03 2M](image)

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

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

![Diagram of E32-A03-1 2M](image)

**Note 1:** Use the engraved surface and its opposing surface as installation (reference) surfaces.

**Note 2:** Set of two symmetrical parts.

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

![Diagram of E32-A04 2M](image)

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

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

![Diagram of E32-T24SR 2M](image)

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

![Diagram of E32-T24S 2M](image)
<table>
<thead>
<tr>
<th>Models</th>
<th>Installation</th>
<th>Cable</th>
<th>Weight (packed state) (g)</th>
<th>Dimensions Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-A01 5M</td>
<td>80°C 0.03N · 10 R4</td>
<td>Fluorosilicone Plastic</td>
<td>None</td>
<td>51 Page</td>
</tr>
<tr>
<td>E32-A03 2M</td>
<td>80°C 0.29N · 10 R1</td>
<td>Polyethylene Plastic</td>
<td>None</td>
<td>31 Page</td>
</tr>
<tr>
<td>E32-A03-1 2M</td>
<td>80°C 0.29N · 10 R10</td>
<td>Polyethylene Plastic</td>
<td>None</td>
<td>57 Page</td>
</tr>
<tr>
<td>E32-A04 2M</td>
<td>80°C 0.29N · 2.2'' dia. R10</td>
<td>Polyethylene Plastic</td>
<td>None</td>
<td>31 Page</td>
</tr>
<tr>
<td>E32-A08 2M</td>
<td>80°C 0.53N · 20 9.8N SUS</td>
<td>Glass</td>
<td>None</td>
<td>55 Page</td>
</tr>
<tr>
<td>E32-A08H2 2M</td>
<td>80°C 0.53N · 20 9.8N SUS</td>
<td>Glass</td>
<td>None</td>
<td>55 Page</td>
</tr>
<tr>
<td>E32-A09 2M</td>
<td>80°C 0.53N · 20 9.8N Polyethylene Plastic</td>
<td>None</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>E32-A09H2 2M</td>
<td>80°C 0.53N · 20 9.8N Polyethylene Plastic</td>
<td>None</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>E32-A12 2M</td>
<td>80°C 0.53N · 20 9.8N Polyethylene Plastic</td>
<td>None</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>E32-C21N 2M</td>
<td>80°C 0.29N · 3.2'' dia. R4</td>
<td>Polyethylene Plastic</td>
<td>White line on emitter cable</td>
<td>30</td>
</tr>
<tr>
<td>E32-C31 2M</td>
<td>80°C 0.78N · 3.2'' dia. R4</td>
<td>Polyethylene Plastic</td>
<td>White line on emitter cable</td>
<td>40</td>
</tr>
<tr>
<td>E32-C31M 1M</td>
<td>80°C 0.78N · 3.2'' dia. R4</td>
<td>Polyethylene Plastic</td>
<td>White line on emitter cable</td>
<td>40</td>
</tr>
<tr>
<td>E32-C31N 2M</td>
<td>80°C 0.29N · 3.2'' dia. R4</td>
<td>PVC and Polyethylene Plastic</td>
<td>White line on emitter cable</td>
<td>40</td>
</tr>
<tr>
<td>E32-C41 1M</td>
<td>80°C 0.78N · 3.2'' dia. R4</td>
<td>Polyethylene Plastic</td>
<td>White tube on emitter cable</td>
<td>30</td>
</tr>
<tr>
<td>E32-C42 1M</td>
<td>80°C 0.29N · 3.2'' dia. R4</td>
<td>Polyethylene Plastic</td>
<td>White tube on emitter cable</td>
<td>30</td>
</tr>
<tr>
<td>E32-C42S 1M</td>
<td>80°C 0.29N · 3.2'' dia. R4</td>
<td>Polyethylene Plastic</td>
<td>White tube on emitter cable</td>
<td>30</td>
</tr>
<tr>
<td>E32-C520 2M</td>
<td>80°C 0.98N · 6.2'' dia. R4</td>
<td>Polyethylene Plastic</td>
<td>White line on emitter cable</td>
<td>40</td>
</tr>
<tr>
<td>E32-C91N 2M</td>
<td>80°C 0.98N · 6.2'' dia. R4</td>
<td>Polyethylene Plastic</td>
<td>White line on emitter cable</td>
<td>36</td>
</tr>
<tr>
<td>E32-D11 2M</td>
<td>80°C 0.98N · 6.2'' dia. R4</td>
<td>PVC</td>
<td>None</td>
<td>50</td>
</tr>
<tr>
<td>E32-D11N 2M</td>
<td>80°C 0.98N · 6.2'' dia. R4</td>
<td>PVC</td>
<td>None</td>
<td>50</td>
</tr>
<tr>
<td>E32-D12 2M</td>
<td>80°C 0.98N · 6.2'' dia. R4</td>
<td>PVC</td>
<td>None</td>
<td>50</td>
</tr>
<tr>
<td>E32-D12F 2M</td>
<td>80°C 0.98N · 6.2'' dia. R4</td>
<td>PVC</td>
<td>None</td>
<td>50</td>
</tr>
<tr>
<td>E32-D16Z 2M</td>
<td>80°C 0.15N · 20 9.8N Fluorosilicone Plastic</td>
<td>None</td>
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<tr>
<td>E32-D16ZKR 2M</td>
<td>80°C 0.15N · 20 9.8N Fluorosilicone Plastic</td>
<td>None</td>
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<tr>
<td>E32-D16ZXR 2M</td>
<td>80°C 0.15N · 20 9.8N Fluorosilicone Plastic</td>
<td>None</td>
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<tr>
<td>E32-D15YR 2M</td>
<td>80°C 0.15N · 20 9.8N PVC</td>
<td>PVC</td>
<td>None</td>
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</tr>
<tr>
<td>E32-D15Z 2M</td>
<td>80°C 0.15N · 20 9.8N PVC</td>
<td>PVC</td>
<td>None</td>
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</tr>
<tr>
<td>E32-D15ZXR 2M</td>
<td>80°C 0.15N · 20 9.8N PVC</td>
<td>PVC</td>
<td>None</td>
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</tr>
<tr>
<td>E32-D16 2M</td>
<td>80°C 0.53N · 20 9.8N PVC</td>
<td>PVC</td>
<td>None</td>
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</tr>
<tr>
<td>E32-D21 2M</td>
<td>80°C 0.78N · 3.2'' dia. R4</td>
<td>PVC</td>
<td>None</td>
<td>43</td>
</tr>
<tr>
<td>E32-D21R 2M</td>
<td>80°C 0.78N · 3.2'' dia. R4</td>
<td>PVC</td>
<td>None</td>
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</tr>
<tr>
<td>E32-D21-S3 2M</td>
<td>80°C 0.78N · 3.2'' dia. R4</td>
<td>PVC</td>
<td>None</td>
<td>58</td>
</tr>
<tr>
<td>E32-D21FR 2M</td>
<td>80°C 0.78N · 3.2'' dia. R4</td>
<td>PVC</td>
<td>None</td>
<td>58</td>
</tr>
<tr>
<td>E32-D21FR 2M</td>
<td>80°C 0.78N · 3.2'' dia. R4</td>
<td>PVC</td>
<td>None</td>
<td>58</td>
</tr>
<tr>
<td>E32-D21FR 2M</td>
<td>80°C 0.78N · 3.2'' dia. R4</td>
<td>PVC</td>
<td>None</td>
<td>58</td>
</tr>
<tr>
<td>E32-D22 2M</td>
<td>80°C 0.29N · 1.7'' dia. R4</td>
<td>PVC</td>
<td>None</td>
<td>30</td>
</tr>
</tbody>
</table>

1. Unbreakable length of cable from fiber head.
2. Do not bend the cable for at least 20 mm from where the cable inserts into the Fiber Amplifier Unit.
3. Avoid rapid temperature changes.
4. For embedded mounting, prepare a hole with a diameter of 2.6 mm.
<table>
<thead>
<tr>
<th>Models</th>
<th>Installation</th>
<th>Cable</th>
<th>Weight (packed state) (g)</th>
<th>Dimensions Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-D22R 2M</td>
<td>−40 to 70°C</td>
<td>0.19N · m 3.2&quot; dia. R1 0 9.8N Polyethylene Plastic None</td>
<td>40</td>
<td>13 Page (15)</td>
</tr>
<tr>
<td>E32-D22-S1 2M</td>
<td>−40 to 70°C</td>
<td>0.29N · m 4.2&quot; dia. R10 10 9.8N Polyethylene Plastic None</td>
<td>45</td>
<td>19 Page (16-1)</td>
</tr>
<tr>
<td>E32-D24R 2M</td>
<td>−40 to 70°C</td>
<td>0.19N · m 3.2&quot; dia. R1 0 9.8N Polyethylene Plastic None</td>
<td>40</td>
<td>19 Page (16-2)</td>
</tr>
<tr>
<td>E32-D24-S2 2M</td>
<td>−40 to 70°C</td>
<td>0.19N · m 5.1&quot; dia. R25 10 9.6N Polyethylene Plastic None</td>
<td>55</td>
<td>19 Page (16-3)</td>
</tr>
<tr>
<td>E32-D25XB 2M</td>
<td>−40 to 70°C</td>
<td>0.15N · m R4 10 9.8N PVC Plastic None</td>
<td>40</td>
<td>43 Page (49-1)</td>
</tr>
<tr>
<td>E32-D25S 3M</td>
<td>−40 to 70°C</td>
<td>0.29N · m R10 10 9.8N Polyethylene Plastic None</td>
<td>50</td>
<td>19 Page (16-4)</td>
</tr>
<tr>
<td>E32-D31-S1 0,5M</td>
<td>−40 to 70°C</td>
<td>0.78N · m 3.2&quot; dia. R4 10 9.8N Polyethylene Plastic None</td>
<td>35</td>
<td>19 Page (16-5)</td>
</tr>
<tr>
<td>E32-D32L 2M</td>
<td>−40 to 70°C</td>
<td>0.29N · m 3.2&quot; dia. R25 10 9.4N Polyethylene Plastic None</td>
<td>50</td>
<td>13 Page (16-6)</td>
</tr>
<tr>
<td>E32-D33-S1 0,5M</td>
<td>−40 to 70°C</td>
<td>0.29N · m 3.2&quot; dia. R4 10 9.8N Polyethylene Plastic None</td>
<td>35</td>
<td>19 Page (16-7)</td>
</tr>
<tr>
<td>E32-D33 2M</td>
<td>−40 to 70°C</td>
<td>0.29N · m 3.2&quot; dia. R25 10 9.8N Polyethylene Plastic None</td>
<td>40</td>
<td>19 Page (16-8)</td>
</tr>
<tr>
<td>E32-D33S 2M</td>
<td>−40 to 70°C</td>
<td>0.29N · m 2.2&quot; dia. R4 10 9.8N Polyethylene Plastic None</td>
<td>30</td>
<td>19 Page (16-9)</td>
</tr>
<tr>
<td>E32-D36P 2M</td>
<td>−40 to 70°C</td>
<td>0.78N · m R4 10 9.8N Polyethylene Plastic None</td>
<td>40</td>
<td>49 Page (49-2)</td>
</tr>
<tr>
<td>E32-D36T 2M</td>
<td>−40 to 70°C</td>
<td>− − R40 10 9.8N Polyethylene Plastic None</td>
<td>190</td>
<td>51 Page (31-1)</td>
</tr>
<tr>
<td>E32-D43M 1M</td>
<td>−40 to 70°C</td>
<td>0.29N · m 1.7&quot; dia. R4 10 9.8N Polyethylene Plastic None</td>
<td>30</td>
<td>13 Page (16-10)</td>
</tr>
<tr>
<td>E32-D51 2M</td>
<td>−40 to 150°C</td>
<td>0.98N · m 6.2&quot; dia. R35 10 9.4N Fluororesin Plastic None</td>
<td>60</td>
<td>47 Page (47-1)</td>
</tr>
<tr>
<td>E32-D51R 2M</td>
<td>−40 to 100°C</td>
<td>0.98N · M 6.2&quot; dia. R2 0 9.4N Polyurethane Plastic None</td>
<td>60</td>
<td>47 Page (47-2)</td>
</tr>
<tr>
<td>E32-D61-S 2M</td>
<td>−60 to 350°C</td>
<td>0.98N · m 6.2&quot; dia. R25 10 9.4N SUS Glass None</td>
<td>190</td>
<td>47 Page (47-3)</td>
</tr>
<tr>
<td>E32-D61L-S 2M</td>
<td>−60 to 350°C</td>
<td>0.98N · m 4.2&quot; dia. R25 10 9.4N SUS Glass None</td>
<td>170</td>
<td>47 Page (47-4)</td>
</tr>
<tr>
<td>E32-D73-S 2M</td>
<td>−40 to 400°C</td>
<td>0.98N · m 2.2&quot; dia. R25 10 9.4N SUS Glass None</td>
<td>170</td>
<td>47 Page (47-5)</td>
</tr>
<tr>
<td>E32-D81S-S 2M</td>
<td>−40 to 200°C</td>
<td>0.78N · m 6.2&quot; dia. R10 10 9.8N Fluororesin Plastic None</td>
<td>70</td>
<td>47 Page (47-6)</td>
</tr>
<tr>
<td>E32-D82T 4M</td>
<td>−40 to 200°C</td>
<td>0.29N · m 6.5&quot; dia. R25 10 9.4N Fluororesin Plastic None</td>
<td>450</td>
<td>51 Page (51-1)</td>
</tr>
<tr>
<td>E32-DC200BR 2M</td>
<td>−40 to 70°C</td>
<td>0.88N · m 6.2&quot; dia. R1 0 9.4N PVC Plastic None</td>
<td>60</td>
<td>19 Page (16-11)</td>
</tr>
<tr>
<td>E32-DC200PRR 2M</td>
<td>−40 to 70°C</td>
<td>0.78N · m 3.2&quot; dia. R1 0 9.8N Polyethylene Plastic None</td>
<td>40</td>
<td>19 Page (16-12)</td>
</tr>
<tr>
<td>E32-G16 2M</td>
<td>−40 to 70°C</td>
<td>0.53N · m R6 0 9.6 29.4N Polyethylene Plastic −</td>
<td>51</td>
<td>49 Page (49-3)</td>
</tr>
<tr>
<td>E32-L11P 2M</td>
<td>−10 to 60°C</td>
<td>0.78N · m R40 10 9.8N Fluororesin Plastic None</td>
<td>310</td>
<td>39 Page (39-1)</td>
</tr>
<tr>
<td>E32-L11FS 2M</td>
<td>−10 to 85°C</td>
<td>0.78N · m R40 10 9.8N Fluororesin Plastic None</td>
<td>310</td>
<td>39 Page (39-2)</td>
</tr>
<tr>
<td>E32-L15 2M</td>
<td>−40 to 70°C</td>
<td>0.53N · m R25 10 9.4N Polyethylene Plastic White tube on emitter cable</td>
<td>60</td>
<td>21 Page (21-1)</td>
</tr>
<tr>
<td>E32-L16N 2M</td>
<td>−40 to 70°C</td>
<td>0.29N · m R25 10 9.4N Polyethylene Plastic None</td>
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<td>33 Page (33-1)</td>
</tr>
<tr>
<td>E32-L24S 2M</td>
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<td>0.29N · m R10 10 9.8N Polyethylene Plastic None</td>
<td>40</td>
<td>33 Page (33-2)</td>
</tr>
<tr>
<td>E32-L25L 2M</td>
<td>−40 to 105°C</td>
<td>0.29N · m R10 10 9.8N Polyethylene Plastic None</td>
<td>40</td>
<td>33 Page (33-3)</td>
</tr>
<tr>
<td>E32-L25T 2M</td>
<td>−40 to 70°C</td>
<td>− − R10 10 9.8N Polyethylene Plastic None</td>
<td>40</td>
<td>51 Page (51-2)</td>
</tr>
<tr>
<td>E32-L2D11 2M</td>
<td>−40 to 70°C</td>
<td>0.98N · m R25 10 9.4N Polyethylene Plastic None</td>
<td>40</td>
<td>09 Page (09-1)</td>
</tr>
<tr>
<td>E32-L2D11N 2M</td>
<td>−40 to 70°C</td>
<td>0.98N · m 6.2&quot; dia. R2 0 9.4N Polyethylene Plastic None</td>
<td>40</td>
<td>97 Page (97-1)</td>
</tr>
<tr>
<td>E32-L2D11R 2M</td>
<td>−40 to 70°C</td>
<td>0.98N · m R1 0 9.4N Polyethylene Plastic None</td>
<td>40</td>
<td>09 Page (09-2)</td>
</tr>
</tbody>
</table>

1 Unbindable 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.
### Installation Information

<table>
<thead>
<tr>
<th>Models</th>
<th>Installation</th>
<th>Cable</th>
<th>Weight (packed state) (g)</th>
<th>Dimensions Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-LR11NP 2M</td>
<td>-40 to 70°C</td>
<td>0.98N · m</td>
<td>29.4N</td>
<td>40</td>
</tr>
<tr>
<td>E32-LT11M 2M</td>
<td>-40 to 70°C</td>
<td>0.78N · m</td>
<td>R25 10</td>
<td>40</td>
</tr>
<tr>
<td>E32-LT11N 2M</td>
<td>-40 to 70°C</td>
<td>0.78N · m</td>
<td>R25 10</td>
<td>40</td>
</tr>
<tr>
<td>E32-LT11R 2M</td>
<td>-40 to 70°C</td>
<td>0.78N · m</td>
<td>R1 0</td>
<td>40</td>
</tr>
<tr>
<td>E32-LT35Z 2M</td>
<td>-40 to 70°C</td>
<td>0.15N · m</td>
<td>R1 0</td>
<td>25</td>
</tr>
<tr>
<td>E32-R18 2M</td>
<td>-25 to 55°C</td>
<td>0.54N · m</td>
<td>R25 10</td>
<td>35</td>
</tr>
<tr>
<td>E32-R21 2M</td>
<td>-40 to 70°C</td>
<td>0.39N · m</td>
<td>R10 10</td>
<td>35</td>
</tr>
<tr>
<td>E32-T10V 2M</td>
<td>-25 to 70°C</td>
<td>0.3N · m</td>
<td>R25 10</td>
<td>70</td>
</tr>
<tr>
<td>E32-T11N 2M</td>
<td>-40 to 70°C</td>
<td>0.78N · m</td>
<td>R4 10</td>
<td>41</td>
</tr>
<tr>
<td>E32-T11F 2M</td>
<td>-40 to 70°C</td>
<td>0.29N · m</td>
<td>R4 10</td>
<td>60</td>
</tr>
<tr>
<td>E32-T11N 2M</td>
<td>-40 to 70°C</td>
<td>0.78N · m</td>
<td>R1 0</td>
<td>40</td>
</tr>
<tr>
<td>E32-T12P 2M</td>
<td>-40 to 70°C</td>
<td>0.78N · m</td>
<td>R40 10</td>
<td>210</td>
</tr>
<tr>
<td>E32-T12R 2M</td>
<td>-40 to 70°C</td>
<td>0.29N · m</td>
<td>R1 0</td>
<td>60</td>
</tr>
<tr>
<td>E32-T14 2M</td>
<td>-40 to 70°C</td>
<td>0.49N · m</td>
<td>R25 10</td>
<td>60</td>
</tr>
<tr>
<td>E32-T14F 2M</td>
<td>-40 to 70°C</td>
<td>0.78N · m</td>
<td>R40 10</td>
<td>220</td>
</tr>
<tr>
<td>E32-T14L 2M</td>
<td>-40 to 70°C</td>
<td>0.23N · m</td>
<td>R1 0</td>
<td>60</td>
</tr>
<tr>
<td>E32-T15X 2M</td>
<td>-40 to 70°C</td>
<td>0.15N · m</td>
<td>R1 0</td>
<td>60</td>
</tr>
<tr>
<td>E32-T15Y 2M</td>
<td>-40 to 70°C</td>
<td>0.15N · m</td>
<td>R1 0</td>
<td>60</td>
</tr>
<tr>
<td>E32-T15Z 2M</td>
<td>-40 to 70°C</td>
<td>0.29N · m</td>
<td>R1 0</td>
<td>60</td>
</tr>
<tr>
<td>E32-T16 2M</td>
<td>-40 to 70°C</td>
<td>0.29N · m</td>
<td>R1 0</td>
<td>60</td>
</tr>
<tr>
<td>E32-T16W 2M</td>
<td>-25 to 55°C</td>
<td>0.29N · m</td>
<td>R1 0</td>
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</tr>
<tr>
<td>E32-T17L 2M</td>
<td>-40 to 70°C</td>
<td>0.78N · m</td>
<td>R25 10</td>
<td>240</td>
</tr>
<tr>
<td>E32-T21 2M</td>
<td>-40 to 70°C</td>
<td>0.78N · m</td>
<td>R4 10</td>
<td>30</td>
</tr>
<tr>
<td>E32-T21S1 2M</td>
<td>-40 to 70°C</td>
<td>0.78N · m</td>
<td>R10 10</td>
<td>45</td>
</tr>
<tr>
<td>E32-T223R 2M</td>
<td>-40 to 70°C</td>
<td>0.20N · m</td>
<td>R1 20</td>
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</tr>
<tr>
<td>E32-T226 2M</td>
<td>-40 to 70°C</td>
<td>0.20N · m</td>
<td>R4 10</td>
<td>40</td>
</tr>
<tr>
<td>E32-T22S 2M</td>
<td>-40 to 70°C</td>
<td>0.29N · m</td>
<td>R10 10</td>
<td>60</td>
</tr>
<tr>
<td>E32-T24E 2M</td>
<td>-40 to 70°C</td>
<td>0.20N · m</td>
<td>R10 10</td>
<td>40</td>
</tr>
<tr>
<td>E32-T24R 2M</td>
<td>-40 to 70°C</td>
<td>0.20N · m</td>
<td>R1 0</td>
<td>40</td>
</tr>
<tr>
<td>E32-T24S 2M</td>
<td>-40 to 70°C</td>
<td>0.29N · m</td>
<td>R10 10</td>
<td>60</td>
</tr>
<tr>
<td>E32-T24SR 2M</td>
<td>-40 to 70°C</td>
<td>0.29N · m</td>
<td>R1 0</td>
<td>60</td>
</tr>
<tr>
<td>E32-T25X 2M</td>
<td>-40 to 70°C</td>
<td>0.15N · m</td>
<td>R4 10</td>
<td>40</td>
</tr>
</tbody>
</table>

*1 Unbendable length of cable from fiber head.
*2 Ambient operating temperature of the recommended reflector (E39-RP1) is −40 to 60°C.
*3 For embedded mounting, prepare a hole with a diameter of 2.6 mm.
<table>
<thead>
<tr>
<th>Models</th>
<th>Installation</th>
<th>Cable</th>
<th>Weight (packed state) (g)</th>
<th>Dimensions Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>E32-TS3 1M</td>
<td>−40 to 70°C</td>
<td>0.29N · m</td>
<td>R10 10 9.8N</td>
<td>Polyethylene Plastic None 40</td>
</tr>
<tr>
<td>E32-TS1 2M</td>
<td>−40 to 150°C</td>
<td>0.78N · m</td>
<td>R35 10 29.4N</td>
<td>Fluoreszen Plastic None 70</td>
</tr>
<tr>
<td>E32-TS1P 2M</td>
<td>−40 to 150°C</td>
<td>0.78N · m</td>
<td>R40 10 29.4N</td>
<td>Fluoreszen Plastic None 220</td>
</tr>
<tr>
<td>E32-TS1R 2M</td>
<td>−40 to 100°C</td>
<td>0.78N · m</td>
<td>R2 0 29.4N</td>
<td>Polyurethane Plastic None 60</td>
</tr>
<tr>
<td>E32-TS5 1M</td>
<td>−25 to 120°C</td>
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<td>R30 10 29.4N</td>
<td>Fluoreszen Glass None 160</td>
</tr>
<tr>
<td>E32-TS1-3M</td>
<td>−60 to 350°C</td>
<td>0.78N · m</td>
<td>R25 10 29.4N</td>
<td>SUS Glass None 200</td>
</tr>
<tr>
<td>E32-TS1L 2M</td>
<td>−40 to 200°C</td>
<td>0.29N · m</td>
<td>R10 10 29.4N</td>
<td>Fluoreszen Glass None 60</td>
</tr>
<tr>
<td>E32-TS45 1M</td>
<td>−25 to 200°C</td>
<td>0.29N · m</td>
<td>R25 10 29.4N</td>
<td>SUS Glass None 190</td>
</tr>
<tr>
<td>E32-TC208R 2M</td>
<td>−40 to 70°C</td>
<td>0.78N · m</td>
<td>R1 0 29.4N</td>
<td>PVC Plastic None 60</td>
</tr>
<tr>
<td>E32-VF1</td>
<td>−25 to 70°C</td>
<td>− − − − −</td>
<td>240</td>
<td>53 Page (53-F)</td>
</tr>
<tr>
<td>E32-VF4</td>
<td>−25 to 70°C</td>
<td>− − − − −</td>
<td>280</td>
<td>53 Page (53-G)</td>
</tr>
<tr>
<td>E32-F1</td>
<td>−40 to 200°C</td>
<td>− − − − −</td>
<td>2</td>
<td>26 Page (26-A)</td>
</tr>
<tr>
<td>E32-F1-33</td>
<td>−40 to 200°C</td>
<td>− − − − −</td>
<td>3</td>
<td>28 Page (28-D)</td>
</tr>
<tr>
<td>E32-F11</td>
<td>−40 to 350°C</td>
<td>− − − − −</td>
<td>15</td>
<td>26 Page (26-F)</td>
</tr>
<tr>
<td>E32-F17</td>
<td>−25 to 70°C</td>
<td>− − − − −</td>
<td>10</td>
<td>21 Page (21-E)</td>
</tr>
<tr>
<td>E32-F18</td>
<td>−40 to 70°C</td>
<td>− − − − −</td>
<td>5</td>
<td>23 Page (23-F)</td>
</tr>
<tr>
<td>E32-F1V</td>
<td>−25 to 120°C</td>
<td>− − − − −</td>
<td>3</td>
<td>53 Page (53-H)</td>
</tr>
<tr>
<td>E32-F2</td>
<td>−40 to 200°C</td>
<td>− − − − −</td>
<td>2</td>
<td>26 Page (26-G)</td>
</tr>
<tr>
<td>E32-F32A 1M</td>
<td>−40 to 150°C</td>
<td>− − R30 0</td>
<td>70</td>
<td>43 Page (43-I)</td>
</tr>
<tr>
<td>E32-F32C 1M</td>
<td>−40 to 150°C</td>
<td>− − R30 0</td>
<td>110</td>
<td>41 Page (41-J)</td>
</tr>
<tr>
<td>E32-F30D 1M</td>
<td>−40 to 150°C</td>
<td>− − R30 0</td>
<td>80</td>
<td>43 Page (43-G)</td>
</tr>
<tr>
<td>E32-F3A</td>
<td>−40 to 70°C</td>
<td>− − − − −</td>
<td>2</td>
<td>21 Page (21-I)</td>
</tr>
<tr>
<td>E32-F3A-6</td>
<td>−40 to 70°C</td>
<td>− − − − −</td>
<td>1</td>
<td>23 Page (23-I)</td>
</tr>
<tr>
<td>E32-F3B</td>
<td>−25 to 55°C</td>
<td>− − − − −</td>
<td>2</td>
<td>23 Page (23-J)</td>
</tr>
<tr>
<td>E32-FOC</td>
<td>−25 to 55°C</td>
<td>− − − − −</td>
<td>1</td>
<td>21 Page (21-J)</td>
</tr>
<tr>
<td>E32-R1</td>
<td>−25 to 55°C</td>
<td>− − − − −</td>
<td>20</td>
<td>35 Page (35-C)</td>
</tr>
<tr>
<td>E32-R3</td>
<td>−25 to 55°C</td>
<td>− − − − −</td>
<td>20</td>
<td>35 Page (35-C)</td>
</tr>
<tr>
<td>E32-RP1</td>
<td>−40 to 60°C</td>
<td>− − − − −</td>
<td>25</td>
<td>35 Page (35-D)</td>
</tr>
<tr>
<td>E32-RP37</td>
<td>−25 to 55°C</td>
<td>− − − − −</td>
<td>4</td>
<td>35 Page (35-D)</td>
</tr>
<tr>
<td>E32-RSP1</td>
<td>−25 to 55°C</td>
<td>− − − − −</td>
<td>4</td>
<td>35 Page (35-D)</td>
</tr>
</tbody>
</table>

1. Unbondable 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 130°C.
3. Unbendable length of cable from fiber head.
4. The heat-resistant rating is not the same for all parts of the Fiber Unit. Refer to the dimensions diagrams for details.
Smart Fiber Amplifier Units

E3NX-FA Series NEW

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.

<table>
<thead>
<tr>
<th>Sensing Distance*</th>
<th>Minimum Sensing Object*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 Times</td>
<td>1/10th</td>
</tr>
<tr>
<td>6 m</td>
<td>0.3 μm dia.</td>
</tr>
</tbody>
</table>

For E30-LT11 Fiber Unit with a fiber length of 3.5 m

Achieve Easy Detection in Many Applications

Advanced Smart Tuning

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

Optimum Light Intensity Adjustment from Transparent Objects to Black Workpieces

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

Sensor Communications Units for E3NX-FA

E3NW Series NEW

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

Real-time monitoring lets you perform maintenance before malfunctions occur.
Smart Fiber Amplifier Units

E3X-HD Series

Affordable Amplifier Units with Simple Operation and Stable Detection Capabilities

Sensor Communications Units for E3X-HD

E3X-ECT / E3X-CRT

Sensor Communications Units for CompoNet and EtherCAT

<Fiber Amplifier Unit Comparison>

<table>
<thead>
<tr>
<th>Fiber Amplifier Unit specifications</th>
<th>E3NX-FA Series</th>
<th>E3X-HD Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>1 or 2 outputs (depending on the model)</td>
<td>1 output</td>
</tr>
<tr>
<td>External input</td>
<td>Supported or not supported (depending on the model)</td>
<td>Not supported</td>
</tr>
<tr>
<td>Response time</td>
<td>30 µs (32 µs)/250 µs/1 ms/16 ms (Default: 250 µs)</td>
<td>50 µs (55 µs)/250 µs/1 ms/16 ms (Default: 250 µs)</td>
</tr>
<tr>
<td>Sensing distance</td>
<td>E32-T11R 3,000 mm</td>
<td>2,000 mm</td>
</tr>
<tr>
<td></td>
<td>E32-D11R 1,280 mm</td>
<td>840 mm</td>
</tr>
<tr>
<td>Minimum sensing object</td>
<td>E32-T11R 2 µm dia.</td>
<td>5 µm dia.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensor Communications Unit application</th>
<th>E3X-ECT / E3X-CRT</th>
<th>EtherCAT (E3X-ECT) CompoNet (E3NW-CRT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications method</td>
<td>Fiber Sensor (E3NX-FA0) Laser Sensors (E3NC-LA0, E3NC-SA0) Contact-Type Sensor (E9NC-TA0) *</td>
<td>Fiber Sensor (E3X-HD0) Fiber Sensor (E3X-MDA0) Laser Photoelectric Sensor (E3C-LDA0) Proximity Sensor (E2C-EDA0)</td>
</tr>
<tr>
<td>Applicable Sensors</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page listings</th>
<th>E3NX-FA Series</th>
<th>E3X-HD Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordering Information</td>
<td>64 Page</td>
<td>78 Page</td>
</tr>
<tr>
<td>Ratings and Specifications</td>
<td>66 Page</td>
<td>80 Page</td>
</tr>
<tr>
<td>Dimensions</td>
<td>68 Page</td>
<td>80 Page</td>
</tr>
</tbody>
</table>

* E3NW-CRT Sensor Communications Units (CompoNet) cannot be used.

Fiber Amplifier Unit Accessories

65, 79 Page
# E3NX-FA Fiber Amplifier Units and Related Products

## Fiber Amplifier Units E3NX-FA Series

<table>
<thead>
<tr>
<th>Type</th>
<th>Appearance</th>
<th>Connecting method</th>
<th>Inputs/outputs</th>
<th>Models</th>
<th>Ratings and Specifications</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard models</td>
<td></td>
<td>Pre-wired (2 m)</td>
<td>1 output</td>
<td>E3NX-FA11 2M</td>
<td>E3NX-FA41 2M</td>
<td>Page 68 (66-A)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wire-saving Connector</td>
<td>1 output</td>
<td>E3NX-FA8</td>
<td>E3NX-FA8</td>
<td>Page 68 (66-B)</td>
</tr>
<tr>
<td>Advanced models</td>
<td></td>
<td>Pre-wired (2 m)</td>
<td>2 outputs + 1 input</td>
<td>E3NX-FA21 2M</td>
<td>E3NX-FA51 2M</td>
<td>Page 68 (66-A)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wire-saving Connector</td>
<td>1 output + 1 input</td>
<td>E3NX-FA7</td>
<td>E3NX-FA9</td>
<td>Page 68 (66-B)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M8 Connector</td>
<td>1 output + 1 input</td>
<td>E3NX-FA24</td>
<td>E3NX-FA54</td>
<td>Page 69 (69-A)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 outputs</td>
<td>E3NX-FA7TW</td>
<td>E3NX-FA9TW</td>
<td>Page 69 (69-B)</td>
</tr>
<tr>
<td>Model for Sensor Communications Unit*</td>
<td>Connector for Sensor Communications Unit</td>
<td>—</td>
<td>E3NX-FA0</td>
<td>—</td>
<td>—</td>
<td>Page 69 (69-B)</td>
</tr>
</tbody>
</table>

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

## Sensor Communications Unit

### Communication method

- **EtherCAT**
  - Appearance: [Image]
  - Applicable Fiber Amplifier Model: E3NW-ECT
  - Model: E3NW-ECT
  - Ratings and Specifications: Page 76 (77-A)

- **CompoNet**
  - Appearance: [Image]
  - Applicable Fiber Amplifier Model: E3NX-FA0
  - Model: E3NW-CRT
  - Ratings and Specifications: —

- **CC-Link**
  - Appearance: [Image]
  - Applicable Fiber Amplifier Model: E3NW-CCL
  - Model: E3NW-CCL
  - Ratings and Specifications: —

* For details, refer to your OMRON website.

## Distributed Sensor Unit

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Applicable Fiber Amplifier Model</th>
<th>Model</th>
<th>Ratings and Specifications</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E3NX-FA0</td>
<td>E3NW-DS</td>
<td>Page 76</td>
<td>Page 77 (77-B)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Appearance</th>
<th>Cable length</th>
<th>Number of conductors</th>
<th>Applicable Fiber Amplifier Units</th>
<th>Models</th>
<th>Ratings, Specifications and Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master Connector</td>
<td>![Master Connector Image]</td>
<td>2 m</td>
<td>4</td>
<td>E3NX-FA7, E3NX-FA9, E3NX-FA11</td>
<td>E3X-CN21</td>
<td>Page 88 (88-A)</td>
</tr>
<tr>
<td>Slave Connector</td>
<td>![Slave Connector Image]</td>
<td></td>
<td>2</td>
<td></td>
<td>E3X-CN22</td>
<td>Page 88 (88-B)</td>
</tr>
<tr>
<td>Master Connector</td>
<td>![Master Connector Image]</td>
<td></td>
<td>3</td>
<td>E3NX-FA6, E3NX-FA8</td>
<td>E3X-CN11</td>
<td>Page 88 (88-A)</td>
</tr>
<tr>
<td>Slave Connector</td>
<td>![Slave Connector Image]</td>
<td></td>
<td>1</td>
<td></td>
<td>E3X-CN12</td>
<td>Page 88 (88-B)</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Cable length</th>
<th>Number of conductors</th>
<th>Models</th>
<th>Ratings and Specifications and Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight</td>
<td>2 m</td>
<td>4</td>
<td>XS3F-M421-402-A</td>
<td>Page 88 (88-A)</td>
</tr>
<tr>
<td></td>
<td>5 m</td>
<td></td>
<td>XS3F-M421-405-A</td>
<td>Page 88 (88-C)</td>
</tr>
<tr>
<td>L-shaped</td>
<td>2 m</td>
<td></td>
<td>XS3F-M422-402-A</td>
<td>Page 88 (88-D)</td>
</tr>
<tr>
<td></td>
<td>5 m</td>
<td></td>
<td>XS3F-M422-405-A</td>
<td></td>
</tr>
</tbody>
</table>

**Mounting Bracket**

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

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Model</th>
<th>Quantity</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E39-L143</td>
<td>1</td>
<td>Page 89 (88-A)</td>
</tr>
</tbody>
</table>

**DIN Track**

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

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Type</th>
<th>Models</th>
<th>Quantity</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shallow type,</td>
<td>PFP-100N</td>
<td>1</td>
<td>Page 89 (88-B)</td>
</tr>
<tr>
<td></td>
<td>total length: 1 m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shallow type,</td>
<td>PFP-50N</td>
<td></td>
<td>Page 89 (88-C)</td>
</tr>
<tr>
<td></td>
<td>total length: 0.5 m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Deep type,</td>
<td>PFP-100N2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>total length: 1 m</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Model</th>
<th>Quantity</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PFP-M</td>
<td>1</td>
<td>Page 89 (88-D)</td>
</tr>
</tbody>
</table>

**Cover**

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

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Model</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E39-G25 FOR E3NX-FA</td>
<td>1</td>
</tr>
</tbody>
</table>
## Ratings and Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Type</th>
<th>Standard</th>
<th>Advanced</th>
<th>Model for Sensor Communications Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply voltage</td>
<td></td>
<td>10 to 30 VDC, including 10% ripple (p-p)</td>
<td></td>
<td>Supplied from the connector through the Sensor Communications Unit</td>
</tr>
<tr>
<td>Power consumption</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control output</td>
<td></td>
<td>Load power supply voltage: 30 VDC max., open-collector output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External input</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicators</td>
<td></td>
<td>7-segment displays (Sub digital display: green, Main digital display: white)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection circuits</td>
<td></td>
<td>Power supply reverse polarity protection, output short-circuit protection, and output reverse polarity protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sensitivity adjustment</td>
<td></td>
<td>Smart tuning (2-point tuning, full auto tuning, position tuning, maximum sensitivity tuning, power tuning, or percentage tuning (=99% to 99%)) or manual adjustment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum connectable Units</td>
<td></td>
<td>30 units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutual interference prevention</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply voltage</td>
<td></td>
<td>10 to 30 VDC, including 10% ripple (p-p)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td></td>
<td>Normal mode: 840 mW max., (Current consumption at 35 mA max.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control output</td>
<td></td>
<td>Load power supply voltage: 30 VDC max., open-collector output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External input</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicators</td>
<td></td>
<td>7-segment displays (Sub digital display: green, Main digital display: white)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection circuits</td>
<td></td>
<td>Power supply reverse polarity protection, output short-circuit protection, and output reverse polarity protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sensitivity adjustment</td>
<td></td>
<td>Smart tuning (2-point tuning, full auto tuning, position tuning, maximum sensitivity tuning, power tuning, or percentage tuning (=99% to 99%)) or manual adjustment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum connectable Units</td>
<td></td>
<td>30 units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutual interference prevention</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply voltage</td>
<td></td>
<td>10 to 30 VDC, including 10% ripple (p-p)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td></td>
<td>Normal mode: 840 mW max., (Current consumption at 35 mA max.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control output</td>
<td></td>
<td>Load power supply voltage: 30 VDC max., open-collector output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External input</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicators</td>
<td></td>
<td>7-segment displays (Sub digital display: green, Main digital display: white)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection circuits</td>
<td></td>
<td>Power supply reverse polarity protection, output short-circuit protection, and output reverse polarity protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sensitivity adjustment</td>
<td></td>
<td>Smart tuning (2-point tuning, full auto tuning, position tuning, maximum sensitivity tuning, power tuning, or percentage tuning (=99% to 99%)) or manual adjustment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum connectable Units</td>
<td></td>
<td>30 units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutual interference prevention</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply voltage</td>
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<td>10 to 30 VDC, including 10% ripple (p-p)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td></td>
<td>Normal mode: 840 mW max., (Current consumption at 35 mA max.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control output</td>
<td></td>
<td>Load power supply voltage: 30 VDC max., open-collector output</td>
<td></td>
<td></td>
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<td>External input</td>
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<td>Indicators</td>
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<td>Power supply reverse polarity protection, output short-circuit protection, and output reverse polarity protection</td>
<td></td>
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<tr>
<td>Response time</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>sensitivity adjustment</td>
<td></td>
<td>Smart tuning (2-point tuning, full auto tuning, position tuning, maximum sensitivity tuning, power tuning, or percentage tuning (=99% to 99%)) or manual adjustment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum connectable Units</td>
<td></td>
<td>30 units</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Two sensor outputs are allocated in the programmable logic controller PLC I/O table.
2. At Power Supply Voltage of 10 to 30 VDC.
3. The following applies to the input.
4. The mutual interference prevention function is disabled if the detection mode is set to super-high-speed mode.
5. When connected to an OMRON NJ-series Controller.
6. The bank is not reset by the user reset function or saved by the user save function.
## Fiber Amplifiers, Communications Unit and Accessories

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<td>E3NX-FA54TW</td>
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<tr>
<td>Pre-wired</td>
<td>Wire-saving Connector</td>
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### Technical Guide and Precautions

**Fiber Amplifiers, Communications Unit and Accessories**

**E3NX-FA**

### Advanced Models

- **Eco function LO**: 840 mW max. (Current consumption: 28 mA max. at 30 VDC, 45 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)
- **Normal mode**: 990 mW max. (Current consumption: 33 mA max. at 30 VDC, 65 mA max. at 10 VDC)

### Power Supply Voltage

- **Groups of 1 to 3 Amplifier Units**: 100 mA max., Load power supply voltage: 30 VDC max., open-collector output
- **Load current**: 0.1 mA max.
- **Load current**: 0.1 mA max.

### External Input

- **With E3NW-CCL**: 16 units
- **With E3NW-CRT**: 16 units
- **With E3NW-ECT**: 30 units

### Conditions

- **Altitude**: 2,000 m max.
- **Pollution degree 3** (as per IEC 60947-1)
- **Polycarbonate (PC)**
- **PVC**
- **Instruction Manual**

### Specifications

- **Ambient temperature range**: Operating: Groups of 1 to 2 Amplifier Units: -25 to 55°C, Groups of 3 to 10 Amplifier Units: -25 to 50°C, Groups of 11 to 16 Amplifier Units: -25 to 45°C, Groups of 17 to 30 Amplifier Units: -25 to 40°C, Storage: -30 to 70°C (with no icing or condensation)
- **Ambient illumination (Receiver side)**: Incandescent lamp: 20,000 lx max., Sunlight: 30,000 lx max.
- **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.
- **Pollution degree 3** (as per IEC 60947-1)
- **Polycarbonate (PC)**
- **PVC**
- **Instruction Manual**

### Functions

- **Eco mode**: Select from OFF (digital displays lit), Eco ON (digital displays not lit) or Eco LO (digital displays dimmed)
- **Bank switching**: Select from banks 1 to 4.
- **Power tuning**: Select from ON or OFF.

### Output 1

- **Select from normal detection mode, or area detection mode.**

### Output 2

- **Select from normal detection mode, alarm output mode, or error output mode.**

### External input

- **Select from input OFF, tuning, power tuning, emission OFF, zero reset, or bank switching.**

### Hysteresis width

- **Select from standard setting or user setting. For a user setting, the hysteresis width can be set from 0 to 9,999.**

### Environmental Immunity

- **Shock resistance (destruction)**: 500 m/s² for 3 times each in X, Y, and Z directions
- **Vibration resistance (destruction)**: 10 to 55 Hz with a 1.5 mm double amplitude for 2 hours each in X, Y, and Z directions

### Weight (packed state/unit only)

- **Approx. 115 g** (Approx. 75 g)
- **Approx. 60 g** (Approx. 20 g)
- **Approx. 115 g** (Approx. 75 g)
- **Approx. 60 g** (Approx. 20 g)
- **Approx. 65 g** (Approx. 25 g)

### Accessories

- **Instruction Manual**

---

* *Eco LO is supported for Amplifier Units manufactured in July 2014 or later.*
Fiber Amplifiers, Communications Unit and Accessories

**E3NX-FA**

**Pre-wired Amplifier Units**

**E3NX-FA11**
- **E3NX-FA21**
- **E3NX-FA41**
- **E3NX-FA51**

**Amplifier Units with Wire-saving Connectors**

**E3NX-FA6**
- **E3NX-FA7**
- **E3NX-FA7TW**
- **E3NX-FA8**
- **E3NX-FA9**
- **E3NX-FA9TW**

---

**Technical Guide and Precautions**

**Fiber Amplifiers, Communications Unit and Accessories**

**Installation Information**

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**Environmental Immunity**

**Selection Guide F Highway**

**Fiber Units**

**Fiber Sensor**

**Solar**

**Semi, FPD, Vacuum**

**Detection Area**

**Resistant Heat-Bending Oil-resistant Chemical-Retro]**

**Standard Power High Power Small Spot High Power Narrow view**

**Beam Improvements**

**Retro-reflective**

**Limited-reflective**

**Chemical-resistant, Oil-resistant**

**Bending**

**Heat-resistant**

**Area Detection**

**Liquid-level**

**Vacuum**

**PDP, Semi, Solar**
Amplifier Units with M8 Connector

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

Amplifier Unit with Connector for Sensor Communications Unit

**E3NX-FA0**
I/O Circuit Diagrams

### NPN Output

<table>
<thead>
<tr>
<th>Models</th>
<th>Operation mode</th>
<th>Timing chart</th>
<th>L/D indicators</th>
<th>Output circuit</th>
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</thead>
<tbody>
<tr>
<td>E3NX-FA11</td>
<td>Light-ON</td>
<td>Incident light</td>
<td>OUT indicator (orange)</td>
<td>()</td>
</tr>
<tr>
<td>E3NX-FA8</td>
<td>Dark-ON</td>
<td>No incident light</td>
<td>OUT indicator (orange)</td>
<td>()</td>
</tr>
<tr>
<td>E3NX-FA21</td>
<td>Light-ON</td>
<td>Incident light</td>
<td>OUT indicator (orange)</td>
<td>()</td>
</tr>
<tr>
<td>E3NX-FA7 E3NX-FA24</td>
<td>Dark-ON</td>
<td>No incident light</td>
<td>OUT indicator (orange)</td>
<td>()</td>
</tr>
<tr>
<td>E3NX-FA7TW</td>
<td>Light-ON</td>
<td>Incident light</td>
<td>OUT indicator (orange)</td>
<td>()</td>
</tr>
<tr>
<td>E3NX-FA7TW</td>
<td>Dark-ON</td>
<td>No incident light</td>
<td>OUT indicator (orange)</td>
<td>()</td>
</tr>
</tbody>
</table>

- **Display:** OUT indicator (orange)
- **Control output:** Brown
- **Load:** 10 to 30 VDC
- **Control output ch2:** Brown
- **Load ch2:** External input
- **M8 Connector Pin Arrangement:**

---

**Technical Guide and Precautions**

- Fiber Amplifiers
- Communications Unit
- Accessories

**Installation Information**

- Standard installation
- Saving space

---

**Application**

- Solar
- FPD
- Vacuum
- Resistant
- Heat-resistant
- Chemical-resistant
- Oil-resistant
- Detection
- Area Detection
- Liquid-level
- Vacuum

---

**Fiber Sensor Features**

- Threaded
- Cylindrical
- Flat
- Sleeved
- Small Spot
- High Power
- Narrow view
- BGS
- Retro-reflective
- Limited-reflective
- Chemical-resistant
- Oil-resistant
- Bending
- Heat-resistant
- Environmental immunity
- Beam improvements

---

**Model Index**

- E3NX-FA7
- E3NX-FA7TW
- E3NX-FA11
- E3NX-FA21
- E3NX-FA8
- E3NX-FA24
### PNP Output

<table>
<thead>
<tr>
<th>Models</th>
<th>Operation mode</th>
<th>Timing chart</th>
<th>L/D indicators</th>
<th>Output circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3NX-FA41</td>
<td>Light-ON</td>
<td>Incident light</td>
<td>Lit (orange)</td>
<td>Brown</td>
</tr>
<tr>
<td>E3NX-FA8</td>
<td>Dark-ON</td>
<td>Incident light</td>
<td>Lit (orange)</td>
<td>Blue</td>
</tr>
<tr>
<td>E3NX-FA51</td>
<td>Light-ON</td>
<td>Incident light</td>
<td>Lit (orange)</td>
<td>Brown</td>
</tr>
<tr>
<td>E3NX-FA9</td>
<td>Dark-ON</td>
<td>Incident light</td>
<td>Lit (orange)</td>
<td>Blue</td>
</tr>
<tr>
<td>E3NX-FA54</td>
<td>Light-ON</td>
<td>Incident light</td>
<td>Lit (orange)</td>
<td>Brown</td>
</tr>
<tr>
<td>E3NX-FA9TW</td>
<td>Dark-ON</td>
<td>Incident light</td>
<td>Lit (orange)</td>
<td>Blue</td>
</tr>
</tbody>
</table>

#### Wire color

<table>
<thead>
<tr>
<th>Wire color</th>
<th>Connection pin</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown</td>
<td>1</td>
<td>Power supply (+V)</td>
</tr>
<tr>
<td>White</td>
<td>2</td>
<td>External input / Output</td>
</tr>
<tr>
<td>Blue</td>
<td>3</td>
<td>Power supply (0 V)</td>
</tr>
<tr>
<td>Black</td>
<td>4</td>
<td>Output</td>
</tr>
</tbody>
</table>

#### Plug (Sensor I/O Connector)

![Terminal number and wire color](image-url)

**XS3F-M421-402-A**

**XS3F-M421-405-A**

**XS3F-M422-402-A**

**XS3F-M422-405-A**
Nomenclature

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

- [L/D Indicator] Indicates the setting status: Light-ON (L) or Dark-ON (D).
- [OUT Indicator] Turns ON when the output is ON.
- [ST Indicator] Turns ON when Smart Tuning is in progress.
- [DPC Indicator] Turns ON when Dynamic Power Control is effective.
- [MODE Button] Use to switch between Detection Mode and Setting Mode.

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

- [L/D Indicator] Indicates the setting status: Light-ON (L) or Dark-ON (D).
- [OUT Indicator] Turns ON when OUT1 or OUT2 is ON.
- [ST Indicator] Turns ON when Smart Tuning is in progress.
- [DPC Indicator] Turns ON when Dynamic Power Control is effective.
- [MODE Button] Use to switch between Detection Mode and Setting Mode.

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 ON.
   - Reflective: Set to “Light ON” to turn the output ON with a workpiece in the detection area. [L/D Indicator] turns 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 [ ] is displayed.

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

- Maximum Sensitivity Tuning
  1. Hold [ ] button for 3 seconds or longer with a workpiece as shown below.
  2. Hold for 3 seconds or longer
  3. Hold for 7 seconds or longer

(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 [ ] is displayed in green digital.

Incident light level setting: The incident level in Step 1 is adjusted to “0”.
Threshold setting: Set to the middle between max. and min. incident light levels on Step 1.

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. [Hold for 3 seconds or longer]

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.

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 × (1 + Percentage Tuning Level)].

(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.

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

- **Smart Tuning**
  Refer to “Smart Tuning Error” for error displays.

- **Error** | **Display** | **Cause** | **Error Origin Tuning Type** | **Remedy**

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

Refer to “Detailed Settings” to change the power tuning level.

**Channel switching**

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

- **The OUT selection indicators and the settings will change.**
  1. Press button for 1 second.
  2. The OUT selection indicators (OUT1/OUT2) switch. [Output 1]

- **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.

 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)

  Hold both for 3 sec. or longer

* Press either of UP/DOWN.
**Convenient Setting Features**

(5) **Reset Incident Light Level to "0"**
- **Zero Reset Function**
  Changes the incident light level to "0".
  The threshold level is also shifted accordingly.
  The lower limit of the threshold is −1,099.

(6) **Producing an Output When the Incident Level Is within an Area**
- **Area Detection Mode**
  1. Select [SET Mode] → [OUT1 Mode] → [Area Detection Mode].
     Press button for at least 3 seconds to leave the SET mode.
  2. Press button in [Detection Mode] to display OUT1 HIGH and OUT1 LOW.
     "HIGH" and "LOW" will appear on the green digital display.
  3. Press button for the high and low thresholds to execute smart tuning.

(7) **Monitoring the Incident Level for Sensing Objects Passing at High Speed**
- **Change Finder**
  1. Select [SET Mode] → [Digital Display] to set [SP CF dp].
  2. Press button for 3 seconds or longer to leave 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 [sp ao].
     To clear the setting, press button and button together for 3 seconds or longer to set [sp ao].
  2. Send a workpiece past the Fiber Unit.
  3. Displaying the Passing Time and Difference in Incident Levels.
  4. Press button and button together for 3 seconds or longer to leave SET mode.

**Detailed Settings**

**Hold** button for 3 seconds or longer to enter SET mode.

**Function Setting**

<table>
<thead>
<tr>
<th>1. Function Selection</th>
<th>2. Detection Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="function.png" alt="Function" /></td>
<td><img src="detection.png" alt="Detection" /></td>
</tr>
</tbody>
</table>

**Description**

**Changing Functions to Set in SET mode**
- Functions 1 to 5 can be set in SET mode.
- Functions 1 to 16 can be set.

**Changing Light Level and Response Time**
- Detection Function: Response time, Light Level
  - (a) HS High-speed mode: 250 μs (Standard)
  - (b) STD Standard mode: 1 ms
  - (c) Giga Giga mode: 16 ms
  - (d) SHS Super high-speed mode: 30 μs

**Smart Tuning**
- Change Finder
- 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.

**Stable Detection Regardless of Incident Light Level Change**
- Refer to "Convenient Setting Features" for more details.

**Setting Output Timer**
- Outputs are displayed for 0.5 seconds after the workpiece passes.
- The workpiece moves before the output.

**Changing the Target Incident Light Level (Power Tuning Level)**
- Use button to set the power tuning level.
  - (a) 10% to 70% in 1 steps; the initial value: 50%.
  - (b) 70% to 100% in 10% steps; the initial value: 70%.
  - (c) 100% to 120% in 10% steps; the initial value: 100%.

**Hold** button for 3 seconds or longer to enter SET mode.

**Function Selection: [sp]**

**Saving Settings in Each Bank**
7. Power Tuning
ON/OFF Setting

Setting ON or OFF Incident Level Adjustment when Tuning

8. Percentage Tuning

Detecting Translucent or Small Workpiece
Press button in [Power] menu, then use button to set the percentage tuning level. (~99% to 99.9% in 1% steps; the initial value: ~10%) Refer to "Smart Tuning"

9. Output 1 Mode

Changing the Output Mode for Output 1

10. Output 2 Mode

Changing the Output Mode for Output 2

Alarm Output Mode: Press button and then set the alarm output level with button. (0 to 100 P in 1-P increments, default: 50 P)

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 tuning time.

11. External Input

Changing Digital Display in RUN Mode for Specific Purpose

Checking a Margin Against Threshold

12. Digital Display

Threshold Light Level 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 Bottom Light Level
Holds and displays the minimum value of the peak of the light incident and the maximum value of the bottom of the light interruption.

Setting for Intuitive Analog Display

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

Adjusting Optical Axis

Peak Light Bottom Light Level
Holds the peak incident light level and displays it in green digital figures.

Checking the Channel No. in Group Mounting

Checking the Light Level of Fast Moving Workpiece

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 button with ECO Lo displayed and then set the hysteresis width with button. (0 to 9999)

Turning ON and OFF Writing to EEPROM
The settings that have been changed by an external input with \( \frac{1}{2} \) will not be overwritten to prevent EEPROM from reaching its lifespan (1,000,000 writings).
### Ratings and Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>E3NW-ECT</th>
<th>E3NW-DS</th>
</tr>
</thead>
</table>
| Connectable Sensor Amplifier Units | N-Smart SMART FIBER AMPLIFIER: E3NX-FA0 | SMART LASER AMPLIFIER: E3NC-LA0  
SMART LASER AMPLIFIER: E3NC-SA0  
CONTACT TYPE SMART AMPLIFIER: E3NC-TA0  |
| 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) 100 mA max. (Not including the current supplied to Sensor) | 2 W max. (Not including the power supplied to Sensor) 80 mA max. (Not including the current supplied to Sensor) |
| Indicators                 | L/A IN Indicator (Green), L/A OUT Indicator (Green), PWR Indicator (Green), RUN Indicator (Green), ERROR Indicator (Red), and SS (Sensor Status) Indicator (Green/Red) | RUN Indicator (Green), and SS (Sensor Status) Indicator (Green/Red) |
| Vibration resistance (destruction) | 10 to 60 Hz with a 0.7-mm double amplitude, 60 to 150 Hz 50 m/s² for 1.5 hours each in X, Y, and Z directions |                              |
| Shock resistance (destruction) | Destruction: 150 m/s² for 3 times each in X, Y, and Z directions |                              |
| Ambient temperature range  | Operating: 0 to 55°C; Storage: −30 to 70°C (with no icing or condensation) | Operating: 0 to 55°C; 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 |
| 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                 |                              |

### Communications Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
<td>EtherCAT</td>
</tr>
<tr>
<td>Modulation</td>
<td>Baseband</td>
</tr>
<tr>
<td>Baud rate</td>
<td>100 Mbps</td>
</tr>
<tr>
<td>Physical layer</td>
<td>100Base-TX (IEEE802.3u)</td>
</tr>
<tr>
<td>Topology</td>
<td>Daisy chain</td>
</tr>
<tr>
<td>Communications media</td>
<td>STP category 5 or higher</td>
</tr>
<tr>
<td>Communications distance</td>
<td>100 m max. between nodes</td>
</tr>
<tr>
<td>Noise immunity</td>
<td>Compliant with IEC 61000-4-4, 1 kV min.</td>
</tr>
</tbody>
</table>

*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 50°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.

CompoNet-compatible and CC-Link-compatible products are also available. Refer to your OMRON website for details.
E3X-HD Fiber Amplifier Units and Related Products

### Fiber Amplifier Units E3X-HD Series

<table>
<thead>
<tr>
<th>Type</th>
<th>Appearance</th>
<th>Connecting method</th>
<th>Models</th>
<th>Ratings and Specifications</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threaded</td>
<td></td>
<td>Pre-wired (2 m)</td>
<td>E3X-HD11 2M</td>
<td>E3X-HD41 2M</td>
<td>Page 80</td>
</tr>
<tr>
<td>Standard models</td>
<td></td>
<td>Wire-saving Connector</td>
<td>E3X-HD6</td>
<td>E3X-HD8</td>
<td>Page 80</td>
</tr>
<tr>
<td>Flat</td>
<td></td>
<td>M8 Connector</td>
<td>E3X-HD14</td>
<td>E3X-HD44</td>
<td>Page 81</td>
</tr>
<tr>
<td>Model for Sensor</td>
<td></td>
<td>Connector for Sensor</td>
<td>E3X-HD0</td>
<td></td>
<td>Page 81</td>
</tr>
<tr>
<td>Communications Unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Sensor Communications Unit

<table>
<thead>
<tr>
<th>Communication method</th>
<th>Appearance</th>
<th>Applicable Fiber Amplifier Model</th>
<th>Models</th>
<th>Ratings and Specifications</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>CompoNet</td>
<td></td>
<td>E3X-HD0 E3X-MDA0</td>
<td>E3X-CRT</td>
<td></td>
<td>Page 87</td>
</tr>
<tr>
<td>EtherCAT</td>
<td></td>
<td></td>
<td>E3X-ECT</td>
<td></td>
<td>Page 87</td>
</tr>
</tbody>
</table>
## 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.

<table>
<thead>
<tr>
<th>Type</th>
<th>Appearance</th>
<th>Cable length</th>
<th>Number of conductors</th>
<th>Models</th>
<th>Ratings and Specifications</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master Connector</td>
<td><img src="image1" alt="Master Connector" /></td>
<td>2m</td>
<td>3</td>
<td>E3X-CN11</td>
<td>Page 88</td>
<td>Page 88</td>
</tr>
<tr>
<td>Slave Connector</td>
<td><img src="image2" alt="Slave Connector" /></td>
<td>1</td>
<td>E3X-CN12</td>
<td></td>
<td>Page 88</td>
<td>Page 88</td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Cable length</th>
<th>Number of conductors</th>
<th>Models</th>
<th>Ratings and Specifications</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight</td>
<td>2m</td>
<td>4</td>
<td>XS3F-M421-402-A</td>
<td>Page 88</td>
<td>Page 88</td>
</tr>
<tr>
<td></td>
<td>5m</td>
<td></td>
<td>XS3F-M421-405-A</td>
<td></td>
<td>Page 88</td>
</tr>
<tr>
<td>L-shaped</td>
<td>2m</td>
<td></td>
<td>XS3F-M422-402-A</td>
<td>Page 88</td>
<td>Page 88</td>
</tr>
<tr>
<td></td>
<td>5m</td>
<td></td>
<td>XS3F-M422-405-A</td>
<td></td>
<td>Page 88</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Model</th>
<th>Quantity</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E39-L143</td>
<td>1</td>
<td>Page 89 (89-A)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Type</th>
<th>Models</th>
<th>Quantity</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shallow type, total length: 1 m</td>
<td>PFP-100N</td>
<td>1</td>
<td>Page 89 (89-B)</td>
</tr>
<tr>
<td></td>
<td>Shallow type, total length: 0.5 m</td>
<td>PFP-50N</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Deep type, total length: 1 m</td>
<td>PFP-100N2</td>
<td></td>
<td>Page 89 (89-C)</td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Model</th>
<th>Quantity</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PFP-M</td>
<td>1</td>
<td>Page 89 (89-D)</td>
</tr>
</tbody>
</table>
Fiber Amplifiers, Communications Unit and Accessories

### Ratings and Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>Standard</th>
<th>Model for Sensor Communications Unit</th>
<th>&quot;E3X-HD&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPN output</td>
<td>E3X-HD11</td>
<td>E3X-HD06</td>
<td>E3X-HD14</td>
</tr>
<tr>
<td>PNP output</td>
<td>E3X-HD41</td>
<td>E3X-HD8</td>
<td>E3X-HD44</td>
</tr>
<tr>
<td></td>
<td>Pre-wired</td>
<td>Wire-saving Connector</td>
<td>MB Connector</td>
</tr>
</tbody>
</table>

**Light source (wavelength):** Red, 4-element LED (625 nm)

**Power supply voltage:** 12 to 24 VDC, ±10%, ripple (P-P) 10% max.

**Power consumption:**
- Normal mode: 720 mW max. (Current consumption: 30 mA max. at 24 VDC, 60 mA max. at 12 VDC)
- Eco ON: 530 mW max. (Current consumption: 22 mA max. at 24 VDC, 44 mA max. at 12 VDC)
- Eco LO: 640 mW max. (Current consumption: 26 mA max. at 24 VDC, 53 mA max. at 12 VDC)

**Control output:**
- Load current: Groups of 1 to 3 Amplifier Units: 100 mA max., Groups of 4 to 16 Amplifier Units: 20 mA max.
- Residual voltage: At load current of less than 10 mA: 1 V max., At load current of 10 to 100 mA: 2 V max.
- OFF current: 0.1 mA max.

**Protection circuits:**
- Power supply reverse polarity protection, output short-circuit protection and output reverse polarity protection

**Maximum connectable Units:**
- 16 units with E3X-CRT: 16 units with E3X-ECT: 30 units

**Mutual interference prevention:**
- Possible for up to 10 units (optical communications sync) / 4

**Auto power control (APC):** Always ON

**Ambient Illumination (Receiver side):**
- Indiscernible lamp: 20,000 lx max., Sunlight: 30,000 lx max.

**Ambient temperature range:**
- Operating: Groups of 1 to 2 Amplifier Units: −25 to 95°C, Groups of 3 to 10 Amplifier Units: −25 to 50°C, Groups of 11 to 16 Amplifier Units: −25 to 45°C, Storage: −30 to 70°C (with no icing or condensation)
- Operating: Groups of 1 to 2 Amplifier Units: 0 to 55°C, Groups of 3 to 10 Amplifier Units: 0 to 50°C, Groups of 11 to 16 Amplifier Units: 0 to 45°C, Groups of 17 to 30 Amplifier Units: 0 to 40°C, Storage: −30 to 70°C (with no icing or condensation)

**Ambient humidity range:** Operating and storage: 35% to 85% (with no condensation)

**Dielectric strength:** 1,000 VAC at 50/60 Hz for 1 min

**Vibration resistance (destruction):** 10 to 55 Hz with a 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions

**Shock resistance (destruction):** 500 m/s² for 3 times each in X, Y, and Z directions

**Degree of protection:** IEC 60529 IP50 (with Protective Cover attached)

**Weight (packed state/unit only):** Approx. 105 g / Approx. 65 g / Approx. 60 g / Approx. 20 g / Approx. 70 g / Approx. 25 g

**Materials:**
- Case: Polycarbonate (PC)
- Cover: Heat-resistant ABS (connector: PBT)
- Cable: PVC

**Accessories:** Instruction Manual

**Dimensions (Unit: mm):**

**Pre-wired Amplifier Units**

- E3X-HD11
- E3X-HD41

---

*1. The E3X-ECT EtherCAT Sensor Communications Unit and the E3X-CRT CompoNet Sensor Communications Unit can be used.
*2. Use either the E3X-CN11 (master connector, 3 conductors) or the E3X-CN12 (slave connector, 1 conductor).
*3. When connected to an OMRON NJ-series Controller.
*4. The communications function and mutual interference protection function are disabled when the detection mode is set to Super-high-speed mode (SHS). When including E3X-DA-5 with activated power tuning the maximum number of mutual interference prevention is up to 6. When including E3X-MDA with activated power tuning the maximum number of mutual interference prevention is up to 5.

---

**Note:** When using E39-L143 Mounting Brackets, there will be small gaps between the Amplifier Units if they are mounted side by side.
Amplifier Units with Wire-saving Connectors

**E3X-HD6**

**E3X-HD8**

---

Amplifier Units with M8 Connectors

**E3X-HD14**

**E3X-HD44**

---

Amplifier Unit with Connector for Sensor Communications Unit

**E3X-HD0**

---

**With Mounting Bracket Attached**

*Note:* When using E39-L143 Mounting Brackets, there will be small gaps between the Amplifier Units if they are mounted side by side.

The dimensions are the same as the E3X-HD6/8, except for the connector.
### I/O Circuit Diagrams

#### NPN Output

<table>
<thead>
<tr>
<th>Models</th>
<th>Operation mode</th>
<th>Timing chart</th>
<th>L/D indicators</th>
<th>Output circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3X-HD11, E3X-HD14</td>
<td>Light-ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incident light No incident light</td>
<td>OUT indicator (orange)</td>
<td>Lit</td>
<td><a href="#">Lit.</a></td>
</tr>
<tr>
<td></td>
<td>Output load (e.g., relay)</td>
<td>ON</td>
<td>Not lit</td>
<td><a href="#">Lit.</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Set</td>
<td><a href="#">Lit.</a></td>
<td>(Between brown and black leads)</td>
</tr>
<tr>
<td></td>
<td>Dark-ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incident light No incident light</td>
<td>OUT indicator (orange)</td>
<td>Lit</td>
<td><a href="#">Lit.</a></td>
</tr>
<tr>
<td></td>
<td>Output load (e.g., relay)</td>
<td>ON</td>
<td>Not lit</td>
<td><a href="#">Lit.</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Set</td>
<td><a href="#">Lit.</a></td>
<td>(Between blue and black leads)</td>
</tr>
</tbody>
</table>

#### PNP Output

<table>
<thead>
<tr>
<th>Models</th>
<th>Operation mode</th>
<th>Timing chart</th>
<th>L/D indicators</th>
<th>Output circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3X-HD41, E3X-HD8, E3X-HD44</td>
<td>Light-ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incident light No incident light</td>
<td>OUT indicator (orange)</td>
<td>Lit</td>
<td><a href="#">Lit.</a></td>
</tr>
<tr>
<td></td>
<td>Output load (e.g., relay)</td>
<td>ON</td>
<td>Not lit</td>
<td><a href="#">Lit.</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Set</td>
<td><a href="#">Lit.</a></td>
<td>(Between blue and black leads)</td>
</tr>
<tr>
<td></td>
<td>Dark-ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incident light No incident light</td>
<td>OUT indicator (orange)</td>
<td>Lit</td>
<td><a href="#">Lit.</a></td>
</tr>
<tr>
<td></td>
<td>Output load (e.g., relay)</td>
<td>ON</td>
<td>Not lit</td>
<td><a href="#">Lit.</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Set</td>
<td><a href="#">Lit.</a></td>
<td>(Between blue and black leads)</td>
</tr>
</tbody>
</table>

#### ON delay

<table>
<thead>
<tr>
<th>Incident light</th>
<th>No incident light</th>
<th>Light-ON</th>
<th>OFF delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Dark-ON</td>
<td>OFF</td>
<td>Dark-ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>

#### One-shot

<table>
<thead>
<tr>
<th>Incident light</th>
<th>No incident light</th>
<th>Light-ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Dark-ON</td>
<td>OFF</td>
<td>Dark-ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>

#### Plug (Sensor I/O Connector)

<table>
<thead>
<tr>
<th>Terminal number</th>
<th>Wire color</th>
<th>Connection pin</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>X3SF-M421-402-A</td>
<td>Brown</td>
<td>1</td>
<td>Power supply (+V)</td>
</tr>
<tr>
<td>X3SF-M422-402-A</td>
<td>White</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>X3SF-M423-405-A</td>
<td>Blue</td>
<td>3</td>
<td>Power supply (0 V)</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>4</td>
<td>Output</td>
</tr>
</tbody>
</table>

Note: Pin 2 is not used.

### Nomenclature

- **[L/D Indicator]** Indicates the setting status: Light-ON (L) or Dark-ON (D).
- **[PC Indicator]** Turns ON when Dynamic Power Control is effective.
- **[ MODE Button]** Use to switch between Light-ON (L) and Dark-ON (D).
- **[UP/DOWN Button]** Used to fine-tune the threshold or change set values.
Operating Procedures

Basic Settings

Output switching
1. Press \( \text{button} \) with a workpiece in the detection area.
2. Press \( \text{button} \) again without a workpiece in the detection area.

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. If the incident light level of 1 is smaller during long distance detection, the minimum value by which an output is correctly turned ON will be set.

Smart Tuning [Easy Sensitivity Setting]

(1) Detect for Workpiece Presence/Absence
- 2-point Tuning
1. Press \( \text{button} \) with a workpiece in the detection area.
2. Press \( \text{button} \) again without a workpiece in the detection area.

Incident light level setting:
The 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.

(2) Enhance Durability of the Fiber Head against Dust and Stain
- Maximum Sensitivity Tuning
1. Hold \( \text{button} \) for 3 seconds or longer with/out workpiece as shown below.
   - Through-beam: Workpiece is present
   - Reflective: Workpiece is absent

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. If the incident light level of 1 is smaller during long distance detection, the minimum value by which an output is correctly turned ON will be set.

(3) Adjust for Moving Workpiece without Stopping Line
- Full Auto Tuning
1. Hold \( \text{button} \) without the presence of a workpiece, and pass the workpiece through while \( \text{FULL} \rightarrow \text{FULL} \rightarrow \text{FULL} \) is displayed in red digital.
   (Keep holding the \( \text{button} \) while the workpiece passes through, and hold 7 seconds or longer until \( \text{FULL} \) is displayed in red digital. After the workpiece passes through, release your finger from the \( \text{button} \).)

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.

(4) Determine Workpiece Position
- Position Tuning
1. Press \( \text{button} \) without a workpiece in the area.
2. Place the workpiece at the desired position and hold \( \text{button} \).

The red digital display changes \( \text{FULL} \rightarrow \text{FULL} \). Setting is Completed

(5) Detect Transparent or Small Workpiece
(Set Threshold by incident light level percentage)
- Percentage Tuning
1. Turn ON Percentage Tuning in SET mode.
2. Press \( \text{button} \) without a workpiece in the area.

Incident light level setting:
The Step 2 incident level is adjusted to the power tuning level. Threshold setting:Set to the value obtained by \( [\text{Incident Level at Step } 2] \times \text{Percentage Tuning Level } + \text{Incident Level at Step } 2 \).

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

Smart Tuning Error

Error / Display / Cause | Error Orig / Tuning Type | Remedy
--- | --- | ---
Near Error | 2-point Tuning, Full Auto Tuning | Positioning Tuning
2-point Tuning Full Auto Tuning Positioning Tuning
- Change the detection function mode to a slower response time mode.
- Reduce the distance between the light emitting and light receiving surfaces. (Through-beam)
- Place the Fiber Head closer to the sensing object. (Reflective)

Over Error | All | Tuning other than Maximum Sensitivity Tuning
- Enhance the power tuning level.
- Use a thin-diameter fiber.
- Width the emitter and receptor distance (Through-beam)
- Distance the Fiber Head from the sensing object (Reflective)

Low Error | Tuning other than Maximum Sensitivity Tuning | Decrease the power tuning level.
- Reduce the distance between the light emitting and light receiving surfaces. (Through-beam)
- Place the Fiber Head closer to the sensing object. (Reflective)

The adjustment range of smart tuning is approx. 20 to 1/100 times. When selecting giga mode as detection function, the range will be approx. 2 to 1/100 times due to the large initial value.

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

Minute Adjustment of Threshold Level
1. Press \( \text{button} \) to adjust the threshold level.

The threshold level becomes higher. Hold the key for high-speed level adjustment.

The threshold level becomes lower.
Convenient Setting Features

(1) 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.

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.

Refer to "Smart Tuning Error" for error displays.

(2) 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”
The DPC indicator turns ON when the DPC function is effective.

  2. Set the DPC function ON in SET mode.

Refer to “Detailed Settings”
- Steps 1 and 2 can be reversed.
- The DPC function will be disabled when a smart tuning error occurs, differential function with maximum sensitivity tuning is performed, or the first incident light level of the positioning tuning is low.
- The incident light level is corrected to the power tuning level to maintain stable threshold and incident light levels. This provides stable detection regardless of the incident level changes caused by dirty sensor head, position error, or temperature changes.

(3) 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.

<table>
<thead>
<tr>
<th>Item</th>
<th>Initial Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold Value</td>
<td>55</td>
</tr>
<tr>
<td>Control Output</td>
<td>L-ON</td>
</tr>
</tbody>
</table>

* Settings for other functions are returned to the detailed setting initial values. User-saved settings are retained.

Smart Tuning is canceled.

Caution is required; the output is inverted if button is pressed first.

(4) 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.

- **User Reset Function**
  Reads out the saved settings.

  2. Select in and press button.

  3. Select in and press button.

Caution is required; the output is inverted if button is pressed first.

(5) Prevent Mistake-operation

- **Key Lock Function**

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

Enable/Cancel (This procedure)

* Press either of UP/DOWN.

(6) Reset Incident Light Level to “0”

- **Zero Reset Function**

Changes the incident light level to “0”. The threshold level is also shifted accordingly.

Enable

Cancel

The zero reset function is canceled when either of the DPC function/differential function/Smart Tuning is performed.
Detailed Settings

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

<table>
<thead>
<tr>
<th>Function Setting</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1. Function Selection | Changing Functions to Set in SET Mode
   | (a): Functions 1 to 5. can be set
   | (b): Functions 1 to 10 can be set. |
| 2. Detection Function | Changing Light Level and Response Time
   | (a) High-speed mode 250 μs (Standard)
   | (b) Standard mode 1 ms 1 time
   | (c) Giga mode 16 ms 12 times
   | (d) Super-high-speed mode NPN 50 μs 0.25 times |

Smart Tuning is canceled if the detection mode is changed.
* The communication and mutual interference prevention functions are disabled when the detection mode is set to super high-speed mode.

Stable Detection Regardless of Incident Light Level Change
Refer to “Convenient Setting Features”

3. DPC Function | DPC Function (Use of the function with Through-beam model or Retro-reflective model is recommended)
Perform Smart Tuning.

4. Timer Function | Setting Output Timer
   | Off-delay Timer (a) Incident light L-ON, D-ON when the detection is too short.
   | (b) Output ON after detection.
   | (c) Keeps the output ON for a specified time regardless of the workspace line variation.

A timer value can be set after pressing button when a timer menu (other than “)” is displayed.
Use button to set the time. (1 to 9999 ms in 1 ms steps; the initial value: 10 ms)

Changing the Target Incident Light Level (Power Tuning Level)
Use button to set the power tuning level. (0% to 9999 in 1 steps; the initial value: 9999)
Refer to “Convenient Setting Features”

5. Power Tuning Level | Detecting Transparent or Small Workpiece
Press button in ”[ ” menu, then use button to set the percentage tuning level. (0.9% to 99% in 1% steps; the initial value: 100%)
Refer to “Smart Tuning”

Refer to “Power Tuning”

6. Percentage Tuning | Professional Design Features
   | • Level Threshold Light Incident Initializes all the settings by returning them to the factory defaults.
   | • DPC Function (Use of the function with Through-beam model or Retro-reflective model is recommended)
      * Perform Smart Tuning.

DPC Function is canceled if the setting is made after position tuning, set both the through-beam model or the first incident light level of the positioning tuning is low.

If the setting is made after position tuning, set both the through-beam model or the first incident light level of the positioning tuning is low.

Differential function with maximum sensitivity tuning is performed, when the DPC function is effective.

The DPC indicator turns ON blinking when incident level decreases and the DPC indicator starts flashing.

The displayed incident level by correcting internal phase and the sensitivity is displayed.

Hold both for 3 seconds or longer to enter SET mode.

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

7. Differential Function | Detecting Incident Light Level Change
Detects if the absolute value of the incident light level change of the set response time is larger than the threshold value. The display shows the change of the incident light level of the set response time in red.

<table>
<thead>
<tr>
<th>Differential Setting</th>
<th>Response Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>250 μs</td>
</tr>
<tr>
<td>2</td>
<td>500 μs</td>
</tr>
<tr>
<td>3</td>
<td>1 ms</td>
</tr>
<tr>
<td>4</td>
<td>10 ms</td>
</tr>
<tr>
<td>5</td>
<td>100 ms</td>
</tr>
</tbody>
</table>

Use button to specify the response time. When the differential function is enabled, the detection function setting is disabled. Smart tunings except power tuning are disabled.
The adjustment range of power tuning is approx. 1 to 1/100 times.

Changing Digital Display in RUN Mode for Specific Purpose

8. Digital Display | Checking a Margin Against Threshold
Threshold light level is displayed in green digital figures.

Setting Threshold using a Small or Fast Moving Workpiece

9. Inverted Display | Peak Light Bottom Level Light Level
Threshold displays the minimum value of the peak of the light incident and the maximum value of the bottom of the bottom of the light interruption.

Adjusting Optical Axis

Checking the Channel No. in Group Mounting

Mounting Amplifier in Inverted Direction
Inverts the display upside down. The digital display shows the threshold value in red, and light incident level in green.

Saving Power Consumption

Eco on Indicators (Green and Red digital displays) turn OFF in approx. 10 seconds after a key operation.
Eco Lo Indicates (Green and Red digital displays) turn ON with low brightness in approx. 10 seconds after a key operation.
### Ratings and Specifications

#### E3X-CRT

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication method</strong></td>
<td>CompoNet Communications</td>
</tr>
<tr>
<td><strong>Connectable Sensors</strong></td>
<td>Fiber Sensors: E3X-HD0 and E3X-MDA0</td>
</tr>
<tr>
<td></td>
<td>Laser Sensor Head with Separate Digital Amplifier: E3C-LDA0</td>
</tr>
<tr>
<td></td>
<td>Proximity Sensor with Separate Amplifier: E2C-EDA0</td>
</tr>
<tr>
<td><strong>Communications power supply voltage</strong></td>
<td>14 to 26.4 VDC (Communications Unit draws power from the communications power supply.)</td>
</tr>
<tr>
<td><strong>Power and current consumption</strong></td>
<td>2.4 W max. (Not including the power supplied to Sensor.)</td>
</tr>
<tr>
<td></td>
<td>100 mA max. at 24 VDC (Not including the current supplied to Sensor.)</td>
</tr>
<tr>
<td><strong>Functions</strong></td>
<td>I/O communications, message communications, and Sensor error output</td>
</tr>
<tr>
<td><strong>Indicators</strong></td>
<td>MS Indicator (Green/Red), NS indicator (Green/Red), and SS (Sensor Status) indicator (Green/Red)</td>
</tr>
<tr>
<td><strong>Vibration resistance</strong></td>
<td>10 to 150 Hz with double amplitude of 0.7 mm, or 50 m/s²</td>
</tr>
<tr>
<td></td>
<td>80 min each in X, Y, and Z directions</td>
</tr>
<tr>
<td><strong>Shock resistance</strong></td>
<td>150 m/s²</td>
</tr>
<tr>
<td></td>
<td>3 times each in X, Y, and Z directions</td>
</tr>
<tr>
<td><strong>Dielectric strength</strong></td>
<td>500 VAC 50/60Hz 1 min</td>
</tr>
<tr>
<td><strong>Insulation resistance</strong></td>
<td>20MΩ min.</td>
</tr>
<tr>
<td><strong>Ambient operating temperature</strong></td>
<td>0 to 55°C (with no icing or condensation)</td>
</tr>
<tr>
<td></td>
<td>* The temperature is limited by the number of connected Fiber Amplifier Units.</td>
</tr>
<tr>
<td><strong>Ambient operating humidity</strong></td>
<td>25% to 85% (with no icing or condensation)</td>
</tr>
<tr>
<td><strong>Storage temperature</strong></td>
<td>–30 to 70°C (with no icing or condensation)</td>
</tr>
<tr>
<td><strong>Storage humidity</strong></td>
<td>25% to 85% (with no condensation)</td>
</tr>
<tr>
<td><strong>Mounting method</strong></td>
<td>35-mm DIN track-mounting</td>
</tr>
<tr>
<td><strong>Weight (packed state/unit only)</strong></td>
<td>Approx. 220 g/Approx. 95 g</td>
</tr>
<tr>
<td><strong>Accessories</strong></td>
<td>Connector cover, DIN track End Plates and Instruction manual</td>
</tr>
</tbody>
</table>

**Note.** The E3X-CRT has two operating modes: I/O mode 1 and I/O mode 2. The following table gives the differences between these modes.

<table>
<thead>
<tr>
<th>I/O mode</th>
<th>I/O classification</th>
<th>Number of allocated points</th>
<th>Maximum number of interconnected</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O mode 1</td>
<td>Input Unit</td>
<td>Input: 32</td>
<td>15</td>
</tr>
<tr>
<td>I/O mode 2</td>
<td>I/O Unit</td>
<td>Input: 64, Output: 64</td>
<td>16</td>
</tr>
</tbody>
</table>

* Temperature Limitations Based on Number of Connected Fiber Amplifier Units:
  - Groups of 1 to 2 Amplifier Units: 0 to 55°C
  - Groups of 3 to 10 Amplifier Units: 0 to 50°C
  - Groups of 11 to 16 Amplifier Units: 0 to 45°C

#### E3X-ECT

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication method</strong></td>
<td>EtherCAT</td>
</tr>
<tr>
<td><strong>Connectable Sensors</strong></td>
<td>Fiber Sensors: E3X-HD0 and E3X-MDA0</td>
</tr>
<tr>
<td></td>
<td>Laser Sensor Head with Separate Digital Amplifier: E3C-LDA0</td>
</tr>
<tr>
<td></td>
<td>Proximity Sensor with Separate Amplifier: E2C-EDA0</td>
</tr>
<tr>
<td><strong>Power supply voltage</strong></td>
<td>20.4 to 26.4 VDC</td>
</tr>
<tr>
<td><strong>Power and current consumption</strong></td>
<td>2.4 W max. (Not including the power supplied to Sensor.)</td>
</tr>
<tr>
<td></td>
<td>100 mA max. at 24 VDC (Not including the current supplied to Sensor.)</td>
</tr>
<tr>
<td><strong>Functions</strong></td>
<td>DC (synchronous) mode, Free run mode, PDO communications,* 1</td>
</tr>
<tr>
<td></td>
<td>SDO communications, Sensor error output</td>
</tr>
<tr>
<td><strong>Indicators</strong></td>
<td>L/A IN indicator (Yellow), L/A OUT indicator (Yellow), PWR indicator (Green), RUN indicator (Green), ERROR indicator (Red), and SS (Sensor Status) indicator (Green/Red)</td>
</tr>
<tr>
<td><strong>Vibration resistance</strong></td>
<td>10 to 150 Hz with double amplitude of 0.7 mm, or 50 m/s²</td>
</tr>
<tr>
<td></td>
<td>80 min each in X, Y, and Z directions</td>
</tr>
<tr>
<td><strong>Shock resistance</strong></td>
<td>150 m/s²</td>
</tr>
<tr>
<td></td>
<td>3 times each in X, Y, and Z directions</td>
</tr>
<tr>
<td><strong>Dielectric strength</strong></td>
<td>500 VAC 50/60Hz 1 min</td>
</tr>
<tr>
<td><strong>Insulation resistance</strong></td>
<td>20MΩ min.</td>
</tr>
<tr>
<td><strong>Ambient operating temperature</strong></td>
<td>0 to 55°C (with no icing or condensation)</td>
</tr>
<tr>
<td></td>
<td>* The temperature is limited by the number of connected Fiber Amplifier Units.</td>
</tr>
<tr>
<td><strong>Ambient operating humidity</strong></td>
<td>25% to 85% (with no condensation)</td>
</tr>
<tr>
<td><strong>Storage temperature</strong></td>
<td>–30 to 70°C (with no icing or condensation)</td>
</tr>
<tr>
<td><strong>Storage humidity</strong></td>
<td>25% to 85% (with no condensation)</td>
</tr>
<tr>
<td><strong>Mounting method</strong></td>
<td>35-mm DIN track-mounting</td>
</tr>
<tr>
<td><strong>Weight (packed state/unit only)</strong></td>
<td>Approx. 220 g/Approx. 95 g</td>
</tr>
<tr>
<td><strong>Accessories</strong></td>
<td>Power supply connector, connector cover, DIN track End Plates and Instruction manual</td>
</tr>
</tbody>
</table>

*1. Data Size Assignable to the PDO (Process Data Object): There is a maximum data size that can be assigned. The maximum size is 36 bytes.

*2. Temperature Limitations Based on Number of Connected Fiber Amplifier Units:
  - Groups of 1 to 2 Amplifier Units: 0 to 55°C
  - Groups of 3 to 10 Amplifier Units: 0 to 50°C
  - Groups of 11 to 16 Amplifier Units: 0 to 45°C
  - Groups of 17 to 30 Amplifier Units: 0 to 40°C

Read the User’s Manual for precautions on using this Unit. (E412)
Fiber Amplifiers, Communications Unit and Accessories

Accessories (sold separately)

### Ratings and Specifications

#### Wire-saving Connectors

<table>
<thead>
<tr>
<th>Item</th>
<th>Type</th>
<th>Master Connector</th>
<th>Slave Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of conductors</td>
<td>4</td>
<td>E3X-CN21</td>
<td>E3X-CN11</td>
</tr>
<tr>
<td>Diameter of cable</td>
<td>4 dia.</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Rated current</td>
<td></td>
<td>2.5A</td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td></td>
<td>50VDC</td>
<td></td>
</tr>
<tr>
<td>Contact resistance</td>
<td></td>
<td>20 mΩ max. (20 mVDC max., 100 mA max.)</td>
<td></td>
</tr>
<tr>
<td>Number of insertions</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Housing</td>
<td>Polybutylene terephthalate (PBT)</td>
<td>Phosphor bronze/gold-plated nickel</td>
</tr>
<tr>
<td></td>
<td>Contact</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weight (packed state)</td>
<td>Approx. 55 g</td>
<td>Approx. 25 g</td>
</tr>
</tbody>
</table>

#### Sensor I/O Connectors

<table>
<thead>
<tr>
<th>Item</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of conductors</td>
<td>4</td>
</tr>
<tr>
<td>Diameter of cable</td>
<td>4 dia.</td>
</tr>
<tr>
<td>Rated current</td>
<td>1A</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>125VDC</td>
</tr>
<tr>
<td>Contact resistance</td>
<td>40 mΩ max. (20 mVDC max., 100 mA max.)</td>
</tr>
<tr>
<td>Number of insertions</td>
<td>Destruction: 200 times</td>
</tr>
</tbody>
</table>

### Dimensions

(Unit: mm)

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

**Master Connector**

**Slave Connector**

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

---

88-D E3X-CN22  
E3X-CN12

---

88-A E3X-CN21  
E3X-CN11

---

88-C XS3F-M421-402-A  
XS3F-M421-405-A

---

88-D XS3F-M422-402-A  
XS3F-M422-405-A

---

Note: E3X-CN21: 4 dia. cable / 4 conductors / Standard length: 2 m  
(E3X-CN22: 4 dia. cable / 4 conductors / Standard length: 2 m)  
(E3X-CN11: 4 dia. cable / 3 conductors / Standard length: 2 m  
(E3X-CN12: 2.6 dia. cable / 1 conductor / Standard length: 2 m)
Mounting Brackets

**89-A E39-L143**

Material: Stainless steel (SUS304)

**DIN track**

**89-B PFP-100N**

Material: Aluminum

**89-C PFP-100N2**

Material: Aluminum

**End Plate**

**89-D PFP-M**

Material: Iron, zinc plating
Reference Information for Fiber Units

Influence of Fiber Cable Length

The sensing distance listed in the Fiber Units specifications are based on the fiber cable lengths found in the suffix of the model number. The sensing distance will change if the fiber cable is cut or extended. The following graph shows the percentage change of the various fiber cable length, where 100% is the sensing distance for a fiber cable with a length of 2 m. Use this as a guideline for installation distances. Keep in mind that extending the cable with a fiber connector will result in even shorter sensing distances than the value given in the graph.

![Graph showing the influence of fiber cable length on sensing distance.](image)

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.

![Graph showing sensing distance ratios by workpiece materials.](image)

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.

![Flexible fiber diagram](image)

- **Break-resistant Fibers**
This fiber is resistant to repeated bends for use on moving parts.

![Break-resistant fiber diagram](image)

- **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.

![Standard fiber diagram](image)

- **Coaxial Reflective Fibers**
These fibers are suitable for sensing small objects at close range.

![Coaxial reflective fiber diagram](image)
### Q&A

<table>
<thead>
<tr>
<th>Category</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber Units</td>
<td>How do I interpret the optical axis diameter in the Fiber Unit specifications?</td>
<td>The optical axis diameter is the beam size that the Through-beam Fiber Unit uses for detection. 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. The incident level may fluctuate, however, if the workpiece passes the beam at high speed. 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.</td>
</tr>
<tr>
<td>Fiber Amplifier Units</td>
<td>Are there any differences between the Fiber Units that are used for emitter and receiver?</td>
<td>With Through-beam Fiber Units, there is no difference between emitter fibers and receiver fibers. With Reflective Fiber Units, the emitter fibers and receiver fibers are different on Coaxial Reflective Models. Emitter fiber cables have identification marks. Refer to the individual dimensions diagrams of Fiber Units for details.</td>
</tr>
<tr>
<td></td>
<td>What size must the hole be to mount a Threaded or Cylindrical Fiber Unit?</td>
<td>Refer to the recommended mounting hole dimensions given on pages 58 to 61.</td>
</tr>
<tr>
<td></td>
<td>Are Fiber Cables available in different lengths?</td>
<td>Some models are available with either 5-m or 10-m cable. Ask your OMRON representative for details.</td>
</tr>
<tr>
<td></td>
<td>What is the aperture angle?</td>
<td>The aperture angle is the angle at which the emitter beam spreads out.</td>
</tr>
<tr>
<td></td>
<td>Are these Fiber Units CE certified?</td>
<td>Fiber Units do not have any electrical components and therefore are exempt from CE certification.</td>
</tr>
<tr>
<td></td>
<td>Can these Fiber Units be used in explosion-proof areas?</td>
<td>The Fiber Units can be used in an explosion-proof area. Install only the Fiber Unit in the explosion-proof area and install the Fiber Amplifier Unit outside the explosion-proof area.</td>
</tr>
<tr>
<td></td>
<td>What the Fiber Units with built-in lenses?</td>
<td>These highly recommended Fiber Units have built-in lenses that achieve stable detection with high-power beams.</td>
</tr>
<tr>
<td>Fiber Amplifier Units</td>
<td>Can the Fiber Amplifier Units be linked with other models?</td>
<td>The E3X-HD Series can be connected only with the E3X-DA-S and MDA Series.</td>
</tr>
<tr>
<td></td>
<td>Can the Fiber Amplifier Unit be operated from a mobile console?</td>
<td>Mobile consoles cannot be used with either the E3NX-FA Series or the E3X-HD Series.</td>
</tr>
<tr>
<td></td>
<td>Can a Sensor Communications Unit be used?</td>
<td>If you use E3NX-FA0 Amplifier Units, you can use the E3NW-ECT(EtherCAT), E3NW-CRT(CompoNet) or E3NW-CCL (CC-Link). If you use E3X-HD0 Amplifier Units, you can use the E3X-CRT (CompoNet) or E3X-ECT (EtherCAT).</td>
</tr>
</tbody>
</table>
Safety Precautions

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).

![Amplifier Unit with Wire-saving Connector](image1)

![Amplifier Unit with Connector for Communications Unit](image2)

(3) <E3NX-FA series>
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 mm² for extension. The power voltage must be 24 to 30 V when connecting amplifier units with extension cable and wire-saving connector. <E3X-HD series>
The length for the cable extension must be 100 m or less. Be sure to use a cable of at least 0.3 mm² 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 200 ms after the power supply is turned ON.
(9) The Mobile Console E3X-MC11, E3X-MC11-SV2 and E3X-MC11-S cannot be connected.
(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-EKT Sensor Communications Units cannot be used. The E3X-CRT and E3X-EKT Sensor Communications Unit can be used with the E3X-HD0, but the E3X-DRT21-S and E3X-NW-ECT Sensor Communications Units cannot be used.
(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.

Fiber Amplifier Unit

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) Do not use the product if the case is damaged.

(11) 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.

(12) When setting the Sensor, be sure to check safety, such as by stopping the equipment.

(13) Be sure to turn off the power supply before connecting or disconnecting wires.

(14) Do not attempt to disassemble, repair, or modify the product in any way.

(15) When disposing of the product, treat it as industrial waste.

(16) Do not use the Sensor in water, rain, or outdoors.

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.
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.

<table>
<thead>
<tr>
<th>Model Index</th>
<th>Maximum number of connectable Amplifier Units</th>
<th>Maximum number of mutual interference prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3NX-FA series*</td>
<td>30</td>
<td>10</td>
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<tr>
<td>E3X-HD series standard models*</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>(E3X-HD11/HD41/HD6/HD8)</td>
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</tr>
<tr>
<td>E3X-HD0</td>
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<td>10</td>
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<tr>
<td>With E3X-ECT</td>
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<td></td>
</tr>
<tr>
<td>With E3X-CRT</td>
<td>16</td>
<td>10</td>
</tr>
</tbody>
</table>

- 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.
- The mutual interference prevention function cannot be used if the detection mode is set to super-high-speed mode (SHS).

Mounting Fiber Units

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

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

Mount Fiber Unit
1. Open the protective cover.
2. Raise the lock lever.
3. Insert the Fiber Unit in the fiber unit hole to the bottom.
4. Return the lock lever to the original position and fix the Fiber Unit.

- When mounting a coaxial reflective Fiber Unit, insert the single-core Fiber Unit to the upper hole (Emitter side) and the multi-core Fiber Unit to the lower hole (Receiver side).
- The cables for the Single-core Fiber Units (Emitters) have identification marks. Refer to the dimensions diagrams for details.

- When removing the Fiber Unit, follow the above steps in reverse order.
- To maintain the characteristics of the Fiber Unit, make sure the lock is released before removing the Fiber Unit.
Fiber Units

**Warning**

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

**Precautions for Correct Use**

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

- **Mounting**
  - **Tightening Force**
    
    Refer to pages 58 to 61 for the tightening torque to apply when mounting a Fiber Unit.

  **<Threaded Models>**
  - Mounting panel
  - Toothed washer
  - Use a proper-sized wrench for the nut.

  **<Cylindrical Models>**
  - Set screw
  - (Flat head or sunken head) (M3 max.)

  **<Chemical and Oil-resistant Models>**
  - The following method is recommended for mounting Fiber Units with fluororesin-covered sensing heads (E32-TDF and E32-0DF) 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 58 to 61 for tensile strengths.
- Make sure any bend in the Fiber Unit is larger than the allowable bending radius.
- Refer to pages 58 to 61 for bending radius ratings and length of un bendable 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.
- For applications in hazardous environments, install the Fiber Unit in the hazardous environment but install the Amplifier Unit in a safe environment.

**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.
**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.

**Safety Precautions**

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 (E32-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.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber Unit</td>
<td>Fiber Unit</td>
</tr>
<tr>
<td>Splice</td>
<td>Retention clip</td>
</tr>
<tr>
<td>Retention clip</td>
<td>Fiber Unit</td>
</tr>
</tbody>
</table>

- 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.
**New Product Information (New Products: Indicated by in the following table.)**

**Hex-shaped Models**

- 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.

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. (→ 14 page)

### Specifications

#### Through-beam Fiber Units

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<thead>
<tr>
<th>Aperture angle</th>
<th>Size</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>97 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. 15°</td>
<td>M4</td>
<td>Flexible, R2</td>
<td>4.000*</td>
<td>4.000*</td>
<td>GIGA = HS Other modes</td>
<td>E32-LT11N 2M NEW A</td>
<td>97-A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approx. 60°</td>
<td>M4</td>
<td>Flexible, R1</td>
<td>2.000</td>
<td>3.000</td>
<td>GIGA = HS Other modes</td>
<td>E32-T11N 2M NEW B</td>
<td>97-B</td>
</tr>
</tbody>
</table>

#### Reflective Fiber Units

<table>
<thead>
<tr>
<th>Aperture angle</th>
<th>Size</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>97 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. 15°</td>
<td>M6</td>
<td>Flexible, R2</td>
<td>840</td>
<td>1,260</td>
<td>GIGA = HS Other modes</td>
<td>E32-LD11N 2M NEW C</td>
<td>97-C</td>
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<tr>
<td></td>
<td>M3</td>
<td>Flexible, R2</td>
<td>290</td>
<td>440</td>
<td>GIGA = HS Other modes</td>
<td>E32-C21N 2M NEW D</td>
<td>97-D</td>
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<tr>
<td>Approx. 60°</td>
<td>M4</td>
<td>Flexible, R4</td>
<td>840</td>
<td>1,170</td>
<td>GIGA = HS Other modes</td>
<td>E32-C81N 2M NEW F</td>
<td>97-F</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Aperture angle</th>
<th>Size</th>
<th>Appearance (mm)</th>
<th>Bending radius of cable</th>
<th>Sensing distance (mm)</th>
<th>Optical axis diameter (minimum sensing object)</th>
<th>Models</th>
<th>97 Page Dimensions No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. 15°</td>
<td>M6</td>
<td>Flexible, R2</td>
<td>1,200</td>
<td>2,020</td>
<td>GIGA = HS Other modes</td>
<td>E32-UR11NP 2M NEW G</td>
<td>97-G</td>
</tr>
</tbody>
</table>

*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-HD] 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)
- [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-HD and the second value is for the E3NX-FA.

*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.
Installation

Applications

Transparent Objects Beam Improvements

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Technical Selection Guide

Fiber Units

Standard Installation

Saving Space

Solar

Semi, Liquid-level Detection

Bending resistant, Limited BGS

High Power

Flat

Sleeved

Small Spot

Narrow view

BGS

Retro-refractive

Limited-refractive

Chemical-resistant, Oil-resistant

Bending

Heat-resistant

Area Detection

Liquid-level

Vacuum

FPD, Semi, Solar

Installation Information → 58, 59, 60, 61 Page

Dimensions

Through-beam Fiber Units

- 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.

E32-LT11N 2M (Free Cutting)

97-A

14.3

2.95

Model display tube

2.3 dia.

Sensing surface Two, 1.5 dia. (Methacrylate resin)

Two, 2.2 dia.

Fiber attachment (ES9-PW17) provided

Hexagonal nut, Opposite side: 10, Thickness: 2.4 (Nickel-plated brass)

Toothed washer (nickel-plated iron)

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

E32-DT11N 2M (Free Cutting)

97-B

9.4

3.4 dia.

Model display tube

2.2 dia.

M4 nuts (Nickel-plated iron)

Provided (4 each)

M4×0.7 (Thin-wall chrome-plated zinc alloy)

Sensing surface Two, 1 dia. (Methacrylate resin)

Two, 1.3 dia.

Fiber attachment (ES9-PW17) provided

Hexagonal nut, Opposite side: 10, Thickness: 2.4 (Nickel-plated brass)

Toothed washer (nickel-plated iron)

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

E32-C21N 2M (Free Cutting)

97-D

10.5

2.006

Model display tube

2.2 dia.

Sensing surface Two, 1.5 dia. (Methacrylate resin)

Two, 2.2 dia.

Fiber attachment (ES9-PW17) provided

Hexagonal nut, Opposite side: 10, Thickness: 2.4 (Nickel-plated brass)

Toothed washer (nickel-plated iron)

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

E32-C91N 2M (Free Cutting)

97-F

13.5

2.006

Model display tube

2.2 dia.

M4×0.7 (Thin-wall chrome-plated zinc alloy)

Sensing surface Two, 1 dia. (Methacrylate resin)

Two, 1.3 dia.

Fiber attachment (ES9-PW17) provided

Hexagonal nut, Opposite side: 10, Thickness: 2.4 (Nickel-plated brass)

Toothed washer (nickel-plated iron)

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

E32-LR11NP 2M (Free Cutting)

97-G

15.8

2.006

Model display tube

2.2 dia.

Sensing surface Two, 1.5 dia. (Methacrylate resin)

Two, 2.2 dia.

Fiber attachment (ES9-PW17) provided

Hexagonal nut, Opposite side: 10, Thickness: 2.4 (Nickel-plated brass)

Toothed washer (nickel-plated iron)

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

E39-RP1

44

8.5

3

0.2

Material: Methacrylate resin

-Back- ABS

- Installation Information -

E32-LT11N 2M (Free Cutting)

- Technical Selection Guide -

Fiber Units

Standard Installation

Saving Space

Solar

Semi, Liquid-level Detection

Bending resistant, Limited BGS

High Power

Flat

Sleeved

Small Spot

Narrow view

BGS

Retro-refractive

Limited-refractive

Chemical-resistant, Oil-resistant

Bending

Heat-resistant

Area Detection

Liquid-level

Vacuum

FPD, Semi, Solar

Installation Information

Fiber Units

Standard Installation

Saving Space

Solar

Semi, Liquid-level Detection

Bending resistant, Limited BGS

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BGS

Retro-refractive

Limited-refractive

Chemical-resistant, Oil-resistant

Bending

Heat-resistant

Area Detection

Liquid-level

Vacuum

FPD, Semi, Solar

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<td>E32-C21 2M</td>
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<tr>
<td>E32-D32 2M</td>
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<td>P.13</td>
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</tbody>
</table>

**Chemical-resistant, Oil-resistant**

Bending

**Environmental Stress**

Heat-resistant

Area Detection

Liquid-level

Vacuum

FPD, Semi, Solar

Installation Information

For Applications, Communications, Weather, and Wires

Technical Guide and Precautions

Model Index

Selection by Model
Terms and Conditions Agreement

Read and understand this catalog.

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranties.

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