CSM_E32series_DS_E_10_1

OMRON

*Best Selection*

# Fiber Sensors

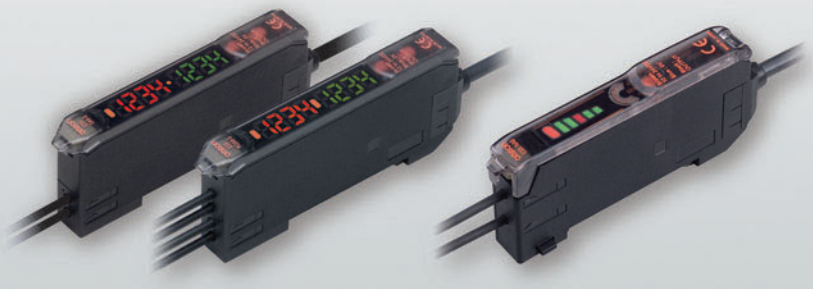
Best Selection Catalog

## OMRON's Fiber Sensors continue to support an increasing range of applications.

This catalog brings you the latest information on our Fiber Units.

E32-series Fiber Units

Amplifier Units



E3X-DA-S/-MDA Series

E3X-NA Series

realizing

# Fiber Unit

## Standard Models — First, Our Standard Lineup

P6

These Fibers Units can be used in a variety of applications, such as detecting the presence of workpieces and positioning.

### A Wide Variety of Shapes for Adapting to Different Installation Locations

Choose the model that suits the installation space from a wide variety of shapes and sizes.

Right angle | Screw-shaped | Cylindrical | Flat | Equipped with sleeve

### Space Savings and Simple Mounting

**Flat Models**

Flat models that allow simple screw mounting and straightforward wiring have been added to the lineup. Using these models eliminates the problem of fibers getting caught on surrounding objects.

Flat model

### Detect Workpieces in Tight Spaces

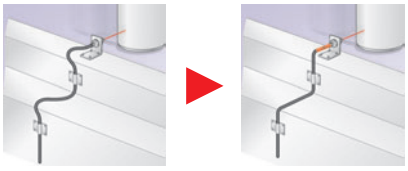
**Custom-produced Sleeves**

Models with sleeves allow detection in tight spaces. We will perform the time-consuming task of fashioning the sleeve, with a length and bends to suit the space (except for ultrafine sleeves).

Models with sleeves

### Flexible, Pliable Fiber That Can Be Handled Like Wire

We have developed a broad range of fibers to meet a wide variety of needs. Multicore (flexible) fiber is a new type of standard fiber that can be used like wire without worrying about the bending radius. We have also produced fiber that will not break when used in moving parts and fiber that is not degraded by contact with oil.



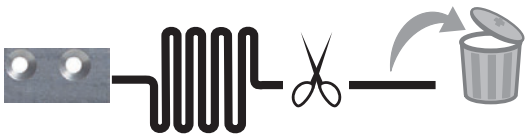
Conventional fiber | Flexible fiber

You will certainly appreciate the ease of use that flexible fiber ensures.

### Length Can Be Specified in 1-m Units

**Saving Energy and Work**

We will produce fiber of the required length (in meter units). For large-scale installations, specifications of up to 20 m can be handled. (Specifications of 0.3 m and 0.5 m are also possible.)



## Special-beam Models

### Detection with Increased Reliability P10

A variety of heads incorporating the latest optical technology makes it possible to solve common problems related to detection and to increase reliability.

- Resistant to dust and dirt
- Capable of detecting small workpieces
- Resistant to workpiece vibration

Use these models to handle unstable detection conditions.

Small-spot models
E32-C42+
E39-F3A

Area-sensing models
E32-T16J

Limited-reflective models
E32-L24L

High-power models
E32-T17L

## Environment-resistive Models

### High Resistance to External Conditions with Fiber P14

We have developed model variations for adapting to a variety of environmental conditions. These models enable detection in high-temperature environments and vacuums.

Heat-resistant models

Chemical-resistant models

- High-temperature environments
- Environments subject to the splattering of chemicals
- Vacuums

Use these models to handle applications in special environments.

## Application-corresponding Models

### Fiber Units for the Food-packaging, Semiconductor, and FPD Industries P16

These models, which were developed for specific applications, offer top-quality detection performance.

- Label detection
- Liquid-level detection
- Alignment and mapping of glass substrates
- Wafer mapping

Use these models for specific applications.

Label-detection models
E32-G14

Alignment-check models
E32-L16

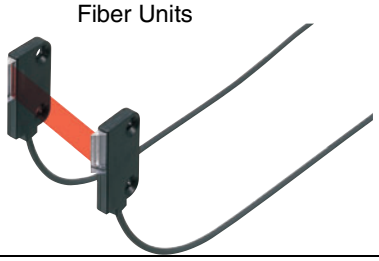
Liquid-level detection models
E32-D36T

■ Page Reference

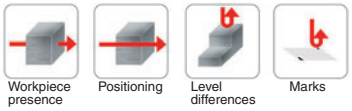
| Type | | Feature/ applications | Variations | Type | Ratings and performance | Dimensions |
|---|---|---|---|---|---|---|
| Standard models | | ➜ Page 6 | ➜ Page 8 | Through-beam ➜ Page 19<br>Reflective ➜ Page 26 | ➜ Page 37 | Through-beam ➜ Page 40<br>Reflective ➜ Page 48 |
| Special-beam models | | ➜ Page 10 | --- | Through-beam ➜ Page 22<br>Reflective ➜ Page 29 | ➜ Page 38 | Through-beam ➜ Page 43<br>Reflective ➜ Page 51 |
| Environment resistant models | | ➜ Page 14 | --- | Through-beam ➜ Page 24<br>Reflective ➜ Page 32 | ➜ Page 39 | Through-beam ➜ Page 46<br>Reflective ➜ Page 56 |
| Application-corresponding models | | ➜ Page 16 | --- | ➜ Page 33 | ➜ Page 39 | ➜ Page 57 |
| Accessories | | --- | --- | ➜ Page 25 (Vacuum-resisitant)<br>➜ Page 35 | --- | ➜ Page 47 (Vacuum-resisitant)<br>➜ Page 60 |

## Selection Guide

We have developed model variations for handling a broad range of applications.



Fiber Units

| Detection conditions \ Environmental conditions | Standard environments | Special environments ■ High-temperature environments (up to 400°C) ■ Environments subject to scattering of chemicals and oil ■ Vacuum environments |
|---|---|---|
| **Standard detection**<br>■ Workpiece presence<br>■ Positioning<br>■ Level differences and marks | Standard Models •••▶P.6<br>  <br>Workpiece presence / Positioning / Level differences / Marks | Environment-resistive Models •••▶P.14<br> <br>Workpiece presence / Positioning / Level difference |
| **Special-beam**<br>■ Long-distance sensing, resistance to dust and dirt<br>■ Small beam, resistance to rattling<br>■ Detection of transparent objects | Special-beam Models •••▶P.10<br> <br>High power / Small spot / Area sensing / Retroreflective sensing | |
| **Application-corresponding**<br>■ Labels<br>■ Liquid level<br>■ Alignment and mapping of glass substrates<br>■ Wafer mapping | Application-corresponding Models •••▶P.16<br> <br>Labels / Liquid level / Alignment / Mapping | |

Amplifier Units

| Type | Digital | | Manual |
|---|---|---|---|
| Appearance | | 2-channel models | |
| Response time | 48 µs, 1 ms, or 4 ms<br>(2-output models: 80 µs, 1 ms, or 4 ms) | 100 µs, 1 ms, or 4 ms | 200 µs<br>(high-speed models: 20 µs) |
| Light source | Red, green, blue, or infrared LED | | Red or green LED |
| Function | Dual display (including digital, bar, percent, and hold display functions)<br>Threshold adjustment performed manually or by teaching<br>OFF-delay, ON-delay, one-shot timer (adjustable from 1 ms to 5 s) | | LED bar display (5 levels)<br>8-turn sensitivity adjuster<br>OFF delay timer (fixed at 40 ms) |
| | Advanced-function models are available (2-output/input models). | | Water-resistant models are available. |
| Models | E3X-DA□-S<br>E3X-DA□TW-S (2-output model)<br>E3X-DA□RM-S (input model) | E3X-MDA□ | E3X-NA□<br>E3X-NA□F (high-speed model)<br>E3X-NA□V (water-resistant model) |

CONTENTS


■ Selection Guide . . . . . P4

■ Overview of Features, Applications, and Variations

| | | |
|---|---|---|
| Standard Models | Flexible (New Standard) | P6 |
| | Standard | P6 |
| | Break-resistant | P6 |
| | Fluorine Coating | P7 |
| Special-beam Models | Long Distance, High Power | P10 |
| | Ultracompact, Ultrafine Sleeve | P10 |
| | Coaxial, Small Spot | P11 |
| | Fine Beam (Narrow Vision Field) | P12 |
| | Area Sensing | P12 |
| | Retroreflective | P13 |
| | Limited-reflective | P13 |
| Environment-resistive Models | Heat-resistant | P14 |
| | Chemical-resistant | P14 |
| | Vacuum-resistant | P15 |
| Application-corresponding Models | Label Detection | P16 |
| | Liquid-level Detection | P16 |
| | Glass-substrate Alignment | P17 |
| | Glass-substrate Mapping | P17 |
| | Water Mapping | P18 |

■ Ordering Information

Through-beam Fiber Units . . . . . P19
Fiber Units with Reflective Sensors . . . . . P26
Application-corresponding Fiber Units . . . . . P33

■ Ratings/Characteristics . . . . . P37

■ Dimensions

Through-beam Fiber Units . . . . . P40
Fiber Units with Reflective Sensors . . . . . P48
Application-corresponding Fiber Units . . . . . P57

■ Precautions . . . . . P63

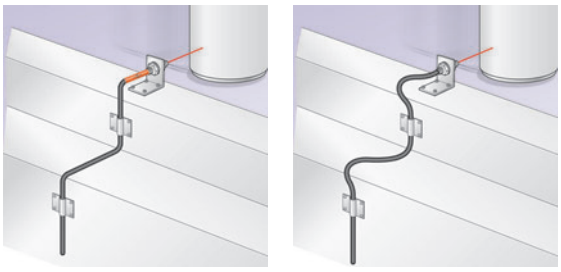
## Standard Models

### Flexible (New Standard)

R

- Perform wiring without worrying about the bending radius.
- Choose the model to suit the installation space from a variety of shapes.

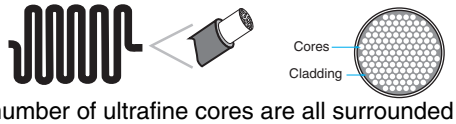
Flexible fiber | Conventional fiber



Fewer problems

Light intensity affected by bends in fiber
Fiber broken by getting caught on surrounding objects

#### ■ Feature: Multicore (Flexible) Fibers




A large number of ultrafine cores are all surrounded by cladding. As a result, the fiber is flexible and can be bent without significantly reducing the light intensity. This helps solve problems, such as fiber being broken by getting caught on other objects.

#### ■ Ratings/Characteristics

| | |
|---|---|
| Min. sensing object | 0.005-mm dia. |
| Min. bending radius | 1 mm |
| Ambient temperature range | –40°C to 70°C (no icing or condensation) |
| Fiber material | Plastic (Free-cut) |

### Standard

- Choose the model to suit the installation space from a variety of shapes.
- New flat models allow space savings and simple installation.

Screw-shaped | Cylindrical | Flat | Equipped with sleeve

#### ■ Feature: Flat Models

Flat models, which allow simple attachment and wiring, have been added to the lineup. Choose the model to suit the installation space from 3 sensing directions and 2 sizes, standard and small.

#### ■ Ratings/Characteristics

| | |
|---|---|
| Min. sensing object | 0.005-mm dia. |
| Min. bending radius | 10 or 25 mm* |
| Ambient temperature range | –40°C to 70°C (no icing or condensation) |
| Fiber material | Plastic (Free-cut) |

*Depends on the fiber diameter.

### Break-resistant

B

- Bundle-fiber models can be used for moving parts.
- Capable of withstanding at least one million repeated bends (in typical applications).

#### ■ Feature: Bundle Fibers

The Fiber Units contain a large number of independent fine fibers, ensuring a high degree of flexibility.

#### ■ Ratings/Characteristics

| | |
|---|---|
| Min. sensing object | 0.005-mm dia. |
| Min. bending radius | 4 mm (withstands repeated bending) |
| Ambient temperature range | –40°C to 70°C (no icing or condensation) |
| Fiber material | Plastic (Free-cut) |

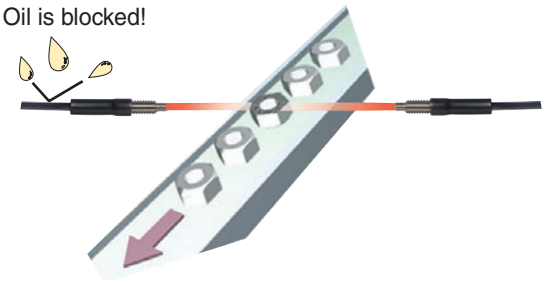
## Standard Models

### Fluorine Coating

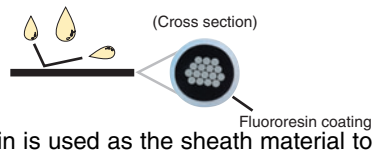
U

- Fiber degradation due to oil is prevented using a fluororesin coating.
- Free cutting is possible with cutter provided.

Oil is blocked!



### ■ Feature: Fluorine Coating




Fluororesin is used as the sheath material to prevent fiber degradation resulting from oil adhesion.
Note: The tip of the head is not chemical-resistant.

### ■ Ratings/Characteristics

| | |
|---|---|
| Min. sensing object | 0.005-mm dia. |
| Min. bending radius | 4 mm |
| Ambient temperature range | –40°C to 70°C (with no icing or condensation) |
| Fiber material | Plastic (Free-cut) |

### Fiber Customization Service (Fiber Length, Sleeve Length, and Bends)

This customization/delivery service applies to standard models. It is aimed at reducing industrial waste and simplifying the installation procedure.

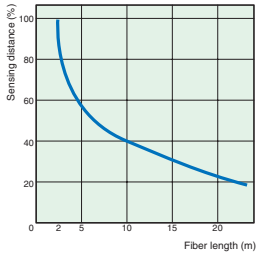
#### Fiber Length

■Applicable Models
Standard models
Flexible Break-resistant Models

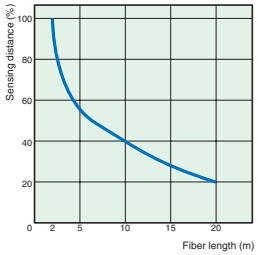
■Model Number Used for Ordering
Standard model number + Fiber length
Fiber length: 0.3 m, 0.5 m, or any length from 1 to 20 m (in 1-m units)

■ Fiber Length vs. Sensing Distance

Through-beam Fiber Units (Fiber length of 2 m corresponds to 100%.)




Fiber Units with Reflective Sensors (Fiber length of 2 m corresponds to 100%.)



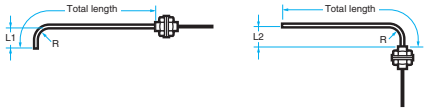

#### Sleeve Length and Bends

■Applicable Models
E32-TC200B/E32-TC200F
E32-DC200B/E32-DC200F
The E32-DC200B cannot be bent.

■ Model Number Used When Changing Only the Sleeve Length

Model: E32-*1C200*2-S*3

■ Model Number Used When Changing the Sleeve Length and Bends




Model Numbers Incorporating the Bending Radius, R, and Dimensions L1 and L2

Specifying L1 Only (Units: mm)

| Bending radius | L1 (±1) | Model number |
|---|---|---|
| R5 | 10 | E32-*1C200*2-S*3A1 |
| | 15 | E32-*1C200*2-S*3A2 |
| R7.5 | 12.5 | E32-*1C200*2-S*3B1 |
| | 17.5 | E32-*1C200*2-S*3B2 |
| R10 | 15 | E32-*1C200*2-S*3C1 |
| | 20 | E32-*1C200*2-S*3C2 |
| R12.5 | 17.5 | E32-*1C200*2-S*3D1 |
| | 22.5 | E32-*1C200*2-S*3D2 |

Specifying L2 Only (Units: mm)

| Bending radius | L2 (±1) | Model number |
|---|---|---|
| R5 | 5 | E32-*1C200*2-S*3A3 |
| | 10 | E32-*1C200*2-S*3A4 |
| R7.5 | 7.5 | E32-*1C200*2-S*3B3 |
| | 17.5 | E32-*1C200*2-S*3B4 |
| R10 | 10 | E32-*1C200*2-S*3C3 |
| | 20 | E32-*1C200*2-S*3C4 |
| R12.5 | 12.5 | E32-*1C200*2-S*3D3 |
| | 22.5 | E32-*1C200*2-S*3D4 |

*1: Insert "T" for Through-beam Fiber Units and "D" for Fiber Units with Reflective Sensors.
*2: Insert the "B" or "F" that appears at the end of the original model number.
*3: Insert "50" if the total length is 50 mm. The total length must not exceed 120 mm.

# Features/Applications

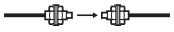
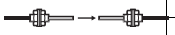
## Standard Models

Overview of Model Variations

### Through-beam Fiber Units

Sensing distance (mm) (See note 1.)

Model

| Type (See note 2.) / Shape of head [For dimensions, refer to page 40.] | | Flexible (New Standard) R — Flexible and pliable | Standard | Break-resistant B — Withstands repeated bending | Fluorine coating U — Cable protected against oil |
|---|---|---|---|---|---|
| | M4 | 530 | | | |
| | | E32-T11N | | | |
| Screw-shaped (top-view)  | M4 | 530 | 760 | 680 | 680 |
| | | E32-T11R | E32-TC200 | E32-T11 | E32-T11U |
| | M3 | 130 | 220 | 200 | |
| | | E32-T21R | E32-TC200E | E32-T21 | |
| (with sleeve)  | M4 (1.2-dia. sleeve) | 530 | 760 | | |
| | | E32-TC200BR | E32-TC200B | | |
| | M3 (0.9-dia. sleeve) | 130 | 220 | | |
| | | E32-TC200FR | E32-TC200F | | |
| Cylindrical (top-view)  | 3 dia. | 530 | 760 | 680 | |
| | | E32-T12R | E32-T12 | E32-T12B | |
| | 1.5 dia. | 130 | 220 | 200 | |
| | | E32-T222R | E32-T222 | E32-T22B | |
| (side-view) | 3 dia. | 210 | 460 | | |
| | | E32-T14LR | E32-T14L | | |
| | 1 dia. | 50 | 130 | | |
| | | E32-T24R | E32-T24 | | |
| Flat (top-view) | 15 × 8 × 3 | 530 | 760 | 680 | |
| | | E32-T15XR | E32-T15X | E32-T15XB | |
| | 12 × 7 × 2 | 130 | 220 | 150 | |
| | | E32-T25XR | E32-T25X | E32-T25XB | |
| (side-view) | 15 × 8 × 3 | 210 | 460 | | |
| | | E32-T15YR | E32-T15Y | | |
| | 12 × 7 × 2 | 50 | 130 | | |
| | | E32-T25YR | E32-T25Y | | |
| (flat-view) | 15 × 8 × 3 | 210 | 460 | | |
| | | E32-T15ZR | E32-T15Z | | |
| | 12 × 7 × 2 | 50 | 130 | | |
| | | E32-T25ZR | E32-T25Z | | |

Note 1. The sensing distances apply for use in combination with the E3X-DA-S Amplifier Unit (general-purpose, standard mode).

2. These symbols are defined as follows. R: Flexible fiber, B: Bendable fiber, U: Fluorine-coated fiber.

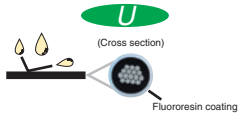
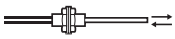
## Standard Models

Overview of Model Variations

### Fiber Units with Reflective Sensors

Sensing distance (mm) (See note 1)

Model

| Type (See note 2.) / Shape of head [For dimensions, refer to page 40.] | | Flexible (New Standard) R Flexible and pliable | Standard | Break-resistant B Withstands repeated bending | Fluorine coating U   Cable protected against oil |
|---|---|---|---|---|---|
| | M6 | 170 | | | |
| | | E32-D11N | | | |
| | M6 | 170 | | | |
| | | E32-C11N | | | |
| | M3 | 25 | | | |
| | | E32-C31N | | | |
| Screw-shaped (top-view) | M6 | 170 | 300 | 170 | 170 |
| | | E32-D11R | E32-DC200 | E32-D11 | E32-D11U |
| | M3 | 30 | 80 | 30 | |
| | | E32-D21R | E32-DC200E | E32-D21 | |
| (with sleeve)  | M6 (2.5-dia. sleeve) | 170 | 300 | | |
| | | E32-DC200BR | E32-DC200B | | |
| | M3 (1.2-dia. sleeve) | 30 | 80 | | |
| | | E32-DC200FR | E32-DC200F | | |
| Cylindrical (top-view)  | 3 dia. | 170 | 230 | 70 | |
| | | E32-D12R | E32-D12 | E32-D221B | |
| | 3 dia. (1.5 dia.) | 30 | 80 | 30 | |
| | | E32-D22R | E32-D22 | E32-D22B | |
| (side-view)  | 6 dia. | 45 | 110 | | |
| | | E32-D14LR | E32-D14L | | |
| | 2 dia. | 15 | 30 | | |
| | | E32-D24R | E32-D24 | | |
| Flat (top-view)  | 15 × 10 × 3 | 170 | 300 | 170 | |
| | | E32-D15XR | E32-D15X | E32-D15XB | |
| | 12 × 7 × 2 | 30 | 80 | 50 | |
| | | E32-D25X | E32-D25X | E32-D25XB | |
| (side-view) | 15 × 10 × 3 | 40 | 100 | | |
| | | E32-D15YR | E32-D15Y | | |
| | 12 × 8 × 2 | 8 | 20 | | |
| | | E32-D25YR | E32-D25Y | | |
| (flat-view) | 15 × 10 × 3 | 40 | 100 | | |
| | | E32-D15ZR | E32-D15Z | | |
| | 12 × 8 × 2 | 8 | 20 | | |
| | | E32-D25ZR | E32-D25Z | | |

Note 1. The sensing distances apply for use in combination with the E3X-DA-S Amplifier Unit (general-purpose, standard mode).

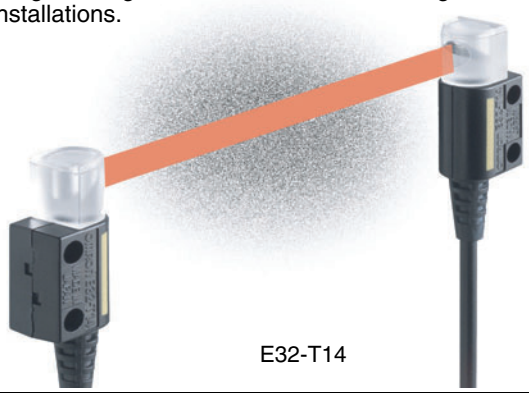
2. These symbols are defined as follows. R : Flexible fiber, B : Bendable fiber, U : Fluorine-coated fiber.

# Features/Applications

## Special-beam Models

### Long Distance, High Power

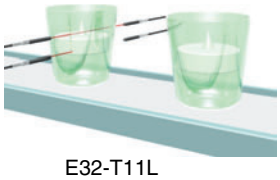
- Powerful beam reduces influence of dust and dirt.
- Long sensing distance enables use in large-scale installations.



E32-T14

■ Applications

Detecting parts inside (translucent) containers



E32-T11L

Detecting workpieces in coating processes

E32-T17L

■ Ratings/Characteristics

| | |
|---|---|
| Ambient temperature range | –40°C to 70°C (no icing or condensation) |
| Fiber material | Plastic (Free-cut) |

■ Overview of Model Variations

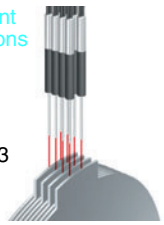
| Type | Features | Shape, sensing distance (mm)* | Model number |
|---|---|---|---|
| Through-beam | Equipped with large lens | 20,000 | E32-T17L |
| | Side-view, screw mounting | 3,400 | E32-T14 |
| | M4 screw | 1,330 | E32-T11L |
| Reflective | Equipped with large lens | 700 | E32-D16 |
| | M6 screw | 400 | E32-D11L |

### Ultracompact, Ultrafine Sleeve

- Ultracompact head can be installed in tight spaces.
- Ultrafine sleeve ensures reliable detection of small objects, such as electronic components.

■ Applications

Alignment inspections



E32-D33

Detection of terminals

E32-T33-S5

■ Ratings/Characteristics

| | |
|---|---|
| Min. sensing object | 0.005-mm dia. |
| Ambient temperature range | –40°C to 70°C (no icing or condensation) |
| Material | Plastic |

■ Overview of Model Variations

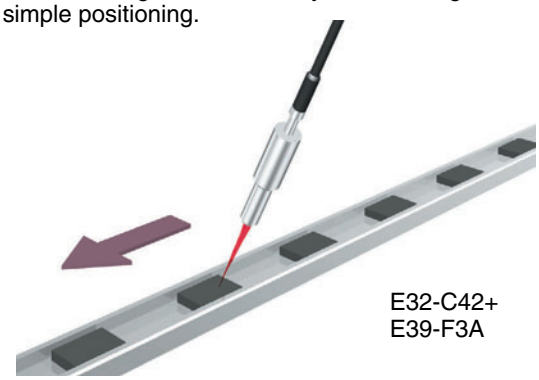
| Type | Features | Shape, sensing distance (mm)* | Model number |
|---|---|---|---|
| Through-beam | 1-dia. cylinder | 130 | E32-T223R |
| | 0.5-dia. sleeve (0.25-dia. opening) | 44 | E32-T33-S5 |
| | 0.22-dia. sleeve (0.1-dia. opening) | 5 | E32-T334-S5 |
| Reflective | 0.8-dia. sleeve | 16 | E32-D33 |
| | 0.5-dia. sleeve | 3 | E32-D331 |

*The sensing distances apply for use in combination with the E3X-DA-S Amplifier Unit (general-purpose, standard mode).

## Special-beam Models

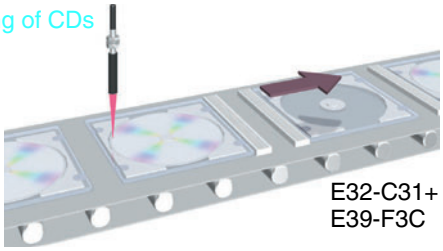
### Coaxial, Small Spot

- Small spot diameter (0.1 mm min. in diameter) enables the reliable detection of small workpieces.
- Use of red light ensures easy visual recognition and simple positioning.




■ Applications

Detecting of CDs



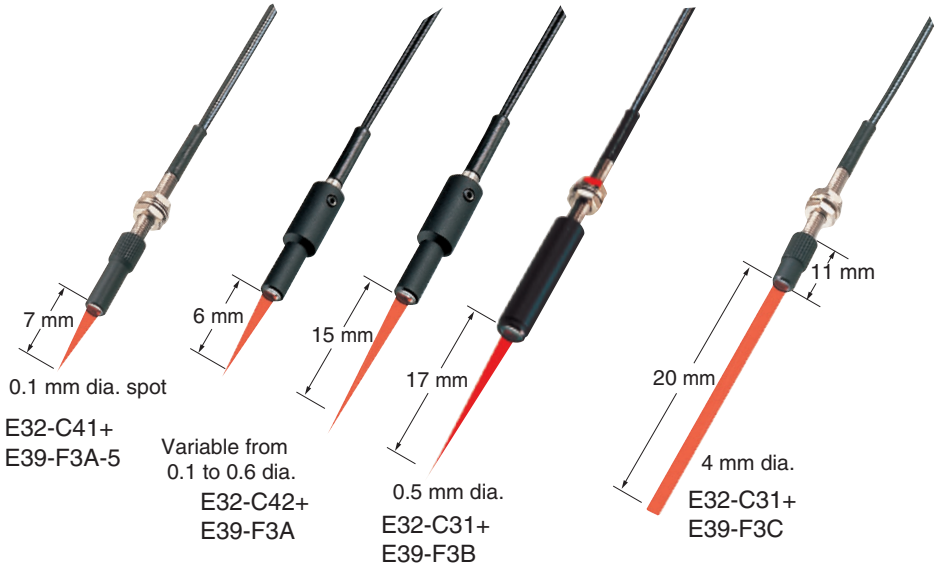

■ Ratings/Characteristics

| | |
|---|---|
| Min. sensing object | 0.005-mm dia. |
| Ambient temperature range | –40°C to 70°C (no icing or condensation) |
| Fiber material | Plastic |

■ Overview of Model Variations

| Type | Features | Shape, sensing distance (mm)* | Model number |
|---|---|---|---|
| Coaxial, reflective | Coaxial, M6 screw | 300 | E32-CC200 |
| | Coaxial, 3-dia. cylinder | 150 | E32-D32L |
| | Small spot | 0.1-dia. spot at a distance of 7 mm | E32-C41+ E39-F3A-5 |
| | Small variable spot | Spot diameter variable in the range 0.1 to 0.6 mm at distances in the range 6 to 15 mm | E32-C42+ E39-F3A |
| | Long distance, small spot | 0.5-dia. spot at 17 mm | E32-C31+ E39-F3B |
| | Long distance, parallel light | Spot diameter of 4 mm max. at distances in the range 0 to 20 mm | E32-C31+ E39-F3C |

*The sensing distances apply for use in combination with the E3X-DA-S Amplifier Unit (general-purpose, standard mode).

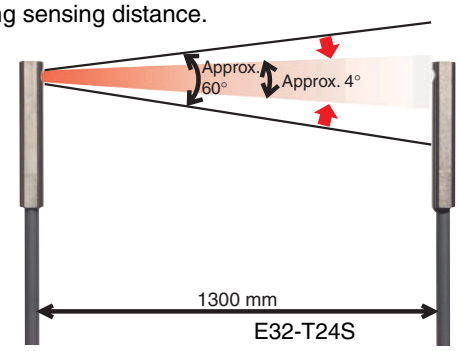


# Features/Applications

## Special-beam Models

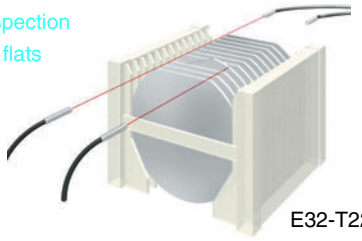
### Fine Beam (Narrow Vision Field)

- Fine beam reduces unwanted light in surrounding area.
- Powerful beam allows use in applications requiring a long sensing distance.




■ Applications

Alignment inspection of orientation flats




■ Ratings/Characteristics

| | |
|---|---|
| Min. bending radius | 10 mm |
| Ambient temperature range | −40°C to 70°C (no icing or condensation) |
| Fiber material | Plastic (Free-cut) |

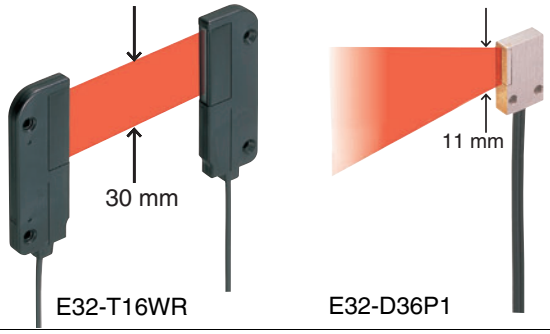
■ Overview of Model Variations

| Type | Features | Shape, sensing distance (mm)* | Model number |
|---|---|---|---|
| Through-beam | Top view | 1,900 | E32-T22S |
| | Side view | 1,300 | E32-T24S |

*The sensing distances apply for use in combination with the E3X-DA-S Amplifier Unit (general-purpose, standard mode).

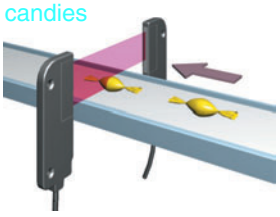
### Area Sensing

- These Fiber Units ensure greater reliability with the detection of position inconsistencies in passing workpieces and the presence of workpieces with holes.
- Wide sensing bands of 11 and 30 mm (through-beam models) enable the detection of large position inconsistencies.

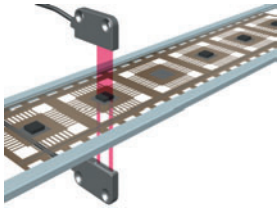



■ Applications

Detecting passage of candies




Detecting chips on film




■ Ratings/Characteristics

| | |
|---|---|
| Ambient temperature range | −40°C to 70°C (no icing or condensation)<br>E32-T16W□ only: −25°C to 55°C |
| Fiber material | Plastic (Free-cut) |

■ Overview of Model Variations

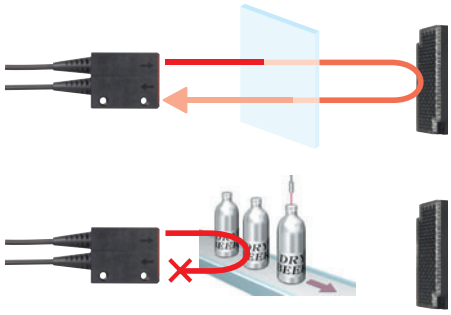
| Type | Features | Shape, sensing distance (mm)* | Model number |
|---|---|---|---|
| Through-beam | Sensing width: 11 mm | 840 | E32-T16PR |
| | Sensing width: 11 mm Flat-view | 750 | E32-T16JR |
| | Sensing width: 30 mm | 1,300 | E32-T16WR |
| Reflective | Beam width: 11 mm | 150 | E32-D36P1 |

*The sensing distances apply for use in combination with the E3X-DA-S Amplifier Unit (general-purpose, standard mode).

## Special-beam Models

### Retroreflective

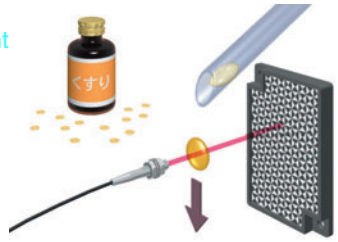
- The return optical path ensures that more light is interrupted by transparent workpieces than with through-beam models.
- Equipped with MSR function to eliminate light reflected directly from the workpiece.



E32-R16

■ Applications

Detecting translucent medicine



E32-R21

■ Ratings/Characteristics

| | |
|---|---|
| Ambient temperature range | E32-R21: –40°C to 70°C<br>E32-R16: –25°C to 55°C<br>(with no icing or condensation) |
| Fiber material | Plastic (Free-cut) |

■ Overview of Model Variations

| Type | Features | Shape, sensing distance (mm)* | Model number |
|---|---|---|---|
| Retroreflective | MSR function, M6 screw | 250 | E32-R21 |
| | MSR function, screw mounting, long distance | 1,500 | E32-R16 |

*The sensing distances apply for use in combination with the E3X-DA-S Amplifier Unit (general-purpose, standard mode).

### Limited-reflective

- Limited-reflective models eliminate light reflected from distant objects.
- Small level differences can be reliably detected.
- The optical-axis direction can be selected according to the installation space.

E32-L24L

■ Applications

Detecting connector pins

E32-L25L

Detecting wafers (glass substrates)

E32-L24L

■ Ratings/Characteristics

| | |
|---|---|
| Min. sensing object | 0.005-mm dia. |
| Fiber material | Plastic (Free-cut)<br>200°C models only: Glass |

■ Overview of Model Variations

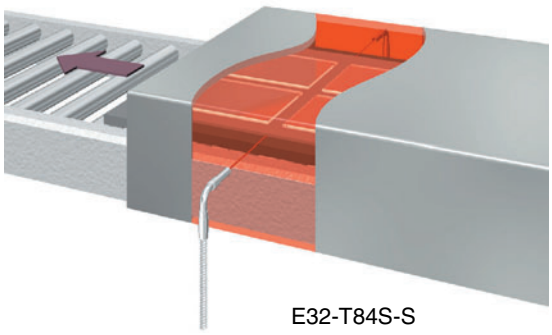
| Type | Features | Shape, sensing distance (mm)* | Model number |
|---|---|---|---|
| Limited-reflective | Ultracompact, flat-view<br>Ideal for checking stocks of glass substrates | 0 to 4 | E32-L24S |
| | Heat-resistant up to 105°C, top-view | 5.4 to 9 (center: 7.2) | E32-L25L |
| | Wide sensing range, flat-view | 0 to 15 | E32-A10 |
| | Heat-resistant up to 200°C, flat-view | 4 to 10 | E32-L86 |

*The sensing distances apply for use in combination with the E3X-DA-S Amplifier Unit (general-purpose, standard mode).

## Environment-resistant Models

### Heat-resistant

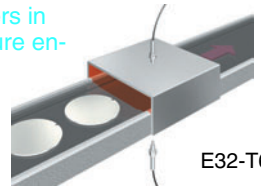
- These Fiber Units can be used for various applications in temperatures up to 400°C.



E32-T84S-S

■ Applications

Detecting wafers in high-temperature environments



E32-T61-S

■ Ratings/Characteristics

| | 150°C models | 200°C and higher models | |
|---|---|---|---|
| | | E32-T81R<br>E32-D81R | All other models |
| Min. bending radius | 35 mm | 10 mm | 25 mm |
| Fiber material | Plastic (Free-cut) (fluororesin coating) | Glass (fluororesin coating) | Glass (SUS spiral coating) |

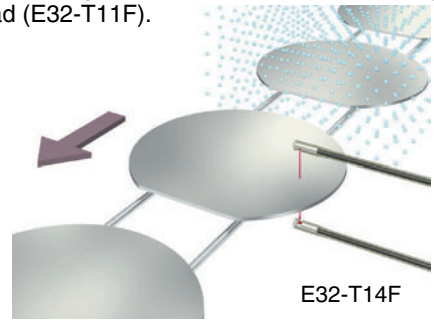
■ Overview of Model Variations

| Type | Ambient temperature range | Features | Shape, sensing distance (mm)*1 | Model number |
|---|---|---|---|---|
| Through-beam | –40°C to 150°C | M4 screw | 760 | E32-T51 |
| | –40°C to 200°C | L-shaped, long distance | 1,300 | E32-T84S-S |
| | –60°C to 350°C | M4 screw | 450 | E32-T61-S |
| Reflective*2 | –60°C to 350°C | M6 screw | 90 | E32-D61-S |
| | –40°C to 400°C | M6 screw, with sleeve | 60 | E32-D73-S |

*1 The sensing distances apply for use in combination with the E3X-DA-S Amplifier Unit (general-purpose, standard mode).
*2 Order the Fiber Unit based on the Amplifier Unit. Use the E32-D□-S if the E3X-DA□-S, E3X-MDA□, or E3X-DAC□-S is used. Use the E32-D□ if any other Amplifier is used.

### Chemical-resistant

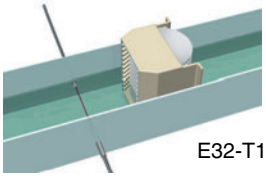
- Built-in lens and high-power beam reduce the influence of dirt and drops of water.
- Round design prevents drops of water sticking to the head (E32-T11F).



E32-T14F

■ Applications

Detecting workpieces in cleaning processes



E32-T12F

■ Ratings/Characteristics

| | All other models | E32-T51F | E32-T81F-S |
|---|---|---|---|
| Ambient temperature range | –40°C to 70°C | –40°C to 150°C | –40°C to 200°C |
| Fiber material | Plastic (Free-cut) (fluororesin coating) | | Glass (fluororesin coating) |

■ Overview of Model Variations

| Type | Features | Shape, sensing distance (mm)* | Model number |
|---|---|---|---|
| Through-beam | Water-resistant round head | 2,000 | E32-T11F |
| | Built-in lens, high power | 3,000 | E32-T12F |
| | Heat-resistant up to 200°C | 700 | E32-T81F-S |
| Reflective*2 | Built-in lens, high power | 95 | E32-D12F |

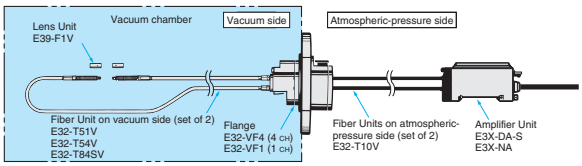
*The sensing distances apply for use in combination with the E3X-DA-S Amplifier Unit (general-purpose, standard mode).

## Environment-resistant Models

### Vacuum-resistant

- These models can be used in high-vacuum environments at pressures from $10^{-5}$ to 0.1 Pa.
- The 4-channel multi-flange, which has a maximum leakage rate of $1\times10^{-10}$ Pa·m³/s, contributes to space savings.

■ Applications (Configuration Example)




■ Ratings/Characteristics

| | 120°C models | 200°C models | Atmospheric-pressure side |
|---|---|---|---|
| Min. bending radius | 30 mm | 25 mm | |
| Fiber material | Glass (fluororesin coating) | Glass (SUS spiral coating) | Plastic (Free-cut) |

■ Overview of Model Variations

| Type | Features | Shape, sensing distance (mm)* | Model number |
|---|---|---|---|
| Through-beam | M4 screw, top-view, heat-resistant up to 120°C, long distance | 1,000 | E32-T51V+ E39-F1V |
| | L-shaped, heat-resistant up to 120°C | 130 | E32-T54V 1M |
| | L-shaped, long distance, heat-resistant up to 200°C | 480 | E32-T84SV 1M |

*The sensing distances apply for use in combination with the E3X-DA-S Amplifier Unit (general-purpose, standard mode).

Fiber Units on Atmospheric-pressure Side

| Appearance | Type | Model number |
|---|---|---|
| | Common | E32-T10V 2M |

Flanges

| Appearance | Type | Model number |
|---|---|---|
| | 4-channel flange | E32-VF4 |
| | 1-channel flange | E32-VF1 |

■ Ratings/Characteristics

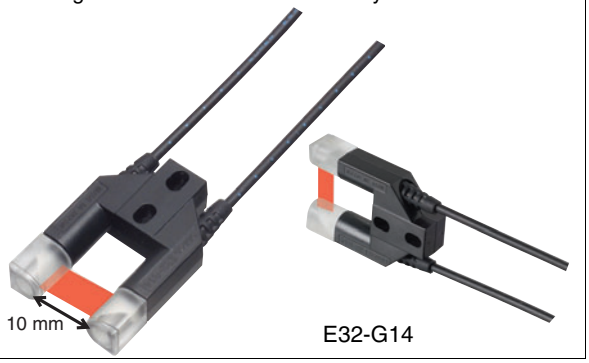
| Item \ Number of channels / Model | 4 channels | 1 channels |
|---|---|---|
| | E32-VF4 | E32-VF1 |
| Leakage rate | $1\times10^{-10}$ Pa·m³/s max. | |
| Ambient temperature range | Operating: –25°C to 55°C<br>Storage: –25°C to 55°C | |
| Material | Aluminum (A5056) | Stainless steel (SUS304)<br>Aluminum (A5056) |
| Flange-seal material | Fluorocarbon rubber (Viton) | |
| Weight (packed state) | Approx. 280 g | Approx. 240 g |

# Features/Application

## Application-corresponding Models

### Label Detection

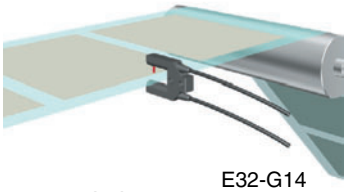
- Built-in lens and high-power beam enable the reliable detection of labels through a mounting board.
- These Fiber Units can be washed with hydrogen peroxide, making them ideal for the food industry.




E32-G14

■ Applications

Detecting labels



E32-G14

■ Ratings/Characteristics

| | |
|---|---|
| Ambient temperature range | –40°C to 70°C (no icing or condensation) |
| Fiber material | Plastic (Free-cut) |
| Degree of protection | IP67 |

■ Overview of Model Variations

| Type | Features | Shape, sensing distance (mm)* | Model number |
|---|---|---|---|
| Through-beam | Slot sensor, no adjustment of optical axis required | 10 | E32-G14 |
| | Screw mounting, side-view | 3,400 | E32-T14 |

*The sensing distances apply for use in combination with the E3X-DA-S Amplifier Unit (general-purpose, standard mode).

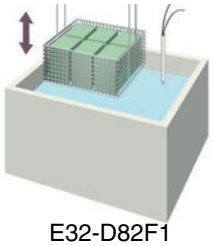
### Liquid-level Detection

- Area sensing is possible with minimal influence from bubbles and drops of water (E32-A01/A02/D36T).
- For safety when disconnections occur, two models have been developed, a light ON model for liquid presence and a light ON model for liquid absence (E32-A01/A02).

Tube-mounting model

E32-D36T

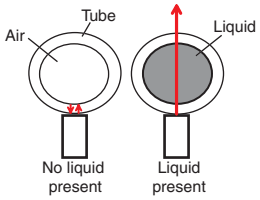
Liquid-contact model



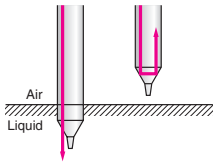
E32-D82F1

■ Operating Principle

Tube-mounting




Liquid-contact model




The presence/absence of liquid is detected using the refractive properties of light. More specifically, it utilizes the fact that the difference in refractive index between the air and the tip/tube is larger than the difference between the liquid and the tip/tube.

■ Overview of Model Variations

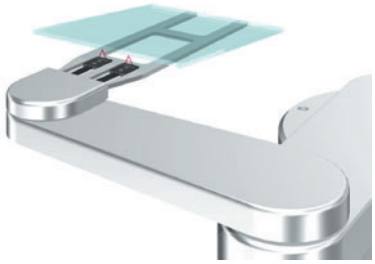
| Type | Features | Shape, sensing distance (mm)* | Model number |
|---|---|---|---|
| Tube-mounting | Light ON when liquid is present (ideal for checking lower limits) | Applicable tube: Transparent tube with a diameter of 3.2, 6.4, or 9.5 mm and a recommended wall thickness of 1 mm | E32-A01 |
| | Light ON when liquid is absent (ideal for checking for overflow) | Applicable tube: Transparent tube with a diameter in the range 6 to 13 mm and a recommended wall thickness of 1 mm | E32-A02 |
| | No restriction on tube diameter, resistant to bubbles and drops of water | Applicable tube: Transparent tube (no restriction on diameter) | E32-D36T |
| Liquid-contact | Heat-resistant up to 200°C, shape prevents liquid buildup | Liquid-contact model | E32-D82F1 |

*The sensing distances apply for use in combination with the E3X-DA-S Amplifier Unit (general-purpose, standard mode).

## Application-corresponding Models

### Glass-substrate Alignment

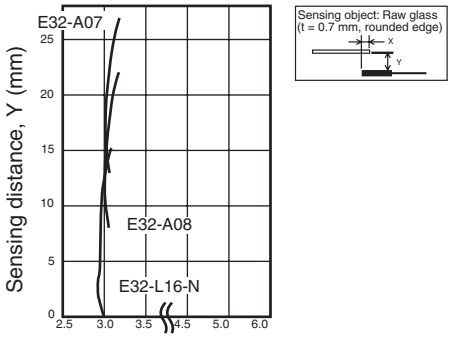
- There is little variation of detection position within the detection range (±0.1 mm max.)
- The different model variations can handle a variety of sensing distances and temperature conditions.



E32-L16-N

■ Engineering Data (E32-A07/A08/L16-N)

Detection-Position Characteristic (Typical Examples)



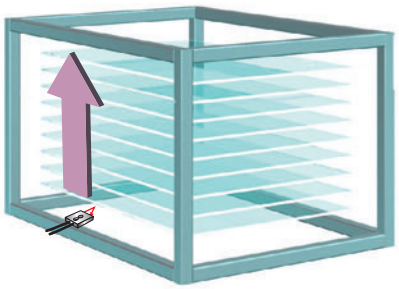

■ Overview of Model Variations

| Type | Features | Shape, sensing distance (mm)* | Model number |
|---|---|---|---|
| Limited-reflective | 0 to 15 mm, wide-range sensing | 0 to 15 | E32-L16-N |
| | Long-distance sensing | 10 to 20 | E32-A08 |
| | | 15 to 25 | E32-A07E1<br>E32-A07E2 |
| | Heat-resistant up to 300°C | 5 to 18 | E32-L66 |

*The sensing distances apply for use in combination with the E3X-DA-S Amplifier Unit (general-purpose, standard mode).

### Glass-substrate Mapping

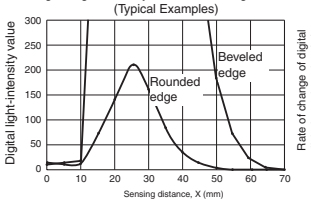
- These models can reliably detect thin glass-substrate end faces (t = 0.5 mm, beveled edge).
- Using a large-diameter lens makes it possible to cope with tilting of the glass substrates.



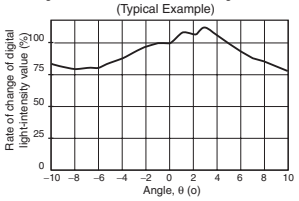
E32-A09

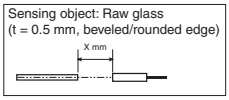
■ Engineering Data (E32-A09)

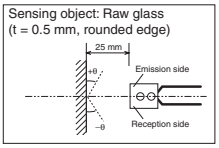
Digital Light-intensity Value vs Sensing Distance (Typical Examples)




Angle Characteristics in Left and Right Directions (Typical Example)




■ Overview of Model Variations

| Type | Features | Shape, sensing distance (mm)* | Model number |
|---|---|---|---|
| Limited-reflective | Large-diameter lens ensures resistance to tilting | 15 to 38 (center: 25) | E32-A09 |
| | Heat-resistant up to 150°C | | E32-A09H |
| | Heat-resistant up to 300°C | 20 to 30 (center: 25) | E32-A09H2 |

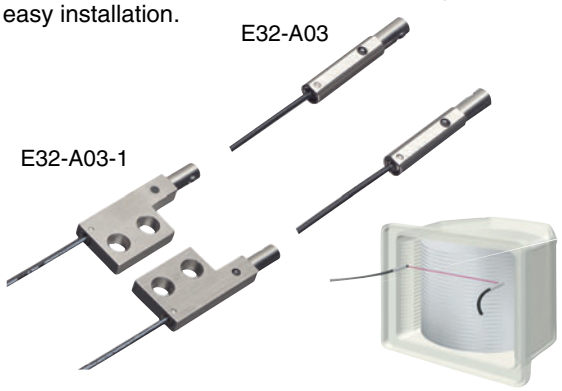
*The sensing distances apply for use in combination with the E3X-DA-S Amplifier Unit (general-purpose, standard mode).

# Features/Applications

## Application-corresponding Models

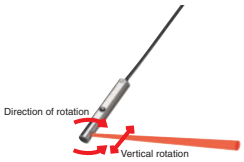
### Wafer Mapping

- Wafers are reliable detected with an ultrafine beam.
- The optical axis is adjusted before delivery to allow easy installation.

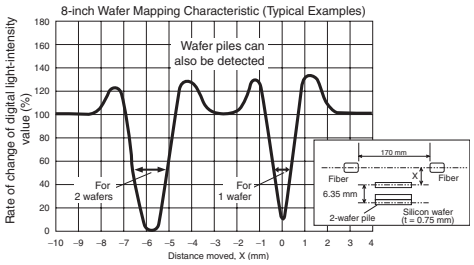



■ Features

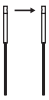
Optical axis adjusted before delivery so that displacement is typically within 0.1°.




■ Engineering Data




■ Overview of Model Variations

| Type | Features | | Shape, sensing distance (mm)* | Model number |
|---|---|---|---|---|
| Through-beam | Opening angle: 1.5° | | 890 | E32-A03 |
| | | With mounting flange | | E32-A03-1 |
| | Opening angle: 3° ultraslim | |  340 | E32-A04 |
| | | With mounting flange | | E32-A04-1 |

*The sensing distances apply for use in combination with the E3X-DA-S Amplifier Unit (general-purpose, standard mode).

# Ordering Information

## Through-beam Fiber Units | Standard models

High-resolution mode | Standard mode | High-speed mode (Super-high-speed mode)

*When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

| Type | Appearance (mm) *2 | Dimensions page | Sensing distance (mm) | Standard object (min. sensing object) (mm) *1 | Min. bending radius (mm) | Features | Model number |
|---|---|---|---|---|---|---|---|
| Flexible (new standard) | Standard size | 40 | 700 / 530 / 350 (140) | 1 dia. (0.005 dia.) | R1 | M4 right angle | E32-T11N |
| | | 40 | | | | M4 screw | E32-T11R |
| | | 40 | | | | 3-dia. cylinder | E32-T12R |
| | | 40 | | | | Flat shape | E32-T15XR |
| | | 40 | | | | M4 screw, with sleeve | E32-TC200BR<br>E32-TC200B4R |
| | | 40 | | | | 3-dia. cylinder, side-view | E32-T14LR |
| | | 41 | 270 / 210 / 130 (50) | | | Flat shape, side-view | E32-T15YR |
| | | 41 | | | | Flat shape, flat-view | E32-T15ZR |
| | Small size | 40 | 160 / 130 / 75 (30) | 0.5 dia. (0.005 dia.) | | M3 screw (small) | E32-T21R |
| | | 40 | | | | 2-dia. cylinder (small) | E32-T22R |
| | | 40 | | | | 1.5-dia. cylinder (small) | E32-T222R |
| | | 40 | | | | Flat shape (small) | E32-T25XR |
| | | 40 | | | | M3 screw (small), with sleeve | E32-TC200FR<br>E32-TC200F4R |
| | | 41 | 60 / 50 / 25 (10) | | | 1-dia. cylinder (small), side-view | E32-T24R |
| | | 41 | | | | Flat shape (small), side-view | E32-T25YR |
| | | 41 | | | | Flat shape (small), flat-view | E32-T25ZR |

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

*2. Free-cut Indicates models that allow free cutting.

R Flexible B Break-resistant U Fluororesin coating

## Through-beam Fiber Units Standard models

High-resolution mode | Standard mode | High-speed mode (Super-high-speed mode)

*When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

| Type | Appearance (mm) *2 | Dimensions page | Sensing distance (mm) | Standard object (min. sensing object) (mm) *1 | Min. bending radius (mm) | Features | Model number |
|---|---|---|---|---|---|---|---|
| Standard | Standard size | 40 | 1,000 / 760 / 500 (200) | 1 dia. (0.005 dia.) | R25 | M4 screw | E32-TC200 |
| | | 40 | | | | 3-dia. cylinder | E32-T12 |
| | | 40 | | | | Flat shape | E32-T15X |
| | | 40 | | | | M4 screw, with sleeve | E32-TC200B<br>E32-TC200B4 |
| | | 40 | | | | 3-dia. cylinder, side-view | E32-T14L |
| | | 41 | 600 / 460 / 300 (120) | | | Flat shape, side-view | E32-T15Y |
| | | 41 | | | | Flat shape, flat-view | E32-T15Z |
| | Small size | 40 | 900 / 680 / 450 (180) | | | M3 screw (small) | E32-TC200A |
| | | 40 | | 0.5 dia. (0.005 dia.) | R10 | | E32-TC200E |
| | | 40 | | | | 2-dia. cylinder (small) | E32-T22 |
| | | 40 | 270 / 220 / 125 (50) | | | 1.5-dia. cylinder (small) | E32-T222 |
| | | 40 | | | | Flat shape (small) | E32-T25X |
| | | 40 | | | | M3 screw (small), with sleeve | E32-TC200F<br>E32-TC200F4 |
| | | 41 | 160 / 130 / 75 (30) | | | 1-dia. cylinder (small), side-view | E32-T24 |
| | | 41 | | | | Flat shape (small), side-view | E32-T25Y |
| | | 41 | | | | Flat shape (small), flat-view | E32-T25Z |

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

*2. Free-cut Indicates models that allow free cutting.

R Flexible B Break-resistant U Fluororesin coating

## Standard models

High-resolution mode | Standard mode | High-speed mode (Super-high-speed mode)

*When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

| Type | | Appearance (mm) *2 | Dimensions page | Sensing distance (mm) | Standard object (min. sensing object) (mm) *1 | Min. bending radius (mm) | Features | Model number |
|---|---|---|---|---|---|---|---|---|
| Break-resistant | Standard size | Free-cut M4 | 42 | 900 / 680 / 450 (180) | 1 dia (0.005 dia.) | R4 (B) | M4 screw | E32-T11 |
| | | Free-cut 3 dia. | 42 | | | | 3-dia. cylinder | E32-T12B |
| | | Free-cut 15 × 8 × 3 | 42 | | | | Flat shape | E32-T15XB |
| | Small size | Free-cut M3 | 42 | 240 / 200 / 110 (45) | 0.5 dia (0.005 dia.) | | M3 screw (small) | E32-T21 |
| | | Free-cut 2 dia. | 42 | | | | 2-dia. cylinder (small) | E32-T221B |
| | | Free-cut 1.5 dia. | 42 | | | | 1.5-dia. cylinder (small) | E32-T22B |
| | | Free-cut 12 × 7 × 2 | 42 | 180 / 150 / 85 (35) | | | Flat shape (small) | E32-T25XB |
| Coating | | Free-cut M4 | 42 | 900 / 680 / 450 (180) | 1 dia. (0.005 dia.) | U R4 | M4 screw, fluorine coating | E32-T11U |

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

*2. Free-cut Indicates models that allow free cutting.

R Flexible B Break-resistant U Fluororesin coating

## Through-beam Fiber Units | Special-beam models

High-resolution mode | Standard mode | High-speed mode (Super-high-speed mode) | *When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

| Type | Appearance (mm) *2 | Dimensions page | Sensing distance (mm) | Standard object (min. sensing object) (mm) *1 | Min. bending radius (mm) | Features | Model number |
|---|---|---|---|---|---|---|---|
| Long-distance, high-power | Free-cut M14 | 43 | 20,000*3<br>20,000*3<br>10,000 (4,000) | 10 dia. | R25 | Large built-in lens, M14 screw | E32-T17L |
| | Free-cut M4 | 40<br>60 | 4,000<br>3,700<br>2,400<br>(970) | 4 dia. (0.1 dia.) | R R1 | M4 right angle | E32-T11N+<br>E39-F1 |
| | | 40<br>60 | 4,000*4<br>4,000*4<br>2,600 (1,500) | | R25 | M4 screw | E32-TC200+<br>E39-F1 |
| | Free-cut M4 | 40<br>60 | 4,000*4<br>3,700<br>2,400 (970) | | R R1 | M4 screw, flexible fiber | E32-T11R+<br>E39-F1 |
| | | 42<br>60 | 4,000*4<br>3,600<br>2,300 (930) | | B R4 | M4 screw, break-resistant | E32-T11+<br>E39-F1 |
| | Free-cut | 43 | 4,000*4<br>3,400<br>2,250 (900) | | R25 | Screw mounting, side-view | E32-T14 |
| | Free-cut M4 | 43 | 1,700<br>1,330<br>870 (350) | 1.4 dia.<br>(0.01 dia.) | | M4 screw | E32-T11L |
| | Free-cut 3 dia. | 43 | | | | 3-dia. cylinder | E32-T12L |
| | Free-cut M4 | 43<br>60 | 910<br>800<br>500 (180) | 3 dia. (0.1 dia.) | R25 | M4 screw, side-view | E32-T11L+<br>E39-F2 |
| | | 40<br>60 | 520<br>400<br>250 (100) | | R R1 | M4 screw, side-view, flexible fiber | E32-T11R+<br>E39-F2 |
| | | 42<br>60 | 820<br>660<br>430 (160) | | B R4 | M4 screw, side-view, break-resistant | E32-T11+<br>E39-F2 |
| | Free-cut M3 | 43 | 540<br>440<br>250 (100) | 0.9 dia.<br>(0.005 dia.) | R10 | M3 screw (small) | E32-T21L |
| | Free-cut 2 dia. | 43 | | | | 2-dia. cylinder (small) | E32-T22L |

*1. The values for the minimum sensing object are representative values that indicate values obtained in standard mode with the sensing distance and sensitivity set to optimum values.
*2. Free-cut Indicates models that allow free cutting.
*3. The optical fiber is 10 m long on each side, so the sensing distance is 20,000 mm.
*4. The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.

R Flexible B Break-resistant U Fluororesin coating

## Special-beam models

High-resolution mode | Standard mode | High-speed mode (Super-high-speed mode)

*When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

| Type | Appearance (mm) *2 | Dimensions page | Sensing distance (mm) | Standard object (min. sensing object) (mm)*1 | Min. bending radius (mm) | Features | Model number |
|---|---|---|---|---|---|---|---|
| Ultracompact, thin-sleeve | Free-cut<br>1 dia. | 44 | 160<br>130<br>75 (30) | 0.5 dia. (0.005 dia.) | R<br>R1 | 1-dia. cylinder, flexible fiber | E32-T223R |
| | Free-cut<br>3 dia. 0.5 dia.<br>Sleeve cannot be bent. | 44 | 53<br>44<br>25 (10) | 0.25 dia. (0.005 dia.) | R10 | 0.5-dia. sleeve; 0.25-dia. opening | E32-T33-S5 |
| | 3 dia. 0.25 dia.<br>Sleeve cannot be bent. | 44 | 12<br>10<br>6 (4) | 0.125 dia. (0.005 dia.) | | 0.25-dia. sleeve, 0.125-dia. opening | E32-T333-S5 |
| | 3 dia. 0.22 dia.<br>Sleeve cannot be bent. | 44 | 6<br>5<br>3 (2) | 0.1 dia. (0.005 dia.) | | 0.22-dia. sleeve, 0.1-dia. opening | E32-T334-S5 |
| Fine-beam | Free-cut<br>3 dia. | 44 | 2,500<br>1,900<br>1,250 (500) | 1.7 dia. (0.1 dia.) | R10 | 3-dia. cylinder | E32-T22S |
| | Free-cut<br>3.5 dia. | 44 | 1,750<br>1,300<br>870 (350) | 2 dia. (0.1 dia.) | | 3.5-dia. cylinder, side-view | E32-T24S |
| Area-sensing | Free-cut<br>11 | 45 | 1,100<br>840<br>560 (220) | (0.2 dia.) *3 | R<br>R1 | Area width: 11 mm | E32-T16PR |
| | | 45 | 1,500<br>1,100<br>750 (300) | | R10 | | E32-T16P |
| | Free-cut<br>11 | 45 | 980<br>750<br>480 (190) | | R<br>R1 | Area width: 11 mm; side-view | E32-T16JR |
| | | 45 | 1,300<br>1,000<br>650 (260) | | R10 | | E32-T16J |
| | Free-cut<br>30 | 44 | 1,700<br>1,300<br>850 (340) | (0.3 dia.) *3 | R<br>R1 | Area width: 30 mm | E32-T16WR |
| | | 44 | 2,300<br>1,800<br>1,150 (450) | | R10 | | E32-T16W |
| | Free-cut<br>10 | 45 | 3,700<br>2,800<br>1,850 (740) | (0.6 dia.) *4 | R25 | Area width: 10 mm; long distance | E32-T16 |
| | M3 | 44 | 750<br>610<br>350 (140) | 2 dia. (0.1 dia) | | Multi-point detection (4-head) | E32-M21 |

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

*2. Free-cut Indicates models that allow free cutting.

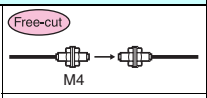
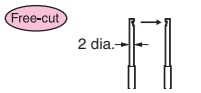
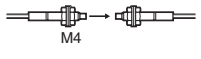
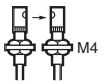
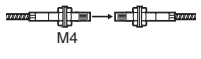
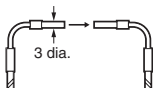
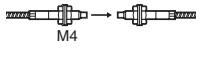
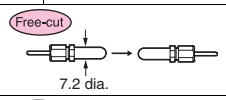
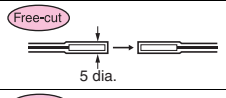
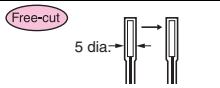
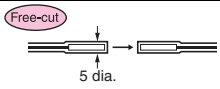
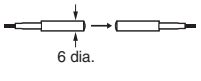
*3. This is the value for which detection is possible within the sensing area, with the sensing distance set to 300 mm. (The sensing object is stationary.)

*4. This is the value for which detection is possible within the sensing area, with the sensing distance set to give a digital value of 1,000. (The sensing object is stationary.)

## Through-beam Fiber Units | Environment-resistant models

High-resolution mode | Standard mode | High-speed mode (Super-high-speed mode)

*When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

| Type | Appearance (mm) *2 | Dimensions page | Sensing distance (mm) | Standard object (min. sensing object) (mm)*1 | Min. bending radius (mm) | Features | Model number |
|---|---|---|---|---|---|---|---|
| Heat-resistant | 150°C *5   | 46 | 1,000<br>760<br>500 (200) | 1.5 dia. (0.1 dia.) | R35 | Heat-resistant up to 150°C | E32-T51 |
| |   | 46 | 300<br>230<br>150 (60) | | | Heat-resistant up to 150°C; side-view | E32-T54 |
| | 200°C *6   | 46 | 360<br>280<br>180 (70) | 1 dia. (0.005 dia.) | R10 | Heat-resistant up to 200°C | E32-T81R-S |
| |   | 46<br>60 | 600<br>450<br>300 (120) | 3 dia. (0.1 dia.) | R25 | Heat-resistant up to 200°C; side-view | E32-T61-S+ E39-F2 |
| |   | 46<br>60 | 4,000*7<br>3,400<br>2,200 (900) | 4 dia. (0.1 dia.) | | Heat-resistant up to 200°C, long distance | E32-T61-S+ E39-F1 |
| |   | 46 | 1,750<br>1,300<br>870 (350) | 1.7 dia. (0.1 dia) | | Heat-resistant up to 200°C; L-shaped; long distance | E32-T84S-S |
| | 350°C *6   | 46 | 600<br>450<br>300 (120) | 1 dia. (0.005 dia.) | | Heat-resistant up to 350°C | E32-T61-S |
| Chemical-resistant |   | 46 | 2,500<br>2,000<br>1,300 (520) | 4 dia. (0.1 dia.) | R4 | Fluororesin cover, round head | E32-T11F |
| |   | 46 | 4,000*7<br>3,000<br>2,000 (800) | | R40 | Fluororesin cover, long distance | E32-T12F |
| |   | 46 | 500<br>400<br>250 (100) | 3 dia. (0.1 dia.) | | Fluororesin cover, side-view | E32-T14F |
| |   | 46 | 1,800<br>1,400<br>900 (350) | 4 dia. (0.1 dia.) | | Fluororesin cover, heat-resistant up to 150°C *5 | E32-T51F |
| |   | 46 | 920<br>700<br>460 (190) | 1 dia. (0.005 dia.) | R10 | Fluororesin cover, heat-resistant up to 200°C *6 | E32-T81F-S |

*1. The values for the minimum sensing object are representative values that indicate values obtained in standard mode with the sensing distance and sensitivity set to optimum values.
*2. Free-cut Indicates models that allow free cutting.
*3. This is the value for which detection is possible within the sensing area, with the sensing distance set to 300 mm. (The sensing object is stationary.)
*4. This is the value for which detection is possible within the sensing area, with the sensing distance set to give a digital value of 1,000. (The sensing object is stationary.)
*5. For continuous operation, use the products within a temperature range of–40°C to 130°C.
*6. The maximum temperature that can be withstood varies with the location. Refer to dimensions diagrams for details.
*7. The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.

## Environment-resistant models

High-resolution mode  Standard mode  High-speed mode (Super-high-speed mode)  *When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

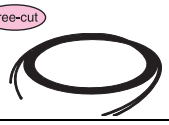
| Type | Appearance (mm) | Dimensions page | Sensing distance (mm) | Standard object (min. sensing object) (mm) * | Min. bending radius (mm) | Features | Model number |
|---|---|---|---|---|---|---|---|
| Vacuum-resistant | | 47 | 260<br>200<br>130 (50) | 1.2 dia. (0.01 dia.) | R30 | M4 screw, heat-resistant up to 120°C | E32-T51V 1M |
| | | 47<br>47 | 1,350<br>1,000<br>680 (260) | 4 dia. (0.1 dia.) | | M4 screw, heat-resistant up to 120°C, long distance | E32-T51V 1M+ E39-F1V |
| | | 47 | 210<br>130<br>100 (35) | 1.2 dia. (0.01 dia.) | | L-shaped, heat-resistant up to 120°C | E32-T54V 1M |
| | | 47<br>47 | 660<br>500<br>330 (180) | 4 dia. (0.1 dia.) | | L-shaped, heat-resistant up to 120°C, long distance | E32-T54V 1M+ E39-F1V |
| | | 47 | 630<br>480<br>320 (130) | 2 dia. (0.1 dia.) | R25 | L-shaped, heat-resistant up to 200°C, long distance | E32-T84SV 1M |

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

### Flanges

| Appearance (mm) | Dimensions page | Type | Model number |
|---|---|---|---|
| | 47 | 4-channel flange | E32-VF4 |
| | 47 | 1-channel flange | E32-VF1 |

### Fiber Units for Atmospheric-pressure Side

| Appearance (mm) | Dimensions page | Type | Model number |
|---|---|---|---|
| Free-cut  | 47 | Amplifier-Flange Connection Fiber | E32-T10V 2M |

* Free-cut Indicates models that allow free cutting.

### Lens Units

| Appearance (mm) | Dimensions page | Type | Quantity | Remarks |
|---|---|---|---|---|
| | 47 | E39-F1V | 2 | Long-distance Lens Unit<br>Can be used for the E32-T51V and the E32-T54V. |

### Mounting Brackets

| Appearance (mm) | Dimensions page | Type | Quantity | Remarks |
|---|---|---|---|---|
| | 47 | E39-L54V | 2 | Can be used for the E32-T54V. |

## Fiber Units with Reflective Sensors — Standard models

High-resolution mode | Standard mode | High-speed mode (Super-high-speed mode) | *When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

| Type | Appearance (mm) *3 | Dimensions page | Sensing distance (mm) *1 | (Min. sensing object) (mm) *2 | Min. bending radius (mm) | Features | Model number |
|---|---|---|---|---|---|---|---|
| Flexible (new standard) | Standard size: Free-cut, M6 | 48 | 300 / 170 / 120 (50) | (0.005 dia.) | R1 | M6 right angle | E32-D11N |
| | Free-cut, M6 | 48 | | | | M6 screw | E32-D11R |
| | Free-cut, 3 dia. | 48 | | | | 3-dia. cylinder | E32-D12R |
| | Free-cut, 15 × 10 × 3 | 48 | | | | Flat shape | E32-D15XR |
| | Free-cut, Sleeve cannot be bent. M6 2.5 dia. | 48 | | | | M6 screw, with sleeve | E32-DC200BR<br>E32-DC200B4R |
| | Free-cut, 6 dia. | 49 | 80 / 45 / 30 (14) | | | 6-dia. cylinder, side-view | E32-D14LR |
| | Free-cut, 15 × 10 × 3 | 49 | 70 / 40 / 26 (12) | | | Flat shape, side-view | E32-D15YR |
| | Free-cut, 15 × 10 × 3 | 49 | | | | Flat shape, flat-view | E32-D15ZR |
| | Small size: Free-cut, M4 | 48 | 50 / 30 / 20 (8) | | | M4 screw (small) | E32-D211R |
| | Free-cut, M3 | 48 | | | | M3 screw (small) | E32-D21R |
| | Free-cut, 3 dia. | 48 | | | | 3-dia. cylinder (small) | E32-D22R |
| | Free-cut, 12 × 8 × 3 | 48 | | | | Flat panel (small) | E32-D25XR |
| | Free-cut, Min. bending radius of sleeve: 5 M3 1.2 dia. | 48 | | | | M3 screw (small), with sleeve | E32-DC200FR<br>E32-DC200F4R |
| | Free-cut, 2 dia. | 49 | 26 / 15 / 10 (4) | | | 2-dia. cylinder (small), side-view | E32-D24R |
| | Free-cut, 12 × 8 × 2 | 49 | 14 / 8 / 5 (2) | | | Flat shape (small), side-view | E32-D25YR |
| | Free-cut, 12 × 8 × 2 | 49 | | | | Flat shape (small), flat-view | E32-D25ZR |

*1. The sensing distances are for white paper.
*2. The values for the minimum sensing object are representative values that indicate values obtained in standard mode with the sensing distance and sensitivity set to optimum values.
*3. (Free-cut) Indicates models that allow free cutting.

(R) Flexible (B) Break-resistant (U) Fluororesin coating

## Standard models

High-resolution mode  Standard mode  High-speed mode (Super-high-speed mode)  *When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

| Type | Appearance (mm) *3 | Dimensions page | Sensing distance (mm) *1 | (Min. sensing object) (mm) *2 | Min. bending radius (mm) | Features | Model number |
|---|---|---|---|---|---|---|---|
| Standard | Standard size | 48 | 500<br>300<br>200 (90) | (0.005 dia.) | R25 | M6 screw | E32-DC200 |
| | | 48 | 400<br>230<br>160 (70) | | | 3-dia. cylinder | E32-D12 |
| | | 48 | 500<br>300<br>200 (90) | | | Flat shape | E32-D15X |
| | | 48 | | | | M6 screw, with sleeve | E32-DC200B<br>E32-DC200B4 |
| | | 49 | 200<br>110<br>80 (36) | | | 6-dia. cylinder, side-view | E32-D14L |
| | | 49 | 170<br>100<br>65 (30) | | | Flat shape, side-view | E32-D15Y |
| | | 49 | | | | Flat shape, flat-view | E32-D15Z |
| | Small size | 48 | 130<br>80<br>50 (22) | | R10 | M4 screw (small) | E32-D211 |
| | | 48 | | | | M3 screw (small) | E32-DC200E |
| | | 48 | | | | 3-dia. cylinder (small) | E32-D22 |
| | | 48 | | | | Flat shape (small) | E32-D25X |
| | | 48 | | | | M3 screw (small), with sleeve | E32-DC200F<br>E32-DC200F4 |
| | | 49 | 50<br>30<br>20 (8) | | | 2-dia. cylinder (small), side-view | E32-D24 |
| | | 49 | 35<br>20<br>12 (6) | | | Flat shape (small), side-view | E32-D25Y |
| | | 49 | | | | Flat shape (small), flat-view | E32-D25Z |

*1. The sensing distances are for white paper.
*2. The values for the minimum sensing object are representative values that indicate values obtained in standard mode with the sensing distance and sensitivity set to optimum values.
*3. Free-cut Indicates models that allow free cutting.

R Flexible  B Break-resistant  U Fluororesin coating

## Fiber Units with Reflective Sensors — Standard models

High-resolution mode | Standard mode | High-speed mode (Super-high-speed mode)

*When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

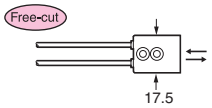
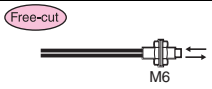
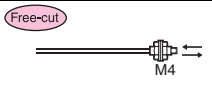
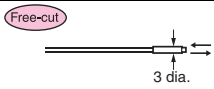
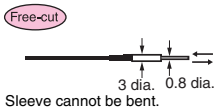
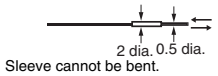
| Type | Appearance (mm) *3 | Dimensions page | Sensing distance (mm) *1 | (Min. sensing object) (mm) *2 | Min. bending radius (mm) | Features | Model number |
|---|---|---|---|---|---|---|---|
| Break-resistant | Standard size | 50 | 300 / 170 / 120 (50) | (0.005 dia.) | B R4 | M6 screw | E32-D11 |
| | | 50 | | | | Flat shape | E32-D15XB |
| | Small size | 50 | 110 / 70 / 45 (20) | | | M4 screw (small) | E32-D21B |
| | | 50 | | | | 3-dia. cylinder (small) | E32-D221B |
| | | 50 | 50 / 30 / 20 (8) | | | M3 screw (small) | E32-D21 |
| | | 50 | | | | 1.5-dia. cylinder (small) | E32-D22B |
| | | 50 | 85 / 50 / 30 (15) | | | Flat shape (small) | E32-D25XB |
| Coating | | 50 | 300 / 170 / 120 (50) | (0.005 dia.) | U R4 | M6 screw, fluorine coating | E32-D11U |

*1. The sensing distances are for white paper.
*2. The values for the minimum sensing object are representative values that indicate values obtained in standard mode with the sensing distance and sensitivity set to optimum values.
*3. Free-cut Indicates models that allow free cutting.

R Flexible B Break-resistant U Fluororesin coating

## Special-beam models

High-resolution mode  Standard mode  High-speed mode (Super-high-speed mode)  *When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

| Type | Appearance (mm) *3 | Dimensions page | Sensing distance (mm) *1 | (Min. sensing object) (mm) *2 | Min. bending radius (mm) | Features | Model number |
|---|---|---|---|---|---|---|---|
| Long-distance, high-power | Free-cut   | 51 | 40 to 1,000<br>40 to 700<br>40 to 450 (40 to 240) | --- | B<br>R4 | Large built-in lens, screw mounting | E32-D16 |
| | Free-cut   | 51 | 650<br>400<br>260 (110) | (0.005 dia.) | R25 | M6 screw | E32-D11L |
| | Free-cut   | 51 | 210<br>130<br>80 (35) | | R10 | M4 screw | E32-D21L |
| | Free-cut   | 51 | | | | 3-dia. cylinder | E32-D22L |
| Ultracompact, thin-sleeve | Free-cut   Sleeve cannot be bent. | 51 | 25<br>16<br>10 (4) | | R4 | 0.8-dia. sleeve | E32-D33 |
| |   Sleeve cannot be bent. | 51 | 5<br>3<br>2 (0.8) | | | 0.5-dia. sleeve | E32-D331 |

*1. The sensing distances are for white paper.
*2. The values for the minimum sensing object are representative values that indicate values obtained in standard mode with the sensing distance and sensitivity set to optimum values.
*3. Free-cut Indicates models that allow free cutting.

## Fiber Units with Reflective Sensors — Special-beam models

High-resolution mode | Standard mode | High-speed mode (Super-high-speed mode)

*When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

| Type | Appearance (mm) *3 | Dimensions page | Sensing distance (mm) *1 | (Min. sensing object) (mm) *2 | Min. bending radius (mm) | Features | Model number |
|---|---|---|---|---|---|---|---|
| Coaxial, small-spot | Free-cut | 52 | 280<br>170<br>160 (50) | (0.005 dia.) | R<br>R4 | M6 right angle | E32-C11N |
| | Free-cut | 52 | 40<br>25<br>23 (7) | | | M3 right angle | E32-C31N |
| | Free-cut | 52 | 250<br>150<br>100 (45) | | | M6 screw | E32-CC200R |
| | | 52 | 500<br>300<br>200 (90) | | R25 | | E32-CC200 |
| | Free-cut | 52 | 250<br>150<br>100 (45) | | | 3-dia. cylinder | E32-D32L |
| | Free-cut | 52 | 120<br>75<br>50 (22) | | | M3 screw (small) | E32-C31 |
| | Free-cut | 52 | | | | 2-dia. cylinder (small) | E32-D32 |
| | | 52<br>60 | 6 to 15 mm; spot diameter: 0.1 to 0.6 mm | | | Small spot (variable) | E32-C42+ E39-F3A |
| | | 52<br>60 | Spot diameter of 0.5 to 1 mm at distances in the range 6 to 15 mm Free-cut | | | | E32-D32+ E39-F3A |
| | | 52<br>60 | Spot diameter of 0.1 mm at 7 mm | | | Small spot | E32-C41+ E39-F3A-5 |
| | | 52<br>60 | Spot diameter of 0.5 mm at 7 mm Free-cut | | | | E32-C31+ E39-F3A-5 |
| | | 52<br>60 | Spot diameter of 0.2 mm at 17 mm | | | Long distance, small spot | E32-C41+ E39-F3B |
| | | 52<br>60 | Spot diameter of 0.5 mm at 17 mm Free-cut | | | | E32-C31+ E39-F3B |
| | Free-cut | 52<br>60 | Spot diameter of 4 mm max. at distances in the range 0 to 20 mm | | | Long-distance sensing, parallel light | E32-C31+ E39-F3C |
| Area-sensing | Free-cut | 53 | 250<br>150<br>100 (45) | (0.005 dia.) | B<br>R4 | Beam width: 11 mm | E32-D36P1 |
| Retroreflective | Free-cut | 53 | 10 to 250<br>10 to 250<br>10 to 250 (10 to 250) | (0.1 dia.) | R10 | M6 screw | E32-R21+ E39-R3 (Attached) |
| | Free-cut | 53 | 150 to 1,500<br>150 to 1,500<br>150 to 1,500<br>(150 to 1,500) | (0.2 dia.) | R25 | Screw mounting, long distance | E32-R16+ E39-R1 (Attached) |

*1. The sensing distances are for white paper.

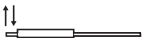
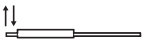
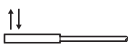
*2. The values for the minimum sensing object are representative values that indicate values obtained in standard mode with the sensing distance and sensitivity set to optimum values.

*3. Free-cut Indicates models that allow free cutting.

R Flexible B Break-resistant U Fluororesin coating

## Special-beam models

High-resolution mode  Standard mode  High-speed mode (Super-high-speed mode)  *When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

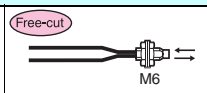
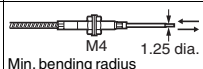
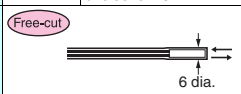
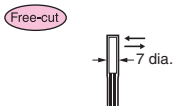
| Type | Appearance (mm) *3 | Dimensions page | Sensing distance (mm) *1 | (Min. sensing object) (mm) *2 | Min. bending radius (mm) | Features | Model number |
|---|---|---|---|---|---|---|---|
| Convergent-reflective | Free-cut | 54 | 3.3<br>3.3<br>3.3 (3.3) | (0.005 dia.) | R25 | Small level differences, high power, side-view | E32-L25 |
| | Free-cut | 54 | | | | Small level differences, top-view | E32-L25A |
| | Free-cut  | 54 | 0 to 4<br>0 to 4<br>0 to 4 (0 to 4) | | R10 | Ultracompact, flat-view | E32-L24S |
| | Free-cut | 54 | 2 to 6 (center: 4)<br>2 to 6 (center: 4)<br>2 to 6 (2 to 6) (center: 4) | | | Heat resistant up to 105°C *4, top-view | E32-L24L |
| | Free-cut | 54 | 5.4 to 9 (center: 7.2)<br>5.4 to 9 (center: 7.2)<br>5.4 to 9 (5.4 to 9) (center: 7.2) | | | Heat resistant up to 105°C *4, top-view | E32-L25L |
| |  | 55 | 4 to 10<br>4 to 10<br>4 to 10 (4 to 10) | | R25 | Heat resistant up to 200°C, flat-view | E32-L86 |
| |  | 55 | 1 to 5<br>1 to 5<br>1 to 5 | Soda glass with reflection factor of 7% | | Heat resistant up to 300°C | E32-L64 |
| | Free-cut  | 55 | 0 to 8<br>0 to 8<br>0 to 6<br>0 to 4 | | | Ideal for detecting glass stock. | E32-A10 |

*1. The sensing distances are for white paper.
*2. The values for the minimum sensing object are representative values that indicate values obtained in standard mode with the sensing distance and sensitivity set to optimum values.
*3. Free-cut Indicates models that allow free cutting.
*4. For continuous operation, use the products within a temperature range of −40°C to 90°C.

## Fiber Units with Reflective Sensors | Environment-resistant models

High-resolution mode | Standard mode | High-speed mode (Super-high-speed mode)

*When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

| Type | Appearance (mm) *3 | Dimensions page | Sensing distance (mm) *1 | (Min. sensing object) (mm) *2 | Min. bending radius (mm) | Features | Model number |
|---|---|---|---|---|---|---|---|
| Heat-resistant | 150°C *4   | 56 | 400<br>230<br>160 (72) | (0.005 dia.) | R35 | Heat resistant up to 150°C | E32-D51 |
| | 200°C *5 | 56 | 150<br>90<br>60 (27) | | R10 | Heat resistant up to 200°C | E32-D81R-S<br>E32-D81R*6 |
| | 350°C *5 | 56 | | | R25 | Heat resistant up to 350°C | E32-D61-S<br>E32-D61*6 |
| | 400°C *5   | 56 | 100<br>60<br>40 (18) | | | Heat resistant up to 400°C, with sleeve | E32-D73-S<br>E32-D73*6 |
| Chemical-resistant |   | 56 | 160<br>95<br>65 (30) | (0.005 dia.) | R40 | Fluororesin cover, long distance | E32-D12F |
| |   | 56 | 70<br>40<br>30 (10) | | | Fluororesin cover, side-view | E32-D14F |

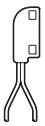
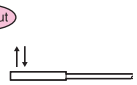
*1. The sensing distances are for white paper.
*2. The values for the minimum sensing object are representative values that indicate values obtained in standard mode with the sensing distance and sensitivity set to optimum values.
*3. Free-cut Indicates models that allow free cutting.
*4. For continuous operation, use the products within a temperature range of −40°C to 90°C.
*5. The maximum temperature that can be withstood varies with the location. Refer to dimensions diagrams for details.
*6. Order the Fiber Unit based on the Amplifier Unit. Use the E32-D□-S if the E3X-DA□-S, E3X-MDA□, or E3X-DAC□-S is used. Use the E32-D□ if any other Amplifier is used.

R Flexible B Break-resistant U Fluororesin coating

# Ordering Information

## Application-corresponding Fiber Units

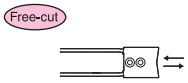
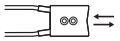
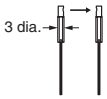
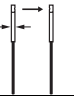
High-resolution mode | Standard mode | High-speed mode (Super-high-speed mode) | *When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

| Type | Appearance (mm) *2 | Dimensions page | Sensing distance (mm) | Standard object (min. sensing object) (mm)*1 | Min. bending radius (mm) | Features | Model number |
|---|---|---|---|---|---|---|---|
| Label-detection | Free-cut | 57 | 10<br>10<br>10 (10) | 4 dia. (0.1 dia.) | R25 | Slot sensor (no adjustment of optical axis required) | E32-G14 |
| | Free-cut | 43 | 4,500<br>3,400<br>2,250 (900) | | | Screw mounting, side-view | E32-T14 |
| Liquid-level detection | Free-cut | 57 | Applicable tube: Transparent tube with a diameter in the range 8 to 10 mm and a recommended wall thickness of 1 mm | | R10 | Compact | E32-L25T |
| | Free-cut  | 57 | Applicable tube: Transparent tube (no restriction on diameter) | | R4 | No restriction on tube diameter, resistant to bubbles and drops of water | E32-D36T |
| | Free-cut | 58 | Applicable tube: Transparent tube with a diameter of 3.2, 6.4, or 9.5 mm and a recommended wall thickness of 1 mm | | | Light ON when fluid is present, resistant to bubbles and drops of water | E32-A01 |
| | Free-cut | 58 | Applicable tube: Transparent tube with a diameter in the range 6 to 13 mm and a recommended wall thickness of 1 mm | | | Light ON when fluid is not present, resistant to bubbles and drops of water | E32-A02 |
| | | 58 | Liquid-contact models | | R40 | Heat resistant up to 200°C, fluororesin cover | E32-D82F1<br>E32-D82F2 |
| Glass-substrate-alignment | Free-cut  | 54 | 0 to 15<br>0 to 15<br>0 to 15 (0 to 12) | Soda glass with reflection factor of 7% | R25 | Variation of detection position within the detection range: 0.1 mm | E32-L16-N |
| | | 58 | 10 to 20<br>10 to 20<br>10 to 20 (–) | | | | E32-A08 |
| | | 58 | 15 to 25<br>15 to 25<br>10 to 20 (–) | | | | E32-A07E1 *5<br>E32-A07E2 *5 |
| | | 58 | 5 to 18<br>5 to 18<br>5 to 16 (–) | | | Heat resistant up to 300°C *3, *4 | E32-L66 |
| | | 54 | 10 to 20<br>10 to 20<br>10 to 20 | | | Heat resistant up to 300°C | E32-A08H2 |

*1. The values for the minimum sensing object are representative values that indicate values obtained in standard mode with the sensing distance and sensitivity set to optimum values.
*2. Free-cut Indicates models that allow free cutting.
*3. The maximum temperature that can be withstood varies with the location. Refer to dimensions diagrams for details.
*4. These values are based on the assumption that there are no repeated sudden changes in temperature.
*5. The characteristics for sensing object incline are different between the Attachments with model numbers ending in "E1" and "E2." Refer to page 52 for installation precautions.

## Application-corresponding Fiber Units

High-resolution mode  Standard mode  High-speed mode (Super-high-speed mode)  *When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

| Type | Appearance (mm) *2 | Dimensions page | Sensing distance (mm) | Standard object (min. sensing object) (mm)*1 | Min. bending radius (mm) | Features | Model number |
|---|---|---|---|---|---|---|---|
| Glass-substrate-mapping | Free-cut  | 59 | 15 to 38 (center: 25)<br>15 to 38 (center: 25)<br>15 to 38 (center: 25)<br>(–) | Edge of soda glass with reflection factor of 7% (t = 0.5 mm, rounded edge) | R25 | Resistant to tilting | E32-A09 |
| | | 59 | | | R35 | Heat resistant up to 150°C *3 | E32-A09H |
| |  | 59 | 20 to 30 (center: 25)<br>20 to 30 (center: 25)<br>20 to 30 (center: 25)<br>(–) | | R25 | Heat resistant up to 300°C *4, *5 | E32-A09H2 |
| Wafer-mapping | Free-cut 3 dia.  | 59 | 1,150<br>890<br>600 (250) | 2 dia. (0.1 dia.) | R1 | Opening angle: 1.5°; optical axis adjusted before delivery | E32-A03 |
| | Free-cut 3 dia. | 59 | | | R10 | Opening angle: 1.5°; with mounting flange; optical axis adjusted before delivery | E32-A03-1 |
| | Free-cut 3.5 dia. | 44 | 1,750<br>1,300<br>870 (350) | | | Long distance; opening angle: 4° | E32-T24S |
| | Free-cut 2 dia.  | 59 | | | | Ultraslim (t = 2 mm); opening angle: 3°; optical axis adjusted before delivery | E32-A04 |
| | Free-cut 2 dia. | 59 | 460<br>340<br>225 (100) | 1.2 dia. (0.1 dia.) | | Ultraslim (t = 2 mm); opening angle: 3°; with mounting flange; optical axis adjusted before delivery | E32-A04-1 |

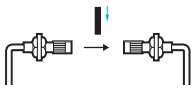
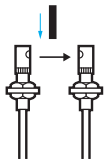
*1. The values for the minimum sensing object are representative values that indicate values obtained in standard mode with the sensing distance and sensitivity set to optimum values.
*2. Free-cut Indicates models that allow free cutting.
*3. For continuous operation, use the products within a temperature range of –40°C to 130°C.
*4. The maximum temperature that can be withstood varies with the location. Refer to dimensions diagrams for details.
*5. These values are based on the assumption that there are no repeated sudden changes in temperature.

R Flexible  B Break-resistant  U Fluororesin coating

## Accessories

### Lens Units

*When used in combination with the E3X-DA-S Amplifier Unit (general-purpose).

| Type | | Appearance | Dimensions page | Applicable Fiber Units | Sensing distance (mm) | | | | Standard object (min. sensing object) (mm) *1 | Features | Model number |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | High-resolution mode | Standard mode | High-speed mode | Super-high-speed mode | | | |
| Through-beam Lens Units | Long-distance Lens Units |  | 60 | E32-T11L | 4,000*2 | 3,200 | 2,100 | 840 | 4 dia. (0.1 dia.) | Long-distance sensing; opening angle: 5° to 40° (heat resistant up to 200°C) | E39-F1 |
| | | | | E32-TC200 | 4,000*2 | 4,000*2 | 2,600 | 1,500 | | | |
| | | | | E32-T11R | 4,000*2 | 3,700 | 2,400 | 970 | | | |
| | | | | E32-T11 | 4,000*2 | 3,600 | 2,300 | 930 | | | |
| | | | | E32-T11U | 4,000*2 | 3,600 | 2,300 | 930 | | | |
| | | | | E32-T81R-S | 2,650 | 2,100 | 1,300 | 520 | | | |
| | | | | E32-T61-S | 4,000*2 | 3,400 | 2,200 | 900 | | | |
| | Side-view Units |  | 60 | E32-T11L | 910 | 800 | 500 | 180 | 3 dia. (0.1 dia.) | Side-view, space-saving (heat resistant up to 200°C) | E39-F2 |
| | | | | E32-TC200 | 840 | 700 | 450 | 160 | | | |
| | | | | E32-T11R | 520 | 400 | 250 | 100 | | | |
| | | | | E32-T11 | 820 | 660 | 430 | 160 | | | |
| | | | | E32-T11U | 820 | 660 | 430 | 160 | | | |
| | | | | E32-T81R-S | 360 | 280 | 180 | 70 | | | |
| | | | | E32-T61-S | 600 | 450 | 300 | 120 | | | |
| | Reflection Units | | 60 | E32-T11L<br>E32-TC200<br>E32-T11R<br>E32-T11<br>E32-T11U<br>E32-T81R-S<br>E32-T61-S | --- | | | | --- | Long distance reflection (heat resistant up to 200°C) | E39-F3 |
| Reflective Lens Units | Small-spot Lens Units | | 60 | E32-C42 | Spot diameter variable in the range 0.1 to 0.6 mm at distances in the range 6 to 15 mm | | | | | Small spot (variable) | E39-F3A |
| | | | | E32-D32 | Spot diameter variable in the range 0.5 to 1 mm at distances in the range 6 to 15 mm | | | | | | |
| | | | 60 | E32-C41 | 0.1-dia. spot at a distance of 7 mm | | | | | Small spot | E39-F3A-5 |
| | | | | E32-C31 | 0.5-dia. spot at a distance of 7 mm | | | | | | |
| | | | 60 | E32-C41 | 0.2-dia. spot at a distance of 17 mm | | | | | Long distance, small spot | E39-F3B |
| | | | | E32-C31 | 0.5-dia. spot at a distance of 17 mm | | | | | | |
| | | | 60 | E32-C31<br>E32-C41 | Spot diameter of 4 mm max. at distances in the range 0 to 20 mm | | | | | Long-distance sensing, parallel light | E39-F3C |

*1. The values for the minimum sensing object are representative values that indicate values obtained in standard mode with the sensing distance and sensitivity set to optimum values.
*2. The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.

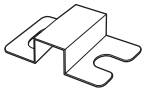
## Accessories

### Protective Spiral Tube

| Appearance | Dimensions page | Application | Applicable Fiber Units | Tube length | Model number |
|---|---|---|---|---|---|
| | 61 | Fiber protection | M3-screw models<br>E32-D21/E32-D21R<br>E32-DC200E<br>E32-DC200F□<br>E32-C31 | 500 mm | E39-F32A5 |
| | | | | 1 m | E39-F32A |
| | | | M3-screw models<br>E32-T21□<br>(Except the E32-T21R.)<br>E32-TC200E<br>E32-TC200F□ | 500 mm | E39-F32B5 |
| | | | | 1 m | E39-F32B |
| | 61 | | M4-screw models<br>E32-T11□ (except the E32-T11N Right-angle Model)<br>E32-TC200<br>E32-TC200B□<br>E32-T51<br>E32-D21L/E32-D21B | 500 mm | E39-F32C5 |
| | | | | 1 m | E39-F32C |
| | 61 | | M6-screw models<br>E32-D11□ (except the E32-D11N Right-angle Model)<br>E32-DC200<br>E32-DC200B<br>E32-CC200□<br>E32-D51 | 500 mm | E39-F32D5 |
| | | | | 1 m | E39-F32D |

Note: Before using a Protective Spiral Tube, remove the protective tube that protects the area between the head and the optical fiber provided with some models. The Lens Unit and Spiral Tube cannot be used at the same time.

### Other Accessories

| Appearance | Dimensions page | Application | Name | Applicable Fiber Units | Remarks | Model number |
|---|---|---|---|---|---|---|
| | 62 | Used to cut the fiber. | Cutter | Fiber Units that allow free cutting | Provided with applicable Fiber Units. | E39-F4 |
| | 62 | Attachments for inserting thin fibers into Amplifier Units | Thin-fiber Attachments | Fiber Units that allow free cutting and have a 1.0-dia. sheath | • 2 per set<br>• Provided with applicable Fiber Units. | E39-F9 |
| | 62 | Used to extend fibers. | Fiber Connectors | Fiber Units that allow free cutting and have a 2.2-dia. sheath | --- | E39-F10 |
| | 62 | Easy-to-use, one-touch relay connectors | | Fiber Units that allow free cutting | E39-F13: Used for Fiber Units with a 2.2-dia. sheath.<br>E39-F14: Used for Fiber Units with a 1.0-dia. sheath.<br>E39-F15: Used to connect Fiber Units with different sheath diameters, 1.0 mm and 2.2 mm. | E39-F13<br>E39-F14<br>E39-F15 |
| | 62 | Used to bends in sleeves. | Sleeve Bender | E32-TC200B(4)<br>E32-TC200F(4)<br>E32-DC200F(4) | --- | E39-F11 |
|  | 62 | Used to secure the 3.5-dia. Fiber Head | Mounting Bracket | E32-T24S<br>E32-A03 | Provided with applicable Fiber Units. | E39-L83 |

# Ratings/Characteristics

## Standard models

| Models | Ambient operating temperature range | Ambient humidity range | Fiber core material (sheath material) | Permissible bending radius | Tightening force (N·m) | Pulling force (N) | IEC standard degree of protection |
|---|---|---|---|---|---|---|---|
| E32-D11 | −40 to +70°C | 35% to 85% | Plastic (PVC coating) | R4 | 0.98 | 29.4 | IP67 |
| E32-D11N | | | Plastic (PVC coating) | R1 | 0.98 | 29.4 | IP67 |
| E32-D11R | | | Plastic (PVC coating) | R1 | 0.98 | 29.4 | IP67 |
| E32-D11U | | | Plastic (fluororesin coating) | R4 | 0.98 | 29.4 | IP67 |
| E32-D12 | | | Plastic (polyethylene coating) | R25 | 0.29 | 29.4 | IP67 |
| E32-D12R | | | Plastic (PVC coating) | R1 | 0.29 | 29.4 | IP67 |
| E32-D14L | | | Plastic (polyethylene coating) | R25 | 0.98 | 29.4 | IP67 |
| E32-D14LR | | | Plastic (PVC coating) | R1 | 0.98 | 29.4 | IP67 |
| E32-D15X | | | Plastic (polyethylene coating) | R25 | 0.15 | 29.4 | IP67 |
| E32-D15XB | | | Plastic (PVC coating) | R4 | 0.15 | 29.4 | IP67 |
| E32-D15XR | | | Plastic (PVC coating) | R1 | 0.15 | 29.4 | IP67 |
| E32-D15Y | | | Plastic (polyethylene coating) | R25 | 0.15 | 29.4 | IP40 |
| E32-D15YR | | | Plastic (PVC coating) | R1 | 0.15 | 29.4 | IP40 |
| E32-D15Z | | | Plastic (polyethylene coating) | R25 | 0.15 | 29.4 | IP40 |
| E32-D15ZR | | | Plastic (PVC coating) | R1 | 0.15 | 29.4 | IP40 |
| E32-D21 | | | Plastic (PVC coating) | R4 | 0.78 | 9.8 | IP67 |
| E32-D211 | | | Plastic (polyethylene coating) | R10 | 0.78 | 9.8 | IP67 |
| E32-D211R | | | Plastic (polyethylene coating) | R1 | 0.78 | 9.8 | IP67 |
| E32-D21B | | | Plastic (PVC coating) | R4 | 0.78 | 9.8 | IP67 |
| E32-D21R | | | Plastic (polyethylene coating) | R1 | 0.78 | 9.8 | IP67 |
| E32-D22 | | | Plastic (polyethylene coating) | R10 | 0.29 | 9.8 | IP67 |
| E32-D221B | | | Plastic (PVC coating) | R4 | 0.29 | 9.8 | IP67 |
| E32-D22B | | | Plastic (PVC coating) | R4 | 0.20 | 9.8 | IP67 |
| E32-D22R | | | Plastic (polyethylene coating) | R1 | 0.29 | 9.8 | IP67 |
| E32-D24 | | | Plastic (polyethylene coating) | R10 | 0.29 | 9.8 | IP67 |
| E32-D24R | | | Plastic (polyethylene coating) | R1 | 0.29 | 9.8 | IP67 |
| E32-D25X | | | Plastic (polyethylene coating) | R10 | 0.15 | 9.8 | IP67 |
| E32-D25XB | | | Plastic (PVC coating) | R4 | 0.15 | 9.8 | IP67 |
| E32-D25XR | | | Plastic (polyethylene coating) | R1 | 0.15 | 9.8 | IP67 |
| E32-D25Y | | | Plastic (polyethylene coating) | R10 | 0.15 | 9.8 | IP40 |
| E32-D25YR | | | Plastic (polyethylene coating) | R1 | 0.15 | 9.8 | IP40 |
| E32-D25Z | | | Plastic (polyethylene coating) | R10 | 0.15 | 9.8 | IP40 |
| E32-D25ZR | | | Plastic (polyethylene coating) | R1 | 0.15 | 9.8 | IP40 |
| E32-DC200 | | | Plastic (polyethylene coating) | R25 | 0.98 | 29.4 | IP67 |
| E32-DC200B(B4) | | | Plastic (polyethylene coating) | R25 | 0.98 | 29.4 | IP67 |
| E32-DC200BR(B4R) | | | Plastic (PVC coating) | R1 | 0.98 | 29.4 | IP67 |
| E32-DC200E | | | Plastic (polyethylene coating) | R10 | 0.78 | 9.8 | IP67 |
| E32-DC200F(F4) | | | Plastic (polyethylene coating) | R10 | 0.78 | 9.8 | IP67 |
| E32-DC200FR(F4R) | | | Plastic (polyethylene coating) | R1 | 0.78 | 9.8 | IP67 |
| E32-T11 | | | Plastic (PVC coating) | R4 | 0.78 | 29.4 | IP67 |
| E32-T11N | | | Plastic (PVC coating) | R1 | 0.78 | 29.4 | IP67 |
| E32-T11R | | | Plastic (PVC coating) | R1 | 0.78 | 29.4 | IP67 |
| E32-T11U | | | Plastic (fluororesin coating) | R4 | 0.78 | 29.4 | IP67 |
| E32-T12 | | | Plastic (polyethylene coating) | R25 | 0.29 | 29.4 | IP67 |
| E32-T12B | | | Plastic (PVC coating) | R4 | 0.29 | 29.4 | IP67 |
| E32-T12R | | | Plastic (PVC coating) | R1 | 0.29 | 29.4 | IP67 |
| E32-T14L | | | Plastic (polyethylene coating) | R25 | 0.29 | 29.4 | IP67 |
| E32-T14LR | | | Plastic (PVC coating) | R1 | 0.29 | 29.4 | IP67 |
| E32-T15X | | | Plastic (polyethylene coating) | R25 | 0.15 | 29.4 | IP67 |
| E32-T15XB | | | Plastic (PVC coating) | R4 | 0.15 | 29.4 | IP67 |
| E32-T15XR | | | Plastic (PVC coating) | R1 | 0.15 | 29.4 | IP67 |
| E32-T15Y | | | Plastic (polyethylene coating) | R25 | 0.15 | 29.4 | IP40 |
| E32-T15YR | | | Plastic (PVC coating) | R1 | 0.15 | 29.4 | IP40 |
| E32-T15Z | | | Plastic (polyethylene coating) | R25 | 0.15 | 29.4 | IP40 |
| E32-T15ZR | | | Plastic (PVC coating) | R1 | 0.15 | 29.4 | IP40 |
| E32-T21 | | | Plastic (PVC coating) | R4 | 0.78 | 9.8 | IP67 |
| E32-T21R | | | Plastic (polyethylene coating) | R1 | 0.78 | 29.4 | IP67 |
| E32-T22 | | | Plastic (polyethylene coating) | R10 | 0.29 | 9.8 | IP67 |
| E32-T221B | | | Plastic (PVC coating) | R4 | 0.29 | 9.8 | IP67 |
| E32-T222 | | | Plastic (polyethylene coating) | R10 | 0.20 | 9.8 | IP67 |
| E32-T222R | | | Plastic (polyethylene coating) | R1 | 0.20 | 9.8 | IP67 |
| E32-T22B | | | Plastic (PVC coating) | R4 | 0.20 | 9.8 | IP67 |
| E32-T22R | | | Plastic (polyethylene coating) | R1 | 0.29 | 9.8 | IP67 |

## Standard models (continued)

| Models | Ambient operating temperature range | Ambient humidity range | Fiber core material (sheath material) | Permissible bending radius | Tightening force (N·m) | Pulling force (N) | IEC standard degree of protection |
|---|---|---|---|---|---|---|---|
| E32-T24 | −40 to +70°C | 35% to 85% | Plastic (polyethylene coating) | R10 | 0.29 | 9.8 | IP67 |
| E32-T24R | | | Plastic (polyethylene coating) | R1 | 0.29 | 9.8 | IP67 |
| E32-T25X | | | Plastic (polyethylene coating) | R10 | 0.15 | 9.8 | IP67 |
| E32-T25XB | | | Plastic (PVC coating) | R4 | 0.15 | 9.8 | IP67 |
| E32-T25XR | | | Plastic (polyethylene coating) | R1 | 0.15 | 9.8 | IP67 |
| E32-T25Y | | | Plastic (polyethylene coating) | R10 | 0.15 | 9.8 | IP40 |
| E32-T25YR | | | Plastic (polyethylene coating) | R1 | 0.15 | 9.8 | IP40 |
| E32-T25Z | | | Plastic (polyethylene coating) | R10 | 0.15 | 9.8 | IP40 |
| E32-T25ZR | | | Plastic (polyethylene coating) | R1 | 0.15 | 9.8 | IP40 |
| E32-TC200 | | | Plastic (polyethylene coating) | R25 | 0.78 | 29.4 | IP67 |
| E32-TC200A | | | Plastic (polyethylene coating) | R25 | 0.78 | 29.4 | IP67 |
| E32-TC200B(B4) | | | Plastic (polyethylene coating) | R25 | 0.78 | 29.4 | IP67 |
| E32-TC200BR(B4R) | | | Plastic (PVC coating) | R1 | 0.78 | 29.4 | IP67 |
| E32-TC200E | | | Plastic (polyethylene coating) | R10 | 0.78 | 9.8 | IP67 |
| E32-TC200F(F4) | | | Plastic (polyethylene coating) | R10 | 0.78 | 9.8 | IP67 |
| E32-TC200FR(F4R) | | | Plastic (polyethylene coating) | R1 | 0.78 | 9.8 | IP67 |

## Special-beam models

| Models | Ambient operating temperature range | Ambient humidity range | Fiber core material (sheath material) | Permissible bending radius | Tightening force (N·m) | Pulling force (N) | IEC standard degree of protection |
|---|---|---|---|---|---|---|---|
| E32-A10 | −40 to +70°C | 35% to 85% | Plastic (polyethylene coating) | R25 | 0.53 | 29.4 | IP30 |
| E32-C11N | −40 to +70°C | | Plastic (combination of PVC and polyethylene) | R4 | 0.98 | 29.4 | IP67 |
| E32-C31 | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.78 | 9.8 | IP67 |
| E32-C31N | −40 to +70°C | | Plastic (combination of PVC and polyethylene) | R4 | 0.29 | 9.8 | IP67 |
| E32-C41 | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.78 | 9.8 | IP67 |
| E32-C42 | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.29 | 9.8 | IP67 |
| E32-CC200 | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.98 | 29.4 | IP67 |
| E32-CC200R | −40 to +70°C | | Plastic (polyethylene coating) | R4 | 0.98 | 29.4 | IP67 |
| E32-D11L | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.98 | 29.4 | IP67 |
| E32-D16 | −40 to +70°C | | Plastic (PVC coating) | R4 | 0.53 | 29.4 | IP40 |
| E32-D21L | −40 to +70°C | | Plastic (polyethylene coating) | R10 | 0.78 | 9.8 | IP67 |
| E32-D22L | −40 to +70°C | | Plastic (polyethylene coating) | R10 | 0.29 | 9.8 | IP67 |
| E32-D32 | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.29 | 9.8 | IP67 |
| E32-D32L | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.29 | 29.4 | IP67 |
| E32-D33 | −40 to +70°C | | Plastic (polyethylene coating) | R4 | 0.29 | 9.8 | IP67 |
| E32-D331 | −40 to +70°C | | Plastic (polyethylene coating) | R4 | 0.29 | 9.8 | IP67 |
| E32-D36P1 | −40 to +70°C | | Plastic (polyethylene coating) | R4 | 0.78 | 29.4 | IP67 |
| E32-L24L | −40 to +105°C | | Plastic (polyethylene coating) | R10 | 0.29 | 9.8 | IP50 |
| E32-L24S | −40 to +70°C | | Plastic (polyethylene coating) | R10 | 0.29 | 9.8 | IP40 |
| E32-L25 | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.29 | 19.6 | IP50 |
| E32-L25A | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.29 | 19.6 | IP50 |
| E32-L25L | −40 to +105°C | | Plastic (polyethylene coating) | R10 | 0.29 | 9.8 | IP50 |
| E32-L64 | −40 to +300°C | | Glass (SUS spiral coating) | R25 | 0.54 | 9.8 | IP50 |
| E32-L86 | −40 to +200°C | | Glass (SUS spiral coating) | R25 | 0.54 | 9.8 | IP40 |
| E32-M21 | −40 to +70°C | | Plastic (PVC coating) | R25 | 0.49. 0.78* | 9.8 | IP50 |
| E32-R16 | −25 to +55°C | | Plastic (polyethylene coating) | R25 | 0.54 | 29.4 | IP66 |
| E32-R21 | −40 to +70°C | | Plastic (polyethylene coating) | R10 | 0.39 | 9.8 | IP67 |
| E32-T11L | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.78 | 29.4 | IP67 |
| E32-T12L | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.29 | 29.4 | IP67 |
| E32-T14 | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.49 | 29.4 | IP67 |
| E32-T16 | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.49 | 29.4 | IP67 |
| E32-T16J | −40 to +70°C | | Plastic (PVC coating) | R10 | 0.29 | 29.4 | IP50 |
| E32-T16JR | −40 to +70°C | | Plastic (PVC coating) | R1 | 0.29 | 29.4 | IP50 |
| E32-T16P | −40 to +70°C | | Plastic (PVC coating) | R10 | 0.29 | 29.4 | IP50 |
| E32-T16PR | −40 to +70°C | | Plastic (PVC coating) | R1 | 0.29 | 29.4 | IP50 |
| E32-T16W | −25 to +55°C | | Plastic (PVC coating) | R10 | 0.29 | 9.8 | IP50 |
| E32-T16WR | −25 to +55°C | | Plastic (PVC coating) | R1 | 0.29 | 9.8 | IP50 |
| E32-T17L | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.78 | 29.4 | IP67 |
| E32-T21L | −40 to +70°C | | Plastic (polyethylene coating) | R10 | 0.78 | 9.8 | IP67 |
| E32-T223R | −40 to +70°C | | Plastic (polyethylene coating) | R1 | 0.20 | 9.8 | IP67 |
| E32-T22L | −40 to +70°C | | Plastic (polyethylene coating) | R10 | 0.29 | 9.8 | IP67 |
| E32-T22S | −40 to +70°C | | Plastic (PVC coating) | R10 | 0.29 | 29.4 | IP50 |
| E32-T24S | −40 to +70°C | | Plastic (PVC coating) | R10 | 0.29 | 29.4 | IP50 |
| E32-T333-S5 | −40 to +70°C | | Plastic (polyethylene coating) | R10 | 0.29 | 9.8 | IP67 |
| E32-T334-S5 | −40 to +70°C | | Plastic (polyethylene coating) | R10 | 0.29 | 9.8 | IP67 |
| E32-T33-S5 | −40 to +70°C | | Plastic (PVC coating) | R10 | 0.29 | 9.8 | IP67 |

*The strength depends on the section. Use 0.49 N•m max. to 5 mm from the tip and 0.78 N•m max. at a distance of more than 5 mm from the tip.

## Environment-resistant models

| Models | Ambient operating temperature range | Ambient humidity range | Fiber core material (sheath material) | Permissible bending radius | Tightening force (N·m) | Pulling force (N) | IEC standard degree of protection |
|---|---|---|---|---|---|---|---|
| E32-D12F | −40 to +70°C | 35% to 85% | Plastic (fluororesin coating) | R40 | 0.78 | 29.4 | IP67 |
| E32-D14F | −40 to +70°C | | Plastic (fluororesin coating) | R40 | 0.78 | 29.4 | IP67 |
| E32-D51 | −40 to +150°C | | Plastic (fluororesin coating) | R35 | 0.98 | 29.4 | IP67 |
| E32-D61 | −60 to +350°C | | Glass (SUS spiral coating) | R25 | 0.98 | 29.4 | IP67 |
| E32-D61-S | −60 to +350°C | | Glass (SUS spiral coating) | R25 | 0.98 | 29.4 | IP67 |
| E32-D73 | −40 to +400°C | | Glass (SUS spiral coating) | R25 | 0.78 | 29.4 | IP67 |
| E32-D73-S | −40 to +400°C | | Glass (SUS spiral coating) | R25 | 0.78 | 29.4 | IP67 |
| E32-D81R | −40 to +200°C | | Glass (fluororesin coating) | R10 | 0.78 | 9.8 | IP67 |
| E32-D81R-S | −40 to +200°C | | Glass (fluororesin coating) | R10 | 0.78 | 9.8 | IP67 |
| E32-T11F | −40 to +70°C | | Plastic (fluororesin coating) | R4 | 0.29 | 29.4 | IP67 |
| E32-T12F | −40 to +70°C | | Plastic (fluororesin coating) | R40 | 0.78 | 29.4 | IP67 |
| E32-T14F | −40 to +70°C | | Plastic (fluororesin coating) | R40 | 0.78 | 29.4 | IP67 |
| E32-T51 | −40 to +150°C | | Plastic (fluororesin coating) | R35 | 0.78 | 29.4 | IP67 |
| E32-T51F | −40 to +150°C | | Plastic (fluororesin coating) | R40 | 0.78 | 29.4 | IP67 |
| E32-T51V | −25 to +120°C | | Glass (fluororesin coating) | R30 | 0.29 | 29.4 | --- |
| E32-T54 | −40 to +150°C | | Plastic (fluororesin coating) | R35 | 0.29 | 29.4 | IP67 |
| E32-T54V | −25 to +120°C | | Glass (fluororesin coating) | R30 | 0.29 | 29.4 | --- |
| E32-T61-S | −60 to +350°C | | Glass (SUS spiral coating) | R25 | 0.78 | 29.4 | IP67 |
| E32-T81F-S | −40 to +200°C | | Glass (fluororesin coating) | R10 | 0.78 | 9.8 | IP67 |
| E32-T81R-S | −40 to +200°C | | Glass (fluororesin coating) | R10 | 0.78 | 9.8 | IP67 |
| E32-T84S-S | −40 to +200°C | | Glass (fluororesin coating) | R25 | 0.29 | 9.8 | IP67 |
| E32-T84SV | −25 to +200°C | | Glass (SUS spiral coating) | R25 | 0.29 | 29.4 | --- |

## Application-corresponding models

| Models | Ambient operating temperature range | Ambient humidity range | Fiber core material (sheath material) | Permissible bending radius | Tightening force (N·m) | Pulling force (N) | IEC standard degree of protection |
|---|---|---|---|---|---|---|---|
| E32-A01 | −40 to +70°C | 35% to 85% | Plastic (fluororesin coating) | R4 | --- | 9.8 | IP50 |
| E32-A02 | −40 to +70°C | | Plastic (fluororesin coating) | R4 | --- | 9.8 | IP50 |
| E32-A03 | −40 to +70°C | | Plastic (polyethylene coating) | R1 | 0.29 | 9.8 | IP50 |
| E32-A03-1 | −40 to +70°C | | Plastic (polyethylene coating) | R10 | 0.29 | 9.8 | IP50 |
| E32-A04 | −40 to +70°C | | Plastic (polyethylene coating) | R10 | 0.29 | 9.8 | IP50 |
| E32-A04-1 | −40 to +70°C | | Plastic (polyethylene coating) | R10 | 0.29 | 9.8 | IP50 |
| E32-A07E1(E2) | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.53 | 9.8 | IP40 |
| E32-A08 | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.53 | 9.8 | IP40 |
| E32-A08H2 | −40 to +300°C | | Glass (SUS spiral coating) | R25 | 0.53 | 29.4 | IP30 |
| E32-A09 | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.53 | 9.8 | IP40 |
| E32-A09H | −40 to +150°C | | Plastic (fluororesin coating) | R35 | 0.53 | 9.8 | IP40 |
| E32-A09H2 | −40 to +300°C | | Glass (SUS spiral coating) | R25 | 0.53 | 9.8 | IP40 |
| E32-D36T | −40 to +70°C | | Plastic (polyethylene coating) | R4 | --- | 29.4 | IP67 |
| E32-D82F1 | −40 to +200°C | | Tip: Glass and fluororesin coating<br>Amplifier insert: Plastic (fluororesin coating) | R40 | 0.29 | 29.4 | IP68 |
| E32-D82F2 | −40 to +200°C | | (Fluororesin coating) | R40 | 0.29 | 29.4 | IP68 |
| E32-G14 | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.49 | 29.4 | IP67 |
| E32-L16-N | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.29 | 29.4 | IP40 |
| E32-L25T | −40 to +70°C | | Plastic (polyethylene coating) | R10 | --- | 9.8 | IP50 |
| E32-L66 | −40 to +300°C | | Glass (SUS spiral coating) | R25 | 0.53 | 9.8 | IP40 |
| E32-T14 | −40 to +70°C | | Plastic (polyethylene coating) | R25 | 0.49 | 29.4 | IP67 |

# Dimensions

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

## Through-beam Fiber Units

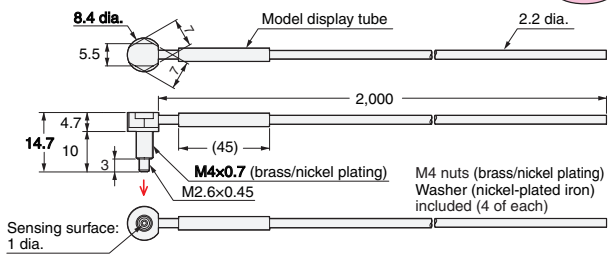
Through-beam models consist of two parts: an emitter and a receiver.

R Flexible B Break-resistant U Fluororesin coating R□ Standard
Free-cut Cutting free (Cutter provided)

### Standard Standard/Flexible Models

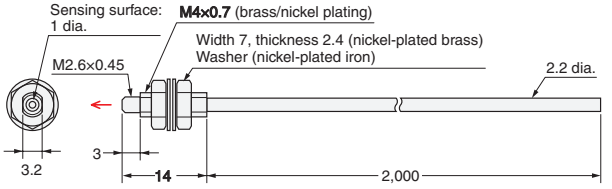
#### E32-T11N R

Free-cut



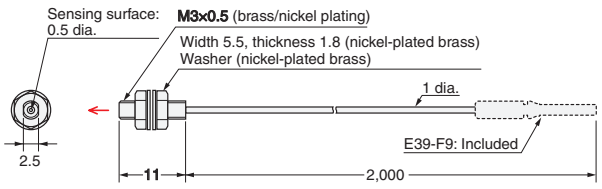

#### E32-TC200 R25
#### E32-T11R R

Free-cut



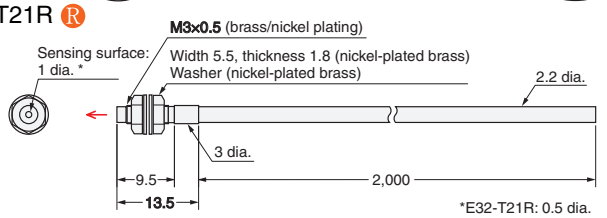

#### E32-TC200E R10

Free-cut



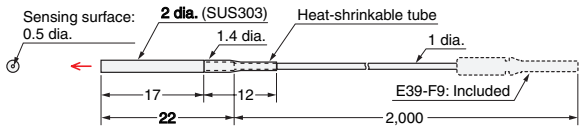

#### E32-TC200A R25
#### E32-T21R R

Free-cut



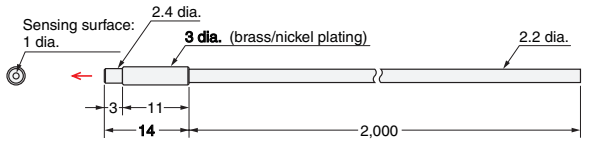

#### E32-T22 R10
#### E32-T22R R

Free-cut



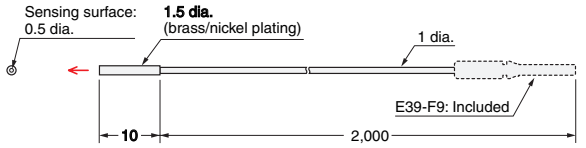

#### E32-T12 R25
#### E32-T12R R

Free-cut



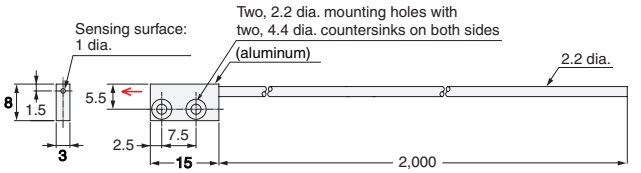

#### E32-T222 R10
#### E32-T222R R

Free-cut




#### E32-T15X R25
#### E32-T15XR R

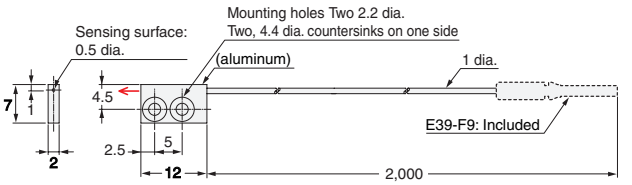
Free-cut




Note: 1. Set of two symmetrical parts.
2. Mounting screws (countersunk screw M2 × 8 4 pcs) included

#### E32-T25X R10
#### E32-T25XR R

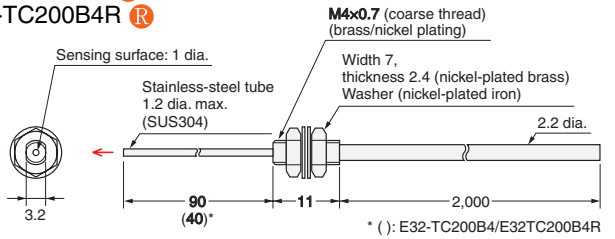
Free-cut




Note: 1. Set of two symmetrical parts.
2. Mounting screws (countersunk screw M2 × 8 4 pcs) included

#### E32-TC200B R25
#### E32-TC200B4 R25
#### E32-TC200BR R
#### E32-TC200B4R R

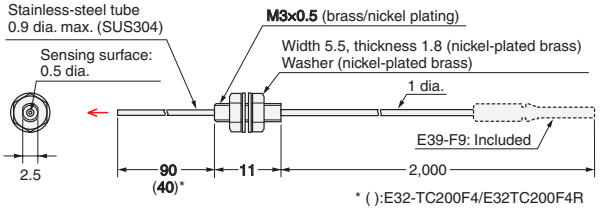
Free-cut




* ( ): E32-TC200B4/E32TC200B4R

#### E32-TC200F R10
#### E32-TC200F4 R10
#### E32-TC200FR R
#### E32-TC200F4R R

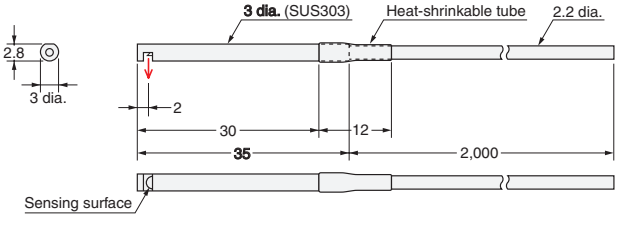
Free-cut




* ( ):E32-TC200F4/E32TC200F4R

#### E32-T14L R25
#### E32-T14LR R

Free-cut



## Through-beam Fiber Units

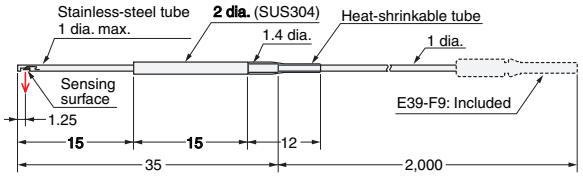
Through-beam models consist of two parts: an emitter and a receiver.

R Flexible B Break-resistant U Fluororesin coating R□ Standard
Free-cut Cutting free (Cutter provided)

### Standard Standard/Flexible Models

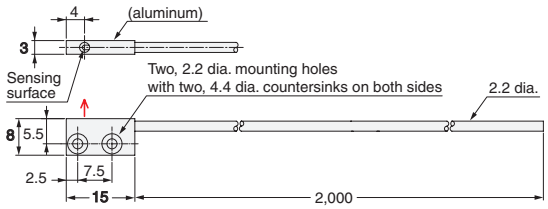
#### E32-T24 R10 / E32-T24R R

Free-cut




#### E32-T15Y R25 / E32-T15YR R

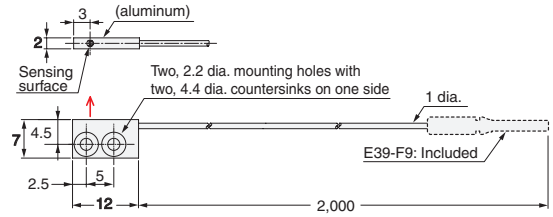
Free-cut




Note: 1. Set of two symmetrical parts.
2. Mounting screws (countersunk screw M2 × 8 4 pcs) included

#### E32-T25Y R10 / E32-T25YR R

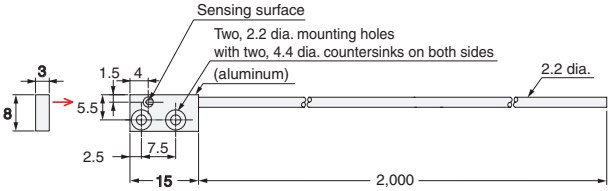
Free-cut




Note: 1. Set of two symmetrical parts.
2. Mounting screws (countersunk screw M2 × 8 4 pcs) included

#### E32-T15Z R25 / E32-T15ZR R

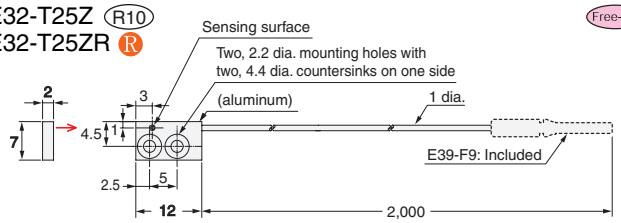
Free-cut




Note: 1. Set of two symmetrical parts.
2. Mounting screws (countersunk screw M2 × 8 4 pcs) included

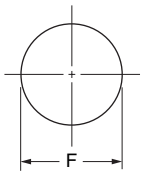
#### E32-T25Z R10 / E32-T25ZR R

Free-cut




Note: 1. Set of two symmetrical parts.
2. Mounting screws (countersunk screw M2 × 8 4 pcs) included

### Mounting hole dimensions (recommended)




<Screw-mounting Model> (Unit:mm)

| Outer diameter of fiber unit | M3 | M4 | M6 | M14 |
|---|---|---|---|---|
| F dimensions | $3^{+0.5}_{0}$ dia. | $4^{+0.5}_{0}$ dia. | $6^{+0.5}_{0}$ dia. | $14^{+1}_{0}$ dia. |

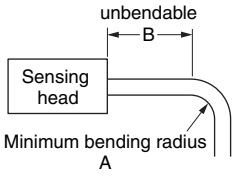
Example: Head size of E32-TC200 is M4. Open the mounting holes with 4 to 4.5 dia.

<Cylindrical Model> (Unit:mm)

| Outer diameter of fiber unit | 1 dia. | 1.5 dia. | 2 dia. | 3 dia. |
|---|---|---|---|---|
| F dimensions | $1.2^{+0.2}_{0}$ dia. | $1.7^{+0.2}_{0}$ dia. | $2.2^{+0.2}_{0}$ dia. | $3.2^{+0.2}_{0}$ dia. |
| Outer diameter of fiber unit | 3.5 dia. | 4 dia. | 5 dia. | 6 dia. |
| F dimensions | $4^{+0.5}_{0}$ dia. | $4.5^{+0.5}_{0}$ dia. | $5.5^{+0.5}_{0}$ dia. | $6.5^{+0.5}_{0}$ dia. |

Example: Head size of E32-T22 is 2 dia.. Open the mounting holes with 2.2 to 2.4 dia.

### Minimum bending radius




R Flexible B Break-resistant U Fluororesin coating R□ Standard

(Unit:mm)

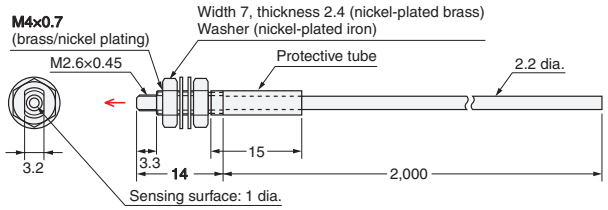
| Type | A Minimum bending radius | B unbendable |
|---|---|---|
| R (except E32-C11N, E32-C31N and E32-CC200) | 1 | 0 |
| R (E32-C11N, E32-C31N, E32-CC200R) | 4 | 0 |
| B U R4 | 4 | 10 |
| R10 | 10 | 10 |
| R25 | 25 | 10 |
| R30 | 30 | 10 |
| R35 | 35 | 10 |
| R40 | 40 | 10 |

Ⓡ Flexible Ⓑ Break-resistant Ⓤ Fluororesin coating R□ Standard
Free-cut Cutting free (Cutter provided)

## Standard Models Break-resistant/Coated Models

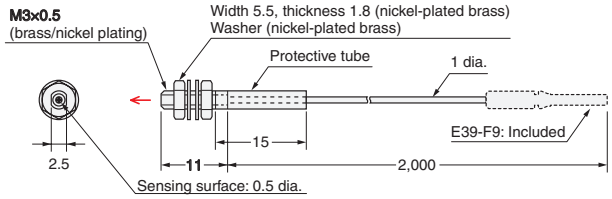
### E32-T11 Ⓑ
### E32-T11U Ⓤ

Free-cut



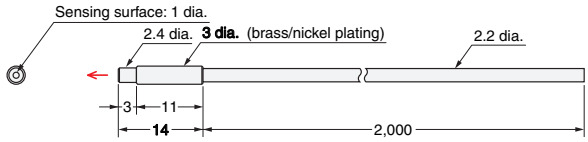

### E32-T21 Ⓑ

Free-cut



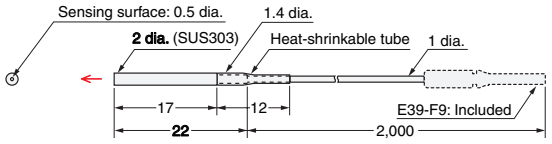

### E32-T12B Ⓑ

Free-cut



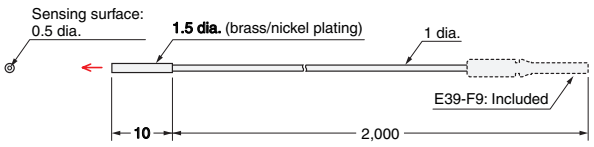

### E32-T221B Ⓑ

Free-cut



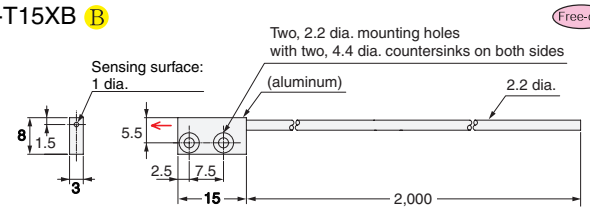

### E32-T22B Ⓑ

Free-cut




### E32-T15XB Ⓑ

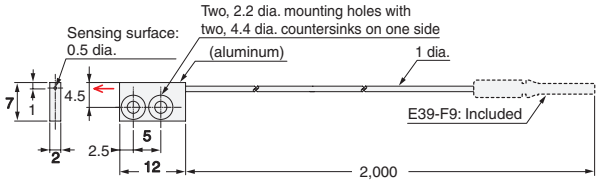
Free-cut




Note: 1. Set of two symmetrical parts.
2. Mounting screws (countersunk screw M2 × 8 4 pcs) included

### E32-T25XB Ⓑ

Free-cut




Note: 1. Set of two symmetrical parts.
2. Mounting screws (countersunk screw M2 × 8 4 pcs) included

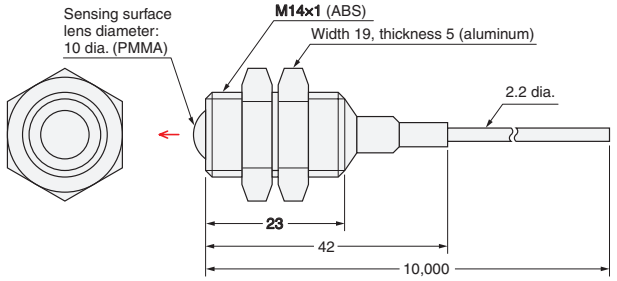
## Through-beam Fiber Units

Through-beam models consist of two parts: an emitter and a receiver.

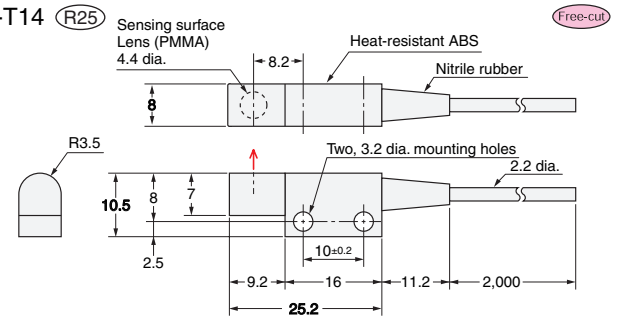
Ⓡ Flexible Ⓑ Break-resistant Ⓤ Fluororesin coating (R□) Standard
(Free-cut) Cutting free (Cutter provided)

### Special-beam Models Long-distance/High-power Models

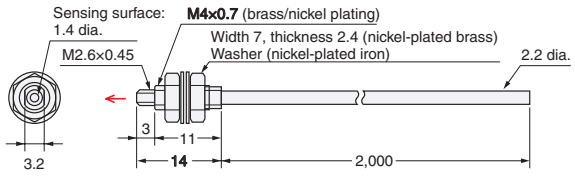
#### E32-T17L (R25) (Free-cut)



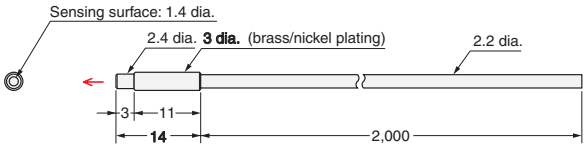

#### E32-T14 (R25) (Free-cut)



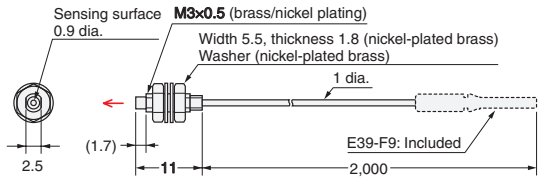

#### E32-T11L (R25) (Free-cut)



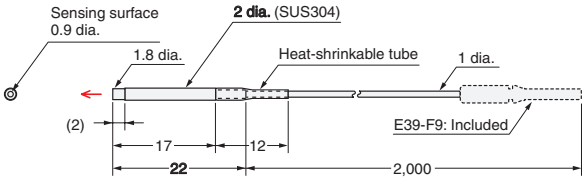

#### E32-T12L (R25) (Free-cut)



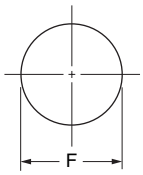

#### E32-T21L (R10) (Free-cut)




#### E32-T22L (R10) (Free-cut)




### Mounting hole dimensions (recommended)




<Screw-mounting Model> (Unit:mm)

| Outer diameter of fiber unit | M3 | M4 | M6 | M14 |
|---|---|---|---|---|
| F dimensions | $3^{+0.5}_{0}$ dia. | $4^{+0.5}_{0}$ dia. | $6^{+0.5}_{0}$ dia. | $14^{+1}_{0}$ dia. |

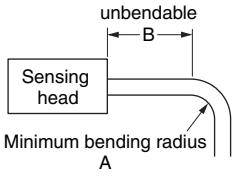
Example: Head size of E32-TC200 is M4. Open the mounting holes with 4 to 4.5 dia.

<Cylindrical Model> (Unit:mm)

| Outer diameter of fiber unit | 1 dia. | 1.5 dia. | 2 dia. | 3 dia. |
|---|---|---|---|---|
| F dimensions | $1.2^{+0.2}_{0}$ dia. | $1.7^{+0.2}_{0}$ dia. | $2.2^{+0.2}_{0}$ dia. | $3.2^{+0.2}_{0}$ dia. |
| Outer diameter of fiber unit | 3.5 dia. | 4 dia. | 5 dia. | 6 dia. |
| F dimensions | $4^{+0.5}_{0}$ dia. | $4.5^{+0.5}_{0}$ dia. | $5.5^{+0.5}_{0}$ dia. | $6.5^{+0.5}_{0}$ dia. |

Example: Head size of E32-T22 is 2 dia.. Open the mounting holes with 2.2 to 2.4 dia.

### Minimum bending radius




Ⓡ Flexible Ⓑ Break-resistant Ⓤ Fluororesin coating (R□) Standard
(Unit:mm)

| Type | A Minimum bending radius | B unbendable |
|---|---|---|
| Ⓡ (except E32-C11N, E32-C31N and E32-CC200) | 1 | 0 |
| Ⓡ (E32-C11N, E32-C31N, E32-CC200R) | 4 | 0 |
| Ⓑ Ⓤ (R4) | 4 | 10 |
| (R10) | 10 | 10 |
| (R25) | 25 | 10 |
| (R30) | 30 | 10 |
| (R35) | 35 | 10 |
| (R40) | 40 | 10 |

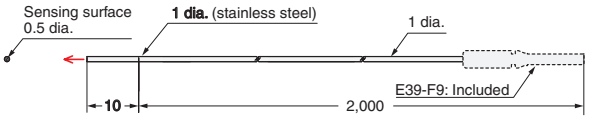
## Through-beam Fiber Units

Through-beam models consist of two parts: an emitter and a receiver.

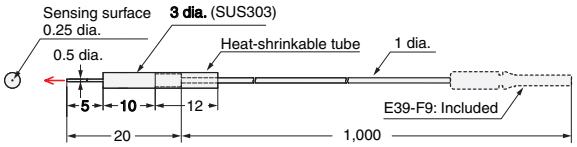
(R) Flexible (B) Break-resistant (U) Fluororesin coating (R□) Standard
Free-cut Cutting free (Cutter provided)

### Special-beam Models Ultracompact/Thin-sleeve Models

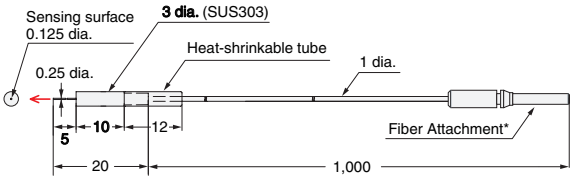
#### E32-T223R (R) Free-cut




#### E32-T33-S5 (R10) Free-cut

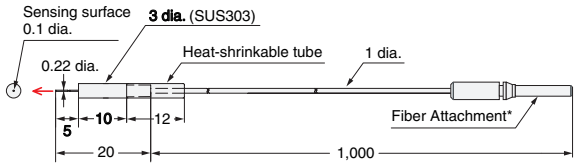



#### E32-T333-S5 (R10)




*The Fiber Attachment is attached with adhesive and cannot be removed.

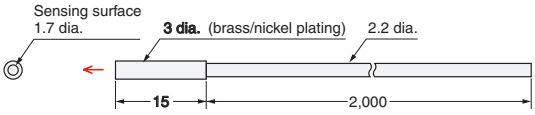
#### E32-T334-S5 (R10)



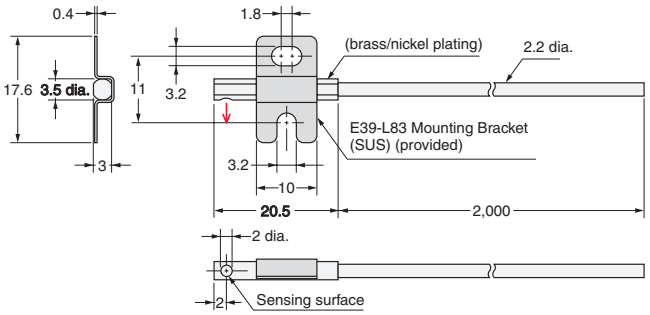

*The Fiber Attachment is attached with adhesive and cannot be removed.

### Special-beam Models Fine-beam (narrow vision field) Models

#### E32-T22S (R10) Free-cut

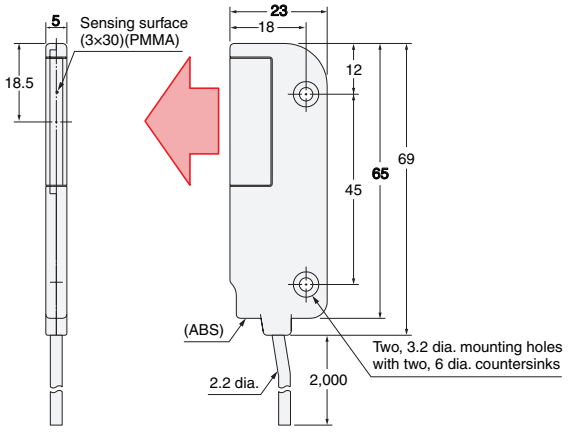



#### E32-T24S (R10) Free-cut

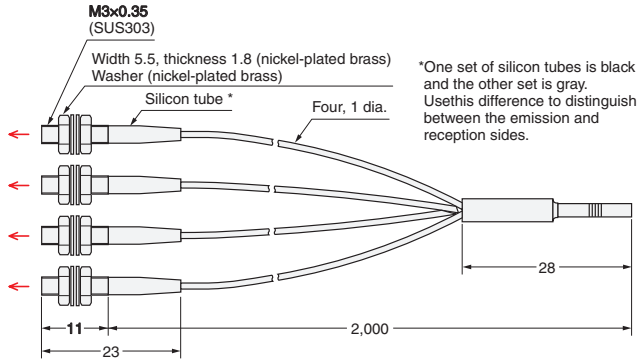



### Special-beam Models Area-sensing Models

#### E32-T16W (R10)
#### E32-T16WR (R) Free-cut




#### E32-M21 (R25)

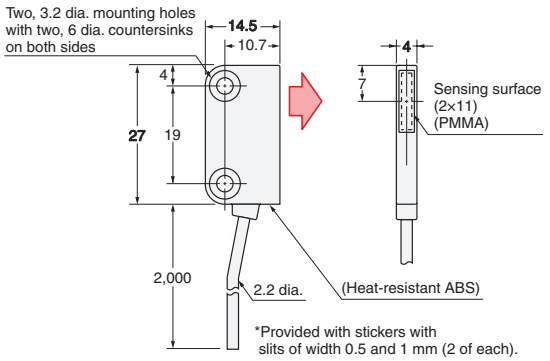


Ⓡ Flexible Ⓑ Break-resistant Ⓤ Fluororesin coating (R□) Standard
(Free-cut) Cutting free (Cutter provided)

## Special-beam Models Area-sensing Models

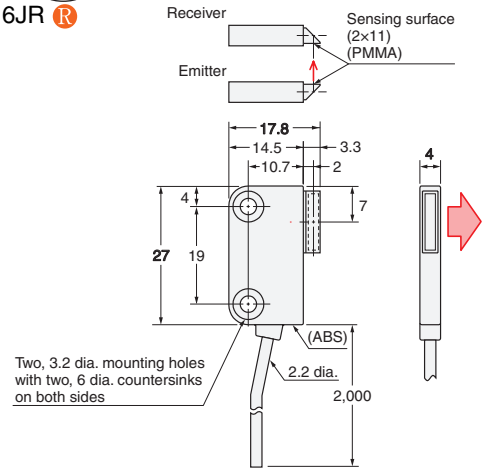
### E32-T16P (R10)
### E32-T16PR Ⓡ

(Free-cut)



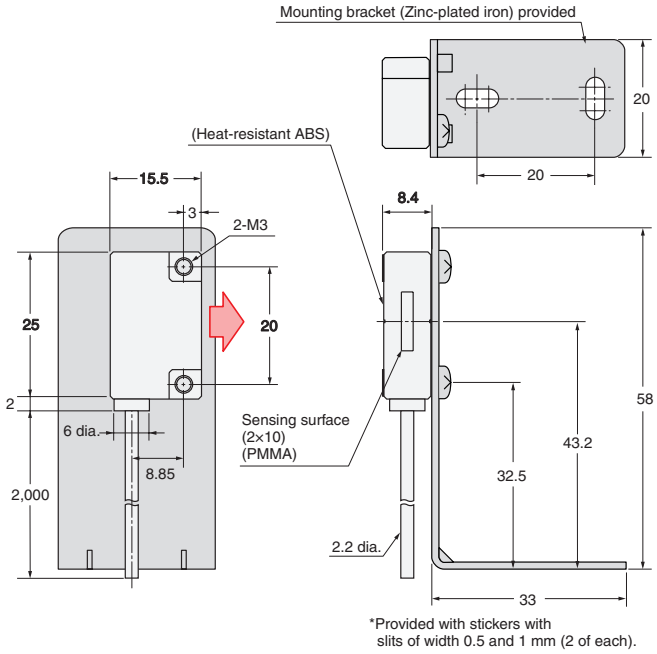

### E32-T16J (R10)
### E32-T16JR Ⓡ

(Free-cut)

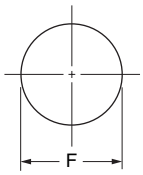



### E32-T16 (R25)

(Free-cut)




## Mounting hole dimensions (recommended)




<Screw-mounting Model> (Unit:mm)

| Outer diameter of fiber unit | M3 | M4 | M6 | M14 |
|---|---|---|---|---|
| F dimensions | $3^{+0.5}_{0}$ dia. | $4^{+0.5}_{0}$ dia. | $6^{+0.5}_{0}$ dia. | $14^{+1}_{0}$ dia. |

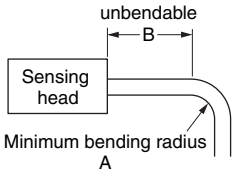
Example: Head size of E32-TC200 is M4. Open the mounting holes with 4 to 4.5 dia.

<Cylindrical Model> (Unit:mm)

| Outer diameter of fiber unit | 1 dia. | 1.5 dia. | 2 dia. | 3 dia. |
|---|---|---|---|---|
| F dimensions | $1.2^{+0.2}_{0}$ dia. | $1.7^{+0.2}_{0}$ dia. | $2.2^{+0.2}_{0}$ dia. | $3.2^{+0.2}_{0}$ dia. |
| Outer diameter of fiber unit | 3.5 dia. | 4 dia. | 5 dia. | 6 dia. |
| F dimensions | $4^{+0.5}_{0}$ dia. | $4.5^{+0.5}_{0}$ dia. | $5.5^{+0.5}_{0}$ dia. | $6.5^{+0.5}_{0}$ dia. |

Example: Head size of E32-T22 is 2 dia.. Open the mounting holes with 2.2 to 2.4 dia.

## Minimum bending radius




Ⓡ Flexible Ⓑ Break-resistant Ⓤ Fluororesin coating (R□) Standard

(Unit:mm)

| Type | A Minimum bending radius | B unbendable |
|---|---|---|
| Ⓡ (except E32-C11N, E32-C31N and E32-CC200) | 1 | 0 |
| Ⓡ (E32-C11N, E32-C31N, E32-CC200R) | 4 | 0 |
| Ⓑ Ⓤ (R4) | 4 | 10 |
| (R10) | 10 | 10 |
| (R25) | 25 | 10 |
| (R30) | 30 | 10 |
| (R35) | 35 | 10 |
| (R40) | 40 | 10 |

## Through-beam Fiber Units

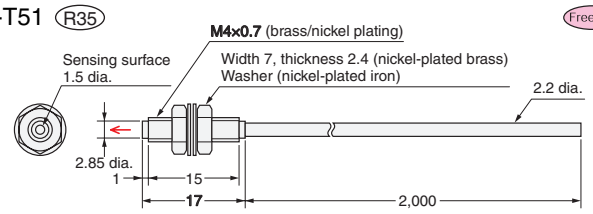
Through-beam models consist of two parts: an emitter and a receiver.

R Flexible B Break-resistant U Fluororesin coating R□ Standard
Free-cut Cutting free (Cutter provided)

### Environment-resistant Models Heat-resistant Models

#### E32-T51 R35

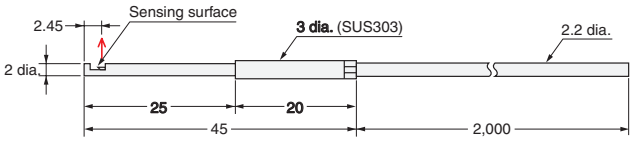
Free-cut




Note: The maximum allowable temperature is 150°C. The maximum allowable temperature for continuous operation is 130°C.

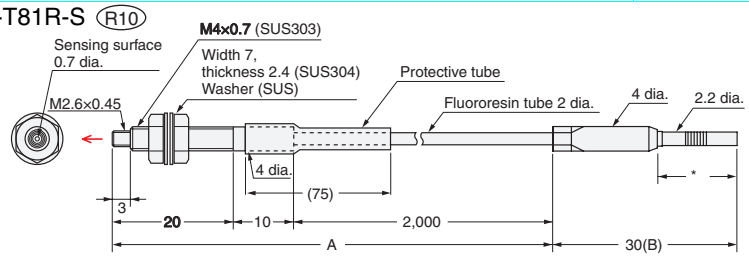
#### E32-T54 R35

Free-cut



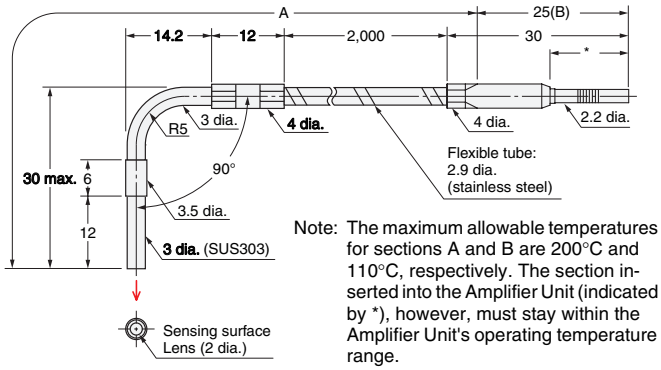

Note: The maximum allowable temperature is 150°C. The maximum allowable temperature for continuous operation is 130°C.

#### E32-T81R-S R10



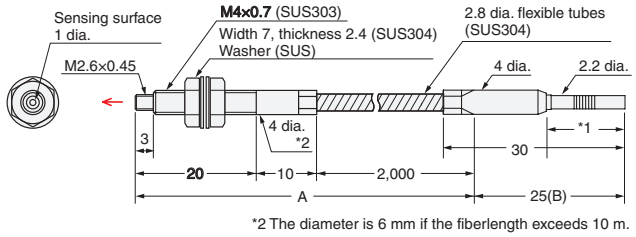

Note: The maximum allowable temperatures for sections A and B are 200°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *), however, must stay within the Amplifier Unit's operating temperature range.

#### E32-T84S-S R25




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 *), however, must stay within the Amplifier Unit's operating temperature range.

#### E32-T61-S R25



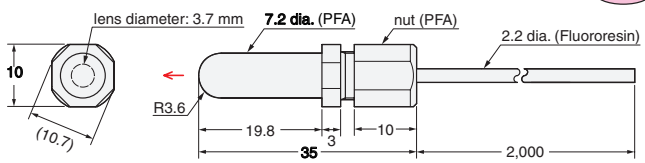

*2 The diameter is 6 mm if the fiberlength exceeds 10 m.

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 *1), however, must stay within the Amplifier Unit's operating temperature range.

### Environment-resistant Models Chemical-resistant Models

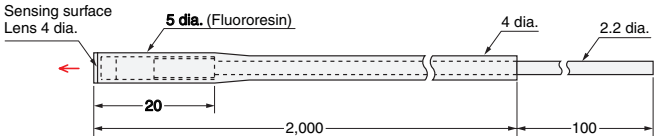
#### E32-T11F R4

Free-cut



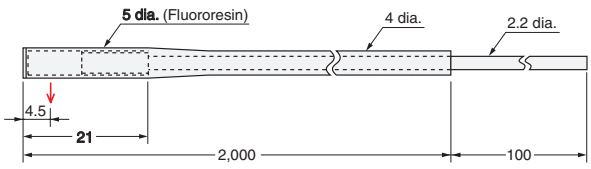

#### E32-T12F R40

Free-cut



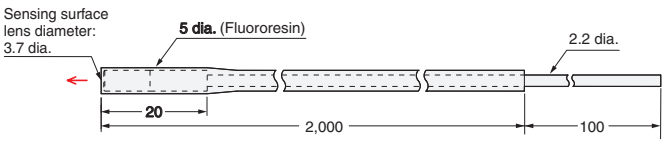

#### E32-T14F R40

Free-cut

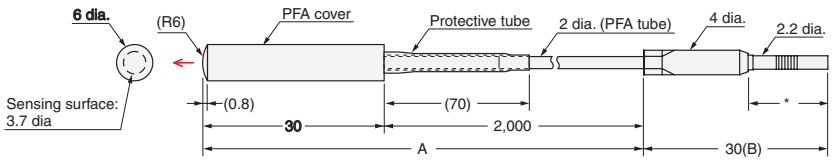



#### E32-T51F R40

Free-cut




#### E32-T81F-S R10

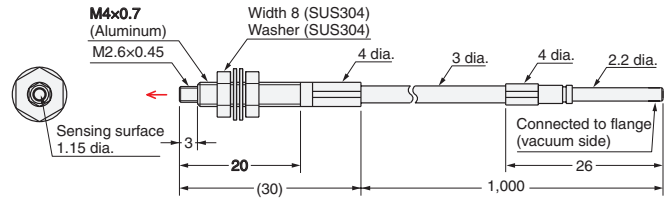



Note: The maximum allowable temperatures for sections A and B are 200°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *), however, must stay within the Amplifier Unit's operating temperature range.

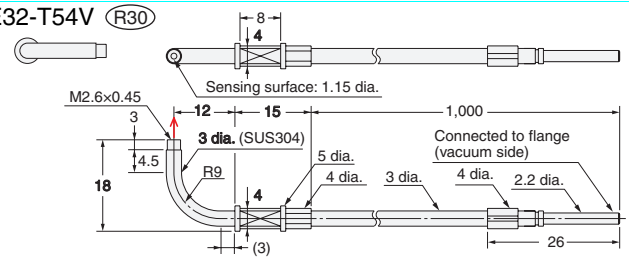
Ⓡ Flexible Ⓑ Break-resistant Ⓤ Fluororesin coating (R□) Standard
(Free-cut) Cutting free (Cutter provided)

## Environment-resistant Models Vacuum-resistant Models

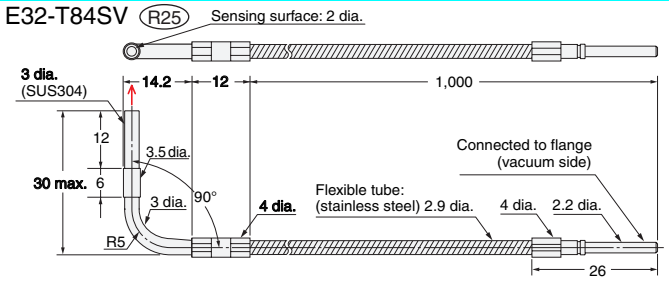
### E32-T51V (R30)



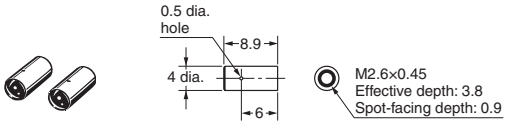

### E32-T54V (R30)




### E32-T84SV (R25)

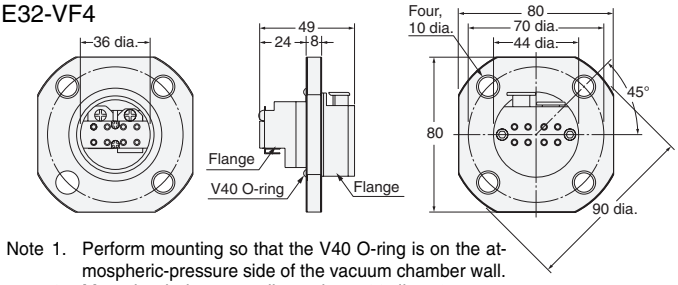



### E39-F1V



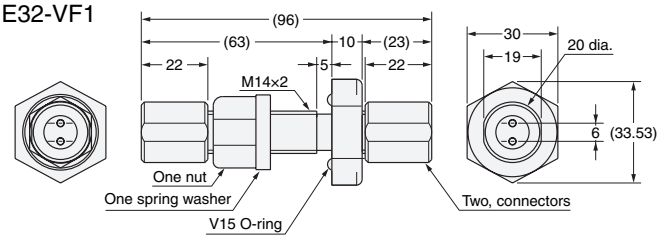

Material:
Aluminum for body and optical glass for the lens itself.

### E32-VF4




Note 1. Perform mounting so that the V40 O-ring is on the atmospheric-pressure side of the vacuum chamber wall.
2. Mounting-hole cutout dimensions: 38 dia. ±0.5 mm

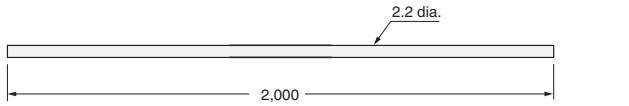
### E32-VF1



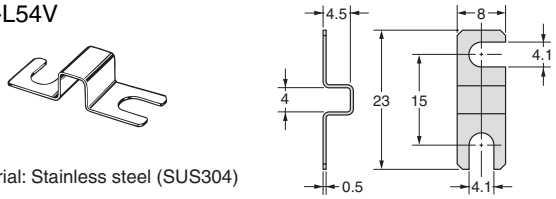

Note 1. Perform mounting so that the V15 O-ring is on the atmospheric-pressure side of the vacuum chamber wall.
2. Mounting-hole cutout dimensions: 14.5 dia. ±0.2 mm

### E32-T10V-2M (R25)

(Free-cut)

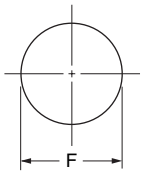



### E39-L54V




Material: Stainless steel (SUS304)

## Mounting hole dimensions (recommended)




<Screw-mounting Model> (Unit:mm)

| Outer diameter of fiber unit | M3 | M4 | M6 | M14 |
|---|---|---|---|---|
| F dimensions | $3^{+0.5}_{0}$ dia. | $4^{+0.5}_{0}$ dia. | $6^{+0.5}_{0}$ dia. | $14^{+1}_{0}$ dia. |

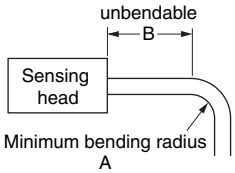
Example: Head size of E32-TC200 is M4. Open the mounting holes with 4 to 4.5 dia.

<Cylindrical Model> (Unit:mm)

| Outer diameter of fiber unit | 1 dia. | 1.5 dia. | 2 dia. | 3 dia. |
|---|---|---|---|---|
| F dimensions | $1.2^{+0.2}_{0}$ dia. | $1.7^{+0.2}_{0}$ dia. | $2.2^{+0.2}_{0}$ dia. | $3.2^{+0.2}_{0}$ dia. |
| Outer diameter of fiber unit | 3.5 dia. | 4 dia. | 5 dia. | 6 dia. |
| F dimensions | $4^{+0.5}_{0}$ dia. | $4.5^{+0.5}_{0}$ dia. | $5.5^{+0.5}_{0}$ dia. | $6.5^{+0.5}_{0}$ dia. |

Example: Head size of E32-T22 is 2 dia.. Open the mounting holes with 2.2 to 2.4 dia.

## Minimum bending radius




Ⓡ Flexible Ⓑ Break-resistant Ⓤ Fluororesin coating (R□) Standard
(Unit:mm)

| Type | A Minimum bending radius | B unbendable |
|---|---|---|
| Ⓡ (except E32-C11N, E32-C31N and E32-CC200) | 1 | 0 |
| Ⓡ (E32-C11N, E32-C31N, E32-CC200R) | 4 | 0 |
| Ⓑ Ⓤ (R4) | 4 | 10 |
| (R10) | 10 | 10 |
| (R25) | 25 | 10 |
| (R30) | 30 | 10 |
| (R35) | 35 | 10 |
| (R40) | 40 | 10 |

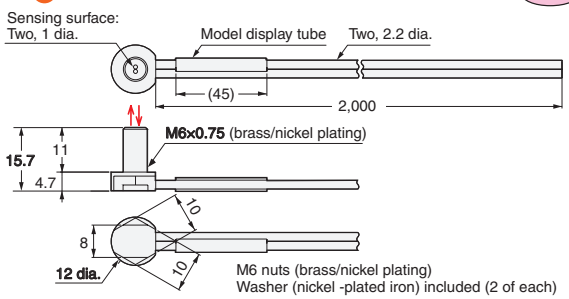
## Fiber Units with Reflective Sensors

### Standard Models | Standard/Flexible Models

R Flexible B Break-resistant U Fluororesin coating R□ Standard
Free-cut Cutting free (Cutter provided)

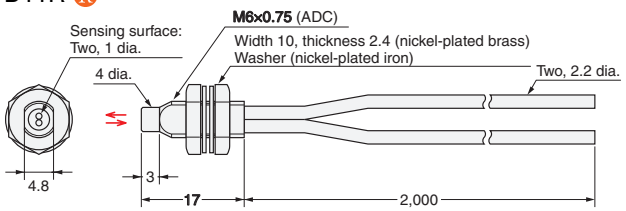
### E32-D11N R

Free-cut



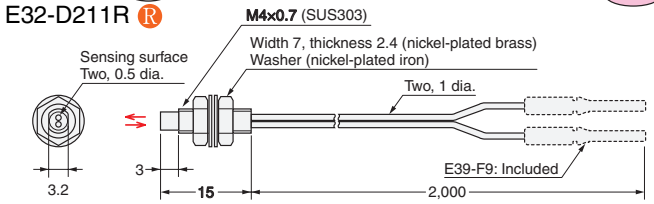

### E32-DC200 R25
### E32-D11R R

Free-cut



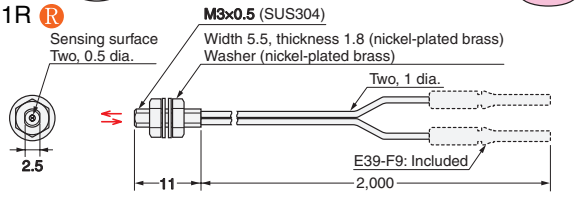

### E32-D211 R10
### E32-D211R R

Free-cut



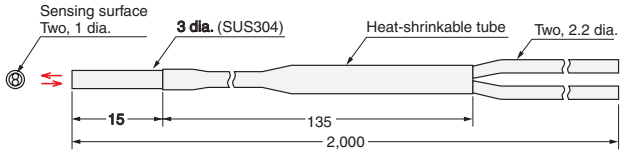

### E32-DC200E R10
### E32-D21R R

Free-cut



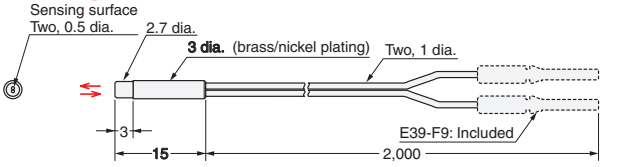

### E32-D12 R25
### E32-D12R R

Free-cut



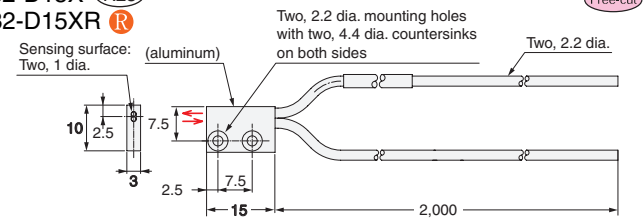

### E32-D22 R10
### E32-D22R R

Free-cut




### E32-D15X R25
### E32-D15XR R

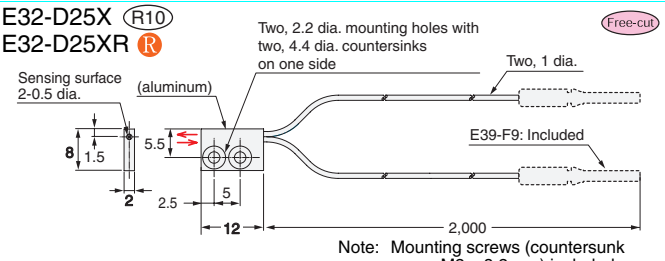
Free-cut




Note: Mounting screws (countersunk screw M2 × 8 2 pcs) included

### E32-D25X R10
### E32-D25XR R

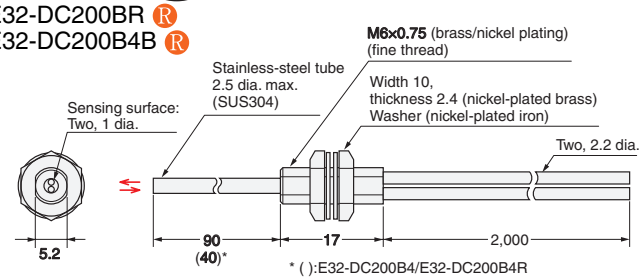
Free-cut




Note: Mounting screws (countersunk screw M2 × 8 2 pcs) included

### E32-DC200B R25
### E32-DC200B4 R25
### E32-DC200BR R
### E32-DC200B4B R

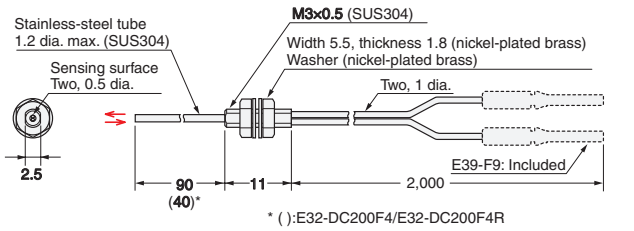
Free-cut




* ( ):E32-DC200B4/E32-DC200B4R

### E32-DC200F R10
### E32-DC200F4 R10
### E32-DC200FR R
### E32-DC200F4R R

Free-cut

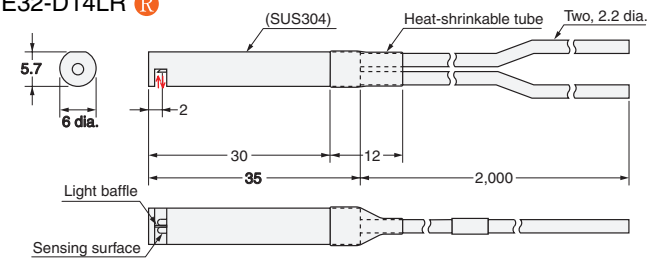



* ( ):E32-DC200F4/E32-DC200F4R

(R) Flexible (B) Break-resistant (U) Fluororesin coating (R□) Standard
(Free-cut) Cutting free (Cutter provided)

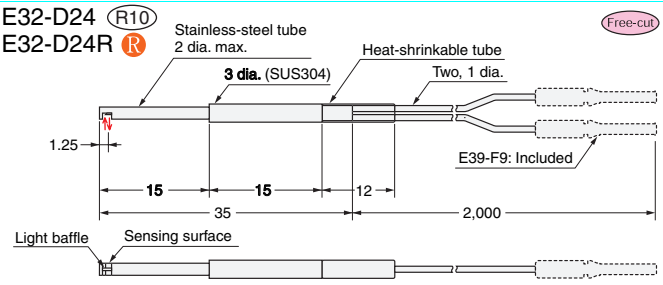
## E32-D14L (R25) / E32-D14LR (R)

(Free-cut)



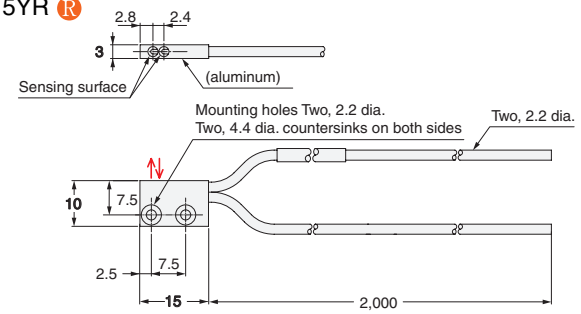

## E32-D24 (R10) / E32-D24R (R)

(Free-cut)




## E32-D15Y (R25) / E32-D15YR (R)

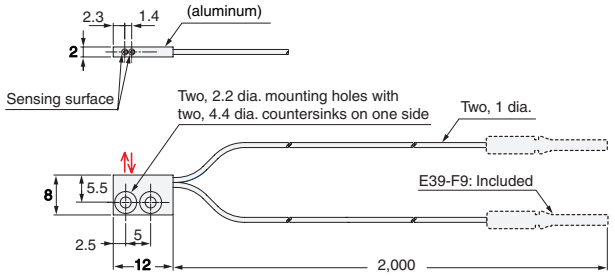
(Free-cut)




Note: Mounting screws (countersunk screw M2 × 8 2 pcs) included

## E32-D25Y (R10) / E32-D25YR (R)

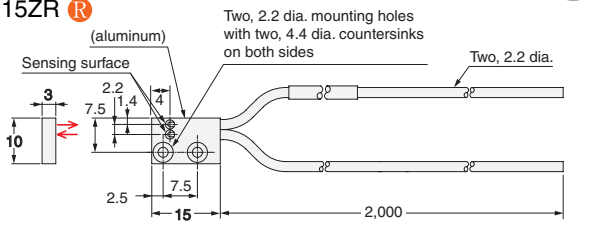
(Free-cut)




Note: Mounting screws (countersunk screw M2 × 8 2 pcs) included

## E32-D15Z (R25) / E32-D15ZR (R)

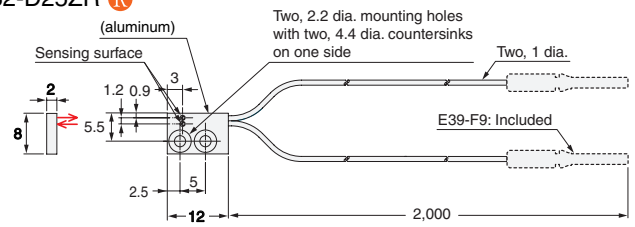
(Free-cut)




Note: Mounting screws (countersunk screw M2 × 8 2 pcs) included

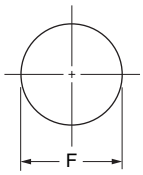
## E32-D25Z (R10) / E32-D25ZR (R)

(Free-cut)




Note: Mounting screws (countersunk screw M2 × 8 2 pcs) included

## Mounting hole dimensions (recommended)




<Screw-mounting Model> (Unit:mm)

| Outer diameter of fiber unit | M3 | M4 | M6 | M14 |
|---|---|---|---|---|
| F dimensions | $3^{+0.5}_{0}$ dia. | $4^{+0.5}_{0}$ dia. | $6^{+0.5}_{0}$ dia. | $14^{+1}_{0}$ dia. |

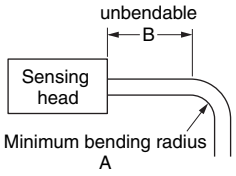
Example: Head size of E32-TC200 is M4. Open the mounting holes with 4 to 4.5 dia.

<Cylindrical Model> (Unit:mm)

| Outer diameter of fiber unit | 1 dia. | 1.5 dia. | 2 dia. | 3 dia. |
|---|---|---|---|---|
| F dimensions | $1.2^{+0.2}_{0}$ dia. | $1.7^{+0.2}_{0}$ dia. | $2.2^{+0.2}_{0}$ dia. | $3.2^{+0.2}_{0}$ dia. |
| Outer diameter of fiber unit | 3.5 dia. | 4 dia. | 5 dia. | 6 dia. |
| F dimensions | $4^{+0.5}_{0}$ dia. | $4.5^{+0.5}_{0}$ dia. | $5.5^{+0.5}_{0}$ dia. | $6.5^{+0.5}_{0}$ dia. |

Example: Head size of E32-T22 is 2 dia.. Open the mounting holes with 2.2 to 2.4 dia.

## Minimum bending radius




(R) Flexible (B) Break-resistant (U) Fluororesin coating (R□) Standard

(Unit:mm)

| Type | A Minimum bending radius | B unbendable |
|---|---|---|
| (R) (except E32-C11N, E32-C31N and E32-CC200) | 1 | 0 |
| (R) (E32-C11N, E32-C31N, E32-CC200R) | 4 | 0 |
| (B) (U) (R4) | 4 | 10 |
| (R10) | 10 | 10 |
| (R25) | 25 | 10 |
| (R30) | 30 | 10 |
| (R35) | 35 | 10 |
| (R40) | 40 | 10 |

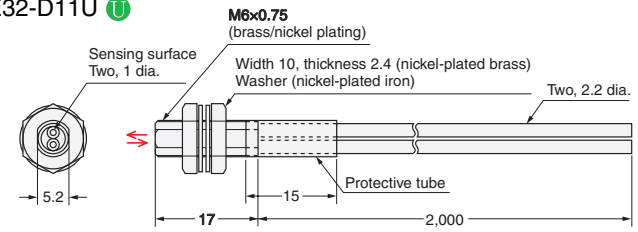
## Fiber Units with Reflective Sensors

### Standard Models Break-resistant/Coated Models

(R) Flexible (B) Break-resistant (U) Fluororesin coating (R□) Standard
(Free-cut) Cutting free (Cutter provided)

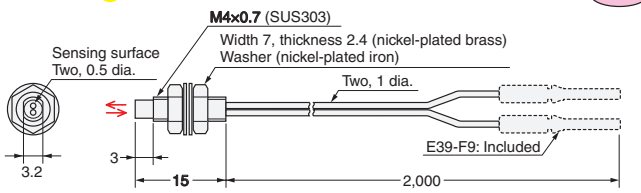
### E32-D11 (B)
### E32-D11U (U)

(Free-cut)



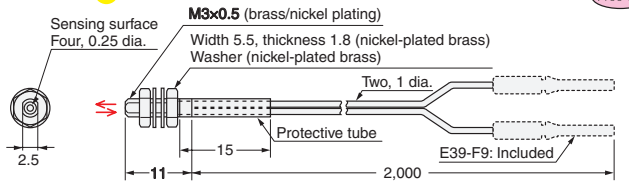

### E32-D21B (B)

(Free-cut)

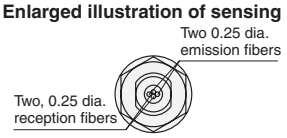



### E32-D21 (B)

(Free-cut)

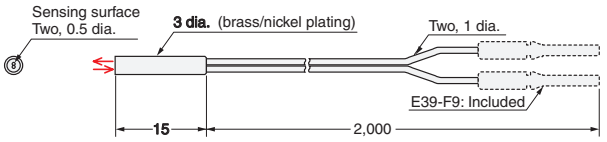



**Enlarged illustration of sensing surface**

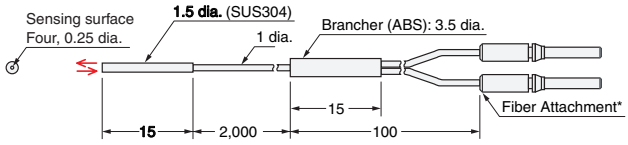



### E32-D221B (B)

(Free-cut)

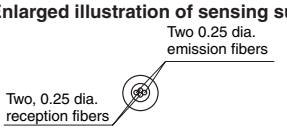



### E32-D22B (B)



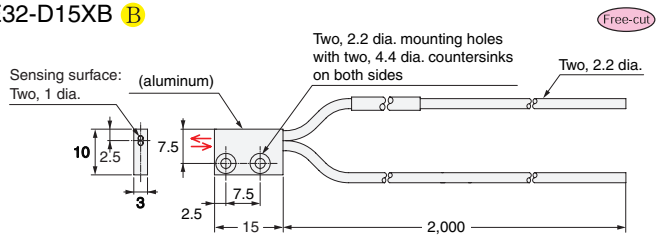

*The Attachment is attached with adhesive and cannot be removed.

**Enlarged illustration of sensing surface**




### E32-D15XB (B)

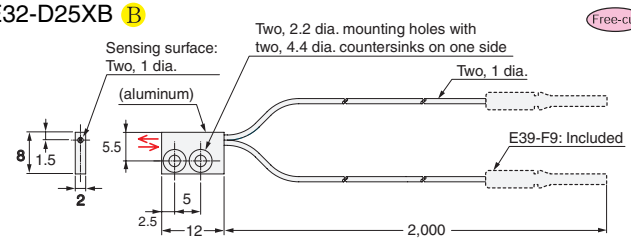
(Free-cut)




Note: Mounting screws (countersunk screw M2 × 8 2 pcs) included

### E32-D25XB (B)

(Free-cut)



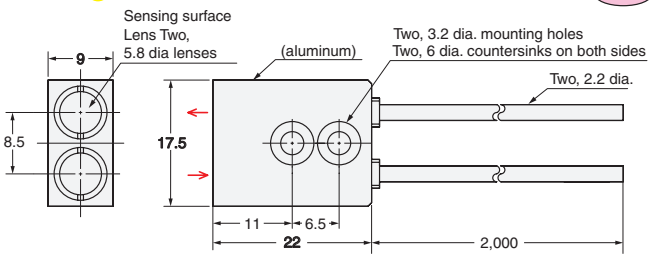

Note: Mounting screws (countersunk screw M2 × 8 2 pcs) included

(R) Flexible (B) Break-resistant (U) Fluororesin coating (R□) Standard
(Free-cut) Cutting free (Cutter provided)

## Special-beam Models Long-distance/High-power Models

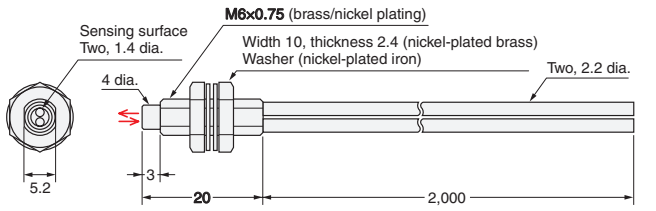
### E32-D16 (B)

(Free-cut)



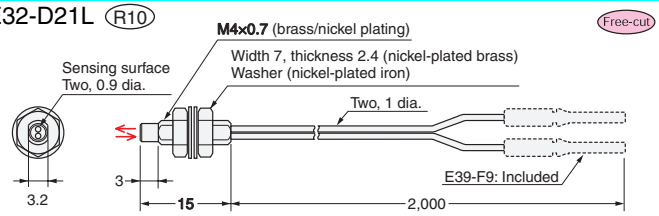

### E32-D11L (R25)

(Free-cut)



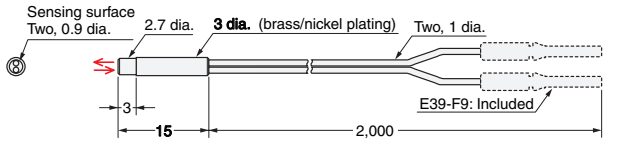

### E32-D21L (R10)

(Free-cut)




### E32-D22L (R10)

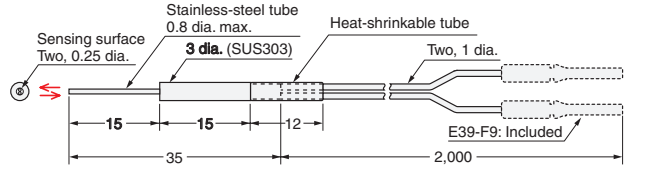
(Free-cut)



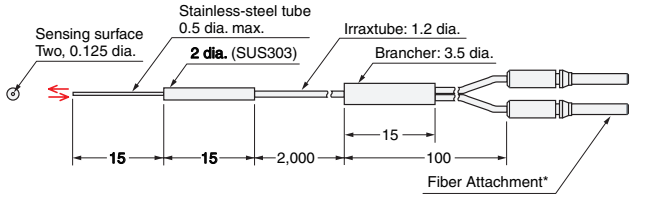

## Special-beam Models Ultracompact/Thin-sleeve Models

### E32-D33 (R4)

(Free-cut)

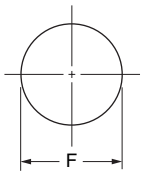



### E32-D331 (R4)




*The Attachment is attached with adhesive and cannot be removed.

## Mounting hole dimensions (recommended)




<Screw-mounting Model> (Unit:mm)

| Outer diameter of fiber unit | M3 | M4 | M6 | M14 |
|---|---|---|---|---|
| F dimensions | $3^{+0.5}_{0}$ dia. | $4^{+0.5}_{0}$ dia. | $6^{+0.5}_{0}$ dia. | $14^{+1}_{0}$ dia. |

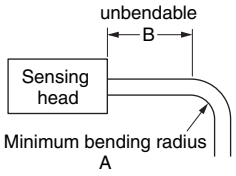
Example: Head size of E32-TC200 is M4. Open the mounting holes with 4 to 4.5 dia.

<Cylindrical Model> (Unit:mm)

| Outer diameter of fiber unit | 1 dia. | 1.5 dia. | 2 dia. | 3 dia. |
|---|---|---|---|---|
| F dimensions | $1.2^{+0.2}_{0}$ dia. | $1.7^{+0.2}_{0}$ dia. | $2.2^{+0.2}_{0}$ dia. | $3.2^{+0.2}_{0}$ dia. |
| Outer diameter of fiber unit | 3.5 dia. | 4 dia. | 5 dia. | 6 dia. |
| F dimensions | $4^{+0.5}_{0}$ dia. | $4.5^{+0.5}_{0}$ dia. | $5.5^{+0.5}_{0}$ dia. | $6.5^{+0.5}_{0}$ dia. |

Example: Head size of E32-T22 is 2 dia.. Open the mounting holes with 2.2 to 2.4 dia.

## Minimum bending radius




(R) Flexible (B) Break-resistant (U) Fluororesin coating (R□) Standard
(Unit:mm)

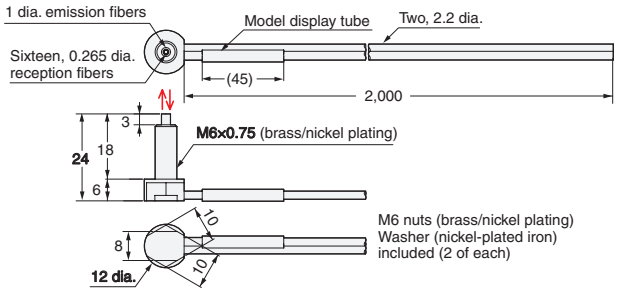
| Type | A Minimum bending radius | B unbendable |
|---|---|---|
| (R) (except E32-C11N, E32-C31N and E32-CC200) | 1 | 0 |
| (R) (E32-C11N, E32-C31N, E32-CC200R) | 4 | 0 |
| (B) (U) (R4) | 4 | 10 |
| (R10) | 10 | 10 |
| (R25) | 25 | 10 |
| (R30) | 30 | 10 |
| (R35) | 35 | 10 |
| (R40) | 40 | 10 |

# Fiber Units with Reflective Sensors

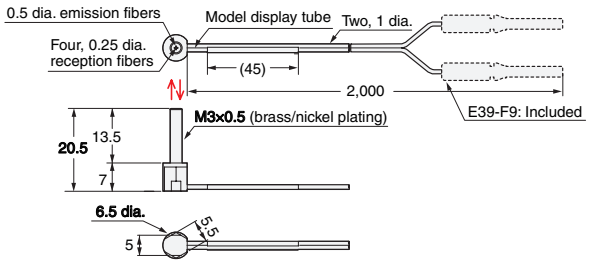
## Special-beam Models Coaxial/Small-spot Models

(R) Flexible (B) Break-resistant (U) Fluororesin coating (R□) Standard
(Free-cut) Cutting free (Cutter provided)

### E32-C11N (R) (Free-cut)

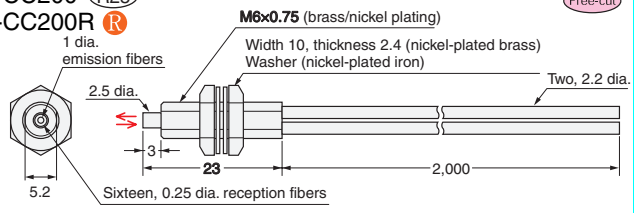



### E32-C31N (R) (Free-cut)



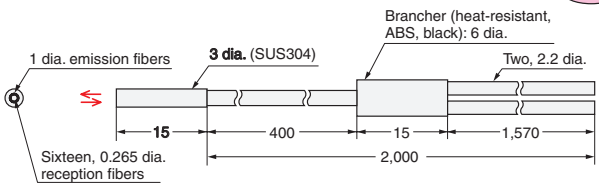

**Note:** The Emitter fiber is shown with a white line.
M3 nuts (brass/nickel plating)
Washer (brass/nickel plating) included (2 of each)

### E32-CC200 (R25) (Free-cut)
### E32-CC200R (R)



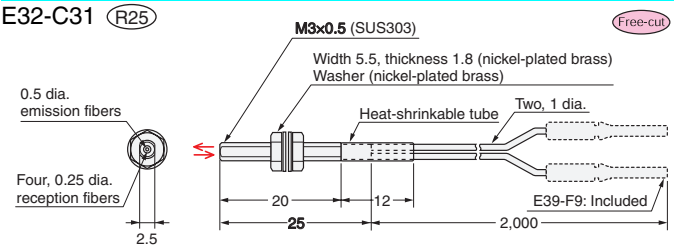

Note: There is a white line on the fiber that is inserted in the emitter-side port.

### E32-D32L (R25) (Free-cut)



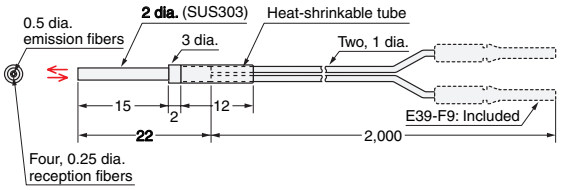

Note: There is a yellow dotted line on the fiber that is inserted in the emitter-side port.

### E32-C31 (R25) (Free-cut)



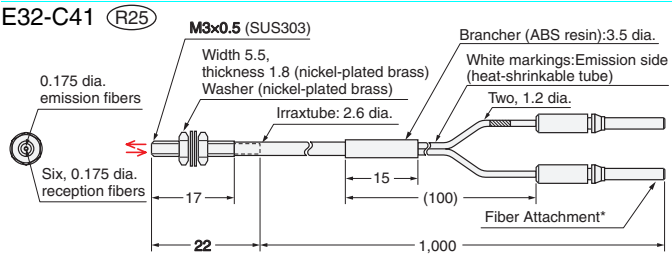

Note: There is a white line on the cable fiber that is inserted in the emitter-side port.

### E32-D32 (R25) (Free-cut)



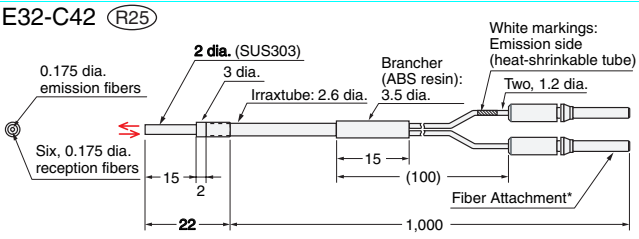

Note: There is a white line on the cable fiber that is inserted in the emitter-side port.

### E32-C41 (R25)




* The Fiber Attachment is attached with adhesive and cannot be removed.

### E32-C42 (R25)



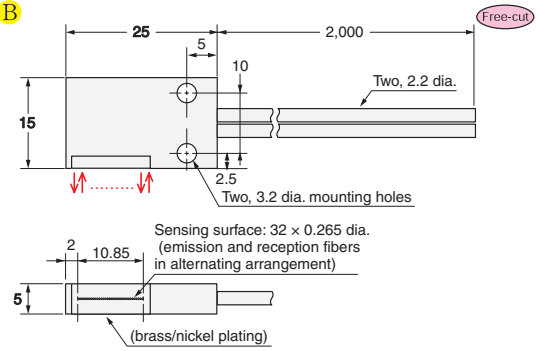

* The Fiber Attachment is attached with adhesive and cannot be removed.

(R)Flexible (B)Break-resistant (U)Fluororesin coating (R□)Standard
(Free-cut)Cutting free (Cutter provided)

## Special-beam Models Area-sensing Models

### E32-D36P1 (B)

(Free-cut)

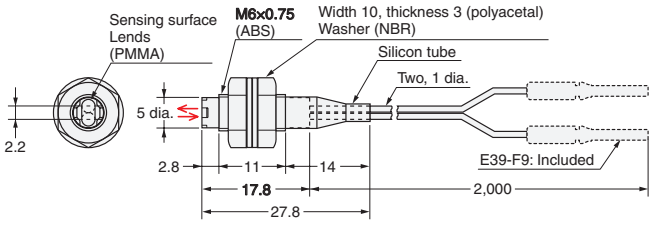



## Special-beam Models Retroreflective Fiber Units

### E32-R21 (R10)

(An E39-R3 Reflector is provided as an accessory.)

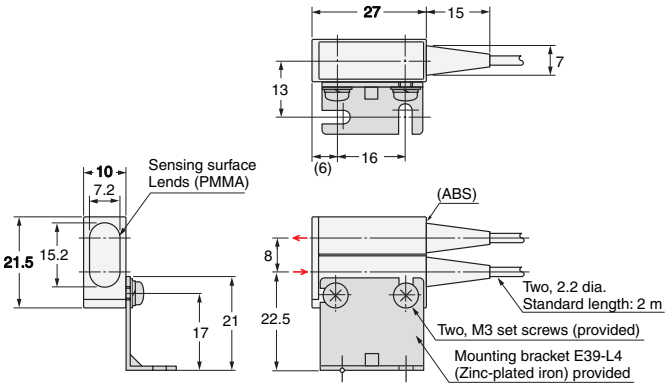
(Free-cut)



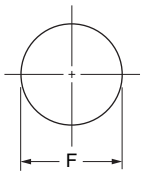

### E32-R16 (R25)

(An E39-R1 Reflector is provided as an accessory.)

(Free-cut)




## Mounting hole dimensions (recommended)




<Screw-mounting Model> (Unit:mm)

| Outer diameter of fiber unit | M3 | M4 | M6 | M14 |
|---|---|---|---|---|
| F dimensions | $3^{+0.5}_{0}$ dia. | $4^{+0.5}_{0}$ dia. | $6^{+0.5}_{0}$ dia. | $14^{+1}_{0}$ dia. |

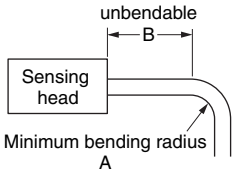
Example: Head size of E32-TC200 is M4. Open the mounting holes with 4 to 4.5 dia.

<Cylindrical Model> (Unit:mm)

| Outer diameter of fiber unit | 1 dia. | 1.5 dia. | 2 dia. | 3 dia. |
|---|---|---|---|---|
| F dimensions | $1.2^{+0.2}_{0}$ dia. | $1.7^{+0.2}_{0}$ dia. | $2.2^{+0.2}_{0}$ dia. | $3.2^{+0.2}_{0}$ dia. |
| Outer diameter of fiber unit | 3.5 dia. | 4 dia. | 5 dia. | 6 dia. |
| F dimensions | $4^{+0.5}_{0}$ dia. | $4.5^{+0.5}_{0}$ dia. | $5.5^{+0.5}_{0}$ dia. | $6.5^{+0.5}_{0}$ dia. |

Example: Head size of E32-T22 is 2 dia.. Open the mounting holes with 2.2 to 2.4 dia.

## Minimum bending radius




(R)Flexible (B)Break-resistant (U)Fluororesin coating (R□)Standard

(Unit:mm)

| Type | A Minimum bending radius | B unbendable |
|---|---|---|
| (R) (except E32-C11N, E32-C31N and E32-CC200) | 1 | 0 |
| (R) (E32-C11N, E32-C31N, E32-CC200R) | 4 | 0 |
| (B) (U) (R4) | 4 | 10 |
| (R10) | 10 | 10 |
| (R25) | 25 | 10 |
| (R30) | 30 | 10 |
| (R35) | 35 | 10 |
| (R40) | 40 | 10 |

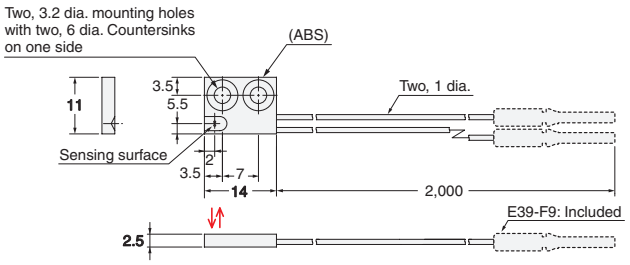
## Fiber Units with Reflective Sensors

### Special-beam Models Convergent-reflective Models

(R) Flexible (B) Break-resistant (U) Fluororesin coating (R□) Standard
(Free-cut) Cutting free (Cutter provided)

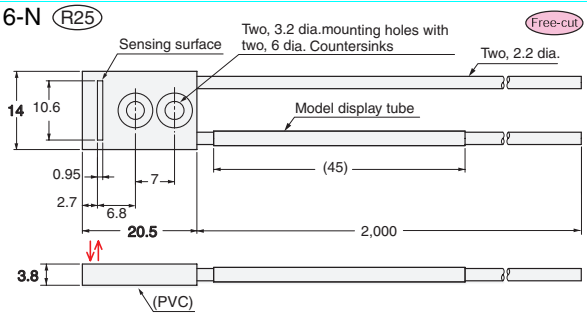
### E32-L24S (R10)

(Free-cut)



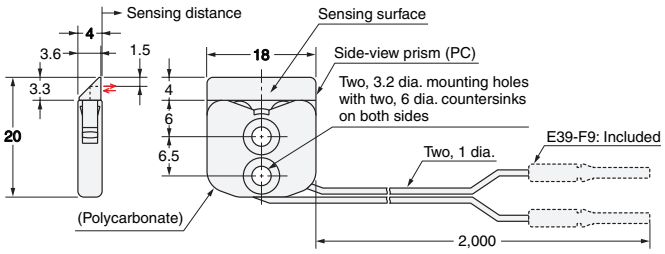

### E32-L16-N (R25)

(Free-cut)



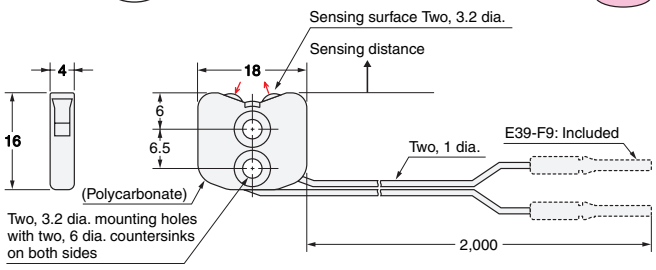

### E32-L24L (R10)

(Free-cut)



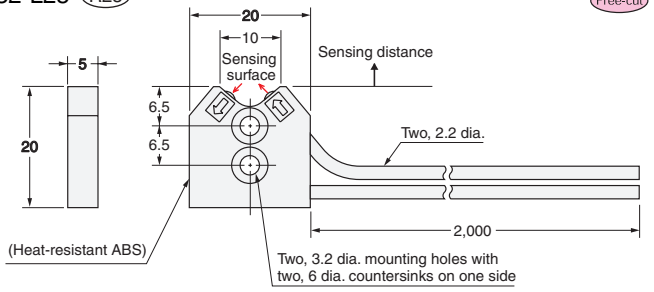

### E32-L25L (R10)

(Free-cut)




### E32-L25 (R25)

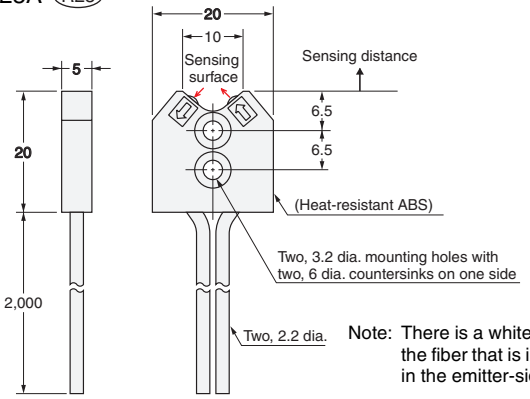
(Free-cut)




Note: There is a white line on the fiber that is inserted in the emitter-side port.

### E32-L25A (R25)

(Free-cut)

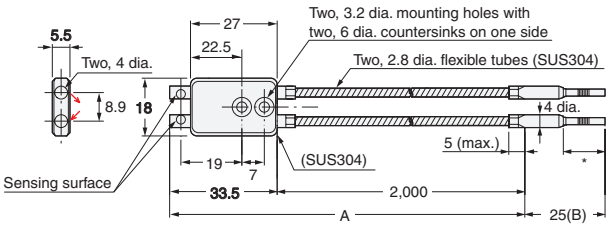



Note: There is a white line on the fiber that is inserted in the emitter-side port.

(R) Flexible (B) Break-resistant (U) Fluororesin coating (R□) Standard
(Free-cut) Cutting free (Cutter provided)

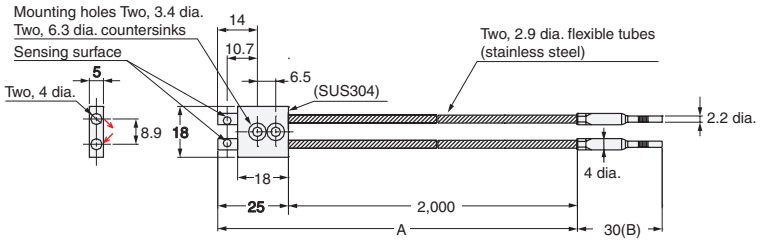
## Special-beam Models Convergent-reflective Models

### E32-L86 (R25)



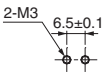

Note: The maximum allowable temperatures for sections A and B are 200°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *), however, must stay within the Amplifier Unit's operating temperature range.

### E32-L64 (R25)

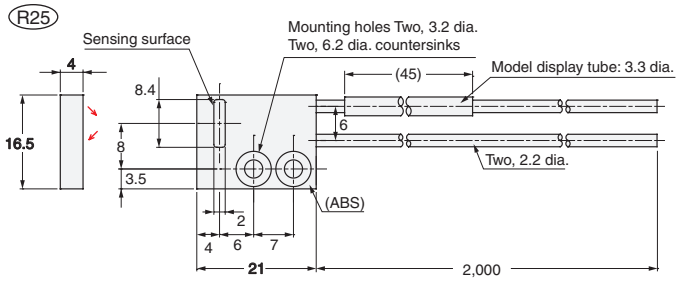



Note: The maximum allowable temperatures are 300°C for section A and 110°C for section B (section inserted into the Amplifier Unit).

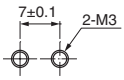
Mounting holes



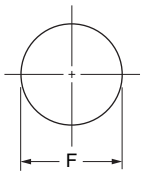

### E32-A10 (R25)




Mounting holes




## Mounting hole dimensions (recommended)




<Screw-mounting Model> (Unit:mm)

| Outer diameter of fiber unit | M3 | M4 | M6 | M14 |
|---|---|---|---|---|
| F dimensions | $3^{+0.5}_{0}$ dia. | $4^{+0.5}_{0}$ dia. | $6^{+0.5}_{0}$ dia. | $14^{+1}_{0}$ dia. |

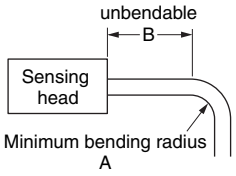
Example: Head size of E32-TC200 is M4. Open the mounting holes with 4 to 4.5 dia.

<Cylindrical Model> (Unit:mm)

| Outer diameter of fiber unit | 1 dia. | 1.5 dia. | 2 dia. | 3 dia. |
|---|---|---|---|---|
| F dimensions | $1.2^{+0.2}_{0}$ dia. | $1.7^{+0.2}_{0}$ dia. | $2.2^{+0.2}_{0}$ dia. | $3.2^{+0.2}_{0}$ dia. |
| Outer diameter of fiber unit | 3.5 dia. | 4 dia. | 5 dia. | 6 dia. |
| F dimensions | $4^{+0.5}_{0}$ dia. | $4.5^{+0.5}_{0}$ dia. | $5.5^{+0.5}_{0}$ dia. | $6.5^{+0.5}_{0}$ dia. |

Example: Head size of E32-T22 is 2 dia.. Open the mounting holes with 2.2 to 2.4 dia.

## Minimum bending radius




(R) Flexible (B) Break-resistant (U) Fluororesin coating (R□) Standard
(Unit:mm)

| Type | A Minimum bending radius | B unbendable |
|---|---|---|
| (R) (except E32-C11N, E32-C31N and E32-CC200) | 1 | 0 |
| (R) (E32-C11N, E32-C31N, E32-CC200R) | 4 | 0 |
| (B) (U) (R4) | 4 | 10 |
| (R10) | 10 | 10 |
| (R25) | 25 | 10 |
| (R30) | 30 | 10 |
| (R35) | 35 | 10 |
| (R40) | 40 | 10 |

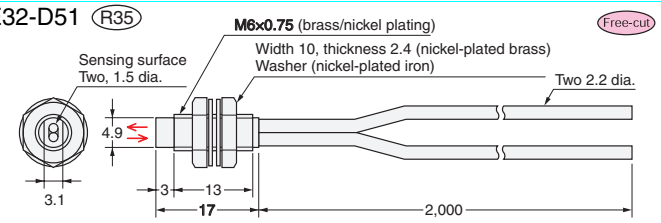
## Fiber Units with Reflective Sensors

(R) Flexible (B) Break-resistant (U) Fluororesin coating (R□) Standard
(Free-cut) Cutting free (Cutter provided)

### Environment-resistant Models Heat-resistant Models

#### E32-D51 (R35)

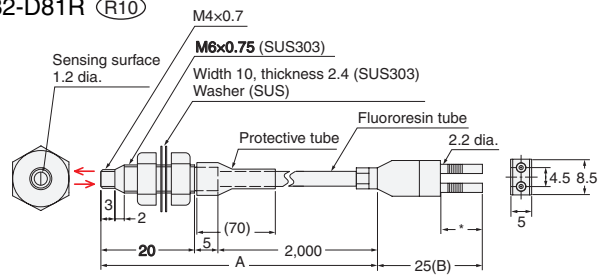
(Free-cut)



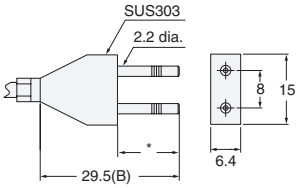

Note: The maximum allowable temperature is 150°C. The maximum allowable temperature for continuous operation is 130°C.

#### E32-D81R-S (R10)
#### E32-D81R (R10)

Using the E32-D81R-S



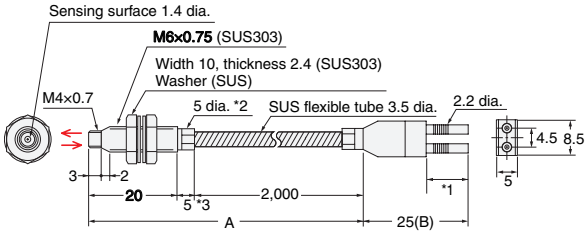

Using the E32-D81R



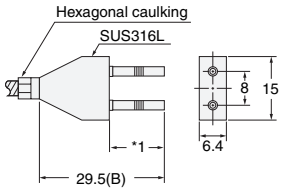

Note 1. The maximum allowable temperatures for sections A and B are 200°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *), however, must stay within the Amplifier Unit's operating temperature range.
2. Order the Fiber Unit based on the Amplifier Unit. Use the E32-D81R-S if the E3X-DA□-S, E3X-MDA□, or E3X-DAC□-S is used. Use the E32-D81R if any other Amplifier is used.

#### E32-D61-S (R25)
#### E32-D61 (R25)

Using the E32-D61-S




Using the E32-D61

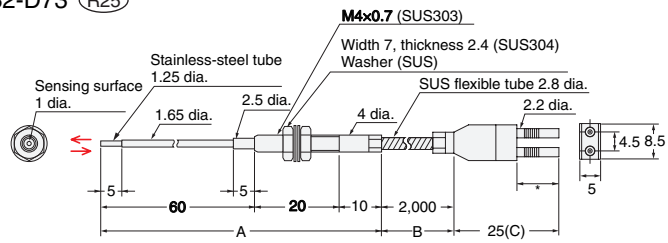



Note 1. The maximum allowable temperatures for sections A and B are 350°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *1), however, must stay within the Amplifier Unit's operating temperature range.
2. Order the Fiber Unit based on the Amplifier Unit. Use the E32-D61-S if the E3X-DA□-S, E3X-MDA□, or E3X-DAC□-S is used. Use the E32-D61 if any other Amplifier is used.

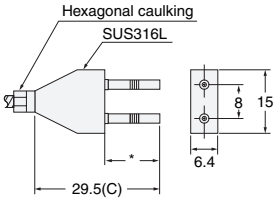
*2. The diameter is 6 dia. if the fiber length exceeds 10 m.
*3. The diameter is 10 if the fiber length exceeds 10 m.

#### E32-D73-S (R25)
#### E32-D73 (R25)

Using the E32-D73-S




Using the E32-D73

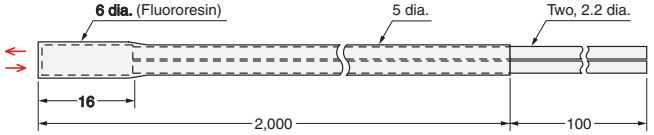



Note 1. The maximum allowable temperatures for sections A, B, and C are 400°C, 300°C, and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *), however, must stay within the Amplifier Unit's operating temperature range.
2. Order the Fiber Unit based on the Amplifier Unit. Use the E32-D□-S if the E3X-DA□-S, E3X-MDA□, or E3XDAC□-S is used. Use the E32-D□ if any other Amplifier is used.

### Environment-resistant Models Chemical-resistant Models

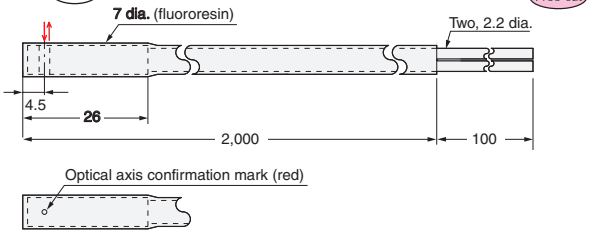
#### E32-D12F (R40)

(Free-cut)




#### E32-D14F (R40)

(Free-cut)



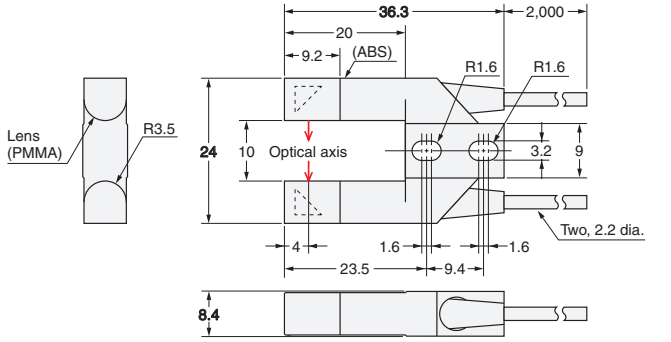
Ⓡ Flexible Ⓑ Break-resistant Ⓤ Fluororesin coating (R□) Standard
(Free-cut) Cutting free (Cutter provided)

## Application-corresponding Fiber Units

### Label-detection Models

#### E32-G14 (R25)

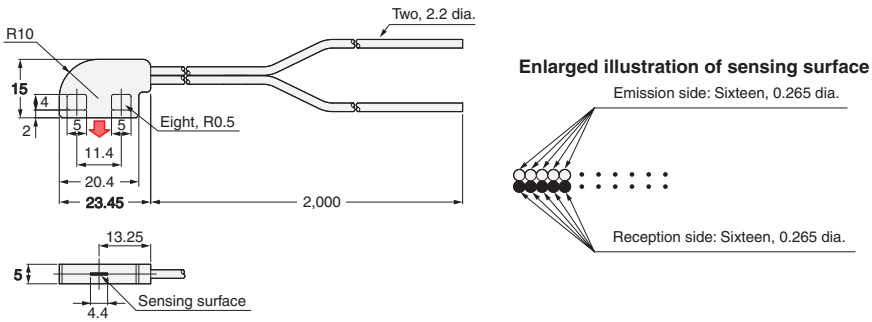
(Free-cut)




### Liquid-level Detection Models

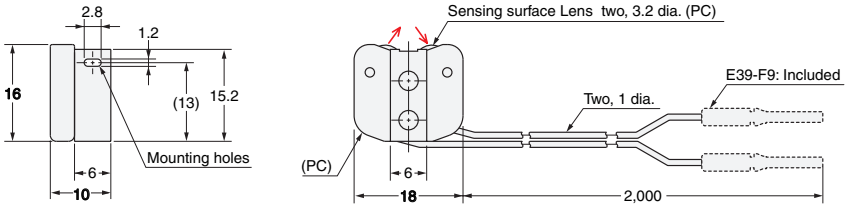
#### E32-D36T (R4)

(Free-cut)

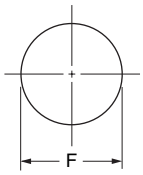



#### E32-L25T (R10)

(Free-cut)




## Mounting hole dimensions (recommended)




<Screw-mounting Model> (Unit:mm)

| Outer diameter of fiber unit | M3 | M4 | M6 | M14 |
|---|---|---|---|---|
| F dimensions | $3^{+0.5}_{0}$ dia. | $4^{+0.5}_{0}$ dia. | $6^{+0.5}_{0}$ dia. | $14^{+1}_{0}$ dia. |

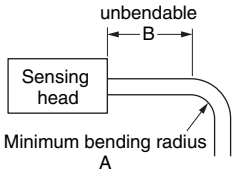
Example: Head size of E32-TC200 is M4. Open the mounting holes with 4 to 4.5 dia.

<Cylindrical Model> (Unit:mm)

| Outer diameter of fiber unit | 1 dia. | 1.5 dia. | 2 dia. | 3 dia. |
|---|---|---|---|---|
| F dimensions | $1.2^{+0.2}_{0}$ dia. | $1.7^{+0.2}_{0}$ dia. | $2.2^{+0.2}_{0}$ dia. | $3.2^{+0.2}_{0}$ dia. |
| Outer diameter of fiber unit | 3.5 dia. | 4 dia. | 5 dia. | 6 dia. |
| F dimensions | $4^{+0.5}_{0}$ dia. | $4.5^{+0.5}_{0}$ dia. | $5.5^{+0.5}_{0}$ dia. | $6.5^{+0.5}_{0}$ dia. |

Example: Head size of E32-T22 is 2 dia.. Open the mounting holes with 2.2 to 2.4 dia.

## Minimum bending radius




Ⓡ Flexible Ⓑ Break-resistant Ⓤ Fluororesin coating (R□) Standard

(Unit:mm)

| Type | A Minimum bending radius | B unbendable |
|---|---|---|
| Ⓡ (except E32-C11N, E32-C31N and E32-CC200) | 1 | 0 |
| Ⓡ (E32-C11N, E32-C31N, E32-CC200R) | 4 | 0 |
| Ⓑ Ⓤ (R4) | 4 | 10 |
| (R10) | 10 | 10 |
| (R25) | 25 | 10 |
| (R30) | 30 | 10 |
| (R35) | 35 | 10 |
| (R40) | 40 | 10 |

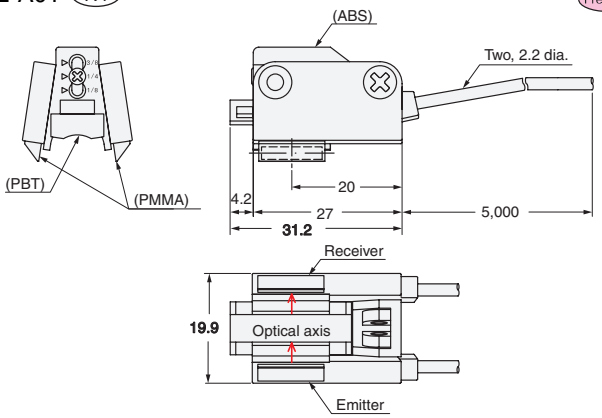
# Fiber Units with Reflective Sensors

## Application-corresponding Fiber Units

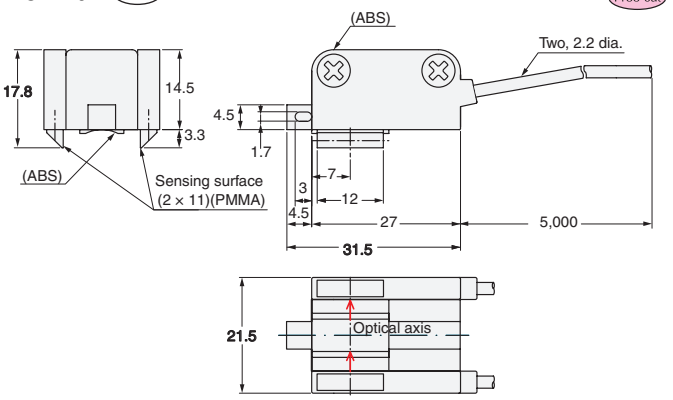
Ⓡ Flexible Ⓑ Break-resistant Ⓤ Fluororesin coating (R□) Standard
(Free-cut) Cutting free (Cutter provided)

### Liquid-level Detection Models

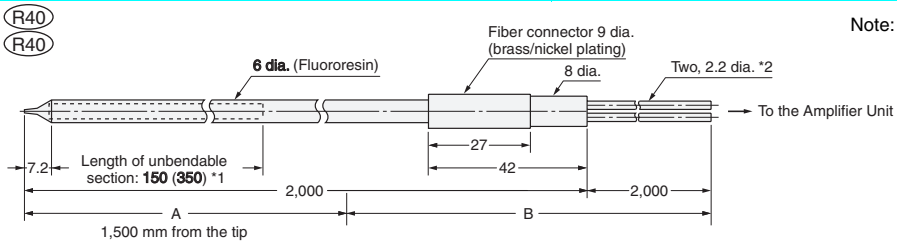
#### E32-A01 (R4) (Free-cut)




#### E32-A02 (R4) (Free-cut)




#### E32-D82F1 (R40)
#### E32-D82F2 (R40)



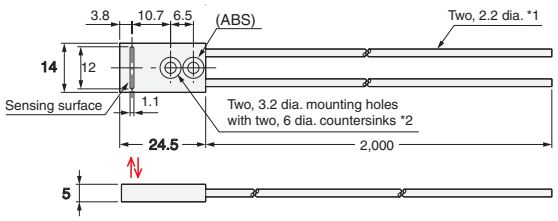

*1.( ): E32-D82F2
*2.The 2-m section of optical fiber on the Amplifier-unit side is plastic and therefore allows free cutting.

Note: The maximum allowable temperatures for sections A and B are 200°C and 85°C, respectively.

### Models for Glass-substrate Alignment/Mapping

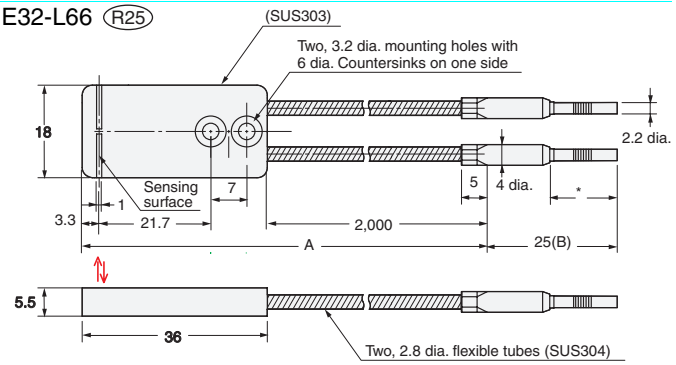
#### E32-A08 (R25)
#### E32-A07E1 (R25)
#### E32-A07E2 (R25)

(Free-cut)



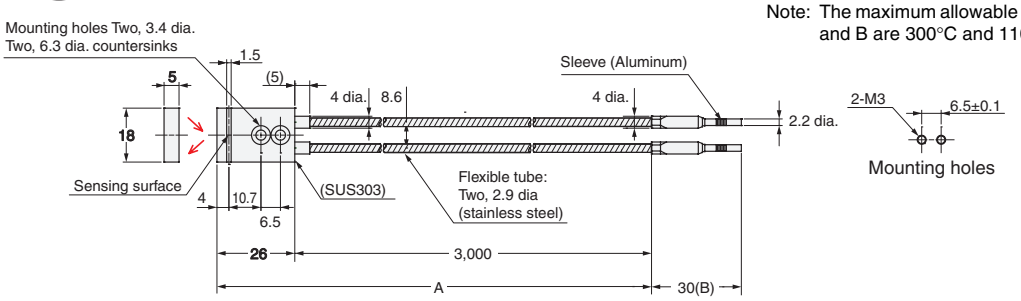

*1 The E32-A07E1/E32-A07E2 has a reception fiber and an emission fiber. Use the fiber with a model display tube (fiber with blue dotted line) as light emitting side.
*2 E32-A08 : Countersinks on one side
E32-A07E1/E32-A07E2 : Countersinks on both sides

#### E32-L66 (R25)




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 *), however, must stay within the Amplifier Unit's operating temperature range.

#### E32-A08H2 (R25)

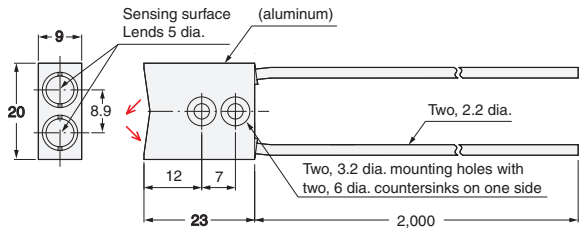



Note: The maximum allowable temperatures for sections A and B are 300°C and 110°C, respectively.

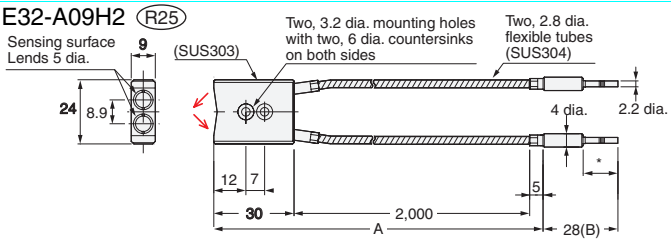
Ⓡ Flexible Ⓑ Break-resistant Ⓤ Fluororesin coating (R□) Standard
(Free-cut) Cutting free (Cutter provided)

## E32-A09 (R25)
## E32-A09H (R35)

(Free-cut)




## E32-A09H2 (R25)

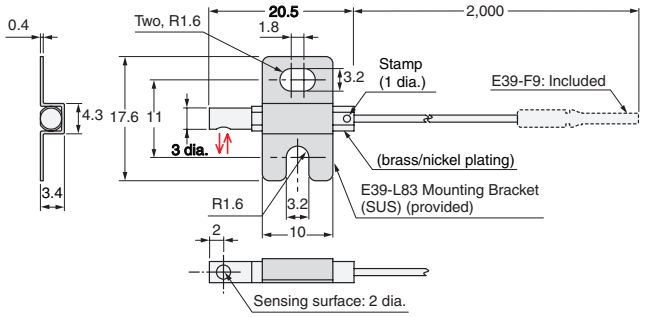



Note: The maximum allowable temperatures for sections A and B are 300°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *), however, must stay within the Amplifier Unit's operating temperature range.

## Wafer-mapping Models

## E32-A03 Ⓡ

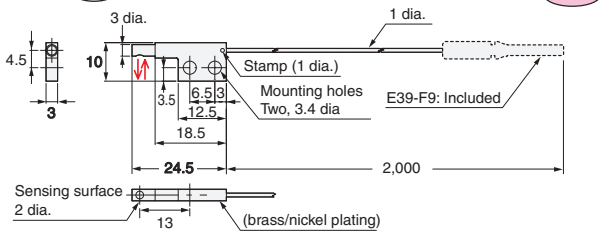
(Free-cut)




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

## E32-A03-1 (R10)

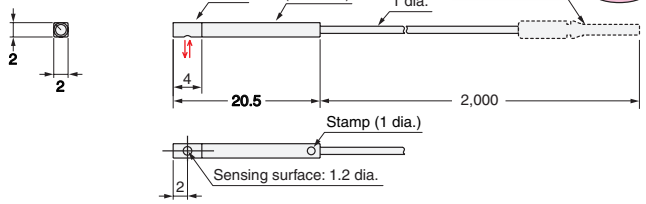
(Free-cut)




Note 1. Use the stamped surface and its opposing surface as installation (reference) surfaces.
2. Set of two symmetrical parts.

## E32-A04 (R10)

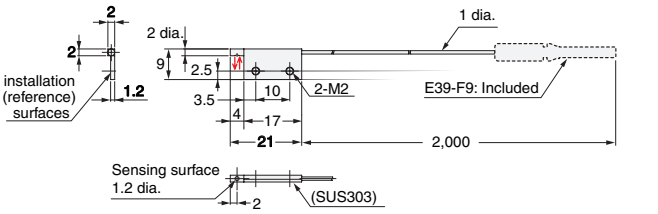
(Free-cut)




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

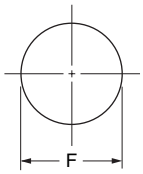
## E32-A04-1 (R10)

(Free-cut)




Note: Set of two symmetrical parts.

## Mounting hole dimensions (recommended)




<Screw-mounting Model> (Unit:mm)

| Outer diameter of fiber unit | M3 | M4 | M6 | M14 |
|---|---|---|---|---|
| F dimensions | $3^{+0.5}_{0}$ dia. | $4^{+0.5}_{0}$ dia. | $6^{+0.5}_{0}$ dia. | $14^{+1}_{0}$ dia. |

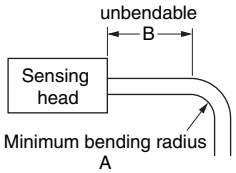
Example: Head size of E32-TC200 is M4. Open the mounting holes with 4 to 4.5 dia.

<Cylindrical Model> (Unit:mm)

| Outer diameter of fiber unit | 1 dia. | 1.5 dia. | 2 dia. | 3 dia. |
|---|---|---|---|---|
| F dimensions | $1.2^{+0.2}_{0}$ dia. | $1.7^{+0.2}_{0}$ dia. | $2.2^{+0.2}_{0}$ dia. | $3.2^{+0.2}_{0}$ dia. |
| Outer diameter of fiber unit | 3.5 dia. | 4 dia. | 5 dia. | 6 dia. |
| F dimensions | $4^{+0.5}_{0}$ dia. | $4.5^{+0.5}_{0}$ dia. | $5.5^{+0.5}_{0}$ dia. | $6.5^{+0.5}_{0}$ dia. |

Example: Head size of E32-T22 is 2 dia.. Open the mounting holes with 2.2 to 2.4 dia.

## Minimum bending radius



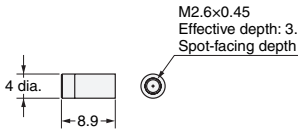

Ⓡ Flexible Ⓑ Break-resistant Ⓤ Fluororesin coating (R□) Standard
(Unit:mm)

| Type | A Minimum bending radius | B unbendable |
|---|---|---|
| Ⓡ (except E32-C11N, E32-C31N and E32-CC200) | 1 | 0 |
| Ⓡ (E32-C11N, E32-C31N, E32-CC200R) | 4 | 0 |
| Ⓑ Ⓤ (R4) | 4 | 10 |
| (R10) | 10 | 10 |
| (R25) | 25 | 10 |
| (R30) | 30 | 10 |
| (R35) | 35 | 10 |
| (R40) | 40 | 10 |

# Accessories

## Lens Units

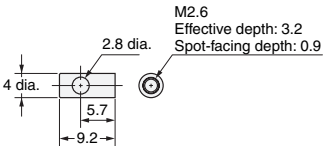
### Lens Units
### E39-F1




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

Note: Two per set.

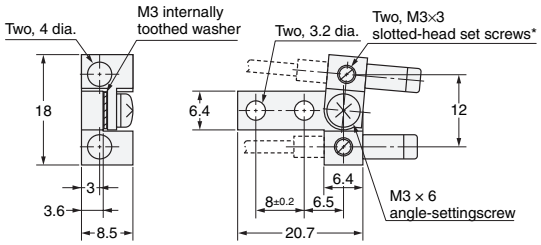
### Side-view Units
### E39-F2




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

Note: Two per set.

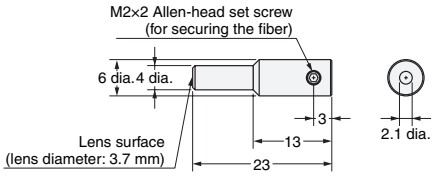
### Reflection Unit with Lens
### E39-F3




Material:
Brass for the body and aluminum for the base.

* Secure the fiber head with the slotted-head set screws. Do not insert a lens (E39-F1).

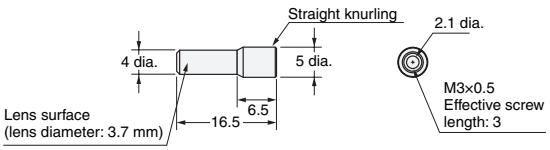
### Lens Unit for Reflective Fiber Units
### E39-F3A




Material:
Aluminum for body and optical glass for lens.

Note: This is the Lens Unit for the E32-D32 and E32-C42.

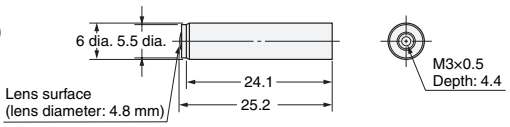
### Lens Unit for Reflective Fiber Units
### E39-F3A-5




Material:
Aluminum for body and optical glass for lens

Note: This is the Lens Unit for the E32-C31 and E32-C41.

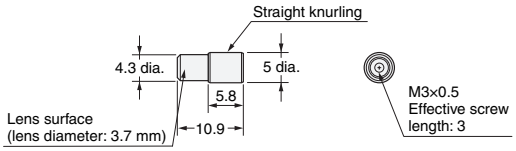
### Lens Unit for Reflective Fiber Units
### E39-F3B




Material:
Aluminum for body and optical glass for lens.

Note: This is the Lens Unit for the E32-C31 and E32-C41.

### Lens Unit for Reflective Fiber Units
### E39-F3C

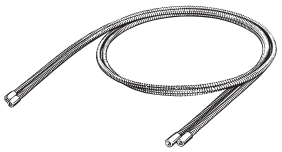


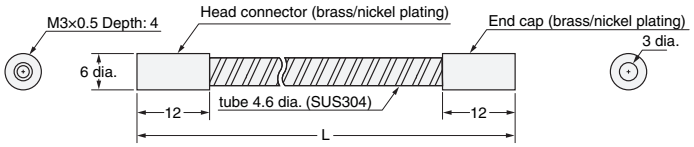

Material:
Aluminum for body and optical glass for lens.

Note: This is the Lens Unit for the E32-C31 and E32-C41.

## Protective Spiral Tubes

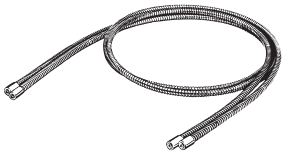
### E39-F32A/F32A5
### E39-F32B/F32B5

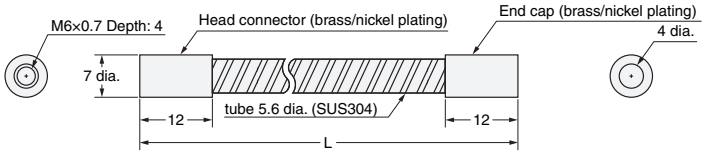





Note 1. The length L is 1,000 for the E39-F32A/-F32B and 500 for the E39-F32A5/-F32B5.
2. The E39-F32B(5) consists of two E39-F32A(5)s.

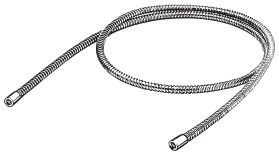
### E39-F32C/F32C5

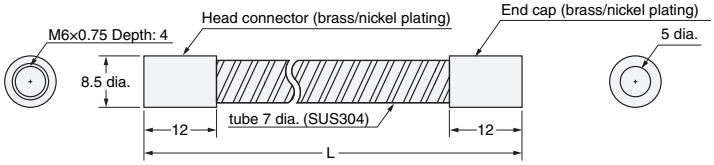





Note: The length L is 1,000 for the E39-F32C and 500 for the E39-F32C5.

### E39-F32D/F32D5



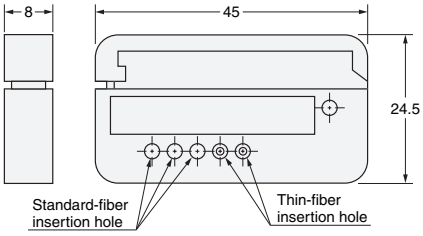



Note: The length L is 1,000 for the E39-F32D and 500 for the E39-F32D5.

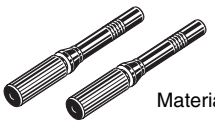
# Accessories

## Other Accessories

### Fiber Cutter
E39-F4

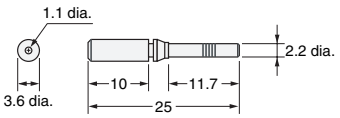



### Thin-fiber Attachments
E39-F9

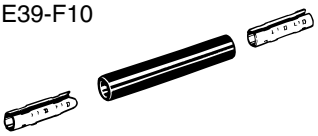


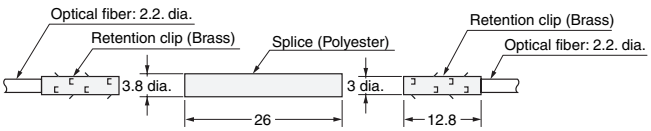
Material: ABS

Note: Two per set.
*Provided with thin-fiber models.

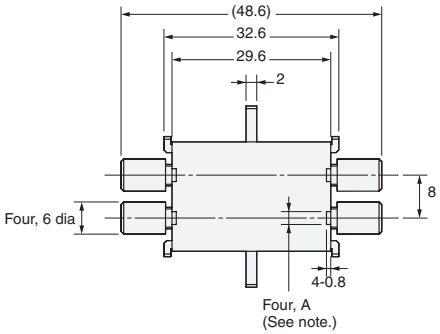


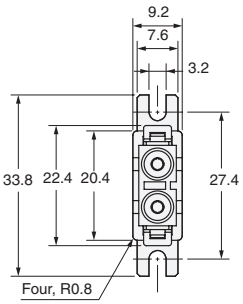

### Fiber Connector
E39-F10






### Fiber Connector
E39-F13
E39-F14
E39-F15

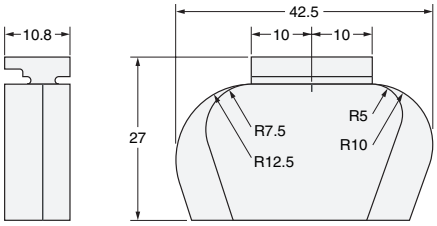


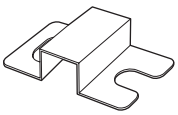

Note: Dimension A varies with the model number as shown in the following table.

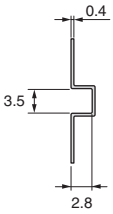
| Model | Dimension A |
|---|---|
| E39-F13 | 2.4 |
| E39-F14 | 1.2 |
| E39-F15 | 2.4/1.2 |

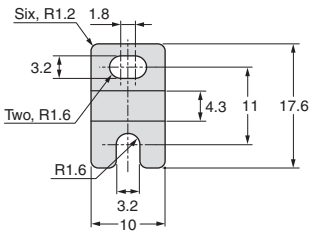
### Sleeve Bender
E39-F11




### Mounting Bracket
E39-L83





# Safety Precautions

**Refer to *Warranty and Limitations of Liability*.**

**⚠ 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 product in atmospheres or environments that exceed product ratings.

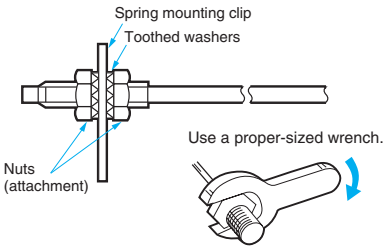
### Fiber Units

● Mounting

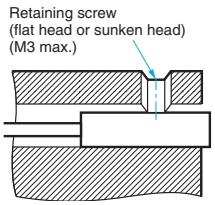
#### Tightening Force

The tightening force used to mount the Fiber Unit must not be more than the value given in Ratings/Characteristics.

#### Screw-mounting Model

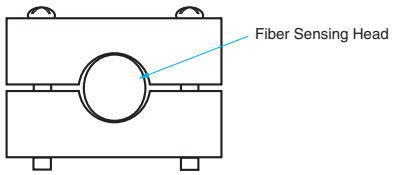



#### Cylindrical Model



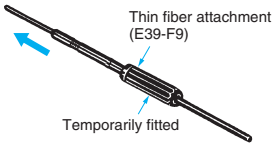
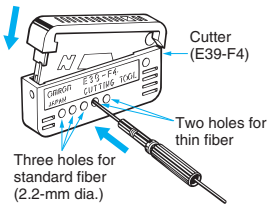
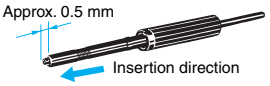

#### Chemical-resistive Models

The following method is recommended to prevent the fluororesin case from cracking when the Sensor is being secured. Be especially careful not to crack the case when using screws to secure the Sensor.




#### Fiber Cutting Procedure

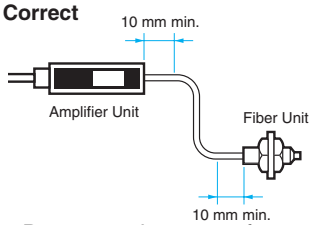
Cut a thin fiber as follows:

| | | |
|---|---|---|
| (1) | The fiber is shipped loosely tightened as shown in the figure at the right. |   |
| (2) | Adjust the fiber to the desired length and then tighten it securely. | |
| (3) | Insert the fiber to be cut into the E39-F4. |   |
| (4) | Finished state (proper cutting state) |   Note: Insert the fiber into the amplifier the direction indicated by the arrow. |

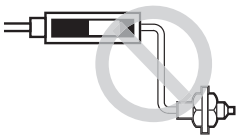
#### Connection

- Do not excessively pull or press the Fiber Unit. Use a pulling force no higher than what is given in *Ratings/Characteristics*.
- Do not bend the Fiber Unit beyond the permissible bending radius given under *Ordering Information*.
- Do not bend the edge of the Fiber Units (excluding the E32-T□R and E32-D□R).

**Correct**

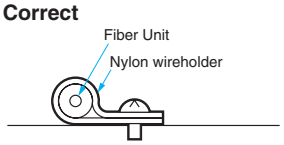



**Incorrect**

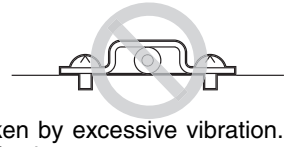


- Do not apply excess force on the Fiber Units.

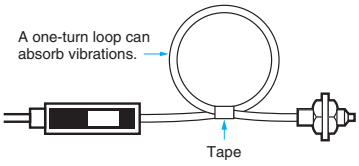
**Correct**




**Incorrect**

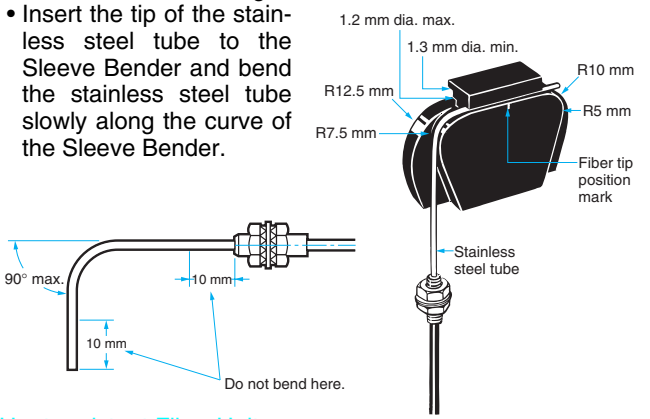


The Fiber Head could be broken by excessive vibration. To prevent this, the following is effective:



### E39-F11 Sleeve Bender

- The bending radius of the stainless steel tube should be as large as possible. The smaller the bending radius becomes, the shorter the sensing distance will be.
- Insert the tip of the stainless steel tube to the Sleeve Bender and bend the stainless steel tube slowly along the curve of the Sleeve Bender.

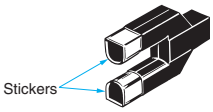



### Heat-resistant Fiber Units (E32-D51 and E32-T51)

- The fibers of these Units cannot be extended using the E39-F10 Fiber Connector.
- The maximum allowable temperature for continuous operation with these Units is 130°C. It is 150°C for short-term use.

### E32-T14 and E32-G14

These Units may enter the light-ON state if there are reflecting objects at the ends of the lenses. In this case, attach the black stickers provided to the ends of the lenses.

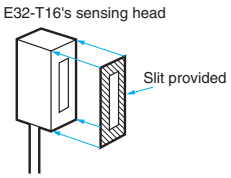



### Wafer Sensors (E32-L25(A))

- To ensure correct performance, insert the fiber with a white line into the emitter-side port of the Amplifier Unit.

### E32-T16 and E32-T16P

Example




To use the slit provided, peel off the backing sheet, align it 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 light intensity cannot be obtained) due to short sensing distances.

### E32-M21

Separate the 4 fibers by distances sufficient to prevent interference.

### Vacuum-resistant Fiber Units (E32-V)

Although Flanges, Fiber Units on the vacuum side, and Lens Units have been cleaned, as an extra precaution, clean these products with alcohol before use in high-vacuum environments to ensure that they are properly degreased.

### Liquid-level Detection Sensors (E32-D82F)

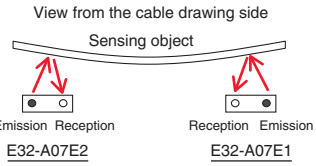
- Secure the Fiber Unit using the unbendable section. Otherwise, the liquid-level detection position may be displaced.
- For applications in hazardous environments, install the Fiber Unit in the hazardous environment but install the Amplifier Unit in a safe environment.

### Liquid-level Detection Sensors: Tube-mounting Models

- Ensure that the tube is not deformed when using a band to secure the Fiber Unit.
- Drops of water, bubbles, or haze inside the tube may cause malfunctions.

### E32-A07E1(E2)

There is a difference in sensing object angle between E32-A07E1 and E32-A07E2. Select a model in accordance with the bending direction of a sensing object. Use the fiber with a model display tube as light emitting side.



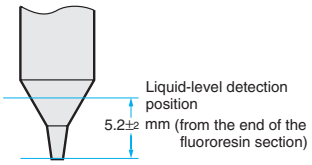

## ● Adjustment

### E32-G14

When a Digital Fiber Amplifier is used, the sensing distance is short, making the incident light intensity large. This makes it impossible to teach without a workpiece.

### Liquid-level (E32-D82F) Detection Position

The liquid-level detection position is at a distance of 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 Considerations

### Liquid Level (E32-D82F)

- Operation may become unstable in the following cases:
  ① Bubbles stick to the cone of the sensing head.
  ② Solute is deposited 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 another object. Damage to, or deformation of, the sensing head may result in unstable operation.

### Heat-resistant Fiber Units (E32-D81R(-S), E32-D61(-S), and E32-D73(-S))

The pitch of the emission-side and reception-side fiber-insertion ports varies with the Amplifier Unit. Be sure to use an appropriate Fiber Unit.

| Amplifier Unit | Fiber Unit |
|---|---|
| E3X-DA□-S<br>E3X-MDA□ | E32-D□-S |
| E3X-DA□-N<br>E3X-NA□ | E32-D□ |

### Chemical-resistant Fiber and Liquid Level (E32-D82F)

Fluororesin has high chemical resistance. However, applications in the atmosphere of vaporized chemicals (gases) or steam may cause malfunction or damage inside sensors. Run a full check before using in such environments.

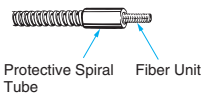
## ■ Accessories

### Use of E39-R3 Reflector

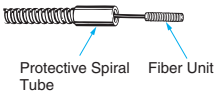
1. Use detergent, etc., to remove any dust or oil from the surfaces where tape is applied. Adhesive tape will not be attached properly if oil or dust remains on the surface.
2. The E39-R3 cannot be used in places where it is exposed to oil or chemicals.

### E39-F32□ Protective Spiral Tubes

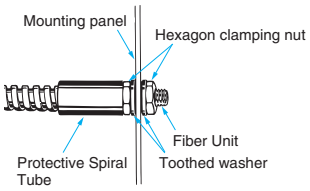
1. Insert a fiber to the Protective Spiral Tube from the head connector side (screwed) of the tube.



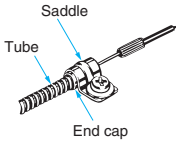

2. Push the fiber into the Protective Spiral Tube. The tube should be straight so that the fiber is not twisted when inserted. Then turn the end cap of the spiral tube.




3. Secure the Protective Spiral Tube on a suitable place with the attached nut.



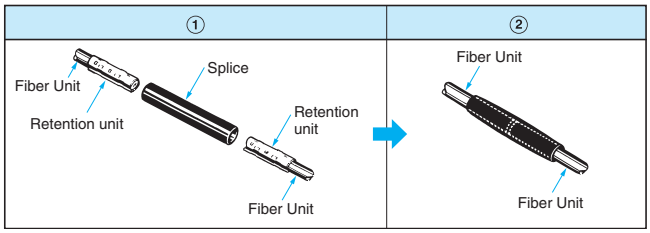

4. Use the attached saddle to secure the end cap of the Protective Spiral Tube. To secure the Protective Spiral Tube at a position other than the end cap, apply tape to the tube so that the portion becomes thicker in diameter.




### E39-F10 Fiber Connector

Mount the Fiber Connector as shown in the following illustrations.

1. Insert the Fiber Unit into the retention clip.
2. Insert the retention clip into the splice.




- The Fiber Units should be as close as possible when they are connected.
  Sensing distance will be reduced by approximately 25% when fibers are connected.
- Only 2.2-mm dia. fibers can be connected.

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# Mouser Electronics

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