OMRON

Best Selection

Fiber Sensor Best Selection Catalog

Measurement Judgement Presence

Start with Smart!

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



realizing

eatures

ride

Fiber Units

standard Installation

Space

Beam Improvements

Jujects 32 Page

Immunity 36 Page

46 Page

Information 56

Fiber Amplifiers, Communications Unit, and Accessories

Technical Guide and Precautions

Model Index 84 Page

Fiber Sensor



Easy

"Mounts Anywhere"

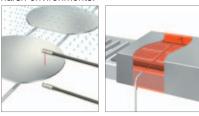
Wide Variety

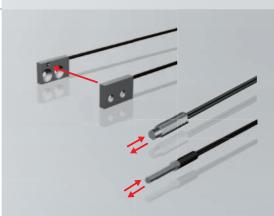
Variously-shaped, compact heads allow installation in any small space.



Suitable for Harsh Environments

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





Optimal Fiber Sensor for additional Fiber Units for various Installation Conditions,

"Easy and Optimum Settings for Anyone"

Universal Design

Anyone can easily set it regardless of the language, the age or the skill

level.

Smart Tuning

Automatically find the optimum settings with the single button.



NEW

Smart Fiber Amplifier Units (Advanced Models)

E3X-HD

60,64 Page

"Smooth Wiring and Setting"

Joining Installation

No wiring is required to join Fiber Amplifier Units together.

Simple Communications

Setting changes and read-out are easy with the communications.



Easy operation by 'One button

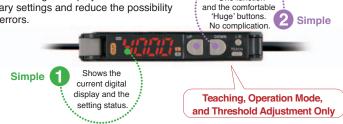
One function'

CompoNet >>> EtherCAT.

"Simplified Setup"

Minimum Required Settings Menu

A simplified menu specifically for detection settings and one digital display eliminate unnecessary settings and reduce the possibility of setting errors.



Simple Fiber Amplifier Units (Simple Models)

E3X-SD

61, 72 Page

Fiber

'Easy' and 'Stable' for

Sensor ures

installation when starting production.

Fiber Amolifier Units with easy optimum setting

Stable

Fiber Units

E32

06 Page



"Extremely Stable Detection, Essentially No Maintenance"

Highest Power in Its Class

More precise detection for low-reflective / large workpieces compare to the conventional models.





Smart Power Control

Long-term stable detection with no maintenance.



NEW

Communications Units

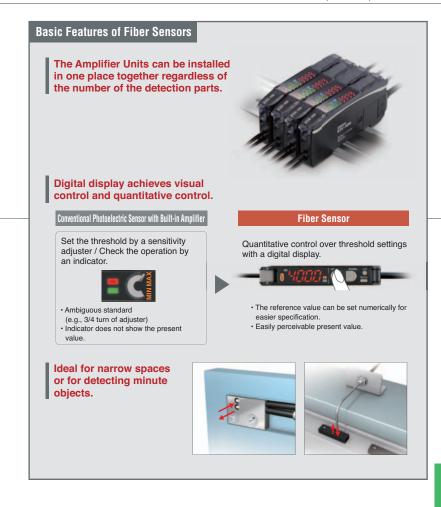
E3X-CRT/ECT

61, 70 Page



Sensor

Minimal Cost Process.



Threaded

Cylindrical

Flat

Sleeved

Small Spot

BGS

reflective Limited-

resistant, Oil-resistant Bending

Heatresistant

Detection

Liquid-level

Vacuum

Technical Guide and Precautions

Model Index

Select of new adoption product Selection by Category

STEP 1

Select a Fiber Unit.

Select a category.

Fiber Unit Index 05

Select a model.

Category Pages 06 to 59

STEP 2

Select a Fiber Amplifier Unit and Communications Unit. STEP 3

Select Accessories of Fiber Amplifier Unit

63 Page

Before Selecting Fiber Units

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

<Specifications on Each Fiber Unit Category Page>

		S	ensing distance (r	nm)	Optical axis		
Appearance (mm)	Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)	Smart Fiber Amp (Advanced Mo E3X-HI	odels)	diameter (minimum sensing	Models	07 Dim
		E3X-SD	■GIGA = HS	Other modes	object)		
14.7 M4	Flexible, R1	530	2,000	ST : 1,000	1 dia.	E32-T11N 2M	(
14 M4 IP87		560	700	SHS: 280	(5 μm dia.)	E32-T11R 2M	(

Fiber Amplifier Unit Series

		Simple Fiber Amplifier Unit E3X-SD Series	Smart Fiber Amplifier Unit E3X-HD Series		
Digital displays	3	Incident level (1 display, threshold display when setting)	Incident level + threshold (2 displays)		
Functions		Standard Models	Advanced Models		
	SPC (Automatic Compensation)	None	Provided		
	Timer	None	ON, OFF and One shot		
	Communications Unit	Unsupported	Supported (CompoNet or EtherCAT)		
Mutual interfer	ence prevention	5 Units	10 Units		
Response time	,	200 μs (Fixed)	50μs (55μs)/250μs/1ms/16ms (Default: 250 μs)		
Page listings	Ordering Information	62 F	Page		
	Ratings and specifications	72 Page	64 Page (Communications Unit: 70 Page)		
	Dimensions	73 Page	64 and 65 Page (Communications Unit: 71 Page)		

Selection by Model

STEP 1

Search for the page in the model index.

84 Page

STEP 2

Search for the model on the corresponding pages.

Fiber Unit Index

Standard Installation

Threaded Models

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

Cylindrical Models



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

a set screw.

Saving Space



Mount directly in limited spaces without using special mounting brackets.

14

Sleeve Models (Close-range Detection)

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

Beam Improvements

Small-Spot, Reflective (Minute Object Detection)



Small-spot to accurately detect small objects.

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



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

10

Narrow View (Detection Across Clearance)



non-spreading beam to prevent false detection of light reflected off surrounding objects.

Detection without Background Interference



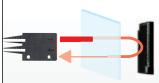
Detect only objects in the sensing range, and not in the background.

Transparent Object Detection

18

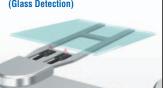
32

Retro-reflective



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

Limited-reflective (Glass Detection)



system provides stable detection of specular reflective glass

The limited-reflective optical 34

Environmental Immunity



Bending-resistant, **Disconnection-resistant**



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

38



environments at up to 400°C

Vacuum-resistant

42 Page

Special Applications



46

Detect across areas for meandering materials or falling workpieces whose position

Liquid-level Detection



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



Can be used under high vacuums of up to 10⁻⁵ Pa.



50 Page

FPD, Semiconductors, and Solar Cells



Designed specifically to reliably detect glass substrates and wafers.

Threaded

Cylindrical

Flat

Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective

Limitedreflective

Chemicalresistant, Oil-resistant

Bending

Heatresistant

Area Detection

Liquid-level

Vacuum

Semi Solar

Threaded Models

Through-beam → This Page

Reflective → 08 Page

Threaded

Cylindrical

Flat

Sleeved

Small Spot

High Power Narrow view

BGS

Retro-reflective

Limited-

Chemical-Oil-resistant Bending

Heatresistant

Detection

Liquid-level

Vacuum Semi, Solar



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





Specifications

Through-beam Fiber Units

				S	ensing distance (n	nm)	Optical axis		
Sensing direction	Size	Appearance (mm)	Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)			diameter (minimum sensing	Models	07 Page Dimensions No.
				E3X-SD	■GIGA = HS	Other modes	object)		
Right-Angle		14.7 M4	Flexible,	530	2,000	ST : 1,000	1 dia.	E32-T11N 2M	07-A
Straight	M4	R1	560	700	SHS: 280	(5 μm dia.)	E32-T11R 2M	07-B	

Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.

GIGA: GIGA Power Mode (16 ms), HIS: High-speed Mode (250 μ s), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 μ s, PNP output: 55 μ s)

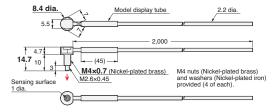
2. The values for the minimum sensing object are representative values that indicate values obtained in Standard Mode with the sensing distance and sensitivity set to the optimum values.

Dimensions

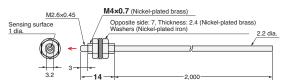
Installation Information → 58 Page

Through-beam Fiber Units (Set of 2)

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



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



- Reference Information for Model Selection -

Features of the Right-angle Type

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

What Is "Flexible" Fiber?

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



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

And

Long-distance Sensing Applications

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

→ 24 Page

Breaking Due to Snagging or Shock

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

→ 38 Page (Only E32-T11R 2M)

Threaded

Cylindrica

Flat Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective

Limitedreflective Chemical-

resistant, Oil-resistant

Bending Heat-

resistant Detection

Liquid-level

Vacuum FPD, Semi,

Solar

Threaded Models

Threaded

Cylindrical

Flat

Sleeved

Small Spot

High Power Narrow view

BGS

Retro-reflective

Limited-

Chemical-Oil-resistant Bending

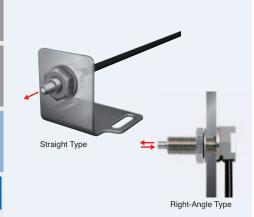
Heatresistant

Detection

Liquid-level

Vacuum

Semi, Solar



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





Specifications

Reflective Fiber Units

	CIIC	ctive Fiber Un	113						
				S	ensing distance (m		Optical axis		
Sensing direction	Size	Appearance (mm)	Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)	Smart Fiber Amp (Advanced M E3X-H	odels)	diameter (minimum sensing	Models	09 Page Dimensions No.
				È3X-SD	■GIGA = HS	Other modes	object)		
Right-Angle	МЗ	Coaxial 20.5 M3	Flexible,	25	■ 110 □ 46	ST: 50 SHS: 14		E32-C31N 2M	09-A
	M6	Coaxial 24 M6	R4	170	780	ST: 350 SHS: 100		E32-C11N 2M	09-B
		M3 IP67	Flexible, R1	30	■ 140 □ 40	ST: 60 SHS: 16	_	E32-D21R 2M	09-C
	МЗ	Coaxial 25 M3	R25	80	330	ST : 150 SHS: 44	(5 μm dia.)	E32-C31 2M	09-D
Straight		Coaxia) 11 M3 IP67	R10	80	330 100	ST: 150 SHS: 44	(5 μm dia.)	E32-C31M 1M <u>NEW</u>	09-E
J	M4	15 🗸	Flexible,	 30	■ 140 40	ST: 60 SHS: 16		E32-D211R 2M	09-F
	M6	17 M6	R1	180	840	ST: 350 SHS: 100		E32-D11R 2M	09-G
	OIVI	Coaxial 23 M6	R25	300	1,400	ST: 600 SHS: 180		E32-CC200 2M	09-H

- Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.

 GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 µs), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 µs, PNP output: 55 µs)

 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 the optimum values.

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

Standard Installation

Installation Information → 56 Page

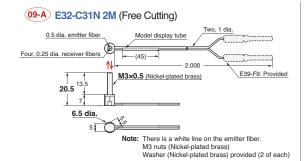
Threaded

High Power

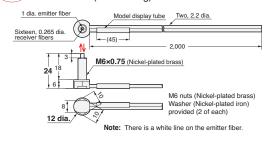
Model Inde

Dimensions

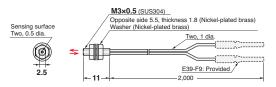
Reflective Fiber Units



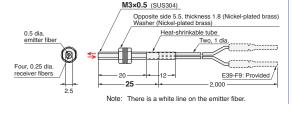
09-B E32-C11N 2M (Free Cutting)



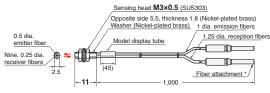
09-C E32-D21R 2M (Free Cutting)



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



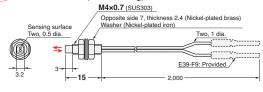
09-E E32-C31M 1M (Free Cutting)



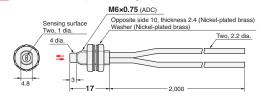
Note: There is a white line on the emitter fiber.

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

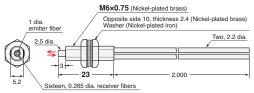
09-F E32-D211R 2M (Free Cutting)



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



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



Breaking Due to Snagging or Shock

The Fiber Unit can be protected from breaking with stainless

Note: There is a white line on the emitter fiber

- Reference Information for Model Selection -

Features of Coaxial Reflective Type

These Fiber Units offer better detection of small objects at close distances (of 2 mm or less) than Standard Reflective Fiber Units.

They also detect glossy surfaces more reliably than Standard Reflective Fiber Units even if the surface is tilted

The receiver fibers are arranged around the emitter fiber as shown below.



Features of the Right-angle Type

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

What Is "Flexible" Fiber?

The flexible fiber has a small bending radius for easy routing without easily breaking.

It is easy to use because the cable can be bent without significantly reducing light intensity.



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

And

steel spiral tube.

→ 40 Page

OMRON

Cylindrical Models

Through-beam → This Page

Reflective → 12 Page

Threaded

Small Spot High Power

Flat

Sleeved

Narrow view BGS

Retro-reflective Limited-

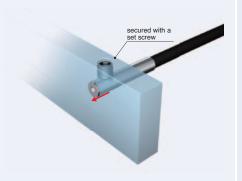
Chemical-Oil-resistant Bending

Heatresistant

> Detection Liquid-level

Vacuum

Semi, Solar



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



Specifications

Through-beam Fiber Units

				Se	ensing distance (m	m)	Optical axis		
Size	Sensing direction	Appearance (mm)	Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)	Smart Fiber Amp (Advanced Mo E3X-HI	odels)	diameter (minimum sensing	Models	11 Page Dimensions No.
				E3X-SD	■GIGA =HS	Other modes	object)		
1 dia.		10 1 dia.	Flexible, R1	120	450 150	ST : 250 SHS: 60	0.5 dia.	E32-T223R 2M	(11-A)
1.5 dia.	Top-View	10 1.5 dia.	Bend- resistant, R4	200	680	ST: 400 SHS: 90	(5 μm dia.)	E32-T22B 2M	(11-B)
3 dia		14 3 dia.	Flexible,	560	700	ST: 1,000 SHS: 280	1 dia.	E32-T12R 2M	(11-C)
o dia.	3 dia. Side-View	35 3 dia.	R1	220	750	ST: 450 SHS: 100	(5 μm dia.)	E32-T14LR 2M	11-D

- Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.

 GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 µs), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 µs, PNP output: 55 µs)

 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 the optimum values.

Dimensions

Installation Information → 58 Page



Through-beam Fiber Units (Set of 2)

11-A E32-T223R 2M (Free Cutting)



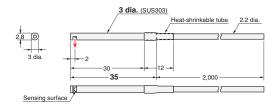
11-B E32-T22B 2M (Free Cutting)



11-C E32-T12R 2M (Free Cutting)



11-D E32-T14LR 2M (Free Cutting)



- Reference Information for Model Selection -

Recommended Mounting Hole Dimensions

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



			(Unit: mm)
Outer diameter of Fiber Unit		1.5 dia.	
Dimension F	1.2 +0.5 dia.	$1.7^{+0.5}_{0}$ dia.	3.2 ^{+0.5} ₀ dia.

Threaded

Cylindrica

Flat

Small Spot

Sleeved

High Power

Narrow view

BGS

Retro-reflective Limited-

reflective Chemicalresistant,

Oil-resistant Bending

> Heatresistant

Detection

Liquid-level

Vacuum

FPD, Semi, Solar

Threaded

Small Spot High Power

Flat

Sleeved

Narrow view BGS

Retro-reflective Limited-

> Chemicalresistant, Oil-resistant

Bending Heat-

resistant

Detection

Liquid-level

Vacuum Semi, Solar

secured with a set screw

Cylindrical Models

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

Specifications

Reflective Fiber Units

				Sen	sing distance (mm)	Optical axis		
	Sensing direction		Bending radius of cable	Simple Fiber Amplifier Units (Simple Models) E3X-SD	Smart Fiber Amp (Advanced M E3X-H	odels)	diameter (minimum sensing	Models	13 Page Dimensions No.
					■GIGA =HS	Other modes	object)		
1.5 dia.		15 1.5 dia.	Bend- resistant, R4	■ 30	140 40	ST : 60 SHS: 16		E32-D22B 2M	(13-A)
1.5 dia. + 0.5 dia.		3 15 1.5 dia. 0.5 dia.	R4	6	2 8	ST : 12 SHS: 4		E32-D43M 1M <u>NEW</u>	13-B
	Top-View	15 3 dia.	Flexible, R1	■30	140 40	ST: 60 SHS: 16	(5 μm dia.)	E32-D22R 2M	13-C
3 dia.		15 3 dia.	Bend- resistant, R4	7 0	300	ST : 140 SHS: 40	(E32-D221B 2M	13-D
		Coaxia) 15 3 dia.	R25	160	200	ST : 300 SHS: 90		E32-D32L 2M	13-E
3 dia. + 0.8 dia.		15 3 dia. 0.8 dia.	R4	16	7 0	ST: 30 SHS: 8		E32-D33 2M	13-F

- Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.

 GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 µs), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 µs, PNP output: 55 µs)

 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 the optimum values.

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

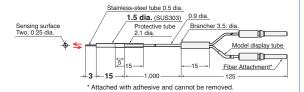
Reflective Fiber Units

13-A E32-D22B 2M (No Cutting)

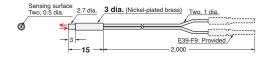
*Attached with adhesive and cannot be re-

Enlarged View of Sensing Surface Emitter fiber: two, 0.25 dia.

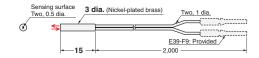
13-B E32-D43M 1M (No Cutting)



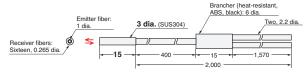
13-C E32-D22R 2M (Free Cutting)



13-D E32-D221B 2M (Free Cutting)

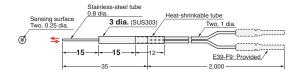


13-E E32-D32L 2M (Free Cutting)



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

13-F E32-D33 2M (Free Cutting)



- Reference Information for Model Selection -

Features of Coaxial Reflective Type

These Fiber Units offer better detection of small objects at close distances (of 2 mm or less) than Standard Reflective Fiber Units.

They also detect glossy surfaces more reliably than Standard Reflective Fiber Units, even if the surface is tilted.

The receiver fibers are arranged around the emitter fiber as shown below.

Emitter fiber Receiver fibers

Recommended Mounting Hole Dimensions

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



		(Unit: mm)
Outer diameter of Fiber Unit	1.5 dia.	3 dia.
Dimension F	$1.7^{+0.5}_{0}$ dia.	$3.2^{+0.5}_{0}$ dia.

Threaded

Cylindrica

Flat Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective Limited-

reflective Chemicalresistant,

Oil-resistant

Bending Heat-

resistant Detection

Liquid-level

Vacuum

FPD, Semi, Solar

Threaded Cylindrical

Flat

Sleeved

Small Spot High Power Narrow

view

BGS

Retro-reflective

Limited-

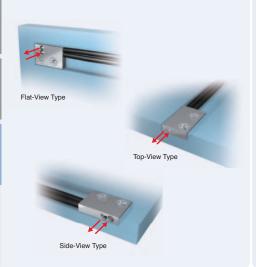
Chemicalresistant, Oil-resistant Bending

resistant Detection

Heat-

Liquid-level

Vacuum Semi, Solar



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

Specifications

■→■ Through-beam Fiber Units

			Sens	sing distance (mm))	Optical axis		
Sensing direction	Appearance (mm)	Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)	Smart Fiber Amplifier Units (Advanced Models) E3X-HD		diameter (minimum sensing	Models	15 Page Dimensions No.
			E3X-SD	■GIGA = HS	Other modes	object)		
Top-View	8 13 15 IP67		560	\$ 2,000	ST :1,000 SHS: 280		E32-T15XR 2M	15-A
Side-View	315 318	Flexible, R1	220	750	ST : 450 SHS: 100	1 dia. (5 μm dia.)	E32-T15YR 2M	15-B
Flat-View	8 15 3 IP67		220	750	ST : 450 SHS: 100		E32-T15ZR 2M	15-C

■⇒ Reflective Fiber Units

				Sen	sing distance (mm)	Optical axis		
Sensing direction		Appearance (mm)	Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)	Smart Fiber Amplifier Units (Advanced Models) E3X-HD		diameter (minimum sensing	Models	15 Page Dimensions No.
				È3X-SD	■GIGA =HS	Other modes	object)		
Top-V	/iew	15 3 I		1 80	840	ST: 350 SHS: 100		E32-D15XR 2M	15-D
Side-\	View	3 15 1P67	Flexible, R1	40	200 52	ST : 100 SHS: 24	(5 μm dia.)	E32-D15YR 2M	15-E
Flat-V	iew/	15 10 3		40	200 52	ST : 100 SHS: 24		E32-D15ZR 2M	15-F

- Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.
 - GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 μ s), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 μ s, PNP output: 55 μ s)

 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 the optimum values.

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

Threaded

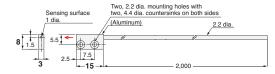
Solar

Dimensions

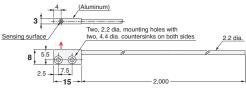
Installation Information → 58 Page

Through-beam Fiber Units (Set of 2)

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

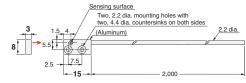


- Note: 1. Set of two symmetrically shaped Fiber Units. 2. Four, $M2 \times 8$ stainless steel countersunk mounting screws are provided.
- 15-B E32-T15YR 2M (Free Cutting)



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

- 2. Four, M2 x 8 stainless steel countersunk mounting screws are provided.
- 15-C E32-T15ZR 2M (Free Cutting)

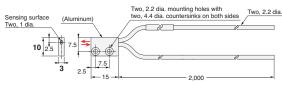


Note: 1. Set of two symmetrically shaped Fiber Units.

Set of two symmetrically shaped hiser of this.
 Four, M2 x 8 stainless steel countersunk mounting screws are provided.

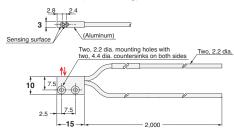
Installation Information → 56 Page **Reflective Fiber Units**

15-D E32-D15XR 2M (Free Cutting)



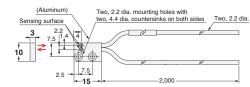
Note: Two, M2 \times 8 stainless steel countersunk mounting screws are provided.

15-E E32-D15YR 2M (Free Cutting)



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

15-F E32-D15ZR 2M (Free Cutting)



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

Sleeve Models (Close-range Detection)

Threaded

Cylindrical

Sleeved

Small Spot

High Power

Narrow view

BGS

Retro-reflective

Limited-Chemical-

Oil-resistant

Bending

Heatresistant

Detection

Liquid-level

Vacuum

Semi, Solar



- · Sleeve Fiber Units allow detection away from the point of installation for stable close-range detection of small objects.
- · The shape of sleeve can be changed freely.



Specifications

Through-beam Fiber Units

			Sen	sing distance (mm))	Optical axis		
Sensing direction	Appearance (mm)	Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)			diameter (minimum sensing	Models	17 Page Dimensions No.
			E3X-SD	■GIGA = HS	Other modes	object)		
Cida Viano	15 20 1 dia. 2 dia.	Flexible, R1	60	170 50	ST: 100 SHS: 20	0.5 dia.	E32-T24R 2M	17-A
Side-View	15 15 0.8 dia. 2.5 dia.	R10	180	450	ST : 250 SHS: 60	(5 μm dia.)	E32-T24E 2M <u>NEW</u>	17-B
Top Viou	15 40 0.5 dia. 3 dia.	HIU	40	150 50	ST: 90 SHS: 20	0.25 dia. (5 μm dia.)	E32-T33 1M	17-C
Top-View	90 11 90 M4 1.2 dia.	Flexible, R1	560	2,000 700	ST : 1,000 SHS: 280	1 dia. (5 μm dia.)	E32-TC200BR 2M	17-D

Reflective Fiber Units

			Sen	sing distance (mm)		Optical axis		
Sensing direction	Appearance (mm)	Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)	Smart Fiber Amp (Advanced Mo E3X-HI	odels)	diameter (minimum sensing	Models	17 Page Dimensions No.
			E3X-SD	■GIGA = HS	Other modes	object)		
Side-View	15 3 dia.	Flexible,	 14	70	ST: 30		E32-D24R 2M	(17-E)
	2 dia.	R1		20	SHS: 8			
	3 15		l o	28	ST : 12		E00 D40M 4M	47.5
	1.5 dia. IP67		6	I 8	SHS: 4		E32-D43M 1M <u>NEW</u>	(17-F)
	15 2 dia.	R4	1 3	14	ST: 6		E32-D331 2M	(17-G)
	0.5 dia.			I 4	SHS: 2	(5 μm dia.)		
Top-View	15 20		1 16	1 70	ST: 30	(2)	E32-D33 2M	(17-H)
	3 dia. 0.8 dia.			20	SHS: 8			
	11 40			140	ST: 60			
	M3 1.2 dia. IP67	Flexible,	30	I 40	SHS: 16		E32-DC200F4R 2M	(17-1)
	90 17	R1		840	ST: 350			
	90 M6 2.5 dia. IP67		180	240	SHS: 100		E32-DC200BR 2M	(17-J)

- Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.

 GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 µs), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 µs, PNP output: 55 µs)

 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 the optimum values.

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

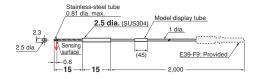
Dimensions

Installation Information → 58 and 59 Page

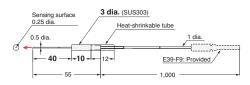
Through-beam Fiber Units (Set of 2)

17-A E32-T24R 2M (Free Cutting) Stainless-steel tube 1 dia. max. 2 dia. (SUS304) Heat-shrinkable tube 1 dia. 1.4 dia Sensing surface E39-F9: Provided 2,000

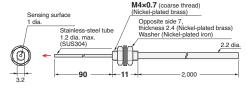
17-B E32-T24E 2M (Free Cutting)



17-C E32-T33 1M (Free Cutting)



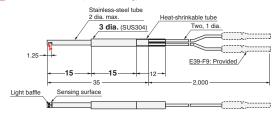
17-D E32-TC200BR 2M (Free Cutting)



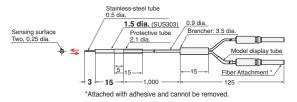
Installation Information → 57 Page

Reflective Fiber Units

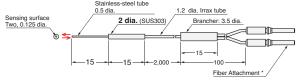
17-E E32-D24R 2M (Free Cutting)



17-F E32-D43M 1M (No Cutting)



17-G E32-D331 2M (No Cutting)

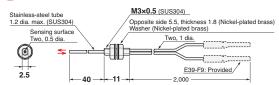


*Attached with adhesive and cannot be removed

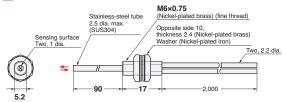
17-H E32-D33 2M (Free Cutting)



17-I E32-DC200F4R 2M (Free Cutting)



17-J E32-DC200BR 2M (Free Cutting)



- Reference Information for Model Selection -



In case of bending sleeve

The E32-TC200BR and E32-DC200F4R have bendable sleeves. Use the Sleeve Bender to bend them.

Sleeve Bender (sold separately)

Appearance	Applicable Fiber Units	Model
Uses for the bending of the sleeve.	E32-TC200BR E32-DC200F4R	E39-F11

Threaded

Cylindrical

Flat

Sleeved

Small Spot

High Power Narrow

view

BGS

Retroreflective Limited-

Chemicalresistant,

Oil-resistant Bending

> Heatresistant

Detection

Liquid-level

Vacuum

FPD, Semi Solar

Small-Spot, Reflective (Minute Object Detection)

Threaded

Cylindrical

Flat

Sleeved

Small Spot High Power

> Narrow view

BGS

reflective

Limited-

Chemical-

Oil-resistant Bendina

Heatresistant

Detection

Liquid-level

Vacuum

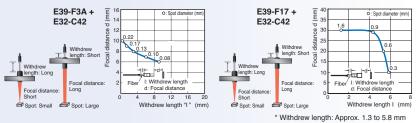
Semi, Solar



· Small-spot is ideal for detecting minute objects. Select the Fiber Unit that is best suited for the workpiece size and installation distance.

(Refer to Reference Information for Model Selection)

· Available with a variable-spot Lens Unit to change the spot diameter without replacing the fiber. The spot diameter can be adjusted according to the size of the workpiece by changing the withdrew length and sensing distance. Refer to the following graph, which shows the relation between the withdrew length, focal distance, and spot diameter.



Specifications

Reflective Fiber Units

Variable-spot types

Lens Units + Fiber Unit

		Center	Lens Units	Lens Units + Fiber Units	Fibe	er Unit	19 Page
Туре	Spot diameter	distance (mm)	Models	Appearance	Bending radius of cable	Model	Dimensions No.
Variable and	0.1 to 0.6 dia.	6 to 15	E39-F3A	23 2 dia 6 dia	R25	E32-C42 1M	19-A
Variable spot	0.3 to 1.6 dia.	10 to 30	E39-F17	22.2 2 dia 6 dia	n25		19-B

Parallel-light-spot types

Lens Unit + Fiber Units

		Center	Lens Unit	Lens Units + Fiber Units	Fibe	r Units	19 Page
Туре	Spot diameter	distance (mm)	Model	Model Appearance		Models	Dimensions No.
Daniel Habi	4 dia.	0 to 20	500 500	10.9 M3	R25	E32-C31 2M	19-C
Parallel light	4 ula.	0 10 20	E39-F3C	10.9 5 dia.	Pliable, R4	E32-C31N 2M	19-D

Small-spot types

Integrated Lens

Туре	Spot diameter	Center distance (mm)	Appearance	Bending radius of cable	Models	19 Page Dimensions No.
Short-distance, Small-spot	0.1 dia.	5	Lens: unnecessary	H25 -	E32-C42S 1M	19-E
Long-distance, Small-spot	6 dia.	50	Lens: unnecessary 25.6 IP50		E32-L15 2M	19-F

^{*} The spot diameter and the center distance are same when using with E3X-HD series or E3X-SD series.

Small-Spot, Reflective (Minute Object Detection)

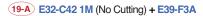
Dimensions

⊕ 6 dia. 🧲

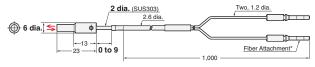
Installation Information → 56, 57 and 58 Page



Reflective Fiber Units



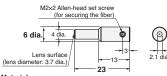
19-B E32-C42 1M (No Cutting) + E39-F17



* Attached with adhesive and cannot be removed

Fiber Attachment*

E39-F3A



optical glass for lens.

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

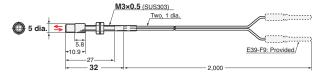
E39-F17



Material:

Aluminum for body and optical glass for lens.

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

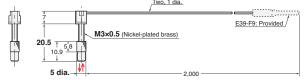


Note: There is a white line on the emitter fiber

* Attached with adhesive and cannot be removed

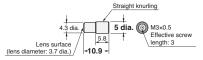
Note: There is a white tube on the emitter fiber.

19-D E32-C31N 2M (Free Cutting) + E39-F3C



Note: There is a white line on the emitter fiber

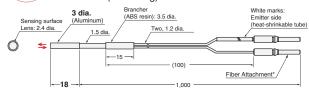
E39-F3C



Aluminum for body and optical glass for lens.

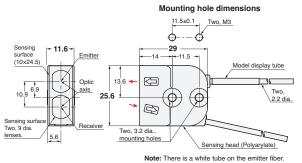
Note: This is the Lens Unit for the E32-C31 and E32-C31N.

19-E E32-C42S 1M (No Cutting)



Note: There is a white tube on the emitter fiber

19-F E32-L15 2M (Free Cutting)



- Reference Information for Model Selection -

Model Selection Tips

Select the best model by following these steps.

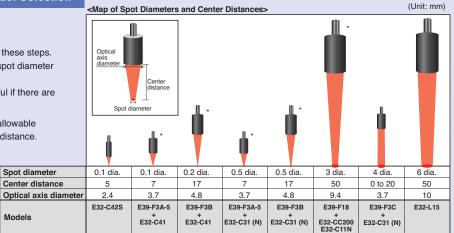
- 1. Select the model based on the spot diameter suitable for the workpiece size
 - The Variable-spot Type is useful if there are different sensing object sizes.

Spot diameter

Models

Center distance

2. Select the model based on the allowable installation distance and center distance.



* Refer to page 20 for details.

Threaded

Cylindrical

Flat

Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective Limited-

Chemical-

resistant, Oil-resistant

Bending

Heatresistant

Detection

Liquid-level

Vacuum

Semi Solar

Small-Spot, Reflective (Minute Object Detection)

Variable-spot, Parallel-light-spot, Integrated lens → 18 Page

Threaded

Cylindrical

Small Spot **High Power**

Flat

Sleeved

Narrow view BGS

Retro-reflective Limited-

Chemicalresistant, Oil-resistant Bending

resistant Detection

Liquid-level Vacuum Semi, Solar



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

Specifications

Reflective Fiber Units

Small-spot Models

Lens Units + Fiber Units

		Center	Lens Units	Lens Units + Fiber Units	Fib	er Units	21 Page
Туре	Spot diameter	distance (mm)	Models	Appearance	Bending radius of cable	Models	Dimensions No.
	0.1 dia.			16.5 M3 5 dia.	R25	E32-C41 1M	21-A
Short-distance, small-spot	0.5 dia.	7	E39-F3A-5	16.5 M3 5 dia.	H25	E32-C31 2M	21-B
	o.o dia.			16.5 5 dia. ^{M3}	Flexible, R4	E32-C31N 2M	21-C
Medium-distance, small-spot	0.2 dia.			25.2 M3 6 dia.		E32-C41 1M	21-D
	0.5 dia.	17	E39-F3B	25.2 M3 6 dia.	R25	E32-C31 2M	21-E
	o.o dia.			25.2 M3 6 dia.	Flexible, R4	E32-C31N 2M	21-F
Long-distance, small-spot	3 dia.	50		30 M6 10 dia.	R25	E32-CC200 2M	21-G
	3 dia.	50	E39-F18	30 10 dia.	Flexible, R4	E32-C11N 2M	21-H

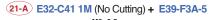
 $^{^{\}star}$ The spot diameter and the center distance are same when using with E3X-HD series or E3X-SD series.

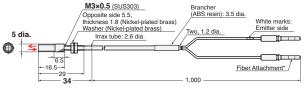
Straight knurling

Installation Information → 56 and 59 Page

Dimensions

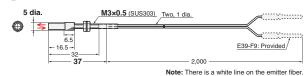
Reflective Fiber Units





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

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



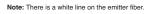
2.1 dia. 5 dia (lens diameter: 3.7 dia.) Material: Aluminum for body and optical

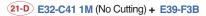
Note: This is a Lens Unit for the E32-C41, E32-C31 and E32-C31N.

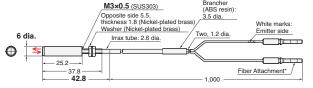
21-C E32-C31N 2M (Free Cutting) + E39-F3A-5

E39-F3A-5



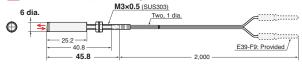


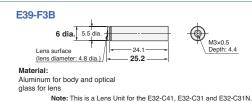




* Attached with adhesive and cannot be removed. Note: There is a white tube on the emitter fiber





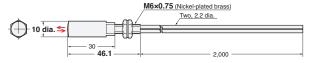


21-F E32-C31N 2M (Free Cutting) + E39-F3B



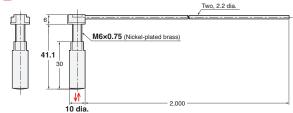
Note: There is a white line on the emitter fiber.

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



Note: There is a white line on the emitter fiber

(21-H) E32-C11N 2M (Free Cutting) + E39-F18



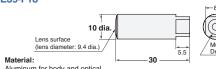
Spot diameter

Models

Center distance

Note: There is a white line on the emitter fiber

E39-F18



Aluminum for body and optical

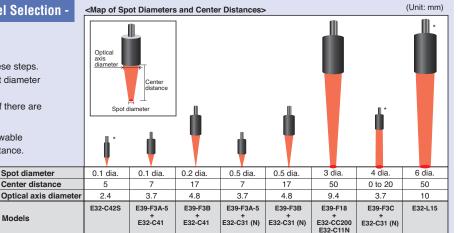
Note: This is a Lens Unit for the E32-C11N and E32-CC200.

- Reference Information for Model Selection -

Model Selection Tips

Select the best model by following these steps.

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



* Refer to page 18 for details.

Threaded

Cylindrical

Flat Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective

Limited-

Chemicalresistant Oil-resistant

Bending

Heatresistant

Detection

Liquid-level

Vacuum

Semi Solar

High-power Beam (Long-distance Installation, Dust-resistant) Fiber only → This Page Lens (to 70°C) → 24 Page

Threaded

Cylindrical

Flat

Small Spot

Sleeved

High Powe Narrow view

reflective Limited-

BGS

Chemicalresistant, Oil-resistant

Bendina Heatresistant

Detection

Liquid-level

Vacuum

Semi, Solar



- Maximum sensing distance without attaching a Lens: 20 m (E32-T17L) Suitable for detection of large objects and for use in large-scale installations.
- · Powerful enough to resist the influences of dust and dirt.
- · In addition to the products listed on this page, Lenses are available to extend the sensing distance. (\rightarrow 24 to 27 pages)

Specifications

Through-beam Fiber Units

				Se	ensing distance (m	m)	Optical axis		
Sensing direction	Aperture angle	Appearance (mm)	Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)	Smart Fiber Am (Advanced M E3X-H	lodels)	diameter (minimum sensing	Models	23 Page Dimensions No.
				E3X-SD	■GIGA = HS	Other modes	object)		
Top-View	10°	42 M14 IP67	Dos	20,000 *1	20,000 *1	ST :20,000*1 SHS: 8,000	10 dia.	E32-T17L 10M	23-A
Side-View	30°	36.4 8 IP67	R25	3,600	4,000 *2	ST: 4,000*2 SHS: 1,800	4 dia. (0.1 dia.)	E32-T14 2M	23-B

- The optical fiber is 10 m long on each side, so the sensing distance is 20,000 mm.
- *1 The optical fiber is 10 m long on each side, so the sensing distance is 4,000 mm.

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

Reflective Fiber Units

				Se	ensing distance (m	m)	Optical axis		
Sensing direction	Aperture angle	Appearance (mm)	Appearance (mm) Bending radius of cable (Simple Fiber Amplifier Units (Simple Models)		Smart Fiber Amplifier Units (Advanced Models) E3X-HD		diameter (minimum sensing	Model	23 Page Dimensions No.
				E3X-SD	■GIGA =HS	Other modes	object)		
Top-View	4 °	9 17.5 IP40	Bend- resistant, R4	800		ST : 40 to 1,400 SHS: 40 to 480	_	E32-D16 2M	23-C

- Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.
 - GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 μ s), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 μ s, PNP output: 55 μ s)

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

Sleeved

Beam

Chemicalresistant, Oil-resistant

> Bending Heatresistant

Detection

Liquid-level

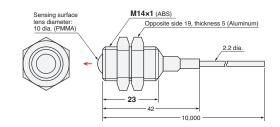
Vacuum FPD,

Semi, Solar

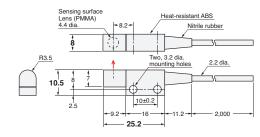
Dimensions

Through-beam Fiber Units (Set of 2)

23-A E32-T17L 10M (Free Cutting)



23-B E32-T14 2M (Free Cutting)



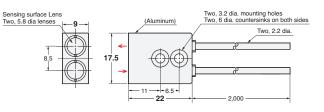
Installation Information → 56 Page

Beam Improvements

Installation Information → 58 Page

Reflective Fiber Units

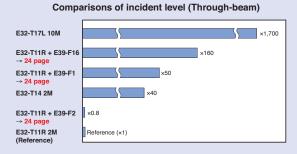
23-C E32-D16 2M (Free Cutting)

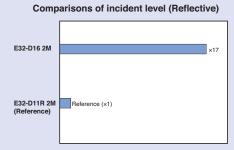


- Reference Information for Model Selection -

Comparisons of incident level

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





Threaded Cylindrical

Flat

Sleeved

Small Spot

High Power

Narrow view

BGS

reflective Limited-

Chemicalresistant, Oil-resistant Bendina

Heatresistant

Detection

Liquid-level

Vacuum

Semi, Solar

Specifications

—→ Thro	ough-beam Fibe	er Units	•								
Lens Units	Туре	High-power	(incident lev	el: 50 times)	Ultra-high-po	wer (incident le	evel: 160 times)	Side-View ((incident leve	l: 0.8 times)	
	Models		E39-F1			E39-F16			E39-F2		
	Appearance		24-A				24-B	24-0			
	Aperture angle		Approx. 12°			Approx. 6°		Approx. 60°			
Fiber Units	Optical axis diameter (minimum sensing object)	4 dia. (0.1 dia.)				7.2 dia.		3 dia. (0.1 dia.)			
					Sens	ing distance	(mm)				
Models	Appearance (mm)	Simple Fiber Amplifier Units	nplifier E3X-HD		Simple Fiber Amplifier Units Smart Fiber Amplifier U			Simple Fiber Smart F Amplifier Units		t Fiber Amplifier Units E3X-HD	
		E3X-SD	■GIGA =HS	Other modes	E3X-SD	■GIGA =HS	Other modes	E3X-SD	■GIGA =HS	Other modes	
E32-T11N 2M	14.7 M4	3,700	4,000 *	ST: 4,000 * SHS: 2,000	4,000 *	4,000 *	ST: 4,000 * SHS: 3,600	_	_	_	
E32-T11R 2M	14 M4	4,000 *	4,000 *	ST : 4,000 * SHS: 2,000	4,000 *	4,000 *	ST : 4,000 * SHS: 3,600	4 40	1,450 500	ST: 800 SHS: 200 25-G	
E32-T11 2M	14	4,000 *	4,000 *	ST : 4,000 * SHS: 1,860	4,000 *	4,000 *	ST : 4,000 * SHS: 4,000 *	720	2,300	ST : 1,320 SHS: 320	

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

- Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.
 - GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 μ s), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 μ s, PNP output: 55 μ s)

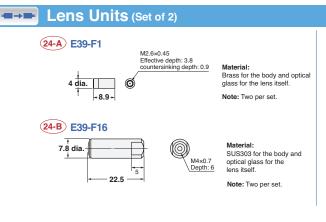
 2. The values for the minimum sensing object are representative values that indicate values obtained in Standard Mode with the sensing distance and sensitivity set to the optimum values.

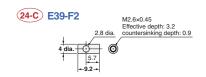
25-C

Dimensions

Installation Information → 59 Page

25-H)





25-F

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

Note: Two per set.

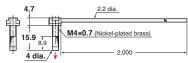
Dimensions

Installation Information → 58 and 59 Page

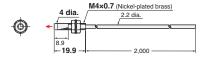
Beam Improvements

Through-beam Fiber Units (Set of 2)

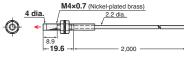




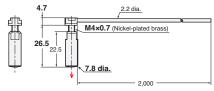
25-B E32-T11R 2M (Free Cutting) + E39-F1



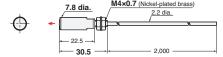
25-C E32-T11 2M (Free Cutting) + E39-F1



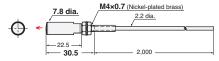
25-D E32-T11N 2M (Free Cutting) + E39-F16



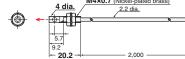
25-E E32-T11R 2M (Free Cutting) + E39-F16



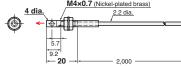
25-F E32-T11 2M (Free Cutting) + E39-F16



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



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

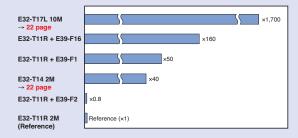


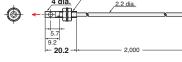
- Reference Information for Model Selection -

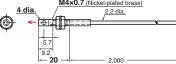
Comparisons of incident level

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

Comparisons of incident level (Through-beam)







Sleeved

Flat

Threaded

Cylindrical

Small Spot

High Power

Narrow view

BGS

Retroreflective

Limitedreflective

Chemical-Oil-resistant

Bending

Heatresistant

Detection Liquid-level

Vacuum FPD, Semi,

Solar

High-power Beam (Long-distance Installation, Dust-resistant) Fiber only → 22 Page

Lens (to 70°C) → 24 Page

Threaded Cylindrical

Flat

Sleeved

Small Spot

High Power

Narrow view

BGS

reflective Limited-

Chemicalresistant, Oil-resistant Bendina

Heatresistant

Liquid-level

Detection

Vacuum Semi Solar

Specifications

Through-beam Fiber Units

Lens Units	Туре	High-power	(incident lev	el: 50 times)	Ultra-high-po	wer (incident le	vel: 160 times)	Side-View (incident lev	el: 0.8 times)
	Models		E39-F1			E39-F16			E39-F2	
	Appearance	6		26-A	6		26-B	26-C		
	Aperture angle	·	Approx. 12°			Approx. 6°		Approx. 60°		
Fiber Units	Optical axis diameter (minimum sensing object)	4 dia. (0.1 dia.)			7.:	2 dia. (0.1 dia	.)	3 dia. (0.1 dia.)		
					Sensi	ing distance (mm)			
Models	Appearance (mm)	Simple Fiber Amplifier Units			Simple Fiber Amplifier			Simple Fiber Amplifier Units		Amplifier Units X-HD
		E3X-SD	■GIGA =HS	Other modes	E3X-SD	■GIGA =HS	Other modes	E3X-SD	■GIGA =H	Other modes
E32-T51R 2M	Heat-resistant up to 100°C	2,000	4,000 *	ST: 4,000 * SHS: 1,500	4,000 *	4,000 *	ST : 4,000 * SHS: 4,000 *	360	1,400 500	ST : 720 SHS: 200
E32-T81R-S 2M	Heat-resistant up to 200°C	1,800	4,000 *	ST : 4,000 * SHS: 1,000	4,000 *	4,000 *	ST : 4,000 * SHS: 1,800	280	1,000 360	ST : 550 SHS: 140
E32-T61-S	Heat-resistant up to 350°C (200°C)	4,000 *	4,000 * 4,000 *	ST : 4,000 * SHS: 1,800	4,000 *	4,000 *	ST : 4,000 * SHS: 3,100	780	1,680 600	ST : 900 SHS: 240

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

- Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.
 - GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 μ s), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 μ s, PNP output: 55 μ s) 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 the optimum values.
 - 3. The ambient temperature of E32-T61-S must be between -40 to 200°C when using it with E39-F1 or E39-F2 Lens Unit. The ambient temperature of E32-T61-S must be between -40 to 350°C when using it with E39-F16 Lens Unit.

Lens Units	Туре	High-power	(incident lev	el: 50 times)	Ultra-high-po	wer (incident le	vel: 160 times)
	Models		E39-F1-33			E39-F16	
	Appearance	•	9 6	26-D	6-D		
	Aperture angle		Approx. 12°		Approx. 6°		
Fiber Units	Optical axis diameter (minimum sensing object)		4 dia. (0.1 dia.	.)	7.2 dia. (0.1 dia.)		
				Appeara	nce (mm)		
Model	Appearance (mm)	Simple Fiber Amplifier Units		mplifier Units K-HD	Simple Fiber Amplifier Units		Amplifier Units K-HD
		E3X-SD	■GIGA =HS	Other modes	E3X-SD	■GIGA =HS	Other modes
E32-T51 2M	Heat-resistant up to 150°C	2,400	4,000 *	ST: 4,000 * SHS: 1,400	4,000 *	4,000 *	ST : 4,000 * SHS: 4,000 *

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

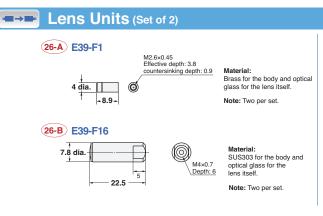
- Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.

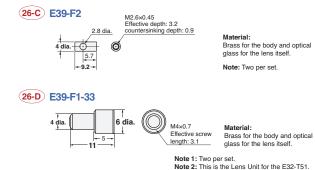
 GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 µs), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 µs, PNP output: 55 µs) 2. The values for the minimum sensing object are representative values that indicate values obtained in Standard Mode with the sensing distance and sensitivity set to the optimum value

Dimensions

OMRON

Installation Information → 59 Page





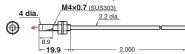
ide and cautions

Model Inde

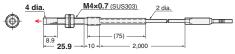
Dimensions

Through-beam Fiber Units (Set of 2)

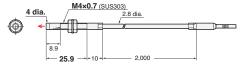




27-B E32-T81R-S 2M (No Cutting) + E39-F1



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

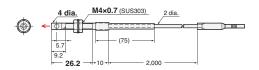


27-H E32-T81R-S 2M (No Cutting) + E39-F2

5.7 9.2

- 20.2

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

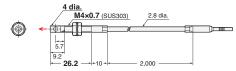


2.000

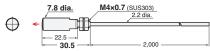
Beam Improvements

Installation Information → 58 and 59 Page

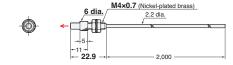
27-I E32-T61-S 2M (No Cutting) + E39-F2



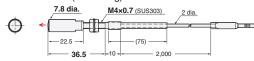
27-D E32-T51R 2M (Free Cutting) + E39-F16



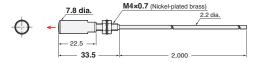
27-J E32-T51 2M (Free Cutting) + E39-F1-33



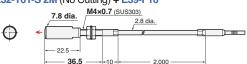
27-E E32-T81R-S 2M (No Cutting) + E39-F16



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



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



- Reference Information for Model Selection -

Comparisons of incident level

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

Comparisons of incident level (Through-beam)



Threaded

Cylindrical

Flat

Small Spot

Sleeved

Narrow view

High Power

Retro-reflective

BGS

Limited-Chemical-

resistant, Oil-resistant Bending

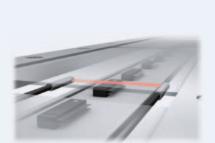
Heatresistant

Detection

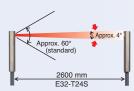
Liquid-level

Vacuum

Semi, Solar



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



Specifications

Through-beam Fiber Units

		ign-beam ribe							1
Sensing direction	Aperture angle	Appearance (mm)	Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)	nsing distance (m Smart Fiber Am (Advanced N E3X-H	plifier Units lodels)	Optical axis diameter (minimum sensing	Models	29 Page Dimensions No.
				E3X-SD	■GIGA =HS	Other modes	object)		
	1.5°	20.5 Thickness: 3 mm	Flexible, R1	890	3,220	ST : 1,780	2 dia.	E32-A03 2M	29-A
	1.5	24.5 10 Thickness: 3 mm IP50		890	1,200	SHS: 500	(0.1 dia.)	E32-A03-1 2M	29-B
Side-View 3.4	3.4°		RIO	340	1,280 450	ST: 680 SHS: 200	1.2 dia. (0.1 dia.)	E32-A04 2M	29-C
		20.5 3.5 dia.	Flexible, R1	1,170	4,000 *	ST : 2,200 SHS: 580	2 dia.	E32-T24SR 2M <u>NEW</u>	29-D
	4°	1P50	R10	1,400	4,000 *	ST : 2,600 SHS: 700	(0.1 dia.)	E32-T24S 2M	29-E
Top-View		15 3 dia IP50		2,000	4,000 *	ST: 3,800 SHS:1,000	1.7 dia. (0.1 dia.)	E32-T22S 2M	29-F

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

- Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.

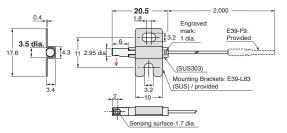
 GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 µs), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 µs, PNP output: 55 µs)
 - 2. The values for the minimum sensing object are representative values that indicate values obtained in Standard Mode with the sensing distance and sensitivity set to the optimum values.

Dimensions

Installation Information → 56 and 58 Page

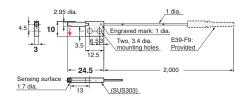
Through-beam Fiber Units (Set of 2)

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



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

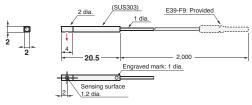
29-B E32-A03-1 2M (Free Cutting)



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

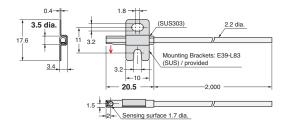
Note 2: Set of two symmetrically shaped Fiber Units.

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

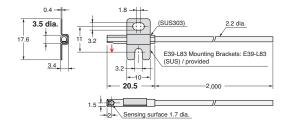


Note: Use the engraved surface and its opposing surface as installation (reference) surfaces.

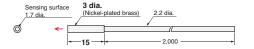
29-D E32-T24SR 2M (Free Cutting)



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



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



- Reference Information for Model Selection -

Aperture angle and Optical Axis Diameter

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



Threaded

Cylindrical

Flat

Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective Limited-

Chemical-

resistant, Oil-resistant

> Bending Heat-

resistant Detection

Liquid-level

Vacuum

Semi, Solar

Detection without Background Interference

Threaded

Flat

Small Spot

Sleeved

Cylindrical

High Power

Narrow view

BGS

reflective Limited-

Chemical-Oil-resistant

Bendina

Heatresistant

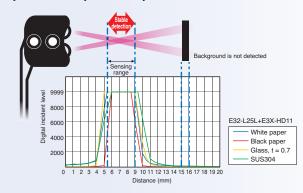
Detection

Liquid-level

Vacuum

Semi, Solar

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



Specifications

Reflective Fiber Units

			Sen	sing distance (mm)	Standard		
Sensing direction	Appearance (mm)	Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)	Smart Fiber Am (Advanced N E3X-H	lodels)	sensing object (minimum sensing	Models	31 Page Dimensions No.
			E3X-SD	■GIGA = HS	Other modes	object)		
Flat-View	20.5 3.8	R25	0 to 15	0 to 15	ST: 0 to 15 SHS: 0 to 12	Soda glass with reflection factor of 7%	E32-L16-N 2M	31-A
riat-view	2.5 14 11 IP50	D40	0 to 4	0 to 4	ST: 0 to 4 SHS: 0 to 4		E32-L24S 2M	31-B
Side-View	18 16 IP50	R10	5.4 to 9 (Cente: 7.2)	5.4 to 9 5.4 to 9 (Center altogether: 7.2)	ST: 5.4 to 9 SHS: 5.4 to 9 (Center altogether: 7.2)	(5 μm dia.)	E32-L25L 2M	31-C

- Note 1. If operation is affected by the background, perform power tuning or use the ECO Mode to decrease the incident light level.
 - 2. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.

 GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 µs), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 µs, PNP output: 55 µs)
 - 3. 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 the optimum values.

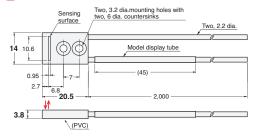
 4. The sensing distances for Reflective Fiber Units are for white paper.

Dimensions

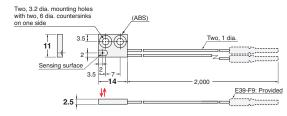
Installation Information → 57 Page

Reflective Fiber Units

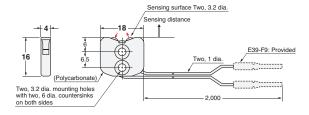
31-A E32-L16-N 2M (Free Cutting)



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



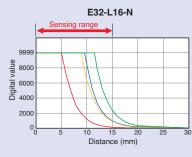
31-C E32-L25L 2M (Free Cutting)

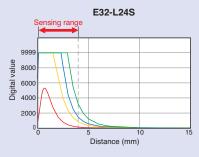


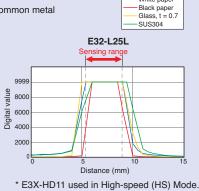
- Reference Information for Model Selection -

Sensing Distance vs. Digital Value

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







Threaded

Cylindrical

Flat Sleeved

Small Spot

High Power

Narrow view

BGS

Retro-reflective Limited-

reflective Chemicalresistant,

Oil-resistant Bending

> Heatresistant

Detection

Liquid-level

Vacuum

Semi, Solar

White paper

Retro-reflective

Retro-reflective → This page Limited-reflective → 34 page

Threaded

Cylindrical

Flat

Small Spot

High Power

Sleeved

Narrow view BGS

reflective Limited-

> Chemical-Oil-resistant

Bendina

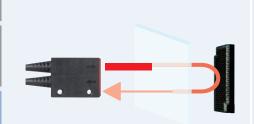
Heatresistant

Detection

Liquid-level

Vacuum

Semi, Solar

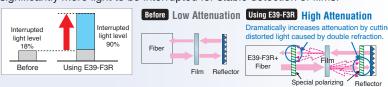


· Retro-reflective Fiber Units are ideal for detecting transparent objects. The light beam passes through the object twice, this model interrupts light more than Through-beam model.



· Excellent detection performance with transparent films. (E32-C31 2M + E39-F3R)

The specially designed filter eliminates undesirable light, which allows significantly more light to be interrupted for stable detection of films.



Specifications

Retro-reflective Fiber Units

Тур	е			Sei	nsing distance (mn	Optical axis			
Features	Appearance (mm)		Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)	Smart Fiber Amplifier Units (Advanced Models) E3X-HD		diameter (minimum sensing	Models	33 Page Dimensions No.
				E3X-SD	■GIGA =HS	Other modes	object)		
Film detection *	М3	M3 5 dia. 23	R25	220	250 = 200	ST : 250	_	E32-C31 2M + E39-F3R + E39-RP37	33-A
Square	ı	42 21.5 10 IP66		1,500		ST : 150 to 1,500 SHS:150 to 1,500	(0.2dia.)	E32-R16 5M	33-B
Threaded Models	М6	27.8 38 N6 IP67	R10	10 to 250	10 to 250	ST: 10 to 250 SHS:10 to 250	(0.1dia.)	E32-R21 2M	33-C

- * This effect may not be as strong for some films. Detection may be unstable if the object is placed directly in front of the Lens Unit. Check suitability beforehand.
- Note 1. Objects with a high reflection factor may cause the Fiber Sensor to detect reflected light as incident light
 - 2. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.
 - GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 μ s), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 μ s, PNP output: 55 μ s)

 3. 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 the optimum values.

Installation Information → 56, 58 and 59 Page

Cylindrical

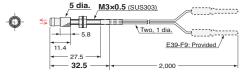
Sleeved

Dimensions

Retro-reflective Fiber Units

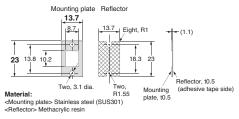


33-A E32-C31 2M (Free Cutting) + E39-F3R



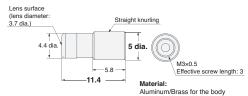
Note: There is a white line on the emitter fiber

E39-RP37

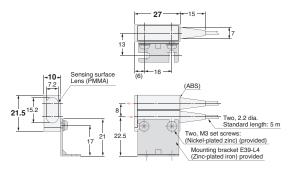


Note: Set includes one Reflector and one Mounting Plate

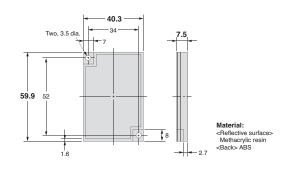
E39-F3R



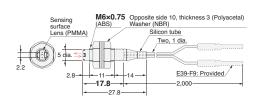
33-B E32-R16 5M (Free Cutting)



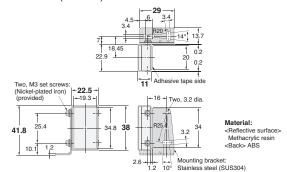
E39-R1 (Provided)



33-C E32-R21 2M (Free Cutting)



E39-R3 (Provided)



- Reference Information for Model Selection -

Performance Comparison of Transparent Object Detection

For detecting transparent objects, consider using following products together: E32-C31, E39-F3R and E39-RP37.

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

We also offer two models with an integrated lens for detecting glass to prevent lens loss.

Sensing object	Film wrapper on cigarette packs	PET bottles	Glass bottles	Plate glass, t: 0.7
E32-C31 2M + E39-F3R + E39-RP37	0	0	0	0
E32-R16 5M	\triangle	Δ	0	0
E32-R21 2M	\triangle	Δ	0	0

Limited-reflective (Glass Detection)

Threaded

Cylindrical

Small Spot

High Power

Flat

Sleeved

Narrow view

Retroreflective Limited-

BGS

Chemicalresistant, Oil-resistant

Bendina

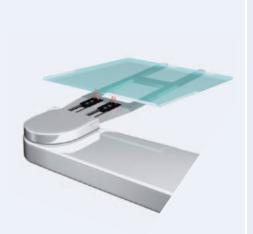
Heatresistant

Detection

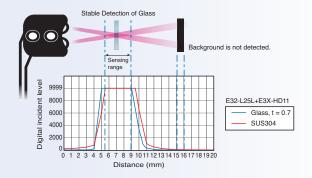
Liquid-level

Vacuum

Semi, Solar



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



Specifications

Limited-reflective Fiber Units

Туре				Ser	nsing distance (mn	1)	Standard		
Features	Detection direction			Simple Fiber Amplifier Units (Simple Models)	E3X-HD		sensing object (minimum sensing	Models	35 Page Dimensions No.
				E3X-SD	■GIGA = HS	Other modes	object)		
Small		14 2.5 :	R10	0 to 4	0 to 4	ST: 0 to 4	(5 μm dia.)	E32-L24S 2M	35-A
size		11 IP50			■ 0 to 4	SHS: 0 to 4	(*		
Standard	20.5		0 to 15	0 to 15	ST: 0 to 15 SHS: 0 to 12		E32-L16-N 2M	35-B	
	Flat-View	IP40	-						
Glass- substrate alignment, 70°C		24.5 5 14 IP40	R25	10 to 20	10 to 20 10 to 20	ST: 10 to 20 SHS: —	Soda glass with reflection factor of 7%	E32-A08 2M	35-C
Standard long distance		24.5 5 14 IP40	40	12 to 30	12 to 30	ST: 12 to 30 SHS: —		E32-A12 2M	35-D
Side View form	Side-View	18 16	R10	5.4 to 9 (Center 7.2)	■ 5.4 to 9 (Center 7.2) ■ 5.4 to 9 (Center 7.2)	ST : 5.4 to 9 (Center 7.2) SHS: 5.4 to 9 (Center 7.2)	(5 μm dia.)	E32-L25L 2M	35-E
Glass- substrate Mapping, 70°C	Top-View	23 9 20 IP40	R25	15 to 38 (Center 25)	15 to 38 (Center 25) 15 to 38 (Center 25)	ST: 15 to 38 (Center 25) SHS: —	End surface of soda glass with reflection factor of 7% (t = 0.7 mm, rounded edges)	E32-A09 2M	35-F

^{*} If the background influences the sensing accuracy, perform power tuning or use the ECO Mode to decrease the incident light level.

- Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.

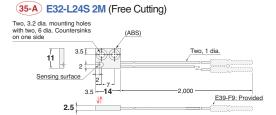
 GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 µs), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 µs, PNP output: 55 µs)
 - The values for the minimum sensing object are representative values that indicate values obtained in Standard Mode with the sensing distance and sensitivity set to the optimum values.
 The sensing distances for Reflective Fiber Units are for white paper.

Limited-reflective (Glass Detection)

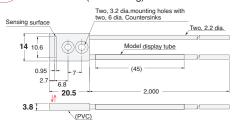
Dimensions

Installation Information → 56 and 57 Page

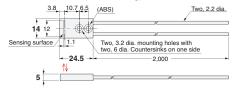
Limited-reflective Fiber Units



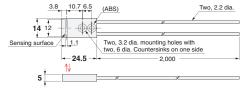
35-B E32-L16-N 2M (Free Cutting)



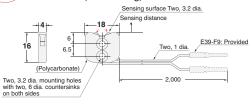
35-C E32-A08 2M (Free Cutting)



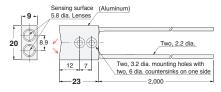
35-D E32-A12 2M (Free Cutting)



35-E E32-L25L 2M (Free Cutting)



35-F E32-A09 2M (Free Cutting)



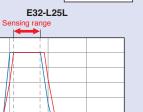
- Reference Information for Model Selection -

Sensing Distance vs. Digital Value

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

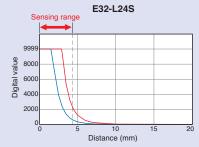
9999

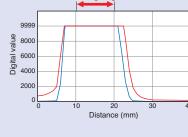
800 600



Glass, t = 0.7

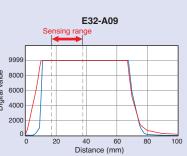
SUS304





E32-A12

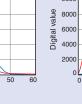
E32-A08



Distance (mm)

—				
9999	i			
8000	-			
0008 pigital value	- 			-
15 4000				
2000				-
0				
0	10 Dist	20 ance (mm)	30	40

E32-L16-N



6000

4000

2000

Digital



* E3X-HD11 used in High-speed (HS) Mode.

Threaded

Cylindrical

Flat Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective Limited-

resistant,

Oil-resistant Bending

> Heatresistant

Detection

Liquid-level

Vacuum Semi

Solar

Threaded

Cylindrical

Flat Sleeved

Small Spot High Power

Narrow view BGS

reflective Limited-

Bending Heatresistant

Detection

Liquid-level

Vacuum

Semi, Solar

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

Chemical-resistant Data for Fluororesin (Reference)

Material Chemical	Fluororesin	Acryl	ABS	Polycarbonate	Polyethylene	PVC
Hydrochloric acid	0	Δ	Δ	\triangle	Δ	×
Sulfuric acid	0	×	×	×	×	×
Sodium hydroxide	0	Δ	Δ	×	0	×
Methyl alcohol	0	×	Δ	×	0	×
Acetone	0	×	×	×	Δ	×
Toluene	0	Δ	×	×	Δ	×
Benzene	0	Δ	Δ	×	Δ	×

Note: Results depend on concentration.

Specifications

Through-beam Fiber Units

				Ser	Sensing distance (mm)				
Туре	Sensing direction	Appearance (mm)	Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)	Smart Fiber Amplifier Units (Advanced Models) E3X-HD		Optical axis diameter (minimum sensing		37 Page Dimensions No.
				E3X-SD	■GIGA = HS	Other modes	object)		
Oil- resistant	Right- angle	19.1 M8	Flexible, R1	4,000 *1	4,000 *1 4,000 *1	ST: 4,000 ^{*1} SHS: 2,200		E32-T11NF 2M <u>NEW</u>	37-A
		20 5 dia. IP67	R40	3,200	4,000 *1 4,000 *1	ST: 4,000*1 SHS: 1,600	4 dia. (0.1 dia.)	E32-T12F 2M	37-B
Chemical/ oil resistant	Top-view	35 7.2 dia.	R4	2,100	4,000 *1	ST: 4,000*1 SHS: 1,000		E32-T11F 2M	37-C
	Side-view	21 5 dia.		400	1,400 500	ST: 800 SHS: 200	3 dia. (0.1 dia.)	E32-T14F 2M	37-D
Chemical/ oil resistant 150°C *2	Top-view	20 5 dia. IP67	R40	1,400	4,000 *1	ST : 2,800 SHS: 700	4 dia. (0.1 dia.)	E32-T51F 2M	37-E

- *1 The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.
 *2 For continuous operation, use the Fiber Unit between –40 and 130°C.

Reflective Fiber Units

				Ser	nsing distance (mn	1)	Standard		
Type Sensing direction Appearance (mm)		Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)	Smart Fiber Amplifier Units (Advanced Models) E3X-HD		sensing object (minimum sensing	Models	37 Page Dimensions No.	
				E3X-SD	■GIGA =HS	Other modes			110.
Semiconductors: Cleaning, developing, and etching, 60°C		Mounting holes A IP67		8 to 20 mm from tip of Lens (Recommended sensing distance: 11 mm) 19 to 31 mm from center of mounting hole A (Recommended sensing distance: 22 mm)			Glass (t=0.7 mm)	E32-L11FP 5M	37-F
Semiconductors: Resist stripping, 85°C	Top view	Mounting holes A 17.5 IP67	R40	(Recommendate) (Recom	8 to 20 mm from tip of Lens (Recommended sensing distance: 11 mm) 32 to 44 mm from center of mounting hole A (Recommended sensing distance: 35 mm)			E32-L11FS 5M	37-G
Chemical/oil resistant	Top-view	16 A G dia.		100	GIGA - ■130	ST: 190 SHS: 60	<i>(</i> 5	E32-D12F 2M	37-H
Only cable: chemical resistant		17 M6	R4	180	840 240	ST: 350 SHS: 100	(5 μm dia.)	E32-D11U 2M	37-1

- Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.
 - GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 μ s), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 μ s, PNP output: 55 μ s)

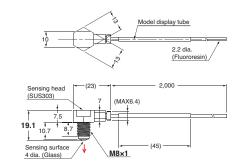
 2. The values for the minimum sensing object are representative values that indicate values obtained in Standard Mode with the sensing distance and sensitivity set to the optimum values.

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

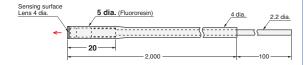
Installation Information → 58 Page

Through-beam Fiber Units (Set of 2)

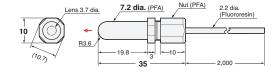
37-A E32-T11NF 2M (Free Cutting)



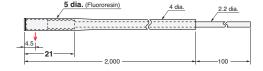
37-B E32-T12F 2M (Free Cutting)



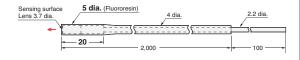
37-C E32-T11F 2M (Free Cutting)



37-D E32-T14F 2M (Free Cutting)

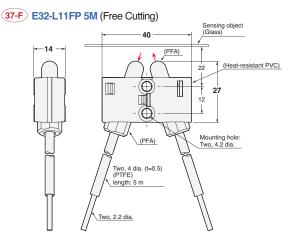


37-E E32-T51F 2M (Free Cutting)

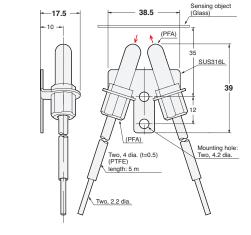


Installation Information → 56 and 57 Page

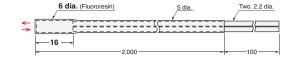
Reflective Fiber Units



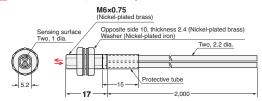
37-G E32-L11FS 5M (Free Cutting)



37-H E32-D12F 2M (Free Cutting)



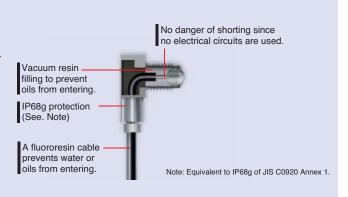
37-I E32-D11U 2M (Free Cutting)



- Reference Information for Model Selection -

Oil-resistance performance of the E32-T11NF

This diagram explains why the new E32-T11NF is oil resistant.



Threaded

Cylindrical

Sleeved

Flat

Small Spot

High Power

Narrow view

BGS

Retroreflective Limited-

Chemical

Bending

Heatresistant

Detection Liquid-level

Vacuum Semi, Solar

Bending-resistant, Disconnection-resistant **Through-beam** → This page

Reflective → 40 page

Fiber Sensor Features

Selection Suide

Fiber Units

Threaded

Space Flat

Small Spot

Sleeved

Cylindrical

High Power
Narrow
view

BGS

reflective
Limitedreflective

Chemicalresistant, Oil-resistant

Bending

Heatresistant

Detection

Liquid-level

Vacuum

Semi, Solar

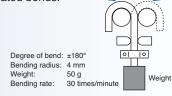
iber Amplifiers, ommunications Init, and ccessories

> echnical iuide and recautions

> > Model Index



Capable of withstanding one million repeated bends.



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



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

Specifications

Through

■→■ Through-beam Fiber Units

				sing distance (mm)		Optical axis		
Size	Size Appearance (mm)		Simple Fiber Amplifier Units (Simple Models)	Smart Fiber Amp (Advanced M E3X-H	odels)	diameter (minimum sensing	Models	39 Page Dimensions No.
			E3X-SD	■GIGA =HS	Other modes	object)		
1.5 dia.	10 1.5 dia.			680	ST: 400	0.5 dia. (5 μm dia.)	E32-T22B 2M	39-A
М3	11 M3	Bend-	200	220	SHS: 90		E32-T21 2M	39-B
M4	14 M4 IP67	resistant, R4	720	\ 2,500	ST : 1,350 SHS: 360	1 dia. (5 μm dia.)	E32-T11 2M	39-C
Square	12 12		150	500	ST: 300 SHS: 70	0.5 dia. (5 μm dia.)	E32-T25XB 2M	39-D

Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.

GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 µs), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 µs, PNP output: 55 µs)

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 the optimum values.

Protective Stainless Spiral Tube (Sold separately)

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

Applicable Fiber Units	Model	Quantity	39 Page Dimensions No.
E32-T11R 2M/E32-T11 2M/ E32-T51R 2M/E32-T51 2M	E39-F32C	2 pieces	39-E

^{*} This Tube cannot be used if a Lens Unit is being used

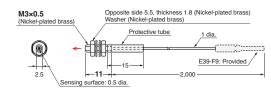
Installation Information → 58 and 59 Page



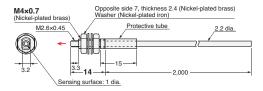
Through-beam Fiber Units (Set of 2)



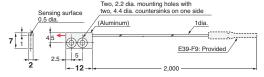
39-B E32-T21 2M (Free Cutting)



39-C E32-T11 2M (Free Cutting)



39-D E32-T25XB 2M (Free Cutting)



Note 1: Set of two symmetrically shaped Fiber Units.

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

39-E E39-F32C



Threaded

Cylindrical

Flat Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective Limited-

reflective Chemical-

resistant, Oil-resistant **Bending**

Heatresistant

Detection

Liquid-level

Vacuum

Semi, Solar

Bending-resistant, Disconnection-resistant

Through-beam → 38 page

Reflective → This page

Cylindrical

Flat

Small Spot

Sleeved

High Power Narrow view

BGS

reflective Limited-

Chemicalresistant, Oil-resistant Bending

Heatresistant

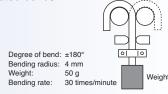
> Detection Liquid-level

Vacuum

Semi, Solar



· Capable of withstanding one million repeated bends.



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



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

Specifications

Reflective Fiber Units

				ing distance (mm)		Optical axis		_
Size	Appearance (mm)	Bending radius of cable	Amplifier Units (Simple Models)	Smart Fiber Amp (Advanced M E3X-H	odels)	diameter (minimum sensing	Models	41 Page Dimensions No.
			E3X-SD	■GIGA =HS	Other modes	object)		
1.5 dia.	15 1.5 dia.			140	ST: 60		E32-D22B 2M	41-A
M3	11 A M3		30	4 0	SHS: 16	(5 μm dia.)	E32-D21 2M	41-B
3 dia.	15 3 dia.	Bend-	70	300	ST : 140		E32-D221B 2M	41-C
M4	15 M4	resistant, R4			SHS: 40		E32-D21B 2M	41-D
M6	17 M6 IP67		180	240	ST : 350 SHS: 100		E32-D11 2M	41-E
Square	12 21 8		1 50	240 = 60	ST : 100 SHS: 30		E32-D25XB 2M	41-F

Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.

GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 µs), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 µs, PNP output: 55 µs) 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 the optimum values.
 The sensing distances for Reflective Fiber Units are for white paper.

Protective Stainless Spiral Tube (Sold separately)

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

Applicable Fiber Units	Models	Quantity	41 Page Dimensions No.
E32-D21R 2M/E32-C31 2M/ E32-D21 2M	E39-F32A	1 piece	
E32-D211R 2M/E32-D21B 2M	E39-F32C	2 pieces	41-G
E32-D11R 2M/E32-CC200 2M/ E32-D11 2M/E32-D51R 2M/ E32-D51 2M	E39-F32D	1 piece	

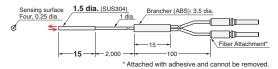
^{*} This Tube cannot be used if a Lens Unit is being used.

Installation Information → 56, 57 and 59 Page



Reflective Fiber Units

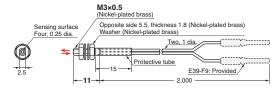
41-A E32-D22B 2M (No Cutting)



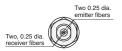
Enlarged View of Sensing Surface



41-B E32-D21 2M (Free Cutting)



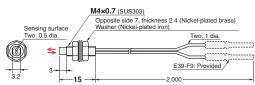
Enlarged View of Sensing Surface



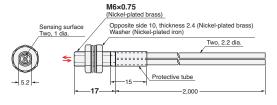
41-C E32-D221B 2M (Free Cutting)



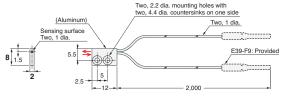
41-D E32-D21B 2M (Free Cutting)



41-E E32-D11 2M (Free Cutting)

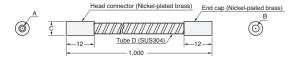


41-F E32-D25XB 2M (Free Cutting)



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

41-G E39-F32A/E39-F32C/E39-F32D



ĺ	Models	Α	В	С	D	
	E39-F32A	M3×0.5 Depth: 4	3 dia.	6 dia.	(4.6 dia.)	
	E39-F32C	M4×0.7 Depth: 4	4 dia.	7 dia.	(5.6 dia.)	
	E39-F32D	M6×0.75 Depth: 4	5 dia.	8.5 dia.	(7 dia.)	

Threaded

Cylindrical

Flat Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective Limited-

reflective

Chemicalresistant, Oil-resistant

> Bending Heat-

resistant

Detection Liquid-level

Vacuum Semi,

Solar

Heat-resistant

Through-beam → This page

Reflective → 44 page

Threaded

Cylindrical

Flat

Small Spot

Sleeved

High Power Narrow

view BGS

Retro-reflective Limited-

Chemicalresistant, Oil-resistant

Bending

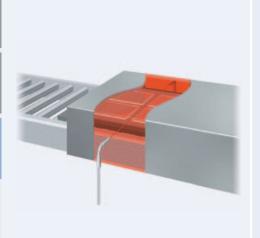
resistant

Detection

Liquid-level

Vacuum

Semi, Solar



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

Specifications

■→■ Through-beam Fiber Units

							1	
			Sen	sing distance (mm	1)	Optical axis		
Heat-resistant temperature	Appearance (mm)	Bending radius of cable	Simple Fiber Amplifier Units (Simple Models) E3X-SD	Smart Fiber Amp (Advanced Mo E3X-H	odels)	diameter (minimum sensing	Models	43 Page Dimensions No.
				■GIGA =HS	Other modes	object)		
100°C *1	14 M4 IP50	Flexible, R2	400	1,600	ST: 800 SHS: 225	1 dia. (0.1 dia.)	E32-T51R 2M	43-A
150°C *2	17 M4 IP67	R35	800	1,000	ST : 1,500 SHS: 400	1.5 dia. (0.1 dia.)	E32-T51 2M	43-B
200°C *3	30 20 M4 IP67	R10	360	1,000	ST : 550 SHS: 140	0.7 dia. (5 μm dia.)	E32-T81R-S 2M	43-C
350°C *4	30 20 M4 IP67	R25	600	1,680	ST: 900 SHS: 240	1 dia. (5 μm dia.)	E32-T61-S 2M	43-D
70°C			_				Standard Fiber Units can be used.	_

- For continuous operation, use the Fiber Unit between -40 to 90°C
- For continuous operation, use the Fiber Unit between -40 to 130°C.
- The heat-resistant rating is not the same for all parts of the Fiber Unit. Refer to the dimensions diagrams for details.
- The ambient operating temperature for the E32-T61-S 2M is -60 to 350°C.
- Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.

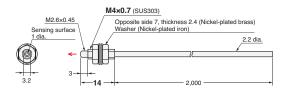
 GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 µs), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 µs, PNP output: 55 µs)

 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 the optimum values.

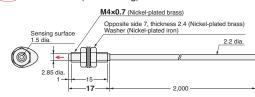
Installation Information → 58 and 59 Page

Through-beam Fiber Units (Set of 2)

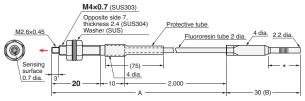
43-A E32-T51R 2M (Free Cutting)



43-B E32-T51 2M (Free Cutting)

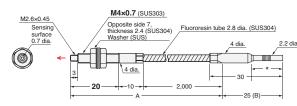


43-C E32-T81R-S 2M (No Cutting)



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

43-D E32-T61-S 2M (No Cutting)



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

Threaded

Cylindrical

Flat Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective Limited-

reflective Chemical-

resistant, Oil-resistant

Bending

resistant

Detection

Liquid-level

Vacuum FPD,

Semi,

Solar

- Reference Information for Model Selection -



Long-distance Sensing Applications

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

→ 26 page

Heat-resistant

Through-beam → 42 page

Reflective → This page

Threaded Cylindrical

Flat

Sleeved **Small Spot**

High Power Narrow view

BGS

Chemicalresistant,

Bending

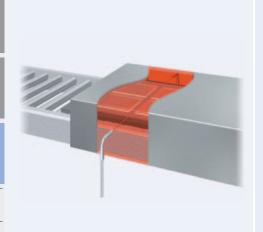
resistant

Retro-reflective Limited-

Oil-resistant

Detection

Liquid-level Vacuum Semi, Solar



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

Specifications

Reflective Fiber Units

	FIECTIVE I IDEI	Omico						
			Sei	nsing distance (mn	1)	Standard		
Heat-resistant temperature	Appearance (mm)	Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)	Smart Fiber Am (Advanced I E3X-I	/lodels)	sensing object (minimum sensing	Models	45 Page Dimensions No.
			E3X-SD	■GIGA = HS	Other modes			
100°C *1	17.5 M6	Flexible, R2	140	670	ST: 280 SHS: 80		E32-D51R 2M	45-A
150°C *2	17 M6 IP67	R35	240	1,120	ST: 450 SHS: 144	(5 μm dia.)	E32-D51 2M	45-B
200°C *3	25 M6 IP67	R10	_	420 120	ST: 180 SHS: 54		E32-D81R-S 2M	45-C
300°C	5 1 18 IP30		10 to 20	10 to 20	ST: 10 to 20 SHS: –	reflection factor of 7%	E32-A08H2 3M	45-D
300 0	9 24		20 to 30	20 to 30	ST: 20 to 30 SHS: -	End surface of soda glass with eflection factor of 7% (t = 0.7 mm, rounded edges)	E32-A09H2 2M	45-E
350°C *3	28 M4 IP67	R25	_	420 =120	ST: 180 SHS: 54		E32-D611-S 2M <u>NEW</u>	45-F
	25 M6		_	420 120	ST: 180 SHS: 54	(5 μm dia.)	E32-D61-S 2M	45-G
400°C *3	60 M4 1.65 dia.		_	280 80	ST: 120 SHS: 36		E32-D73-S 2M	45-H
70°C			_				Standard Fiber Units can be used.	_

- For continuous operation, use the Fiber Unit between -40 to 90°C. For continuous operation, use the Fiber Unit between -40 to 130°C.
- The heat-resistant rating is not the same for all parts of the Fiber Unit. Refer to the dimensions diagrams for details.
- Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.
 - GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 μ s), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 μ s, PNP output: 55 μ s)

 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 the optimum values.

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

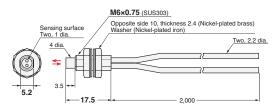
Installation Information → 56 and 57 Page

Sleeved

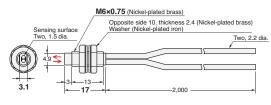
Dimensions

Reflective Fiber Units

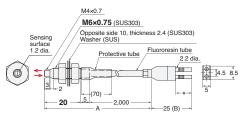
45-A E32-D51R 2M (Free Cutting)



45-B E32-D51 2M (Free Cutting)



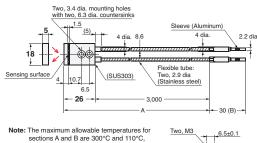
45-C E32-D81R-S 2M (No Cutting)



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

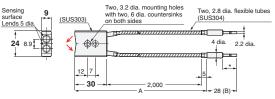
45-D E32-A08H2 3M (No Cutting)

respectively.



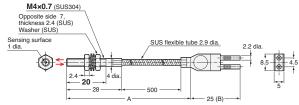
Mounting holes

45-E E32-A09H2 2M (No Cutting)



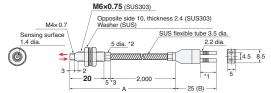
Note: The maximum allowable temperatures for sections A and B are 300°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *) must be maintained within the Amplifier Unit's operating temperature range.

45-F E32-D611-S 2M (No Cutting)



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

45-G E32-D61-S 2M (No Cutting)



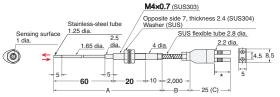
*2. The diameter is 6 dia. if the fiber

length exceeds 10 m.

*3. The length is 10 if the fiber length exceeds 10 m.

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

45-H E32-D73-S 2M (No Cutting)



The maximum allowable temperatures for sections A, B, and C are 400°C, 300°C, and 110°C, respectively.

The section inserted into the Amplifier Unit (indicated by *) must be maintained within the Amplifier Unit's operating temperature range

OMRON

Special Applications

Area Beam (Area Detection)

Meander detection

Threaded

Flat

Sleeved

Cylindrical

Small Spot High Power

Narrow view

BGS

reflective Limited-

Chemicalresistant, Oil-resistant

Bendina

Heatresistant

Detection

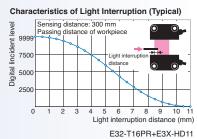
Liquid-level

Vacuum

Semi, Solar

Detection of falling workpieces · Area beams are optimum for detecting workpieces presented in inconsistent positions, such as falling workpieces, or for meander detection, or for detecting workpieces with holes.

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



Specifications

Detection of workpieces with holes

■→■ Through-beam Fiber Units

				Se	nsing distance (mr	n)	Optical axis		
Type Sensing width Appea		Appearance (mm)	Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)	(Advanced M	Smart Fiber Amplifier Units (Advanced Models) E3X-HD		Models	47 Page Dimensions No.
				E3X-SD	■GIGA = HS	Other modes	object)		
	11 mm	14.5 27 4 IP50		800	3,100	ST : 1,700 SHS: 440		E32-T16PR 2M	47-A
Area	TT mm	27 17.8	Flexible, R1	700	2,750	ST : 1,500 SHS: 380	(0.2 dia.) *2	E32-T16JR 2M	47-B
	30 mm	23 69 5 NIP50		1,380	4,000 *1	ST : 2,600 SHS: 680	(0.3 dia.) *2	E32-T16WR 2M	47-C

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

 The values for the minimum sensing object were obtained for detection in the sensing area with the sensing distance set to 300 mm. (The values are for a stationary sensing object.)

Reflective Fiber Units

				Sensing distance (mm)					
Туре	Sensing width	Appearance (mm)	Bending radius of cable	Amplifier Unite	nplifier Units (Advanced Mo		diameter (minimum sensing	Models	47 Page Dimensions No.
				E3X-SD	■GIGA = HS	Other modes	object)		
Array	11 mm	15 5 25	Bend- resistant, R4	150	700 200	ST: 300 SHS: 90	(5 μm dia.)	E32-D36P1 2M	47-D

- Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.

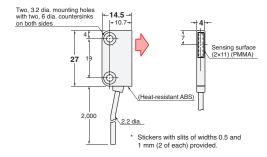
 - GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 μ s), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 μ s, PNP output: 55 μ s)

 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 the optimum values.

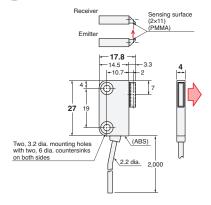
Installation Information → 58 Page

Through-beam Fiber Units (Set of 2)

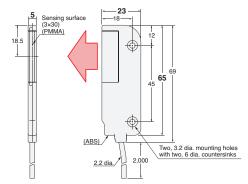
47-A E32-T16PR 2M (Free Cutting)



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



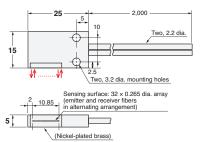
47-C E32-T16WR 2M (Free Cutting)



Installation Information → 57 Page

■⇒ Reflective Fiber Units

47-D E32-D36P1 2M (Free Cutting)



Fiber Senso Features

Selection Suide

Fiber Unit

Threaded

Cylindrical

Flat

Small Spot

High Power

Narrow view

BGS

Retroreflective

Limitedreflective

Chemicalresistant, Oil-resistant

Bending

Heatresistant

Area Detection

Liquid-level

Vacuum

FPD, Semi, Solar

Installation

iber Amplifiers, ommunications nit, and

> schnical iide and

> > lodel Index

Liquid-level Detection

Threaded

Cylindrical

Flat

Sleeved

Small Spot

High Power

Narrow view

BGS

reflective Limited-

Chemical-Oil-resistant

Bendina

Heatresistant

Detection

Liquid-level

Vacuum

Semi, Solar

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

► Tube-mounting Types

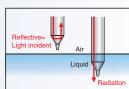
Detect the liquid level inside transparent tubes. Strap the Fiber Unit to a tube with band.



► Liquid-contact Type

Detect the liquid level by direct contact with the liquid.

This model has excellent chemical-resistance because the Fiber Unit is covered in fluororesin.



Specifications

Detection scheme	Tube diameter	Features	Appearance (mm)	Bending radius of cable	Applicable range	Optical axis diameter (minimum sensing object)	Models	49 Page Dimensions No.
	3.2, 6.4 and 9.5 dia.	Resistant to bubbles and droplets Residual quantity detection	19.9 27	Bend- resistant, R4	Applicable tube: Transparent tube with a diameter of 3.2, 6.4, or 9.5 dia. and a recommended wall thickness of 1 mm	_	E32-A01 5M	49-A
Tube- mounting	8 to 10 dia.	Ideal for mounting at multilevels	18 10 Ţ	R10	Applicable tube: Transparent tube with a diameter of 8 to 10 dia. and a recommended wall thickness of 1 mm	_	E32-L25T 2M	49-B
	No restrictions	Usable on large diameter tubes Resistant to bubbles and droplets	23.45 215	R4	Applicable tube: Transparent tube (no restrictions on diameter)	_	E32-D36T 5M	49-C
Liquid contact (heat-resistant up to 200°C)		-	6 dia.	R40 R25 *3	Liquid-contact Type *1	_	E32-D82F1 4M	49-D

^{*1} If the incident light level is too high, perform power tuning or use the ECO Mode to decrease the incident level.

- Reference Information for Model Selection -

Determining the Best Model for Tube-mounted Types

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

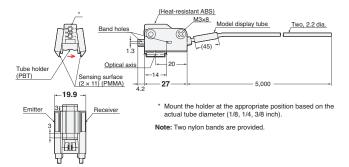
^{*2} The applicable range is the same whether an E3X-HD series or E3X-SD series is used.

When using an E3X-HD Fiber Amplifier Unit in GIGA Power Mode, level detection may not work depending on the tube diameter. Make sure to confirm operation with the actual tube.

^{*3} The bending radius of the sensing section (except for the unbendable section) is 40 mm, and the bending radius of the fiber is 25 mm.

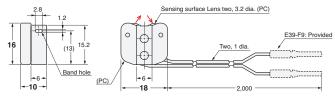
Installation Information → 56 and 57 Page

49-A E32-A01 5M (Free Cutting)





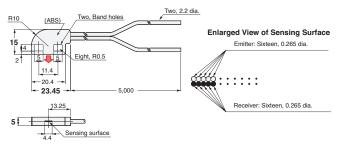
49-B E32-L25T 2M (Free Cutting)





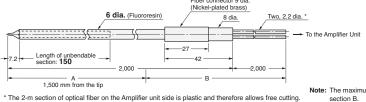
Note: Two nylon bands and one anti-reflector are provided.

49-C E32-D36T 5M (Free Cutting)





49-D E32-D82F1 4M (Free Cutting)



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

And

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

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

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

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

Threaded

Cylindrical

Flat

Sleeved

Small Spot

High Power

Narrow view

BGS

Retro-reflective Limited-

Chemicalresistant,

Oil-resistant

Bending Heat-

resistant

Detection

Liquid-level

Vacuum

Semi, Solar

Vacuum-resistant

Threaded Cylindrical

Flat Sleeved

Small Spot High Power

Narrow view BGS

Retro-reflective

Limited-

Chemical-Oil-resistant

Detection

Liquid-level

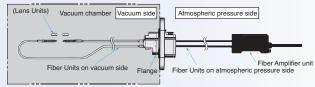
Bending Heatresistant

Vacuum Semi, Solar



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

Configuration Example for using under vacuum



Specifications

■→■ Through-beam Fiber Units

				Sensin	g distance (mm)		Optical axis		
Туре	Heat- resistant temperature	Appearance (mm)	Bending radius of cable	Amplifier Units	Smart Fiber Amp (Advanced M E3X-H	olifier Units odels)	diameter (minimum sensing	Models	51 Page Dimensions No.
					■GIGA =HS	Other modes	object)		
120°C Vacuum side	120°C	30 M4 M4	- R30	200	720 260	ST: 400 SHS: 100	1.2 dia. (10 μm dia.)	E32-T51V 1M	51-A
	120 0			1,200	1,360	ST : 2,000 SHS: 520	4 dia. (0.1 dia.)	E32-T51V 1M + E39-F1V	51-B
	200°C	3 dia.	- R25	500	1,760	ST: 950 SHS: 260	2 dia. (0.1 dia.)	E32-T84SV 1M	51-C
Atmospheric pressure side	70°C		H25	_	_	ST : - SHS: -	_	E32-T10V 2M	51-D

- Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.

 GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 µs), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 µs, PNP output: 55 µs)
 - 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 the optimum values.

Flange

Appearance	Туре	Models	51 Page Dimensions No.	
	4-channel flange	E32-VF4	51-E	
5	1-channel flange	E32-VF1	51-F	

Installation Information → 58 and 59 Page

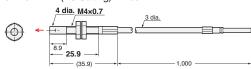


Through-beam Fiber Units (Set of 2)

51-A E32-T51V 1M (No Cutting)



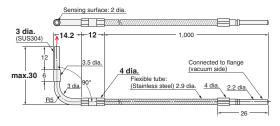
51-B E32-T51V 1M (No Cutting) + E39-F1V



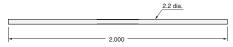
E39-F1V



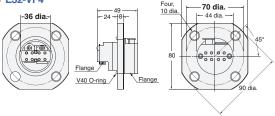
51-C E32-T84SV 1M (No Cutting)



51-D E32-T10V 2M (Free Cutting)



51-E E32-VF4

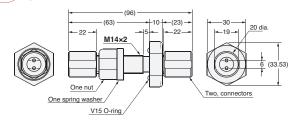


- Note 1. Mount the Flange so that the V40 O-Ring is on the atmospheric-pressure side of the vacuum chamber wall.

 2. Mounting-hole dimensions: 38 dia. ±0.5 mm

 3. The maximum tightening torque is 9.8 N·m.

51-F E32-VF1



- Note 1. Mount the Flange so that the V15 O-Ring is on the atmospheric-pressure

 - side of the vacuum chamber wall.

 2. Mounting-hole dimensions: 14.5 dia. ±0.2 mm

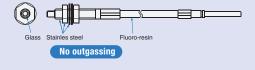
 3. The maximum tightening torque is 14.7 N·m for the clamp nut and 1.5 N·m for the connector.

- Reference Information for Model Selection -

What Is a Vacuum-resistant Fiber Unit?

- · The Flange is designed to create an air-tight seal on the vacuum side.
- · The fibers and Flange on the vacuum side are made of non-outgassing materials.

These parts are inspected, cleaned, and sealed in an air-tight package in a clean room prior to shipment.





countersinking depth: 0.9

Cylindrical

Threaded

Flat

Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective Limited-

Chemicalresistant, Oil-resistant

Bending

Heatresistant

Detection

Liquid-level

Vacuum

FPD, Semi Solar

Fiber Sensol Features

Selection Suide

Fiber Units

Threaded

Cylindrical

Flat

Small Spot

Sleeved

High Power

Narrow view

Retroreflective

BGS

Limitedreflective

Chemicalresistant, Oil-resistant

Bending

Heatresistant

Detection

Liquid-level

Vacuum

FPD, Semi, Solar

Installation Information

iber Amplitiers, Jommunications Jnit, and Accessories

> Technical Guide and Precautions

> > Model Index



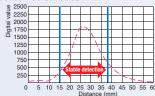
· Glass-substrate Alignment

Detection position accuracy: 0.2 mm max. No variation in detection positions even if the sensing distance changes.

► Tilting workpiece does not affect detection.

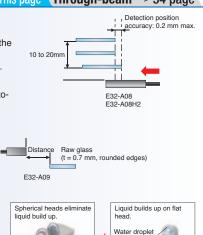
· Glass-substrate Mapping

Stable detection is possible even for difficult-todetect curved surfaces.



 Glass Presence Detection in Wet Processes

- Stable non-contact detection even with warped glass.
- The spherical heads ensure stable detection without being influenced by liquid.



Spherical heads eliminate liquid build up. Liquid builds up on flat head. Water droplet

Specifications

Limited-reflective Fiber Units

					g distance (mm)		Standard		
Application	Ambient temperature	Appearance (mm)	Bending radius of cable	Simple Fiber Amplifier Units (Simple Models)	Smart Fiber Amp (Advanced M E3X-H	odels)	sensing object (minimum sensing	Models	53 Page Dimensions No.
				E3X-SD	■GIGA = HS	Other modes	object)		
Glass presence detection	7000	20.5 3.8 1 14 IP40		0 to 15	0 to 15	ST: 0 to 15 SHS: 0 to 12		E32-L16-N 2M *1	53-A
	- 70°C	24.5 51 14 IP40		10 to 20	10 to 20	ST: 10 to 20	Soda glass	E32-A08 2M	53-B
Alignment	300°C	5 1 18 IP30	R25	10 to 20	10 to 20	SHS: _	factor of 7%	E32-A08H2 3M *1	53-C
	- 70°C	24.5 5 1 14 IP40	HZ5	12 to 30	12 to 30	ST : 12 to 30 SHS: –		E32-A12 2M <u>NEW</u>	53-D
Mapping of	70 0	9 20 IP40		15 to 38 (Center 25)	15 to 38 (Center 25)	ST : 15 to 38 SHS: –	End surface of soda glass with reflection factor of 7%	E32-A09 2M	53-E
substrates	300°C *2	30 9 24		20 to 30 (Center 25)	20 to 30 20 to 30 (Center 25)	ST: 20 to 30 SHS: - (Center 25)	(t = 0.7 mm, rounded edges)	E32-A09H2 2M	53-F
Wet processes (Cleaning, Resist developing, and etching)	60°C	Mounting hole A	R40	(Recommer 19 to 31 mm	20 mm from tip of Lens nded sensing distance: n from center of mountin nded sensing distance:	11 mm) ng hole A	Glass	E32-L11FP 5M	53-G
Wet processes (Resist stripping)	85°C	Mounting hole A	1170	(Recomme 32 to 44 mm	20 mm from tip of Len nded sensing distance: n from center of mounti nded sensing distance:	: 11 mm) ng hole A	(t=0.7mm)	E32-L11FS 5M	53-H

- *1 If operation is affected by the background, perform power tuning or use the ECO Mode to decrease the incident level.
- *2 The maximum allowable temperature is not the same for all parts of the Fiber Unit. Refer to the dimensions diagrams for details.

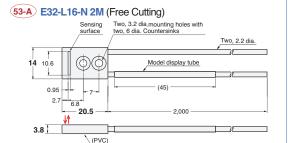
 Must not be repeatedly subject to rapid temperature changes.

Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.

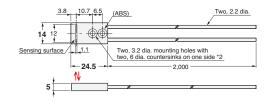
GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 µs), ST: Standard Mode (1 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 µs, PNP output: 55 µs)

Installation Information → 56 and 57 Page

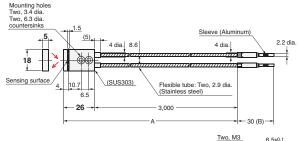
Limited-reflective Fiber Units



53-B E32-A08 2M (Free Cutting)

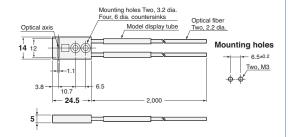


53-C E32-A08H2 3M (No Cutting)

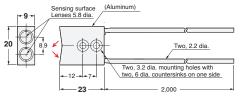


Note: The maximum allowable temperatures is 300°C for sections A and 110°C for section B (section inserted into Amplifier Unit). Mounting holes

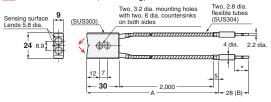
53-D E32-A12 2M (Free Cutting)



53-E E32-A09 2M (Free Cutting)

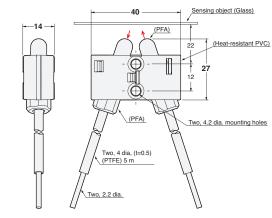


53-F E32-A09H2 2M (No Cutting)

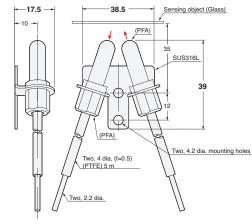


Note: The maximum allowable temperatures for sections A and B are 300°C and 110°C, respectively. The section inserted into the Amplifier Unit (indicated by *) must be maintained within the Amplifier Unit's operating temperature range.

53-G E32-L11FP 5M (Free Cutting)



53-H E32-L11FS 5M (Free Cutting)



Threaded

Cylindrical

Flat

Small Spot

Sleeved

High Power

Narrow view

BGS

Retroreflective Limited-

Chemical-

resistant, Oil-resistant

> Bending Heat-

resistant

Detection Liquid-level

Vacuum

Threaded

Cylindrical

Flat

Sleeved

Small Spot

High Power

Narrow view

BGS

reflective Limited-

Chemical-Oil-resistant

Bendina

Heatresistant

Detection

Liquid-level

Vacuum



· Wafer Mapping E32-A04+E3X-HD11 (E32-A04, High-speed Mode) 2 wafers 10 mm 12-inch silicon wafer 150 mm

- ▶ Thin-profile design enables easy mounting on robot arms.
- Easy to adjust optical axis. (Typical alignment error between mechanical and optical axes is only ±0.1°.)

2500 5000 7500 99

Digital value

Reliably wafer detection, even when stacked closely together.

Specifications

Through-beam Fiber Units

					Sensi	ing distance (mm)	Optical axis		
Application	Ambient temperature	Aperture angle	Appearance (mm)	Bending radius of cable	Amplifier Unite	Smart Fiber Amplifier Units (Advanced Models) E3X-HD		diameter (minimum sensing		55 Page Dimensions No.
					E3X-SD	■GIGA = HS	Other modes	object)		
		1.5°	5° Thickness: 3 mm IP50	Flexible, R1	890	3,220	ST : 1,780 2 dia.		E32-A03 2M	55-A
		1.3	24.5 10 Thickness: 3 mm	— R10 -	030	1,200	SHS: 500	(0.1 dia.)	E32-A03-1 2M	55-B
Wafer Mapping	70°C	3.4°	20.5 Thickness: 2 mm		■ 340	1,280 450	ST: 680 SHS: 200	1.2 dia. (0.1 dia.)	E32-A04 2M	55-C
		40	20.5	Flexible, R1	1,170	4,000 *	ST : 2,200 SHS: 580	2 dia.	E32-T24SR 2M <u>NEW</u>	55-D
		4°	3.5 dia.	R10	1,400	4,000 *	ST : 2,600 SHS: 700	(0.1 dia.)	E32-T24S 2M	55-E

 $^{^{\}star}\,$ The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.

Note 1. The mode of E3X-HD that is given under the sensing distances has the following mode names and response times.

GIGA: GIGA Power Mode (16 ms), HS: High-speed Mode (250 μ s), ST: Standard Mode (17 ms), and SHS: Super-high-speed Mode (NPN output and E3X-HD0: 50 μ s, PNP output: 55 μ s)

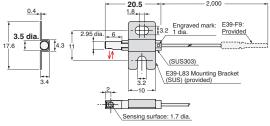
2. The values for the minimum sensing object are representative values that indicate values obtained in Standard Mode with the sensing distance and sensitivity set to the optimum values.

Installation Information → 56 and 58 Page



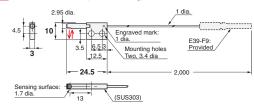
Through-beam Fiber Units (Set of 2)

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



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

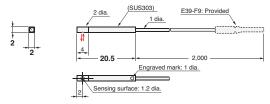
55-B **E32-A03-1 2M** (Free Cutting)



Note1: Use the engraved surface and its opposing surface as installation (reference) surfaces.

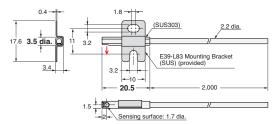
2. Set of two symmetrical parts.

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

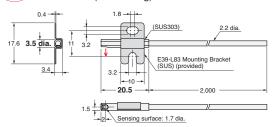


Note: Use the engraved surface and its opposing surface as installation (reference) surfaces.

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



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



Threaded

Cylindrical

Flat

Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective

Limited-Chemical-

Oil-resistant

Bending Heatresistant

Detection

Liquid-level

Vacuum

Threaded Cylindrical Flat

Sleeved

Small Spot High Power

Narrow view BGS

Retro-reflective Limited-

> Chemicalresistant, Oil-resistant

Heatresistant

Bending

Detection

Liquid-level

Vacuum Semi, Solar

Installation Information

		Installation					Cable			Weight	Demensions
Models	Ambient temperature	Tightening torque	Mounting hole	Bending radius	Unbendable length	Tensile strength	Sheath material	Core material	Emitter/receiver differentiation	(packed state) (g)	Page No.
E32-A01 5M	-40 to 70°C	0.03N • m	-	R4	10	9.8N	Fluororesin	Plastic	None	200	49 Page 49-A
E32-A03 2M	-40 to 70°C	0.29N • m	-	R1	0	9.8N	Polyethylene	Plastic	None	40	29 Page 29-A 55 Page 55-A
E32-A03-1 2M	-40 to 70°C	0.29N • m	-	R10	10	9.8N	Polyethylene	Plastic	None	50	29 Page 29-B 55 Page 55-B
E32-A04 2M	-40 to 70°C	0.29N • m	2.2 ^{+0.5} ₀ dia.	R10	10	9.8N	Polyethylene	Plastic	None	40	29 Page 29-C 55 Page 55-C
E32-A08 2M	-40 to 70°C *1	0.53N • m	-	R25	10	9.8N	Polyethylene	Plastic	None	60	35 Page 35-C 53 Page 53-B
E32-A08H2 3M	-40 to 300°C	0.53N • m	-	R25	10	29.4N	SUS	Glass	None	240	45 Page 45-D 53 Page 53-C
E32-A09 2M	-40 to 70°C *1, *2	0.53N • m	-	R25	10	9.8N	Polyethylene	Plastic	None	60	35 Page 35-F 53 Page 53-E
E32-A09H2 2M	-40 to 300°C	0.53N • m	-	R25	10	9.8N	SUS	Glass	None	230	45 Page 45-E 53 Page 53-F
E32-A12 2M	-40 to 70°C	0.53N • m	-	R25	10	9.8N	Polyethylene	Plastic	None	60	35 Page 35-D 53 Page 53-D
E32-C11N 2M	-40 to 70°C	0.98N • m	6.2 ^{+0.5} ₀ dia.	R4	0	29.4N	PVC and Polyethylene	Plastic	White line on emitter cable	70	09 Page 09-B
E32-C31 2M	-40 to 70°C	0.78N • m	3.2 ^{+0.5} ₀ dia.	R25	10	9.8N	Polyethylene	Plastic	White line on emitter cable	40	09 Page 09-D
E32-C31M 1M	-40 to 70°C	0.78N • m	3.2 ^{+0.5} ₀ dia.	R10	10	9.8N	Polyethylene	Plastic	White line on emitter cable	40	09 Page
E32-C31N 2M	-40 to 70°C	0.29N • m	3.2 ^{+0.5} ₀ dia.	R4	0	9.8N	PVC and Polyethylene	Plastic	White line on emitter cable	40	09 Page
E32-C41 1M	-40 to 70°C	0.78N • m	3.2 ^{+0.5} ₀ dia.	R25	10	9.8N	Polyethylene	Plastic	White tube on emitter cable	30	21 Page 21-A, 21-D
E32-C42 1M	-40 to 70°C	0.29N • m	2.2 ^{+0.5} ₀ dia.	R25	10	9.8N	Polyethylene	Plastic	White tube on emitter cable	30	19 Page
E32-C42S 1M	-40 to 70°C	0.29N • m	3.2 ^{+0.5} dia.	R25	10	4N	Polyolefin	Plastic	White tube on emitter cable	30	19 Page
E32-CC200 2M	-40 to 70°C	0.98N • m	6.2 ^{+0.5} dia.	R25	10	29.4N	Polyethylene	Plastic	White line on emitter cable	40	09 Page
E32-D11 2M	-40 to 70°C	0.98N • m	6.2 ^{+0.5} dia.	R4	10	29.4N	PVC	Plastic	None	50	41 Page 41-E
E32-D11R 2M	-40 to 70°C	0.98N • m	6.2 ^{+0.5} dia.	R1	0	29.4N	PVC	Plastic	None	50	09 Page
E32-D11U 2M	-40 to 70°C	0.98N • m	6.2 ^{+0.5} dia.	R4	10	29.4N	Fluororesin	Plastic	None	60	37 Page
E32-D12F 2M	-40 to 70°C	0.78N • m	6.5 ^{+0.5} ₀ dia.	R40	10	29.4N	Fluororesin	Plastic	None	190	37 Page 37-H
E32-D15XR 2M	-40 to 70°C	0.15N • m	-	R1	0	29.4N	PVC	Plastic	None	60	15 Page
E32-D15YR 2M	-40 to 70°C	0.15N • m	-	R1	0	29.4N	PVC	Plastic	None	60	15 Page (15-E)
E32-D15ZR 2M	-40 to 70°C	0.15N • m	_	R1	0	29.4N	PVC	Plastic	None	60	15 Page (15-F)
E32-D16 2M	-40 to 70°C	0.53N • m	-	R4	10	29.4N	PVC	Plastic	None	70	23 Page 23-C
E32-D21 2M	-40 to 70°C	0.78N • m	3.2 ^{+0.5} dia.	R4	10	9.8N	PVC	Plastic	None	20	41 Page 41-B
E32-D211R 2M	-40 to 70°C	0.78N • m	4.2 ^{+0.5} dia.	R1	0	9.8N	Polyethylene	Plastic	None	40	09 Page 09-F
E32-D21B 2M	-40 to 70°C	0.78N • m	4.2 ^{+0.5} dia.	R4	10	9.8N	PVC	Plastic	None	40	41 Page (41-D)
E32-D21R 2M	-40 to 70°C	0.78N • m	3.2 ^{+0.5} dia.	R1	0	9.8N	Polyethylene	Plastic	None	20	09 Page

The heat-resistant rating is not the same for all parts of the Fiber Unit. Refer to the dimensions diagrams for details. Avoid rapid temperature changes.

Threaded Cylindrical

Flat

Sleeved

Small Spot

High Power

Narrow view BGS

Retro-reflective

Chemicalresistant, Oil-resistant

Limited-

Bending

Heatresistant

Detection

Liquid-level

Vacuum FPD,

Semi, Solar

Installation Information

		Installation					Cable			Weight	Demensions
Models	Ambient temperature	Tightening torque	Mounting hole	Bending radius	Unbendable length	Tensile strength	Sheath material	Core material	Emitter/receiver differentiation	(packed state) (g)	Page No.
E32-D221B 2M	-40 to 70°C	0.29N • m	3.2 ^{+0.5} ₀ dia.	R4	10	9.8N	PVC	Plastic	None	40	13 Page 13-D 41 Page 41-C
E32-D22B 2M	-40 to 70°C	0.2N • m	1.7 ^{+0.5} ₀ dia.	R4	10	9.8N	PVC	Plastic	None	30	13 Page 13-A 41 Page 41-A
E32-D22R 2M	-40 to 70°C	0.29N • m	3.2 ^{+0.5} ₀ dia.	R1	0	9.8N	Polyethylene	Plastic	None	40	13 Page
E32-D24R 2M	-40 to 70°C	0.29N • m	3.2 ^{+0.5} ₀ dia.	R1	0	9.8N	Polyethylene	Plastic	None	40	17 Page 17-E
E32-D25XB 2M	-40 to 70°C	0.15N • m	-	R4	10	9.8N	PVC	Plastic	None	40	41 Page 41-F
E32-D32L 2M	-40 to 70°C	0.29N • m	3.2 ^{+0.5} ₀ dia.	R25	10	29.4N	Polyethylene	Plastic	Yellow dotted line on emitter cable	50	13 Page 13-E
E32-D33 2M	-40 to 70°C	0.29N • m	3.2 ^{+0.5} ₀ dia.	R4	10	9.8N	Polyethylene	Plastic	None	40	13 Page 13-F 17 Page 17-H
E32-D331 2M	-40 to 70°C	0.29N • m	2.2 ^{+0.5} ₀ dia.	R4	10	9.8N	Polyethylene	Plastic	None	30	17 Page
E32-D36P1 2M	-40 to 70°C	0.78N • m	-	R4	10	29.4N	Polyethylene	Plastic	None	60	47 Page 47-D
E32-D36T 5M	-40 to 70°C	-	-	R4	10	29.4N	Polyethylene	Plastic	None	190	49 Page 49-C
E32-D43M 1M	-40 to 70°C	0.29N • m	1.7 ^{+0.5} dia.	R4	10	9.8N	Polyethylene	Plastic	None	30	13 Page 13-B 17 Page 17-F
E32-D51 2M	-40 to 150°C *1	0.98N • m	6.2 ^{+0.5} ₀ dia.	R35	10	29.4N	Fluororesin	Plastic	None	60	45 Page 45-B
E32-D51R 2M	-40 to 100°C *2	0.98N • m	6.2 ^{+0.5} ₀ dia.	R2	0	29.4N	Polyurethane	Plastic	None	60	45 Page 45-A
E32-D61-S 2M	-60 to 350°C *3	0.98N • m	6.2 ^{+0.5} dia.	R25	10	29.4N	SUS	Glass	None	190	45 Page 45-G
E32-D611-S 2M	-60 to 350°C *3	0.98N • m	4.2 ^{+0.5} ₀ dia.	R25	10	29.4N	SUS	Glass	None	170	45 Page 45-F
E32-D73-S 2M	-40 to 400°C *3	0.78N • m	4.2 ^{+0.5} ₀ dia.	R25	10	29.4N	SUS	Glass	None	170	45 Page 45-H
E32-D81R-S 2M	-40 to 200°C *3	0.78N • m	6.2 ^{+0.5} dia.	R10	10	9.8N	Fluororesin	Glass	None	70	45 Page 45-C
E32-D82F1 4M	-40 to 200°C	0.29N • m	6.5 ^{+0.5} ₀ dia.	R25	10	29.4N	Fluororesin	Plastic	None	450	49 Page 49-D
E32-DC200BR 2M	-40 to 70°C	0.98N • m	6.2 ^{+0.5} dia.	R1	0	29.4N	PVC	Plastic	None	60	17 Page
E32-DC200F4R 2M	-40 to 70°C	0.78N • m	3.2 ^{+0.5} ₀ dia.	R1	0	9.8N	Polyethylene	Plastic	None	40	17 Page
E32-L11FP 5M	-10 to 60°C	0.78N • m	-	R40	10	9.8N	Fluororesin	Plastic	None	310	37 Page 37-F 53 Page 53-G
E32-L11FS 5M	-10 to 85°C	0.78N • m	-	R40	10	9.8N	Fluororesin	Plastic	None	310	37 Page 37-G 53 Page 53-H
E32-L15 2M	-40 to 70°C	0.53N • m	-	R25	10	29.4N	Polyethylene	Plastic	White tube on emitter cable	60	19 Page
E32-L16-N 2M	-40 to 70°C	0.29N • m	-	R25	10	29.4N	Polyethylene	Plastic	None	60	31 Page 31-A 35 Page 35-B 53 Page 53-A
E32-L24S 2M	-40 to 70°C	0.29N • m	-	R10	10	9.8N	Polyethylene	Plastic	None	40	31 Page 31-B 35 Page 35-A
E32-L25L 2M	-40 to 105°C *2	0.29N • m	-	R10	10	9.8N	Polyethylene	Plastic	None	40	31 Page 31-C 35 Page 35-E
E32-L25T 2M	-40 to 70°C	-	-	R10	10	9.8N	Polyethylene	Plastic	None	40	49 Page 49-B

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

Threaded

Cylindrical Flat

Sleeved

Small Spot

High Power Narrow

view BGS

Retro-reflective Limited-

Chemicalresistant, Oil-resistant Bending

Heatresistant

Detection

Liquid-level

Vacuum Semi, Solar

Installation Information

		Installation					Cable			Weight	Demensions
Models	Ambient temperature	Tightening torque	Mounting hole	Bending radius	Unbendable length	Tensile strength	Sheath material	Core material	Emitter/receiver differentiation	(packed state) (g)	Page No.
E32-R16 5M	–25 to 55°C	0.54N • m	-	R25	10	29.4N	Polyethylene	Plastic	None	220 (E39-R1 included.)	33 Page 33-B
E32-R21 2M	-40 to 70°C	0.39N • m	6.2 ^{+0.5} ₀ dia.	R10	10	9.8N	Polyethylene	Plastic	None	70 (E39-R3 included.)	33 Page 33-C
E32-T10V 2M	-25 to 70°C	0.3N • m	-	R25	10	29.4N	Fluororesin	Plastic	None	170	51 Page 51-D
E32-T11 2M	-40 to 70°C	0.78N • m	4.2 ^{+0.5} ₀ dia.	R4	10	29.4N	PVC	Plastic	None	40	39 Page 39-C
E32-T11F 2M	-40 to 70°C	0.29N • m	-	R4	10	29.4N	Fluororesin	Plastic	None	60	37 Page 37-C
E32-T11N 2M	-40 to 70°C	0.78N • m	4.2 ^{+0.5} ₀ dia.	R1	0	29.4N	PVC	Plastic	None	70	07 Page 07-A
E32-T11NF 2M	–25 to 70°C	12N • m	8.5 ^{+0.5} ₀ dia.	R1	0	29.4N	Fluororesin	Plastic	None	80	37 Page 37-A
E32-T11R 2M	-40 to 70°C	0.78N • m	4.2 ^{+0.5} ₀ dia.	R1	0	29.4N	PVC	Plastic	None	50	07 Page 07-B
E32-T12F 2M	-40 to 70°C	0.78N • m	5.5 ^{+0.5} ₀ dia.	R40	10	29.4N	Fluororesin	Plastic	None	210	37 Page 37-B
E32-T12R 2M	-40 to 70°C	0.29N • m	3.2 ^{+0.5} ₀ dia.	R1	0	29.4N	PVC	Plastic	None	60	11 Page
E32-T14 2M	-40 to 70°C	0.49N • m	-	R25	10	29.4N	Polyethylene	Plastic	None	60	23 Page 23-B
E32-T14F 2M	-40 to 70°C	0.78N • m	5.5 ^{+0.5} dia.	R40	10	29.4N	Fluororesin	Plastic	None	220	37 Page 37-D
E32-T14LR 2M	-40 to 70°C	0.29N • m	3.2 ^{+0.5} ₀ dia.	R1	0	29.4N	PVC	Plastic	None	60	11 Page (11-D)
E32-T15XR 2M	-40 to 70°C	0.15N • m	-	R1	0	29.4N	PVC	Plastic	None	60	15 Page (15-A)
E32-T15YR 2M	-40 to 70°C	0.15N • m	-	R1	0	29.4N	PVC	Plastic	None	60	15 Page (15-B)
E32-T15ZR 2M	-40 to 70°C	0.15N • m	_	R1	0	29.4N	PVC	Plastic	None	60	15 Page (15-C)
E32-T16JR 2M	-40 to 70°C	0.29N • m	-	R1	0	29.4N	PVC	Plastic	None	60	47 Page (47-B)
E32-T16PR 2M	-40 to 70°C	0.29N • m	-	R1	0	29.4N	PVC	Plastic	None	60	47 Page 47-A
E32-T16WR 2M	-25 to 55°C	0.29N • m	-	R1	0	9.8N	PVC	Plastic	None	60	47 Page 47-C
E32-T17L 10M	-40 to 70°C	0.78N • m	14.5 ⁺¹ ₀ dia.	R25	10	29.4N	Polyethylene	Plastic	None	240	23 Page (23-A)
E32-T21 2M	-40 to 70°C	0.78N • m	3.2 ^{+0.5} ₀ dia.	R4	10	9.8N	PVC	Plastic	None	30	39 Page 39-B
E32-T223R 2M	-40 to 70°C	0.20N • m	1.2 ^{+0.5} dia.	R1	10	9.8N	Polyethylene	Plastic	None	40	11 Page
											11 Page (11-B)
E32-T22B 2M	-40 to 70°C	0.20N • m	1.7 ^{+0.5} dia.	R4	10	9.8N	PVC	Plastic	None	40	39 Page 39-A
E32-T22S 2M	-40 to 70°C	0.29N • m	3.2 ^{+0.5} ₀ dia.	R10	10	29.4N	PVC	Plastic	None	60	29 Page (29-F)
E32-T24E 2M	-40 to 70°C	0.29N • m	2.7 ^{+0.5} dia.	R10	10	9.8N	Polyethylene	Plastic	None	40	17 Page
E32-T24R 2M	-40 to 70°C	0.29N • m	2.2 ^{+0.5} ₀ dia.	R1	0	9.8N	Polyethylene	Plastic	None	40	17 Page
											29 Page 29-E
E32-T24S 2M	-40 to 70°C	0.29N • m	-	R10	10	29.4N	PVC	Plastic	None	60	55 Page 55-E
											29 Page 29-D
E32-T24SR 2M	-40 to 70°C	0.29N • m	-	R1	0	9.8N	PVC	Plastic	None	60	55 Page 55-D
E32-T25XB 2M	-40 to 70°C	0.15N • m	-	R4	10	9.8N	PVC	Plastic	None	40	39 Page 39-D
E32-T33 1M	-40 to 70°C	0.29N • m	3.2 ^{+0.5} dia.	R10	10	9.8N	Polyethylene	Plastic	None	40	17 Page
E32-T51 2M	-40 to 150°C *1	0.78N • m	4.2 ^{+0.5} dia.	R35	10	29.4N	Fluororesin	Plastic	None	70	43 Page 43-B
E32-T51F 2M	-40 to 150°C	0.78N • m	5.5 ^{+0.5} dia.	R40	10	29.4N	Fluororesin	Plastic	None	220	37 Page 37-E
E32-T51R 2M	-40 to 100°C	0.78N • m	4.2 ^{+0.5} ₀ dia.	R2	0	29.4N	Polyurethane	Plastic	None	60	43 Page 43-A
E32-T51V 1M	-25 to 120°C	0.29N • m	4.2 ^{+0.5} dia.	R30	10	29.4N	Fluororesin	Glass	None	160	51 Page (51-A)

For continuous operation, use the Fiber Unit between -40 to 130° C For continuous operation, use the Fiber Unit between -40 to 90° C.

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Fiber Unit

Threaded

Cylindrical

Flat Sleeved

Small Spot

High Power
Narrow
view

BGS

Retroreflective

Limitedreflective

Chemicalresistant, Oil-resistant

> Bending Heat-

Area Detection

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> Installation Information

Fiber Ampliners, Communications Unit, and

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		nstallation					Cable			Weight	Demension	
Models	Ambient temperature	Tightening torque	Mounting hole	Bending radius	Unbendable length	Tensile strength	Sheath material	Core material	Emitter/receiver differentiation	(packed state) (g)	Page No.	
E32-T61-S 2M	-60 to 350°C	0.78N • m	4.2 ^{+0.5} dia.	R25	10	29.4N	SUS	Glass	None	200	43 Page	
E32-T81R-S 2M	*1 -40 to 200°C	0.78N • m	4.2 ⁰ dia.	R10	10	9.8N	Fluororesin	Glass	None	60	43-D 43 Page	
E32-T84SV 1M	*1 -25 to 200°C	0.29N • m	4.5 ^{+0.5} ₀ dia.	R25	10	29.4N	SUS	Glass	None	190	43-C 51 Page	
	-40 to 70°C		4.2 ^{+0.5} dia.		0						51-C 17 Page	
E32-TC200BR 2M		0.78N • m		R1		29.4N	PVC	Plastic	None	60	17-D 51 Page	
E32-VF1	-25 to 70°C	-	-	-	-	-	-	-	_	240	51-F 51 Page	
E32-VF4	-25 to 70°C	-	-	_	_	_	-	_	-	280	24 Page 24-A 25 Page	
E39-F1	-40 to 200°C	-	-	-	-	-	-	_	-	2	25-A to 25-C 26 Page 26-A 27 Page 27-A to 27-C	
E39-F1-33	-40 to 200°C	-	-	-	_	-	_	-	-	3	26 Page 26-D 27 Page 27-J	
E39-F11	-	-	-	_	-	_	-	-	-	30	-	
E39-F16	-60 to 350°C	-	-	-	-	-	-	-	-	15	24 Page (24-B) 25 Page (25-D) to (25-F) 26 Page (26-B) 27 Page (27-D) to (27-F) (27-K)	
E39-F17	–25 to 70°C	-	-	_	_	-	-	-	-	10	19 Page 19-B	
E39-F18	-40 to 70°C	-	-	-	-	-	-	-	-	5	21 Page 21-G, 21-H	
E39-F1V	-25 to 120°C	-	-	-	-	-	-	-	-	3	51 Page 51-B	
E39-F2	-40 to 200°C	-	-	-	-	-	-	-	-	2	24 Page (24-C) 25 Page (25-G) to (25-H) 26 Page (26-C) 27 Page (27-G) to (27-I)	
E39-F32A	-40 to 150°C	-	-	R30	-	-	-	-	-	70	41 Page 41-G	
E39-F32C	-40 to 150°C	-	-	R30	-	-	-	-	-	110	39 Page 39-E 41 Page 41-G	
E39-F32D	-40 to 150°C	-	-	R30	-	-	-	-	-	80	41 Page 41-G	
E39-F3A	-40 to 70°C	-	-	_	-	-	_	-	-	2	19 Page	
E39-F3A-5	-40 to 70°C	-	-	-	-	-	-	-	-	1	21 Page 21-A, 21-B, 21-C	
E39-F3B	-40 to 70°C	-	-	-	-	-	-	_	-	2	21 Page (21-D), (21-E), (21-F)	
E39-F3C	-40 to 70°C	-	-	-	-	-	-	-	-	1	19 Page 19-C, 19-D	
E39-F3R	-40 to 70°C	-	-	-	-	-	-	-	-	1	33 Page 33-A	
E39-R1	–25 to 55°C	-	-	-	-	-	-	-	-	20	33 Page 33-B	
E39-R3	-40 to 70°C	-	-	_	_	-	_	_	-	20	33 Page 33-C	
E39-RP37	−25 to 55°C	_	_	_	_	_	_	_	_	4	33 Page 33-A	

Sleeved

High Power

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Chemicalresistant, Oil-resistant

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Retroreflective Limited-

reflective Chemicalresistant

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Communications Units

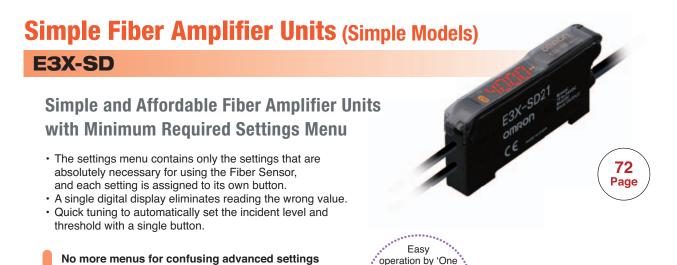
E3X-CRT/E3X-ECT * Compatible with E3X-HD0

Communications Units for CompoNet and EtherCAT

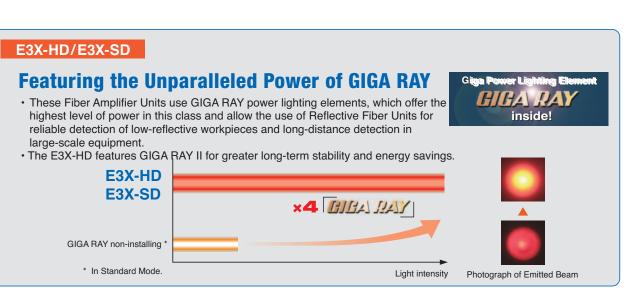
- · No wiring is roquired to join Fiber Amplifier Units together.
- · Setting change and read-out are easy.
- Many Fiber Amplifier Units can be connected. (E3X-CRT: 16 Amplifiers, E3X-ECT: 30 Amplifiers)



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Fiber Amplifiers / Communications Unit / Accessories

Ordering Information

ber Sensor eatures

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Fiber Units

Threaded

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Chemicalresistant, Oil-resistant

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Smart Fiber Amplifier Units (Advanced Models) E3X-HD Series

Fiber Amplifier Units (Standard)

	0	Mo	del	Ratings and	B1
Appearance	Connection method	NPN output	PNP output	Specifications	Dimensions
	Pre-wired (2 m)	E3X-HD11 2M	E3X-HD41 2M	Dave 64	Page 64 64-A
	Wire-saving connector	E3X-HD6	E3X-HD8	Page 64	Page 65 (65-A)

Fiber Amplifier Unit (For CompoNet/EtherCAT Communications Unit)

Appearance	Model	Ratings and Specifications	Dimensions
	E3X-HD0	Page 64	Page 65 (65-B)

Communications Units

Communication method	Appearance	Applicable Fiber Amplifier Model	Model	Ratings and Specifications	Dimensions
CompoNet	· · · · · · · · · · · · · · · · · · ·	E3X-HD0	E3X-CRT		Page 71 71-A
EtherCAT		E3X-MDA0 E3X-DA0-S	E3X-ECT	Page 70	Page 71 71-B

Simple Fiber Amplifier Units (Simple Models) E3X-SD Series

A	0	Mo	del	Ratings and	Dimensione	
Appearance	Connection method	NPN output	PNP output	Specifications	Dimensions	
17. 17	Pre-wired (2 m)	E3X-SD21 2M	E3X-SD51 2M	Dogo 70	Page 73 73-A	
	Wire-saving connector	E3X-SD7	E3X-SD9	Page 72	Page 73 73-B	

Ordering Information

Accessories (sold separately)

Wire-saving connectors (Required for wire-saving connector models.)

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

Туре	Appearance	Cable length	Number of conductors		Ratings and Specifications	Dimensions
Master Connector	1	2 m	3	E3X-CN11	Daga 70	Page 76 76-A
Slave Connector		2 111	1	E3X-CN12	Page 76	Page 76 76-B

Mounting Bracket

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

Appearance	Model	Quantity	Dimensions
	E39-L143	1	Page 77

DIN Track

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

Appearance	Model	Quantity	Dimensions
	PFP-100N		Page 77
	PFP-50N	1	77-B
	PFP-100N2		Page 77 77-C

End Plate

Two End Plates are provided with the Communications Unit.

End Plate is not provided with the Fiber Amplifier Unit and must be ordered separately as required.

Appearance	Model	Quantity	Dimensions
5	PFP-M	1	Page 77 77-D

Fiber Sens Features

Selection Guide

Fiber Unit

Cylindrical

Threaded

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BGS

Retroreflective Limited-

Chemicalresistant, Oil-resistant

Bending

Heatresistant

Area Detection

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Vacuum

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Cylindrical

Flat Sleeved

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reflective Limited-

> resistant, Oil-resistant

> > Bendina

Heatresistant

Detection

Liquid-level

Vacuum Semi Solar

Ratings and Specifications

	Туре		Sta	ndard		For Communications Unit *1	
	Model	E3X-HD11	E3X-HD41	E3X-HD6	E3X-HD8	E3X-HD0	
	Connection method	Pre-	wired	Wire-saving	connector *2	Communications Unit Connector	
Item	Control output	NPN output	PNP output	NPN output	PNP output	-	
Light source (wavelength)		Red, 4-element LE	D (625 nm)				
Power supp	ly voltage	12 to 24 VDC ±10%	%, ripple (P-P) 10% r	nax.			
Power cons	umption	Power Saving Eco	Mode: 530 mW max	. (Current consumpti	on: 22 mA max. at 2	mA max. at 12 DVC) 4 VDC, 44 mA max. at 12 VDC)	
Control outp	out	(Differs for NPN an	d PNP outputs.)	max., open-collector age: 2 V max.), OFF	•	_	
Protection c	ircuits	Power supply rever	se polarity protectio	n, output short-circui	protection and outp	ut reverse polarity protection	
S	uper-high-speed Mode (SHS) *3	Operate or reset: 50 μs	Operate or reset: 55 µs	Operate or reset: 50 µs	Operate or reset: 55 µs	Operate or reset: 50 μs	
Response H	ligh-speed Mode (HS)	Operate or reset: 2	50 μs (default setting	g)			
time	tandard Mode (Stnd)	Operate or reset: 1	ms				
G	liga-power Mode (GIGA)	Operate or reset: 1	6 ms				
Mutual inter	ference prevention	Possible for up to 10 units (optical communications sync) *3					
Auto power	control (APC)	Always ON					
Other functi	ons	Power tuning, differential detection, DPC, timer (OFF-delay, ON-delay, or one-shot), zero reset, resetting settings, and Eco Mode					
Ambient IIIu	mination (Receiver side)	Incandescent lamp: 20,000 lx max., Sunlight: 30,000 lx max.					
Maximum co	onnectable Units	16 units				with E3X-CRT: 16 units with E3X-ECT: 30 units	
Ambient temperature range		Groups of 3 to 10 Amplifers: -25 to 50°C, Groups of 11 to 16 Amplifers: -25 to 45°C Storage: -30 to 70°C (with no icing or condensation) Groups of 3 to 10 Amplifers: -25 to 45°C Groups of 11 to 16 Amplifers Groups of 17 to 30 Amplifers Storage: -30 to 70°C				Operating: Groups of 1 to 2 Amplifers: -25 to 55°C, Groups of 3 to 10 Amplifers: -25 to 50°C, Groups of 11 to 16 Amplifers: -25 to 45°C Groups of 17 to 30 Amplifers: -25 to 40°C Storage: -30 to 70°C (with no icing or condensation)	
Ambient hui	midity range	Operating and storage: 35% to 85% (with no condensation)					
Insulation re	esistance	20 MΩ min. (at 500 VDC)					
Dielectric st	rength	1,000 VAC at 50/60 Hz for 1 minute					
Vibration res	sistance	Destruction: 10 to 55 Hz with a 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions					
Shock resis	tance	Destruction: 500 m/s², for 3 times each in X, Y, and Z directions					
Degree of pr	rotection	IEC 60529 IP50 (w	ith Protective Cover	attached)		_	
Weight (pac	ked state/unit only)	Approx. 105 g/Appr	rox. 65 g	Approx. 60 g/Appro	ox. 20 g	Approx. 65 g/Approx. 25 g	
Matariala	Case	Heat-resistant ABS				Heat-resistant ABS (connector: PBT)	
Materials	Cover	Polycabonate (PC)					
Accessories		Instruction Manual					

- The E3X-ECT EtherCAT Communications Unit and the E3X-CRT CompoNet Communications Unit can be used
- Use either the E3X-CN11 (master connector, 3 conductors) or the E3X-CN12 (slave connector, 1 conductor).

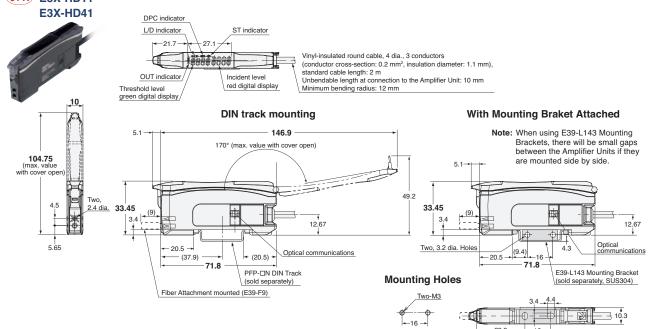
 The communications function and matual interference prevention function are disabled when the detection mode is set to Super-high-speed mode (SHS). When including E3X-DA-S with activated power tuning the maximum number of mutual interference prevention is up to 6. When including E3X-MDA with activated power tuning the maximum number of mutual interference prevention is up to 5.

Dimensions

Pre-wired Models

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

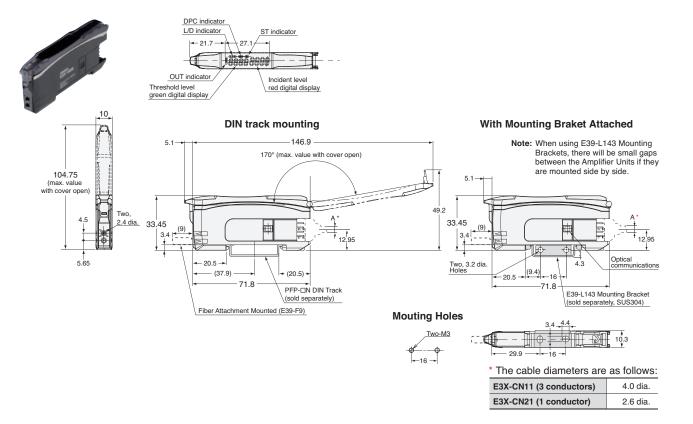
64-A E3X-HD11 E3X-HD41 DPC indicator



E3X-HD

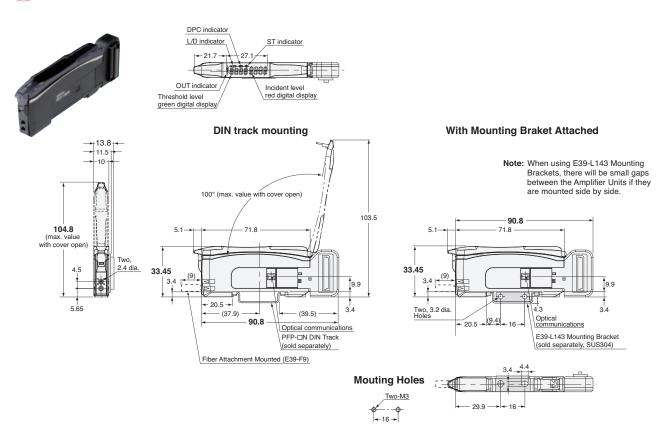
Wire-saving connector Models





Communications Unit Connector Models





iber Senso eatures

Selection Guide

Fiber Units

Threaded

Cylindrical

Flat

Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective Limited-

Chemical-

resistant, Oil-resistant

Bending

Heatresistant

Area Detection

Liquid-level

Vacuum

FPD, Semi, Solar

Installation

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> > lodel Index

Fiber Amplifiers / Communications Unit / Accessories

E3X-HD

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Fiber Units

Threaded

Cylindrical

Saving Space Sleeved

High Power

Narrow

view

BGS

Small Spot

Retroreflective

Chemicalresistant, Oil-resistant

Bending
Heatresistant

Area Detection

Liquid-level

FPD, Semi, Solar

Installation Information

riber Ampliners, Communications Unit, and Accessories

Technical Guide and Precautions

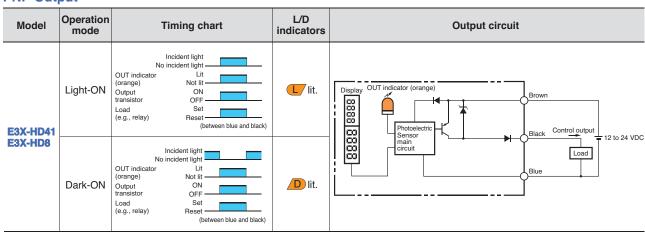
Model Index

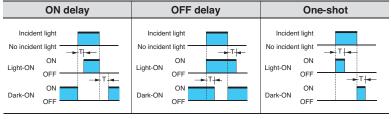
I/O Circuit Diagrams

NPN Output

Model	Operation mode	Timing chart	L/D indicators	Output circuit		
E3X-HD11	Light-ON	Incident light No incident light OUT indicator (orange) Not lit Output ON transistor OFF Load Set (e.g., relay) Reset (between brown and black)	L/lit.	Display OUT indicator (orange) Brown Black Control output Sensor main circuit Display Display		
E3X-HD6	Dark-ON	Incident light No incident light (orange) Not lit Output ON transistor Load (e.g., relay) Not lit ON transistor OFF Load (e.g., relay) Reset (between brown and black)	D lit.	Sensor Sensor 12 to 24 VDC		

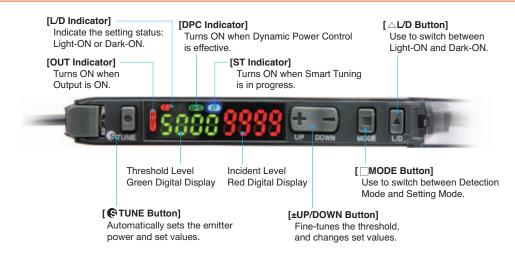
PNP Output





Note: Timing Charts for Timer Settings (T: Set Time)

Nomenclature



Operating Procedures

Basic Settings

Switching Control Output

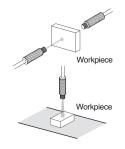
1. Press D button.

Through-beam:

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

Reflective:

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

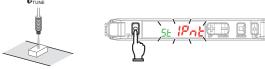


Smart Tuning [Easy Sensitivity Setting]

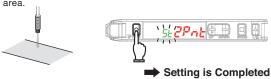
(1) Detect for Workpiece Presence/Absence

2-point Tuning

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



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



Incident light level setting:

The larger incident level of the Step 1 and 2 values is adjusted to the power tuning level.

Threshold setting:

Set to the middle between the Step 1 and 2 incident light levels.



Step 1 and Step 2 can be reversed.

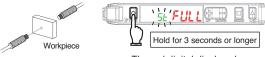
(2) Detect for Workpiece Presence/Absence

Maximum Sensitivity Tuning

 Hold button for 3 seconds or longer with/without workpiece as shown below.

Release the button when [$56 \frac{1}{2} \frac{1}{2} \frac{1}{2}$] is displayed.

Through-beam: Workpiece is present



The red digital display changes $[\beta\beta\alpha\xi]\to [\beta\beta\beta\xi]$

Reflective: Workpiece is absent



Setting is Completed

Incident light level setting:

The incident level in Step 1 is adjusted to "0".

Threshold setting:

The value is set to approx. 7% of the incident light level of 1. If the incident light level of 1 is smaller during long distance detection, the minimum value by which an output is correctly turned ON will be set.

(3) Adjust for Moving Workpiece without Stopping Line

Full Auto Tuning

1. Hold the o button without the presence of a workpiece, and pass the workpiece through while [!Pnt] → [FULL] → [RUL_0] is displayed in red

digital.

(Keep holding the o button while the workpiece passes through, and hold 7 seconds or longer until [Ruto] is displayed in red digital. After the workpiece passes through, release your finger from the button.) Workpiece



Setting is Completed

Incident light level setting:

Adjust the max. incident light level on Step 1 as the power tuning level.

Threshold setting:

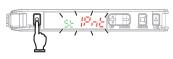
Set to the middle between max. and min. incident light levels on Step 1.

(4) Determine Workpiece Position

Position Tuning

1. Press button without a workpiece in the area.





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





The red digital display changes $[\partial \hat{p}_{\alpha} \hat{p}] \rightarrow [\hat{p}_{\alpha} \hat{p}].$

Setting is Completed

Incident light level setting:

The Step 2 incident level is adjusted to half the power tuning level.

Threshold setting:

Set to the same value as the Step 2 incident level.

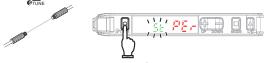
(5) Detect Transparent or Small Workpiece (Set Threshold by incident light level percentage)

Percentage Tuning

1. Turn ON Percentage Tuning in SET mode.

Refer to "Detailed Settings".

2. Press button without a workpiece in the area.



Setting is Completed

Incident light level setting:

The Step 2 incident light level is adjusted to the power tuning level.

Threshold setting:

Set to the value obtained by [Incident Level at Step 2 \times Percentage Tuning Level + Incident Level at Step 2].



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

Threaded

Cylindrical

Flat

Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective

Limited-

Chemicalresistant Oil-resistant

Bending

resistant

Detection

Liquid-level

Vacuum Semi

Solar

Fiber Amplifiers / Communications Unit / Accessories

Threaded

Cylindrical Flat

Sleeved

Small Spot

High Power Narrow

view

BGS

reflective Limited-

Chemical-Oil-resistant

Bending Heatresistant

Detection

Liquid-level

Vacuum

Semi Solar

Smart Tuning Error

Error / Display / Cause	Error Origin Tuning Type	Remedy
Near Error The light level difference between Points 1 and 2 are extremely small.	2-point Tuning Full Auto Tuning Positioning Tuning	Change the detection function mode to a slower response time mode. Narrow the emitter and receiver distance (Through-beam) Mount the sensor closer to the workpiece (Reflective)
Over Error DUE FOR ETT Incident light level is too high.	All	Enhance the power tuning level. Use a thin-diameter fiber. Widen the emitter and receiver distance (Through-beam) Distance the sensor from the workpiece (Reflective)
Low Error Lo Erro Incident light level is too low.	Tuning other than Maximum Sensitivity Tuning	Decrease the power tuning level. Narrow the emitter and receiver distance (Through-beam) Locate the sensor closer to the workpiece (Reflective)

The adjustment range of smart tuning is approx. 20 to 1/100 times

When selecting giga mode as detection function, the range will be approx. 2 to 1/100 times due to the large initial value.

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

Minute Adjustment of Threshold Level

1. Press button to adjust the threshold level.

The threshold level becomes higher. The threshold level becomes lower. 1000 Z 130 🕀 🗩



Hold the key for high-speed level adjustment

Convenient Setting Features

(1) Restore from the Incident Level Changed due to **Dust and Dirt**

Power Tuning

1. Hold and buttons for 1 second or longer without a workpiece in the area `E'PELLA (# E Hold both for

Setting is Completed

Incident light level setting:

The Step 1 incident level is adjusted to the power tuning level. Threshold setting:

Not changed. If the value is low, it will be set to the minimum value in which an output is turned ON/OFF correctly.

Perform the procedure with a workpiece in the area for reflective model setting

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

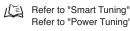


Refer to " Smart Tuning Error" for error displays.

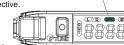
(2) Stable Detection Regardless of Incident Level Change due to Dust and Dirt

DPC Function

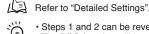
1. Perform Smart Tuning.



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



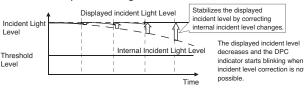
2. Set the DPC function ON in SET mode.



· Steps 1 and 2 can be reversed.



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



(3) Reset Settings

Setting Reset

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

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



Select [←5½] in ⊕ and press ☐ button.

Select [-55 in t] in ⊕ and press □ button.

55
L-ON

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

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

(4) Save or Read Settings

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

User Save Function

Saves the current settings

2. Select [5ALE] in [and press dutton.

3. Select [5848 485] in [4] and press 🔲 button.

User Reset Function

Reads out the saved settings

2. Select [-5½] in 📳 and press 🗖 button.

3. Select [-5+ #5E-] in [] and press 🗐 button.

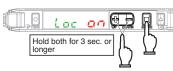
Caution is required; the output is inverted if A button is

(5) Prevent Mistake-operation

Key Lock Function

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

Enable/Cancel (This procedure)



* Press either of UP/DOWN

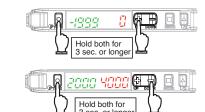
(6) Reset Incident Light Level to "0"

Zero Reset Function

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

Enable

Cancel

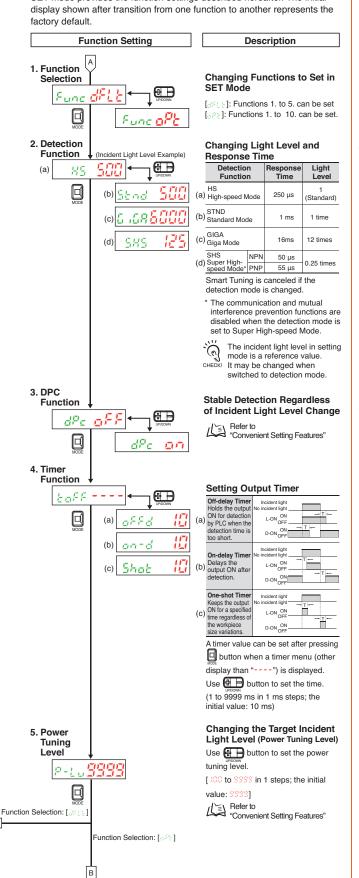


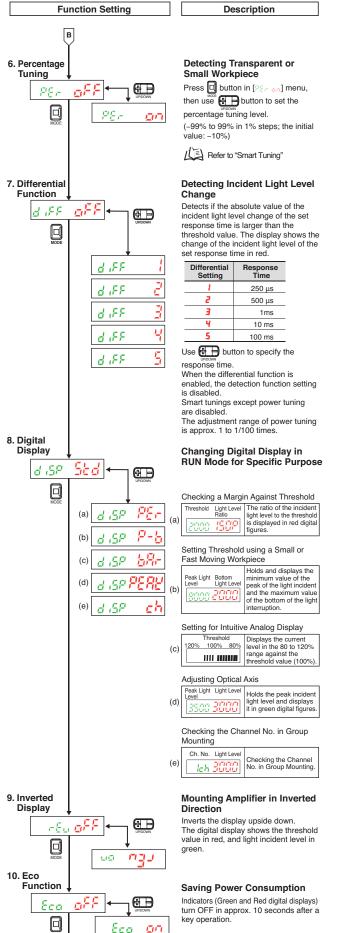
The zero reset function is canceled when either of the DPC function/differential function/Smart Tuning is performed.



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

SET mode provides the function settings described hereafter. The initial





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Threaded

Cylindrical

Flat Sleeved

Small Spot

High Power

Narrow

view

BGS

Retroreflective

Limitedreflective

Chemicalresistant Oil-resistant

Bending

Heatresistant

Detection

Liquid-level

Vacuum

FPD, Semi Solar

Fiber Amplifiers / Communications Unit / Accessories

Communications Unit

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Fiber Units

Threaded

Cylindrical

Sleeved Sleeved

Small Spot

Narrow view

BGS

Retroreflective

Limitedreflective

Chemicalresistant, Oil-resistant

Heatresistant

Area Detection

Liquid-level

Vacuum

Semi, Solar

riber Ampliners, Communications Jnit, and Accessories

> Fechnical Buide and Precautions

> > Model Index

Ratings and Specifications

E3X-CRT

Item	Specifications			
Communication method	CompoNet Communications			
Connectable Sensors	Fiber Sensors: E3X-HD0, E3X-MDA0 and E3X-DA0-S Laser Sensor Head with Separate Digital Amplifier: E3C-LDA0 Proximity Sensor with Separate Amplifier: E2C-EDA0			
Communications power supply voltage	14 to 26.4 VDC (Communications Unit draws power from the communications power supply.)			
Power and current consumption	2.4 W max. (Not including power the supplied to Sensor.) 100 mA max. at 24 VDC (Not including the current supplied to Sensor.)			
Functions	I/O communications, message communications, and Sensor error output			
Indicators	MS Indicator (Green/Red), NS indicator (Green/Red), and SS (Sensor Status) indicator (Green/Red)			
Vibration resistance	10 to 150 Hz with double amplitude of 0.7 mm, or 50 m/s ² 1.5 h each in X, Y, and Z directions			
Shock resistance	150 m/s ² 3 times each in X, Y, and Z directions			
Dielectric strength	500 VAC 50/60Hz 1 minute			
Insulation resistance	$20 M\Omega$ min.			
Ambient operating temperature	0 to 55°C (with no icing or condensation) * The temperature is limited by the number of connected Fiber Amplifier Units.			
Ambient operating humidity	25% to 85% (with no icing or condensation)			
Storage temperature -30 to 70°C (with no icing or condensation)				
Storage humidity	25% to 85% (with no condensation)			
Mounting method	35-mm DIN track-mounting			
Weight (packed state/unit only)	Approx. 220 g/Approx. 95 g			
Accessories	Connector cover and DIN track End Plates			

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

	I/O classification	Number of allocated points	Maximum number of interconnected
I/O Mode 1	Input Unit	Input: 32	15
I/O Mode 2	I/O Unit	Input: 64 Output: 64	16

* Temperature Limitations Based on Number of Connected Fiber Amplifier Units:

Groups of 1 to 2 Amplifiers: 0 to 55°C, Groups of 3 to 10 Amplifiers: 0 to 50°C, Groups of 11 to 16 Amplifiers: 0 to 45°C Read the User's Manual for precautions on using this Unit. (E412)

E3X-ECT

Item	Specifications			
Communication method	EtherCAT			
Connectable Sensors	Fiber Sensor E3X-HD0, E3X-MDA0 and E3X-DA0-S Laser Sensor Head with Separate Digital Amplifier: E3C-LDA0 Proximity Sensor with Separate Amplifier: E2C-EDA0			
Power supply voltage	20.4 to 26.4 VDC			
Power and current consumption	2.4 W max. (Not including power the supplied to Sensor.) 100 mA max. at 24 VDC (Not including the current supplied to Sensor.)			
Functions	DC (synchronous) Mode, Free Run Mode, PDO communications,*1 SDO communications, Sensor error output			
Indicators	L/A I/N indicator (Yellow), L/A OUT indicator (Yellow), PWR indicator (Green), RUN indicator (Green), ERROR indicator (Red), and SS (Sensor Status) indicator (Green/Red)			
Vibration resistance	10 to 150 Hz with double amplitude of 0.7 mm, or 50 m/s ² 1.5 h each in X, Y, and Z directions			
Shock resistance	150 m/s ² 3 times each in X, Y, and Z directions			
Insulation resistance	500 VAC 50/60 Hz 1 minute			
Dielectric strength	20 Μ Ω min.			
Ambient operating temperature	0 to 55°C (with no icing or condensation) * The temperature is limited by the number of connected Fiber Amplifier Units.			
Ambient operating humidity	25% to 85% (with no condensation)			
Storage temperature	−30 to 70°C (with no icing or condensation)			
Storage humidity	25% to 85% (with no condensation)			
Mounting method	35-mm DIN track-mounting			
Weight (packed state/unit only)	Approx. 220 g/Approx. 95 g			
Accessories	Power supply connector, connector cover, and DIN track End Plates			

*1. Data Size Assignable to the PDO (Process Data Object):

There is a maximum data size that can be assigned. The maximum size is 36 bytes.

Temperature Limitations Based on Number of Connected Fiber Amplifier Units:

Groups of 1 to 2 Amplifiers: 0 to 55°C, Groups of 3 to 10 Amplifiers: 0 to 50°C, Groups of 11 to 16 Amplifiers: 0 to 45°C, Groups of 17 to 30 Amplifiers: 0 to 40°C Read the User's Manual for precautions on using this Unit. (E413)

Communications Unit

(Unit: mm)

Featu

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Fiber Unit

Threaded

Cylindrical

Flat Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective Limited-

Chemicalresistant,

Oil-resistant

Bending

Heatresistant

Area Detection

Liquid-level

Vacuum

FPD, Semi, Solar

Installation

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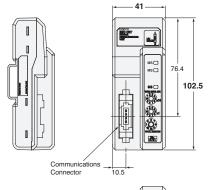
> > Nodel Inde

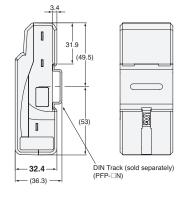
Dimensions

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

71-A E3X-CRT



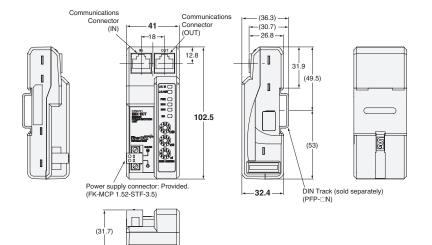




(24) 18.8







E3X-SD

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Selectio Suide

Fiber Units

Threaded

Cylindrical

Sleeved Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective

Limitedreflective

Chemicalresistant, Oil-resistant

Bending

Heatresistant

Area Detection

Liquid-level

FPD, Semi, Solar

Installation Information

Communications
Unit, and

econocal iuide and recautions

Model Index

Ratings and Specifications

	Model	E3X-SD21	E3X-SD51	E3X-SD7	E3X-SD9		
	Connection method	Pre-v		Wire-saving			
Item	Control output	NPN output	PNP output	NPN output	PNP output		
Light source	(wavelength)	Red, 4-element LED (625 nm)	•		·		
Power suppl	y voltage	12 to 24 VDC ±10%, ripple (p-	p): 10% max.				
Power consu	ımption	960 mW max. (Power supply v	voltage: 24 V, Current consum voltage: 12 V, Current consum	,			
Control outp	ut	Open-collector output (NPN or Load current: 50 mA max. (Re Light-ON/Dark-ON mode select	sidual voltage: 1.5 V max.)	4 V max.,			
Response tir	ne	Operate or reset: 200 µs max.					
Sensitivity a	djustment	UP/DOWN direct key setting,	teaching with/without a workpi	ece, automatic teaching			
Protection ci	rcuits	Power supply reverse polarity	protection, output short-circuit	protection, output reverse polar	ity protection		
Mutual interf	erence prevention	Up to 5 Amplifiers (optically synchronized) *					
Ambient illumination Receiver side Incandescent lamp: 10,000 lx max. Sunlight: 20,000 lx max.							
Number of g	ang-mounted Amplifiers	16 max. (The ambient tempera	ature specification depends on	the number of gang-mounted A	mplifiers.)		
Ambient tem	perature range	Operating: Groups of 1 to 3 Amplifiers: –25°C to 55°C Groups of 4 to 11 Amplifiers: –25°C to 50°C Groups of 12 to 16 Amplifiers: –25°C to 45°C Storage: –30°C to 70°C (with no icing or condensation)					
Ambient hun	nidity range	Operating and storage: 35% to 85% (with no condensation)					
Insulation re	sistance	20 MΩ. min. (at 500 VDC)					
Dielectric str	ength	1,000 VAC at 50/60 Hz for 1 minute					
Vibration res	istance	Destruction: 10 to 55 Hz with a 1.5-mm double amplitude for 2 hours each in X, Y and Z directions					
Shock resist	ance	Destruction: 500 m/s², for 3 times each in X, Y and Z directions					
Degree of pr	otection	IEC 60529 IP50 (with Protection	ve Cover attached)				
Weight (pack	red state)	Approx. 100 g		Approx. 55 g			
Material	Case	Polybutylene terephthalate (Pl	BT)				
Material	Cover	Polycarbonate (PC)					
Accessories		Instruction manual					

^{*} Mutual interference prevention is effective when E3X-SD series or E3X-NA serie Amplifiers are gang-mounted without other E3X series Amplifiers.

(Unit: mm)

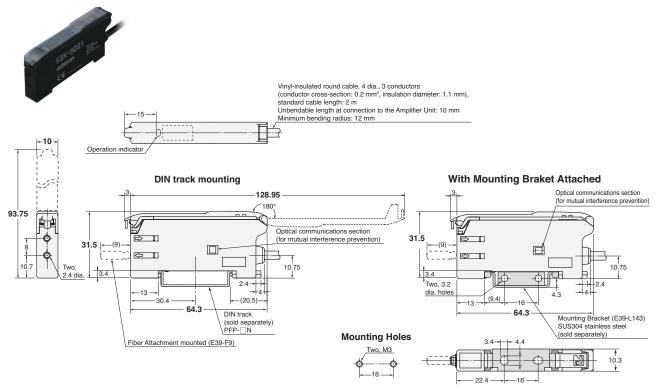
Dimensions

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

Pre-wired Models



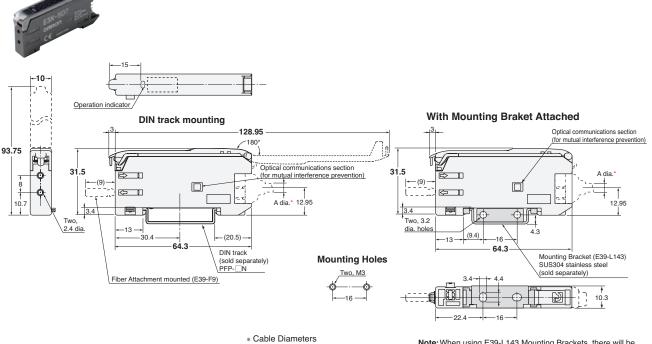
73-A E3X-SD21 E3X-SD51



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

Wire-saving connector Models





E3X-CN11 (3 conductors)

E3X-CN12 (1 conductors)

4.0 dia.

2.6 dia.

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

Threaded

Cylindrical

Flat

Sleeved

Small Spot

High Power

Narrow

view

BGS

Retroreflective Limited-

Chemical-

resistant, Oil-resistant

> Bending Heat-

resistant

Detection

Liquid-level

Vacuum

Semi, Solar

74

Fiber Amplifiers / Communications Unit / Accessories

E3X-SD

oer Sensor atures

election uide

Fiber Units

Threaded

Cylindrical

Sleeved Sleeved

Small Spot

High Power

Narrow

view

BGS

reflective
Limited-reflective

Chemicalresistant, Oil-resistant Bending

Heatresistant

Area Detection

Liquid-level

FPD, Semi, Solar

Installation

Communications
Unit, and
Accessories

ecnnical uide and recautions

Model Index

I/O Circuit Diagrams

NPN Output

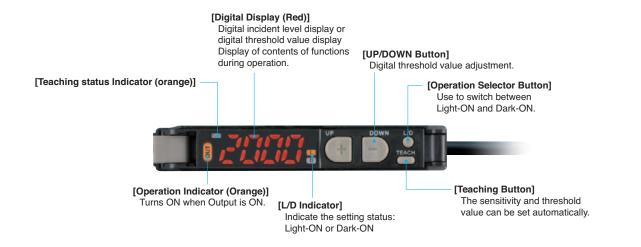
Model	Operation mode	Timing chart	L/D indicators	Output circuit
E3X-SD21	Light-ON	Incident light No incident light OUT indicator (orange) Output transistor Load (e.g., relay) Not lit OFF Load Set (between brown and black)	L lit.	OUT indicator (orange) Photoelectric Sensor Main Control output VDC
E3X-SD7	Dark-ON	Incident light No incident light OUT indicator Lit (orange) Not lit Output ON transistor OFF Load Set (e.g., relay) Reset (between brown and black)	D lit.	circuit Blue

PNP Output

Model	Operation mode	Timing chart	L/D indicators	Output circuit
E3X-SD51	Light-ON	Incident light No incident light OUT indicator (orange) Not lit Output transistor Load (e.g., relay) Reset (between Blue and black)	L lit.	OUT indicator (orange) Photoelectric Sensor Main Photoelectric Sensor T VDC
E3X-SD9	Dark-ON	Incident light No incident light OUT indicator Lit (orange) Not lit Output ON transistor OFF Load Set (e.g., relay) Reset (between Blue and black)	D lit.	main circuit Load Blue

E3X-SD

Nomenclature



Operating Procedures

Sensitivity Setting

The sensitivity can be set with the UP and DOWN Keys similar to using an adjuster knob. The sensitivity can also be easily set by using the following two teaching functions.

Teaching with/without a Workpiece

Two points (one with the workpiece and the other without) are detected, and the operating level is set to the midpoint. Light level is also automatically set to the optimal value.

Operation description	Button/Key
Press the TEACH button with the workpiece.	TEACH
Press the TEACH button without the workpiece.	TEACH

Automatic Teaching

Changes within a time are detected, and the operating level is set to the midpoint between the maximum and the minimum values of the changes. This setting is optimal for when the workpieces cannot be stopped. Execute automatic teaching again if the incident light level is not automatically set to the optimal value.

Operation description	Button/Key
Press the TEACH button for 3 s min. Let the workpiece pass while the button is pressed.	TEACH

Fiber Senso Features

Selection Suide

Fiber Unit

Threaded

Cylindrical

Flat

Sleeved

Small Spot

High Power

Narrow view

BGS

Retroreflective

Limitedreflective Chemical-

resistant, Oil-resistant

Bending

Heatresistant

Area Detection

Liquid-level

Vacuum

FPD, Semi, Solar

Installation Information

Fiber Amplifiers Communications

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> > odel Index

Fiber Amplifiers / Communications Unit / Accessories

Accessories (sold separately)

Cylindrical

Flat Sleeved

> **Small Spot** High Power

Narrow view

BGS

Retro-reflective Limited-

Chemicalresistant, Oil-resistant

Bending

Heatresistant

Detection

Liquid-level

Vacuum

Semi, Solar

Ratings and Specifications

Wire-saving Connectors

lka	Туре	Master Connector	Slave Connector	
Item	Model	E3X-CN11	E3X-CN12	
Number of conductors		3	1	
Diameter of cable		4 dia.	2.6 dia.	
Rated current		2.5 A		
Rated voltage		50 VDC		
Contact resistance		20 mΩ max. (20 mVDC max., 100 mA max.) (The above figure is for connection to the Amplifier Unit and the adjacent Connector. It does not include the conductor resistance of the cable.)		
Number of in	nsertions	Destruction: 50 times (for connection to the Amplifier Unit and the adjacent Connector)		
Material	Housing	Polybutylene terephthalate (PBT)		
waterial	Contact	Phosphor bronze/gold-plated nickel		
Weight (packed state)		Approx. 55 g	Approx. 25 g	

Dimensions

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

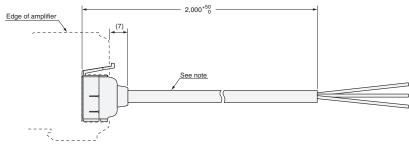
Wire-saving Connectors

Master Connector



76-A E3X-CN11





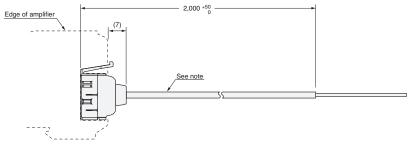
Note: 4 dia. cable / 3 conductors / Standard length: 2 m (Conductor cross section: 0.2 mm² (AWG24), Insulator diameter: 1.1 mm)

Slave Connector



76-B E3X-CN12





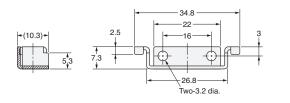
Note: 2.6 dia. cable / 1 conductor / Standard length: 2 m (Conductor cross section: 0.2 mm² (AWG24), Insulator diameter: 1.1 mm)

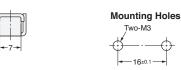
Mounting Brackets



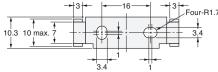
77-A E39-L143







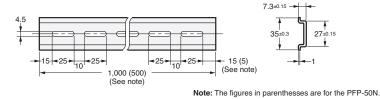
Material: Stainless steel (SUS304)



DIN track



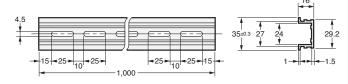




Material: Aluminum





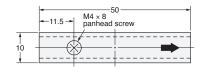


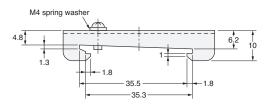
Material: Aluminum

End Plate









Material: Iron, galvanization

Threaded

Cylindrical

Flat

Sleeved

Small Spot

High Power

Narrow view

BGS

Retro-reflective

Limited-

Chemicalresistant, Oil-resistant

Bending

Heatresistant

Detection

Liquid-level

Vacuum

Semi, Solar

78

iber Sensor eatures

election uide

Fiber Units

Threaded

Cylindrical

90 Flat

Sleeved

Small Spot

High Power

view

Retroreflective

Limitedreflective

Chemicalresistant, Oil-resistant

Bending

Heatresistant

Area Detection

Liquid-level

Vacuum

FPD, Semi, Solar

Installation Information

Fiber Amplitiers, Communications Unit, and Accessories

> lecnnical Guide and Precautions

> > Model Index

Reference Information for Fiber Units

Influence of Fiber Cable Length

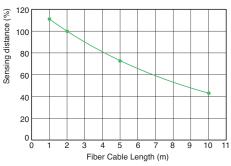
The sensing distance listed in the Fiber Units specifications are based on the fiber cable lengths found in the suffix of the model number.

The sensing distance will change if the fiber cable is cut or extended.

The following graph shows the percentage change of the various fiber cable length, where 100% is the sensing distance for a fiber cable with a length of 2 m.

Use this as a guideline for installation distances.

Keep in mind that extending the cable with a fiber connector will result in even shorter sensing distances than the value given in the graph.

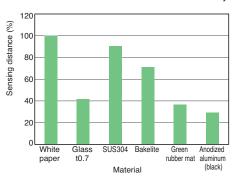


* The 100% value is for a fiber cable with a length of 2 m (same for Through-beam and Reflective Models).

Reflective Models: Sensing Distance Ratios by Workpiece Materials

The following graph shows the percentage change of the various workpieces, where 100% is the sensing distance for white paper, the standard sensing object.

Refer to the value of the material that looks like your workpiece.



* White paper is 100%

Types of Fiber Cables

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

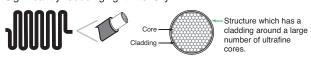
(This is given in the Fiber Unit specifications as either Flexible or Bend-resistant for the cable bending radius, and Coaxial for the appearance.

If no difinition is given, a standard cable is used.)

Flexible Fibers

The flexible fiber has a small bending radius for easy routing without easily breaking.

It is easy to use because the cable can be bent without significantly reducing light intensity.



Standard Fibers

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

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

Structure only of one fiber

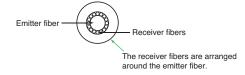
Break-resistant Fibers

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



Coaxial Reflective Fibers

These fibers are suitable for sensing small objects at close range.



MODE

Q&A		
Category	Question	Answer
		The optical axis diameter is the beam size tha Through-beam Fiber Unit uses for detection.

Category	Question	Answer	
	How do I interpret the optical axis diameter in the Fiber Unit specifications?	The optical axis diameter is the beam size that the Through-beam Fiber Unit uses for detection. If you are detecting objects larger than the optical axis diameter, you can expect stable detection performance because the object will block all of the beams of light that are used for detection. The incident level may fluctuate, however, if the workpiece passes the beam at high speed. In this case, it is best to select a Fiber Unit with a smaller optical axis diameter, or change the response time of the Fiber Amplifier Unit (E3X-HD Series) to High-speed mode or to Super-high-speed mode setting.	
Fiber Units	Are there any differences between the Fiber Units that are used for emitter and receiver?	With Through-beam Fiber Units, there is no difference between emitter fibers and receiver fibers. With Reflective Fiber Units, the emitter fibers and receiver fibers are different on Coaxial Reflective Models. Emitter fiber cables have identification marks. Refer to the individual dimensions diagrams for details.	
	What size must the hole be to mount a Threaded or Cylindrical Fiber Unit?	Refer to the recommended mounting hole dimensions given on pages 56 to 59.	
	Are Fiber Cables available in different lengths?	Some models are available with either 5-m or 10-m cable. Ask your OMRON representative for details.	
	What is the aperture angle?	The aperture angle is the angle at which the emitter beam spreads out.	
	Are these Fiber Units CE certified?	Fiber Units do not have any electrical components and therefore are exempt from CE certification.	
	Can these Fiber Units be used in explosion-proof areas?	The Fiber Units can be used in an explosion-proof area. Install only the Fiber Unit in the explosion-proof area and install the Fiber Amplifier Unit outside the explosion-proof area.	
	What is the difference between the E3X-HD Series and E3X-SD Series?	The E3X-HD Series provides Advanced Models with two displays. The E3X-SD Series provides only the minimum required features with a single display.	
Fiber Amplifier Units	Can the Fiber Amplifier Units be connected with other models?	The E3X-HD Series can be connected only with the E3X-DA-S and MDA Series. The E3X-SD Series can be connected only with the E3X-NA Series.	
Office	Can the Fiber Amplifier Unit be operated from a mobile console?	Mobile consoles cannot be used with either the E3X-HD Series or the E3X-SD Series.	
	Can the Fiber Amplifier Unit be used with a	If you use E3X-HD0 Amplifier Units, you can use either the E3X-CRT or E3X-ECT.	

Unit.

Communications Unit?

The E3X-SD Series cannot be used with a Communications

Flat

Sleeved

Small Spot

BGS

reflective

Limited-

Oil-resistant

Bendina

resistant

Detection

Liquid-level

Heat-

Model Index

Fiber Amplifier Unit

This product is not designed or rated for ensuring safety of persons either directly or indirectly.





⚠ Caution

Do not use the product with voltage in excess of the rated voltage.

Excess voltage may result in malfunction or fire



Never use the product with AC power supply. Using an AC power supply may result in rupturing.



Precautions for Safe Use

The following precautions must be observed to ensure safe operation of the Sensor.

- Do not use the Sensor in environments subject to flammable or explosive gases.
- (2) Do not use the Sensor in environments subject to exposure to water, oil, chemicals, etc.
- (3) Do not install the Sensor in environments subject to intense electric field or ferromagnetic field.
- (4) Do not attempt to disassemble, repair, or modify the Sensor Unit in any way.
- (5) Do not apply voltages or currents that exceed the rated ranges.
- (6) Do not use the Sensor in any atmosphere or environment that exceeds the ratings.
- (7) Do not miswire such as the polarity of the power supply.
- (8) Connect the load correctly.
- (9) Do not short both ends of the load.
- (10) Do not use the Sensor if the case is damaged.
- (11) When disposing of the Sensor, treat it as industrial waste.
- (12) High-Voltage lines and power lines must be wired separately from this Sensor. Wiring them together or placing them in the same duct may cause induction, resulting in malfunction or damage.
- (13) When setting the Sensor, be sure to check safety such as by stopping the equipment.

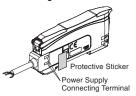
Precautions for Correct Use

- · Do not install the Sensor in the following locations.
 - (1) Locations subject to direct sunlight
 - (2) Locations subject to condensation due to high humidity
 - (3) Locations subject to corrosive gas
 - (4) Locations subject to vibration or mechanical shocks exceeding the rated values
- Use an extension cable with a minimum thickness of 0.3 mm² and less than 100 m long.
- Do not apply the forces on the cord exceeding the following limits: Pull: 40 N; torque: 0.1 N·m; pressure: 20 N; bending: 3 kg
- The Sensor is ready to operate 200 ms after the power supply is turned ON. If the Sensor and load are connected to power supplies separately, turn ON the power supply to the Sensor first.
- When using the wire-saving connector type, attach the protective sticker (provided with E3X-CN series connectors) on the unused power pins to prevent electrical shock and short circuiting.

When using the connector type for the communications unit, attach the protective cap.

<Wire-saving connector models>

<Communications Unit with a connector>





- Output pulses may occur when the power supply is turned OFF. Turn OFF the power supply to the load or load line first.
- Excessive incident light cannot be sufficiently handled by the mutual interference prevention function and may cause malfunction. To prevent this, set a higher threshold level.
- Make sure that the power supply is turned OFF before connecting, separating or adding Amplifier Units.
- Do not pull or apply excessive pressure or force (exceeding 9.8
 N) on the Fiber Unit when it is mounted on the Amplifier Unit.
- The E3X-MC11, E3X-MC11-SV2 and E3X-MC11-S Mobile Consoles cannot be used.
- Mutual interference prevention on the E3X-HD Series does not function among the E3X-DA-N, E3X-SD, or E3X-NA Fiber Amplifier Units.

Mutual interference prevention on the E3X-HD Series does function among the E3X-DA-S and E3X-MDA Fiber Amplifier Units

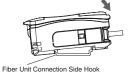
Mutual interference prevention works only when all of the Fiber Amplifier Units are from the E3X-SD Series or the E3X-NA Series

- The E3X-HD0 can be used with E3X-CRT or E3X-ECT Communications Unit, but the E3X-DRT21-S cannot.
 - The E3X-SD Series and the E3X-HD Standard Models (E3X-HD11, E3X-HD41, E3X-HD6, and E3X-HD8) cannot be used with either of the Communications Units.
- If the output short-circuit protection is activated by an overload or short circuit in a control output, cur outrol will flash on the display. Check the connection of the load.
- If a write error occurs due to noise caused by a power interruption or static electricity (EEP Ecc will flash on the display), use the setting keys on the Fiber Amplifier Unit to initialize it.
- Always keep the protective cover in place when using the Amplifier Unit.
- · Do not use thinner, benzine, acetone, and lamp oil for cleaning.

Mounting the Fiber Amplifier Units

■ Mounting on DIN Track

1. Let the hook on the Amplifier Unit's Fiber Unit connection side catch the track and push the unit until it clicks.

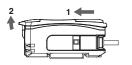


■ Removing from DIN Track

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



Refer to "I/O Circuit Diagrams" or check the side of the unit for wire color and role indications.



■ Mounting Amplifier Units in Group (Connector Type Models)

- 1. Mount the Fiber Amplifier units one at a time onto the DIN track and push them until they click. Use E3X-CN11 (Master connector)
 - for the master Fiber Amplifier unit and E3X-CN12 (Slave connector) for the slave Fiber Amplifier units.
- 2. Slide the Fiber Amplifier units in the direction 2.
- 3. Use End Plates (PFP-M: separately sold) at the both ends of the grouped Fiber Amplifier units to
- prevent them from separating due to vibration or other cause. 4. Tighten the screw on the End



- Plates using a driver. Under environments such as vibration, use an end plates even with a single Fiber Amplifier Unit.
 - The maximum numbers of connectable Amplifier Units are given in the following table.

		Maximum number of interconnected	Maximum number of mutual interference prevention
E3X-HD series Standard type (E3X-HD11/HD41/HD6/HD8)		16	10
E3X-HD0	With E3X-ECT	30	10
E3X-HD0	With E3X-CRT	16	10
E3X-SD series (E3X-SD21/SD51/SD7/SD9)		16	5

- · If Units are to be connected, the ambient temperature will change with the number of Units that are connected. Check the Ratings and Characteristics specifications.
- · Always turn OFF the power before connecting or disconnecting Units.

Mounting Fiber Units

Use Fiber Cutter

Cut a thin fiber as follows.

For standard fibers, insert to the desired cutting position and cut.

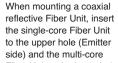
	(1)	The fiber is shipped loosely tightened as shown in the figure at the right	Thin Fiber Attachment (E39-F9) Loosely tighten.
	(2)	Adjust the fiber to the desired length and fully tighten.	
	(3)	Insert the Fiber Unit into E39-F4 and cut it.	Fiber Cutter E39-F4 Thin-diameter Fiber Unit Hole × 2 Standard Fiber Unit Hole (dia. 2.2 mm) × 3
(4)		Finished state. (Correctly cut end)	About 0.5 mm Insertion direction Note: The insertion direction into the Fiber Amplifier Unit is shown in the above figure

■ Mount Fiber Unit

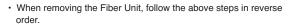
- 1. Open the protective cover.
- 2. Raise the lock lever.
- 3. Insert the Fiber Unit in the fiber unit hole to the bottom.
- 4. Return the lock lever to the original position and fix the Fiber Unit.



· When mounting a coaxial the single-core Fiber Unit to the upper hole (Emitter side) and the multi-core



Fiber Unit to the lower hole (Receiver side).



Multi Core

Fiber Unit

To maintain the characteristics of the Fiber Unit, make sure the lock is released before removing the Fiber Unit.

Threaded

Cylindrical

Sleeved

Small Spot

High Power

Narrow

BGS

Retroreflective

Chemical-

Bending

Heat-

Area Detection

Liquid-level

Vacuum

Semi, Solar

Cylindrical

Flat

Small Spot

Sleeved

Narrow view

BGS

High Power

Retroreflective

> Limited-Chemical-

resistant. Oil-resistant

Bending Heatresistant

Detection

Liquid-level

Vacuum

Semi Solar

Fiber Units

Warning

This product is not designed or rated for ensuring safety of persons either directly or indirectly.



Do not use it for such purposes.

Precautions for Correct Use

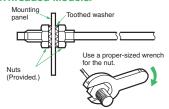
Do not use the Fiber Unit in atmospheres or environments that exceed product ratings.

Mounting

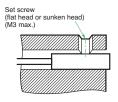
Tightening Force

Refer to pages 56 to 59 for the tightening torque to apply when mounting a Fiber Unit.

<Threaded Models>



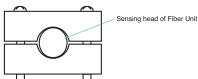
<Cylindrical Models>



<Chemical and Oil-resistant Models>

The following method is recommended for mounting Fiber Units with fluororesin-covered sensing heads (E32-T F and E32-D F) to prevent from cracking the fluororesin case.

If you use a set screw to secure the Fiber Unit, tighten it with care to prevent from cracking the case.



Connections

· Do not subject the Fiber Unit to excessive force, such as tension or compression.

Refer to pages 56 to 59 for tensile strengths.

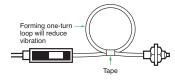
Make sure any bend in the Fiber Unit is larger than the allowable bending radius.

Refer to pages 56 to 59 for bending radius ratings and length of unbendable sections at the base of the Fiber Unit.

Do not compress or place heavy loads on the fibers.



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

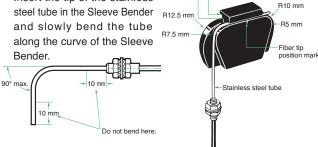


Sleeve Bender (E39-F11)

· The bending radius of the stainless steel tube should be as large as possible. The smaller the bending radius is, the shorter the sensing distance will be. 1.2 mm dia, max

1.3 mm dia.min

Insert the tip of the stainless steel tube in the Sleeve Bender and slowly bend the tube along the curve of the Sleeve Bender.



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

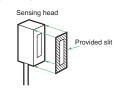
The fibers of these Units cannot be extended using the E39-F10 Fiber Connector.

E32-T14

These Units may enter the light-ON state if there are reflective objects at the end of the lenses.

If reflection is a problem, attach the black stickers provided to the ends of the lenses.

E32-T16PR



To use the provided slit, peel off the backing sheet, align the slit with the edges of the sensing surface, and attach it to the sensing head.

Use the slit in applications where saturation occurs (i.e., changes in incident level cannot be detected) due to short sensing distances.

Vacuum-resistant Fiber Units (E32-□V)

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

Liquid-level Detection Fiber Unit (E32-D82F1)

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

Liquid-level Detection Fiber Units (Tube-mounting Models)

· Make sure that the tube is not deformed when using a band to secure the Fiber Unit.

Flat

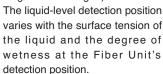
Threaded

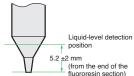
Model Ind

Adjustment

Detection Position for Liquid-level Detection Fiber Unit (E32-D82F1)

The liquid-level detection position is 5.2 ± 2 mm from the end of the fluororesin section. (Refer to the diagram on the right.)





Other Precautions

Liquid-level Detection Fiber Unit (E32-D82F1)

- · Operation may become unstable in the following cases:
 - 1. Bubbles stick to the cone of the sensing head.
 - 2. Solute deposits on the cone of the sensing head.
 - 3. The liquid has a high viscosity.
- There are some liquids, such as milky white liquids, for which detection is not possible.
- Do not let the end of the fluororesin section bump into other objects

Damage to or deformation of the sensing head may cause unstable operation.

Chemical and Oil-resistant, Liquid-level Detection Fiber Unit (E32-D82F1)

Fluororesin shows strong chemical-resistant properties but is permeable if exposed to atmospheres with gaseous chemicals or water vapors, resulting in failure or damage.

Confirm applicability sufficiently before using the Fiber Unit in these environments.

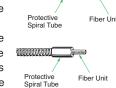
Accessories

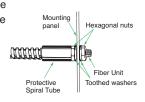
Use of E39-R3 Reflector Provided with E32-R21

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

Mounting method of Protective Spiral Tubes

- 1.Insert the Fiber Unit into the Protective Spiral Tube from the head connector (threaded).
- 2. Push the fiber into the Protective Spiral Tube. The tube must be straight so that the fiber enters without twisting. Turn the Protective Spiral Tube, not the fiber.
- Secure the Protective Spiral Tube to the mounting panel with the provided nuts.





 Use the provided saddle to secure the end cap of the Protective Spiral Tube.

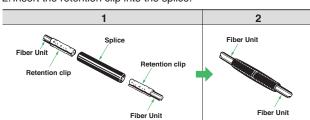
(To secure the Protective Spiral Tube at a position other than the end cap, apply tape to the tube so that the portion becomes thicker in diameter.)



Attaching the E39-F10 Fiber Connector

Attach the Fiber Connecter as shown in the following figures.

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



The Fiber Units should be as close as possible when they are connected.

The sensing distance is reduced by approximately 25% when Fiber Units are extended by the connector.

Only 2.2-mm-diameter fibers can be connected.

Selection by Model

Fiber Senso Features

electic uide

Fiber Unit

Threaded

Cylindrical

Flat Sleeved

Small Spot
High Power

Narrow view
BGS

Retroreflective Limited-

Chemicalresistant, Oil-resistant

Bending

Heatresistant

Area Detection

Liquid-level

FPD, Semi, Solar

nstallation nformation

riber Ampliners, Communications Unit, and Accessories

> Technical Guide and Precaution

> > **Model Index**

	Jiootioi	by mou
Models	Specifications	Dimensions
E32-A	Specifications	Dimensions
E32-A01 5M	P.48	P.49 49-A
E32-A01 5M		-
E32-A03 2W	P.28	P.29 29-A
F00 400 4 014	P.54	P.55 (55-A)
E32-A03-1 2M	P.28	P.29 29-B
	P.54	P.55 55-B
E32-A04 2M	P.28	P.29 29-C
	P.54	P.55 55-C
E32-A08 2M	P.34	P.35 35-C
	P.52	P.53 53-B
E32-A08H2 3M	P.44	P.45 45-D
	P.52	P.53 53-C
E32-A09 2M	P.34	P.35 35-F
	P.52	P.53 53-E
E32-A09H2 2M	P.44	P.45 45-E
	P.52	P.53 53-F
E32-A12 2M	P.34	P.35 35-D
	P.52	P.53 53-D
E32-C		
E32-C11N 2M	P.08	P.09 09-B
	(P.20)	(P.21)
E32-C31 2M	P.08	P.09 09-D
	(P.18, 20, 32)	
E32-C31M 1M	P.08	P.09 09-E
E32-C31N 2M	P.08	P.09 09-A
	(P.18, 20)	(P.19, 21)
E32-C41 1M	P.20	P.21 21-A
		21-D
E32-C42 1M	P.18	P.19 (19-A)
		19-B
E32-C42S 1M	P.18	P.19 (19-E)
E32-CC200 2M	P.08	P.09 (09-H)
	(P.20)	(P.21)
E32-D		
E32-D11 2M	P.40	P.41 (41-E)
E32-D11R 2M	P.08	P.09 (09-G)
E32-D11U 2M	P.36	P.37 (37-I)
E32-D12F 2M	P.36	P.37 37-H)
E32-D15XR 2M	P.14	P.15 (15-D)
E32-D15YR 2M	P.14	P.15 (15-E)
E32-D15ZR 2M	P.14	P.15 (15-F)
E32-D16 2M		P.23 23-C
	P.22	$-\sim$
E32-D21 2M	P.40	P.41 (41-B)
E32-D211R 2M	P.08	P.09 09-F
E32-D21B 2M	P.40	P.41 (41-D)
E32-D21R 2M	P.08	P.09 09-C
E32-D221B 2M	P.12	P.13 (13-D)
	P.40	P.41 (41-C)
E32-D22B 2M	P.12	P.13 (13-A)
	P.40	P.41 (41-A)
E32-D22R 2M	P.12	P.13 (13-C)
E32-D24R 2M	P.16	P.17 (17-E)
E32-D25XB 2M	P.40	P.41 (41-F)
E32-D32L 2M	P.12	P.13 (13-E)
E32-D33 2M	P.12	P.13 13-F
	P.16	P.17 (17-H)
E32-D331 2M	P.16	P.17 (17-G)
E32-D36P1 2M	P.46	P.47 47-D
E32-D36T 5M	P.48	P.49 49-C
E32-D43M 1M	P.12	P.13 13-B
	P.16	P.17 17-F
E32-D51 2M	P.44	P.45 45-B
E32-D51R 2M	P.44	P.45 45-A
E32-D61-S 2M	P.44	P.45 45-G

Models	Specifications	Dimensions
E32-D611-S 2M	P.44	P.45 45-F
E32-D73-S 2M	P.44	P.45 45-H
E32-D81R-S 2M	P.44	P.45 45-C
E32-D82F1 4M	P.48	P.49 49-D
E32-DC200BR 2M	P.16	P.17 17-J
E32-DC200F4R 2M	P.16	P.17 17- 1
E32-L		
E32-L11FP 5M	P.36	P.37 37-F
	P.52	P.53 53-G
E32-L11FS 5M	P.36	P.37 37-G
	P.52	P.53 53-H
E32-L15 2M	P.18	P.19 (19-F)
E32-L16-N 2M	P.30	P.31 (31-A)
	P.34	P.35 (35-B)
E32-L24S 2M	P.52 P.30	P.53 53-A P.31 31-B
E32-L245 2IVI	P.34	
E32-L25L 2M	P.34 P.30	P.35 35-A P.31 31-C
E32-L25L 2W	P.34	P.35 (35-E)
E32-L25T 2M	P.48	P.49 49-B
E32-R		
E32-R16 5M	P.32	P.33 (33-B)
E32-R21 2M	P.32	P.33 (33-C)
E32-T		
E32-T10V 2M	P.50	P.51 51-D
E32-T11 2M	P.38	P.39 39-C
	(P.24)	(P.25, 26)
E32-T11F 2M	P.36	P.37 37-C
E32-T11N 2M	P.06	P.07 07-A
	(P.24)	(P.25)
E32-T11NF 2M	P.36	P.37 37-A
E32-T11R 2M	P.06	P.07 07-B
	(P.24)	(P.25, 26)
E32-T12F 2M	P.36	P.37 37-B
E32-T12R 2M	P.10	P.11 (11-C)
E32-T14 2M	P.22	P.23 23-B
E32-T14F 2M E32-T14LR 2M	P.36 P.10	P.37 37-D
E32-T15XR 2M	P.10	P.11 (11-D)
E32-T15XR 2M	P.14	P.15 (15-B)
E32-T15TR 2M	P.14	P.15 (15-C)
E32-T16JR 2M	P.46	P.47 (47-B)
E32-T16PR 2M	P.46	P.47 (47-A)
E32-T16WR 2M	P.46	P.47 (47-C)
E32-T17L 10M	P.22	P.23 23-A
E32-T21 2M	P.38	P.39 39-B
E32-T223R 2M	P.10	P.11 (11-A)
E32-T22B 2M	P.10	P.11 11-B
	P.38	P.39 39-A
E32-T22S 2M	P.28	P.29 29-F
E32-T24E 2M	P.16	P.17 17-B
E32-T24R 2M	P.16	P.17 17-A
E32-T24S 2M	P.28	P.29 29-E
	P.54	P.55 55-E
E32-T24SR 2M	P.28	P.29 29-D
FOO TOTAL	P.54	P.55 (55-D)
E32-T25XB 2M	P.38	P.39 39-D
E32-T33 1M	P.16	P.17 (17-C)
E32-T51 2M	P.42 (P.26)	P.43 (43-B) (P.27)
E32-T51F 2M		
E32-151F 2M	P.36	P.37 (37-E)
0 10111 2101	P.42 (P.26)	P.43 43-A (P.27)
E32-T51V 1M	P.50	P.51 51-A
		$\overline{}$

Models	Specifications	Dimensions
E32-T61-S 2M	P.42	P.43 43-D
	(P.26)	(P.27)
E32-T81R-S 2M	P.42	P.43 43-C
E32-T84SV 1M	(P.26)	(P.27)
E32-TC200BR 2M	P.50 P.16	P.51 51-C P.17 17-D
E32-V	P. 10	P.17 (U-U)
E32-VF1	P.50	P.51 (51-F)
E32-VF4	P.50	P.51 51-E
E39-F		
E39-F1	P.24, 26	P.24 24-A
E39-F1-33	P.26	P.26 26-D
E39-F11	P.17	
E39-F16	P.24, 26	P.24 24-B
E39-F17	P.18	P.19 (19-B)
E39-F18	P.20	P.21 (21-G) (21-H)
E39-F1V	P.50	P.51 51-B
E39-F2	P.24, 26	P.24 24-C
E39-F32A	P.40	P.41 41-G
E39-F32C	P.38	P.39 39-E
	P.40	P.41 41-G
E39-F32D	P.40	P.41 41-G
E39-F3A	P.18	P.19 19-A
E39-F3A-5	P.20	P.21 21-A
		21-B
		21-C
E39-F3B	P.20	P.21 21-D
		21-E
		21-F
E39-F3C	P.18	P.19 19-C
		(19-D)
E39-F3R	P.32	P.33 33-A
E39-R1		P.33 (33-B)
E39-R3		P.33 (33-C)
E39-RP37	P.32	P.33 (33-A)
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E3X-ECT	P.70	P.71 71-B
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E3X-HD0	P.64	P.65 65-B
E3X-HD11 2M	P.64	P.64 64-A
E3X-HD41 2M	P.64	P.64 64-A
E3X-HD6	P.64	P.65 (65-A)
E3X-HD8	P.64	P.65 65-A
E3X-SD21 2M	P.72	P.73 (73-A)
E3X-SD51 2M	P.72	P.73 (73-A)
E3X-SD7	P.72	P.73 (73-B)
E3X-SD9	P.72	P.73 (73-B)
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PFP-100N		P.77 77-B)
PFP-100N2		P.77 77-C
PFP-50N		P.77 77-B
PFP-M		P.77 77-D
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OMRON Corporation Industrial Automation Company

Tokyo, JAPAN

Contact: www.ia.omron.com

Regional Headquarters
OMRON EUROPE B.V. **Sensor Business Unit**

Carl-Benz-Str. 4, D-71154 Nufringen, Germany Tel: (49) 7032-811-0/Fax: (49) 7032-811-199

OMRON ASIA PACIFIC PTE. LTD. No. 438A Alexandra Road # 05-05/08 (Lobby 2), Alexandra Technopark, Singapore 119967 Tel: (65) 6835-3011/Fax: (65) 6835-2711

OMRON ELECTRONICS LLC

One Commerce Drive Schaumburg, IL 60173-5302 U.S.A. Tel: (1) 847-843-7900/Fax: (1) 847-843-7787

OMRON (CHINA) CO., LTD.
Room 2211, Bank of China Tower,
200 Yin Cheng Zhong Road,
PuDong New Area, Shanghai, 200120, China
Tel: (86) 21-5037-2222/Fax: (86) 21-5037-2200

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