OMRON

An Update: 14 of the Newest Fiber-Optic Cables

E32

Solve More Application Problems With 14 of the Newest Fiber-Optic Cables

- Combine cables with Omron's fiber-optic amplifiers for a complete solution to your sensing application
- Over 80 other fiber-optic cable solutions available, refer to E32 data sheet in Omron's Sensing Products catalog



Ordering Information

■ FEATURES

Application	Features		Sensing method	Part number
Robotic applications with constant flexing and little installation space at the sensing site	1.5 mm diameter sensing head, small 4 mm bending radius for 90-degree turns prevents reduction in sensing distance		Through-beam	**E32-T22B**
			Diffuse	**E32-D22B**
	M4 threaded head, 4 mm bending radius		Diffuse	**E32-D21B**
Harsh environment applications requiring chemical-resistant sensing heads	Teflon® resin sheath protects fiber and 5 mm diameter sensing heads from chemicals, solvents and oils; side-view sensing		Through-beam	**E32-T14F**
High-temperature sensing sites that also require chemical resistance	−40° to 150°C, side view sensing, small 2 mm diameter head for miniature target detection		Through-beam	**E32-T54**
Area detection senses objects coming in random positions anywhere within a wide beam, i.e., pill detection on a conveyor	30 mm sensing area		Through-beam	**E32-T16W**
	11 mm sensing area, side view		Through-beam	**E32-T16J**
	16 alternated light source/receiver fiber pairs over a 10.85 mm area, side view		Diffuse	**E32-D36P1**
High-precision detection requires the same operating position regardless of the direction from which the target enters the detection area	M3 threaded head, 2 m cable length		Diffuse, coaxial	**E32-C31**
	M3 threaded head, 1 m cable length		Diffuse, coaxial	**E32-C41**
	2 mm dia. sensing head, standard fiber		Diffuse, coaxial	**E32-C42**
Minute object detection in severely space-constrained sensing sites	2 mm dia. sensing head with 0.5 dia. x 15 mm probe detects objects as small as gold wire (0.01 mm dia.).		Diffuse	**E32-D331**
Precise position detection with background suppression for reflective surface objects, i.e., positioning glass wafers, slides	Rugged aluminum square sensing head. When used in pairs, eliminate mutual interference by ordering one of each.	Left side emitter	Convergent beam diffuse	**E32-L56E1**
		Right side emitter		**E32-L56E2**

Note: Teflon is a registered trademark of the Dupont Company and the Mitsui Dupont Chemical Company for their fluoride resin.

■ ACCESSORIES (ORDER SEPARATELY)

Description	Applicable fiber-optic cables	Specification	Part number
Small spot lens adapters	Use with E32-D32 and E32-C42 fiber-optic cables	3.7 mm dia. lens	**E39-F3A**
	Use with E32-C31 and E32-C41 fiber-optic cables	3.7 mm dia. lens	**E39-F3A-5**
		4.8 mm dia. lens	**E39-F3B**
		3.7 mm dia. lens	**E39-F3C**

Sensing Distance with Fiber-optic Cables

■ THROUGH-BEAM FIBERS

: Long-distance mode : Standard mode : High-speed mode

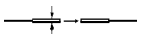
- "Standard object" measurements were made with E3X-DA-N set to Standard mode. The size of standard object is the same as the fiber core diameter or the lens diameter for models with a lens.
- "Minimum sensing object" is shown in parentheses below the standard object. The minimum sensing object size was determined when the E3X-DA-N amplifier received light that exceeded a light incident value of 1000 (set to digital incident level display).

✂ Indicates models that customers can cut to length for their application. Models without this mark are pre-cut by the factory to maintain their respective specifications.

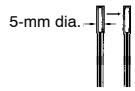
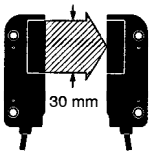
The table specifies the sensing characteristics of each fiber when used with the following amplifiers:

Legend:
DAN-HS E3X-DA-N (Digital amplifier- high speed mode)
DAN-LD E3X-DA-N (Digital amplifier- long distance mode)
DAN-SM E3X-DA-N (Digital amplifier- standard distance mode)

■ THROUGH-BEAM, GENERAL PURPOSE TYPE

Application	Features	Appearance	Type	Detection distance	Standard object (Min. detectable object: opaque)	**Part number**
Flexible, resists breaking	Ideal for mounting on moving sections 4 mm bending radius	 1.5 mm dia.	DAN-HS	80 mm	0.5-mm dia. (0.01-mm dia.)	**E32-T22B** ✂
			DAN-SM	200 mm		
			DAN-LD	220 mm		

■ SPECIAL-PURPOSE THROUGH-BEAM FIBERS

Application	Features	Appearance	Type	Detection distance	Standard object (Min. detectable object: opaque)	**Part number**
Chemical resistant	Side view Teflon-covered *1; with-stands chemicals and harsh environments; Operating ambient temperature: -30°C to 70°C (-22°F to 158°F)	 5-mm dia.	DAN-HS	150 mm	3.0-mm dia. (0.01-mm dia.)	**E32-T14F** ✂
			DAN-LD	400 mm		
			DAN-SM	500 mm		
Heat resistant	Side-view; resists 150°C *2; Detects minute targets; fiber sheath material: fluororesin; Operating ambient temperature: -40°C to 150°C (-40°F to 302°F)	 2-mm dia.	DAN-SM	80 mm	1.0-mm dia. (0.01-mm dia.)	**E32-T54** ✂
			DAN-LD	230 mm		
			DAN-SM	290 mm		
Area sensing *3	Detects in a 30-mm area	 30 mm	DAN-SM	660 mm	0.3-mm dia.*2	**E32-T16W** ✂
			DAN-LD	1,800 mm		
			DAN-SM	2,300 mm		
	Side-view; suitable for applications with limited spatial depth	 11 mm	DAN-SM	660 mm	0.2-mm dia.	**E32-T16J** ✂
			DAN-LD	1,800 mm		
			DAN-SM	2,300 mm		

Note: 1. Teflon is a registered trademark of the Dupont Company and the Mitsui Dupont Chemical Company for their fluoride resin.
2. For continuous operation, use the products within the temperature ranging from -40°C to 130°C (-40°F to 266°F)
3. These figures are for a sensing distance of 100 mm and for detecting over a 11-mm area, or 10-mm area for the E32-T16. (Figures for the diameter of sensing objects are in the still state.)

■ DIFFUSE FIBERS

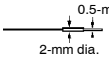
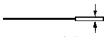
: Long-distance mode : Standard mode : High-speed mode

- "Standard object" measurements were made with E3X-DA-N set to Standard mode.
- "Minimum sensing object" is shown in parentheses below the standard object. The values of the minimum sensing object were obtained at a distance where the smallest object (gold wire) can be sensed with the Diffuse Fiber Unit.
- The E3X-DA-N may continue to receive internal reflective light when it is set to the maximum sensitivity setting. In this case, set the amplifier to "two-point teaching with or without-object teaching."

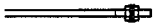
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Legend:
DAN-HS E3X-DA-N (Digital amplifier- high speed mode)
DAN-LD E3X-DA-N (Digital amplifier- long distance mode)
DAN-SM E3X-DA-N (Digital amplifier- standard distance mode)

Application	Features	Appearance	Type	Detection distance (Values measured using white paper)	Standard object (Min. sensing object)	**Part number**
Thin fiber	Minute object detection (0.5-mm dia.)		DAN-HS	1 mm	25 × 25 (0.01-mm dia.)	**E32-D331**
			DAN-SM	3 mm		
			DAN-LD	4 mm		
Flexible (resists breaking)	Ideal for mounting on moving sections (R4)		DAN-HS	10 mm	100 × 100 (0.01-mm dia.)	**E32-D21B** ✂
			DAN-SM	70 mm		
			DAN-LD	90 mm		
			DAN-HS	10 mm	50 × 50 (0.01-mm dia.)	**E32-D22B**
			DAN-SM	30 mm		
			DAN-LD	40 mm		

■ SPECIAL-PURPOSE DIFFUSE FIBERS

Application	Features	Appearance	Type	Detection distance (Values measured using white paper)	Standard object (Min. sensing object)	**Part number**
Coaxial	M3 coaxial; high-precision positioning accuracy; possible to mount small-spot lens (E39-F3A-5/ F3B/F3C)		DAN-HS	25 mm	25 × 25 (0.01-mm dia.)	**E32-C31** ✂
			DAN-SM	75 mm		
			DAN-LD	100 mm		
	M3 coaxial; high-precision positioning accuracy; possible to mount small-spot lens (E39-F3A-5/ F3B/F3C)		DAN-HS	10 mm	50 × 50 (0.01-mm dia.)	**E32-C41**
			DAN-SM	35 mm		
			DAN-LD	45 mm		
	2-mm dia. coaxial; high-precision positioning accuracy; possible to mount small-spot (0.1 to 0.6 mm dia.) lens (E39-F3A)		DAN-HS	10 mm	50 × 50 (0.01-mm dia.)	**E32-C42**
			DAN-SM	35 mm		
			DAN-LD	45 mm		
Area sensing	Side-view; detection over wide areas		DAN-HS	50 mm	300 × 300 (0.01-mm dia.)	**E32-D36P1** ✂
			DAN-SM	150 mm		
			DAN-LD	200 mm		
Conver-gent beam	Suitable for positioning crystal glass		DAN-SM	4 to 12 mm	100 × 100 mm Soda glass with 7% reflection factor	**E32-L56E1** **E32-L56E2** ✂

Specifications

■ THROUGH-BEAM FIBER-OPTIC CABLES

Part number	Operating ambient temperature	Operating relative humidity	Permissible bending radius	Core material	Sheath material	Enclosure rating
E32-T14F	-40°C to 70°C (-40°F to 158°F) with no icing	35% to 85% with no condensation	40 mm	PMMA	Teflon® resin	IEC IP67
E32-T16J	-40°C to 70°C (-40°F to 158°F) with no icing		10 mm		PVC	IEC IP50
E32-T16W	-25°C to 55°C (-13°F to 131°F) with no icing		10 mm		PVC	IEC IP50
E32-T22B	-40°C to 70°C (-40°F to 158°F) with no icing		4 mm min.		PVC	IEC IP67
E32-T54	-40°C to 150°C (-40°F to 302°F) with no icing*		35 mm		Fluoride resin	IEC IP67

*When used continuously between -40°C and 130°C (-40°F and 266°F)
Teflon is a registered trademark of the Dupont Company and the Mitsui Dupont Chemical Company for their fluoride resin.

■ DIFFUSE FIBER-OPTIC CABLES

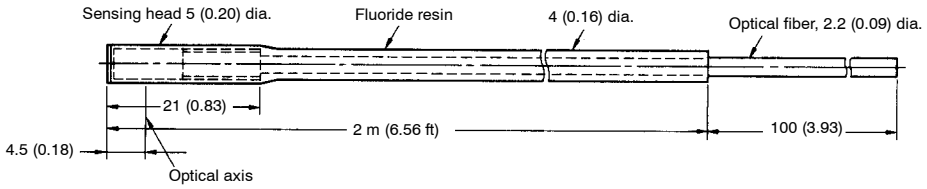
Part number	Operating ambient temperature	Operating relative humidity	Permissible bending radius	Core material	Sheath material	Enclosure rating
E32-D21B	-40°C to 70°C (-40°F to 158°F) with no icing	35% to 85% with no condensation	4 mm min.	PMMA	PVC	IEC IP67
E32-D22B			4 mm min.			
E32-D331			25 mm		Polyethylene	IEC IP67
E32-D36P1			25 mm min.			—
E32-C31	-40°C to 70°C (-40°F to 158°F) with no icing		25 mm min.		PVC	IEC IP67
E32-C41			25 mm min.			
E32-C42			25 mm min.			
E32-L56E1	0°C to 70°C (32°F to 158°F) with no icing		35 mm min.		Fluoride resin	IEC IP40
E32-L56E2			35 mm min.			

Dimensions

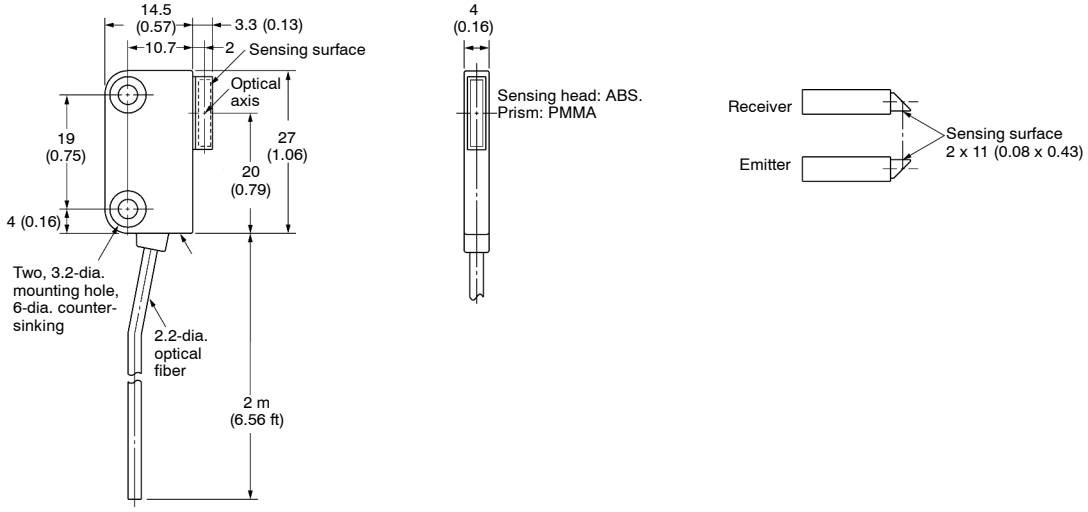
Unit: mm (inch)

■ THROUGH-BEAM FIBER-OPTIC CABLES

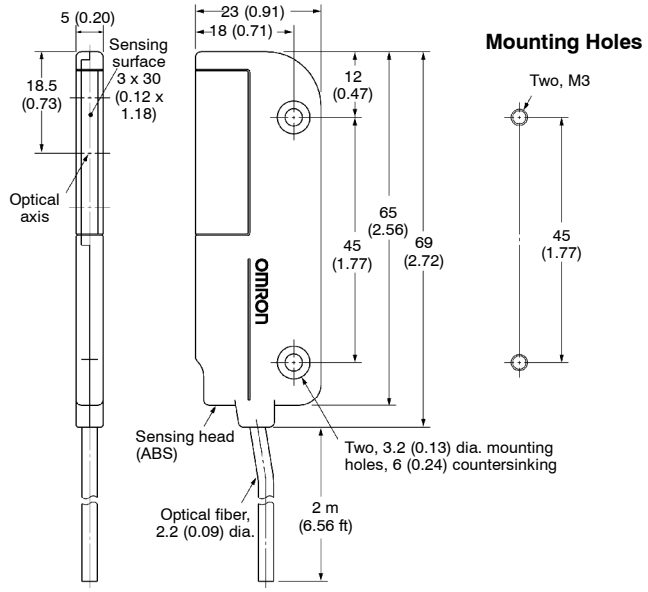
E32-T14F



E32-T16J

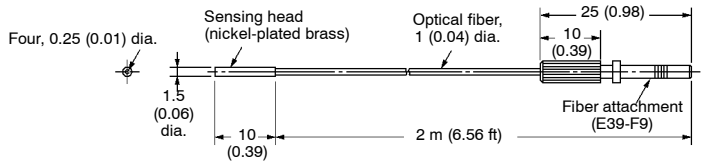


E32-T16W

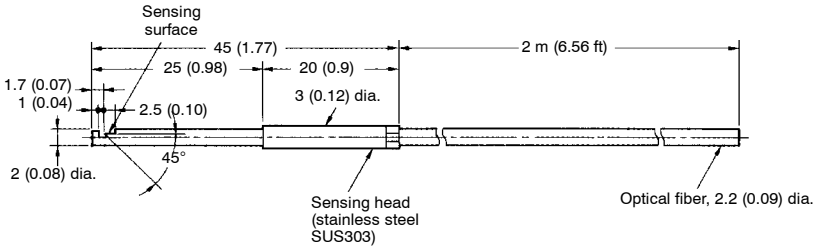


Unit: mm (inch)

E32-T22B



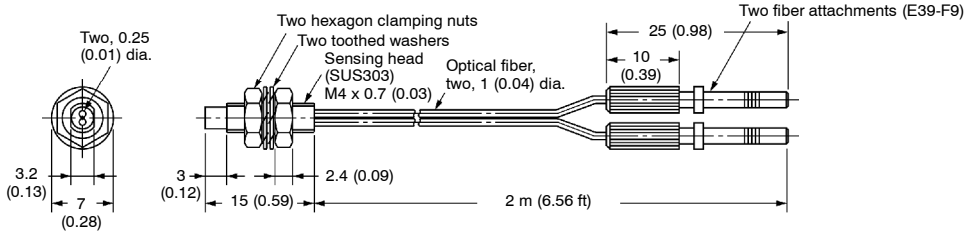
E32-T54



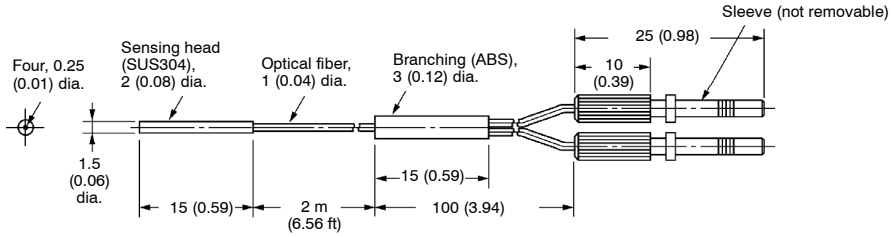
Note: Sensing head withstands temperatures to 150°C (302°F). When used continuously, do not exceed 130°C (266°F).

■ DIFFUSE FIBER-OPTIC CABLES

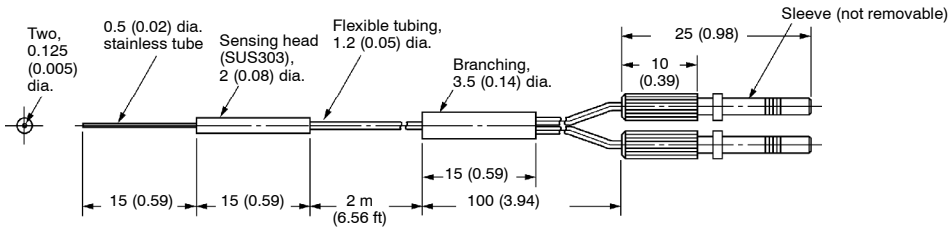
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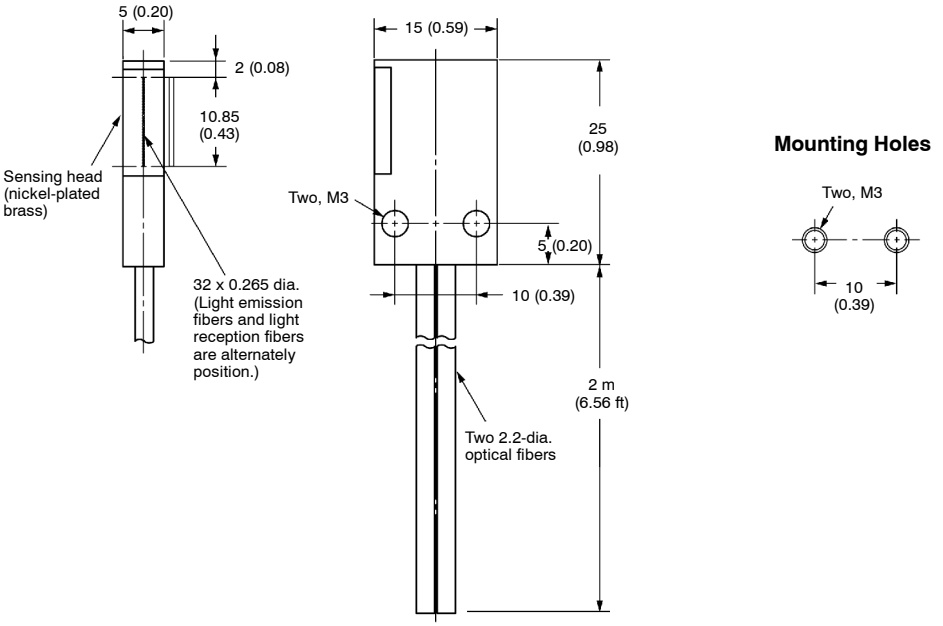
E32-D22B



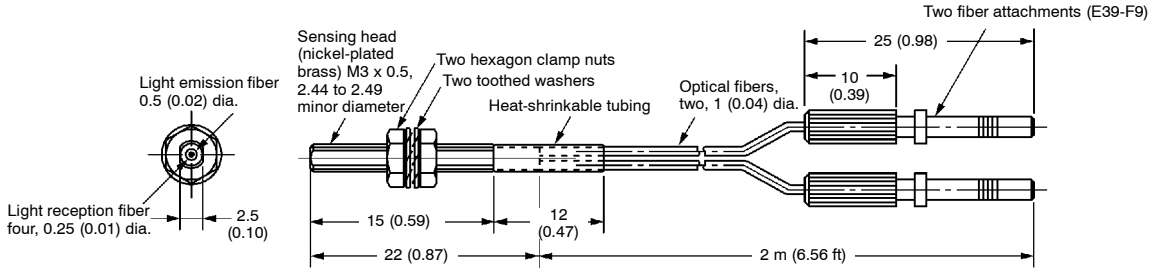
E32-D331



E32-D36P1

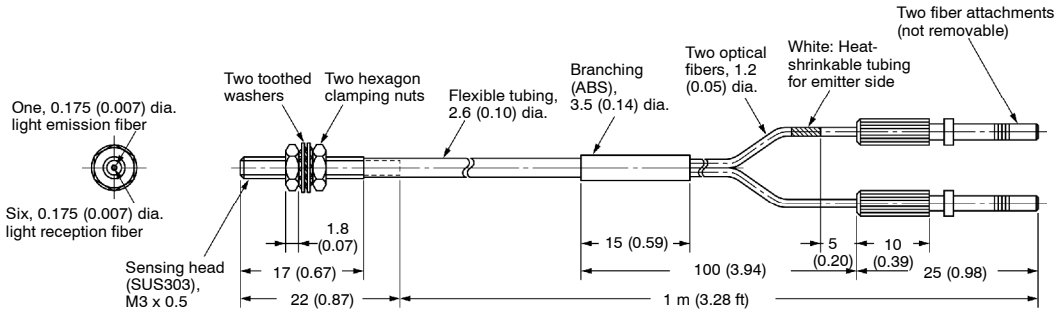


E32-C31



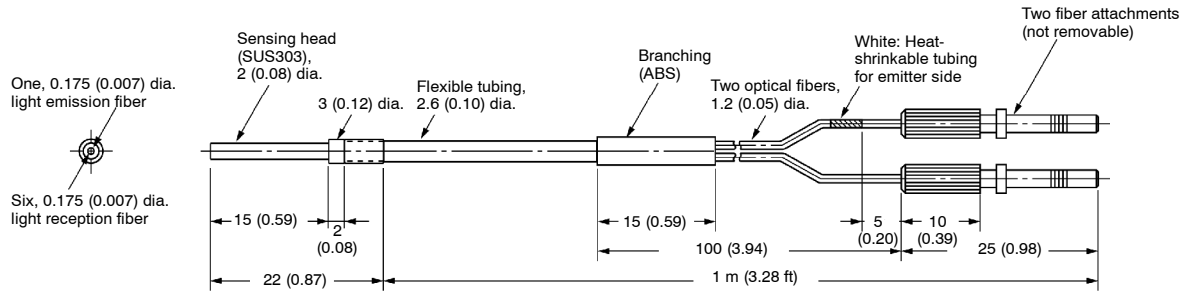
Note: The fiber for the emitter is identified by a white line.

E32-C41

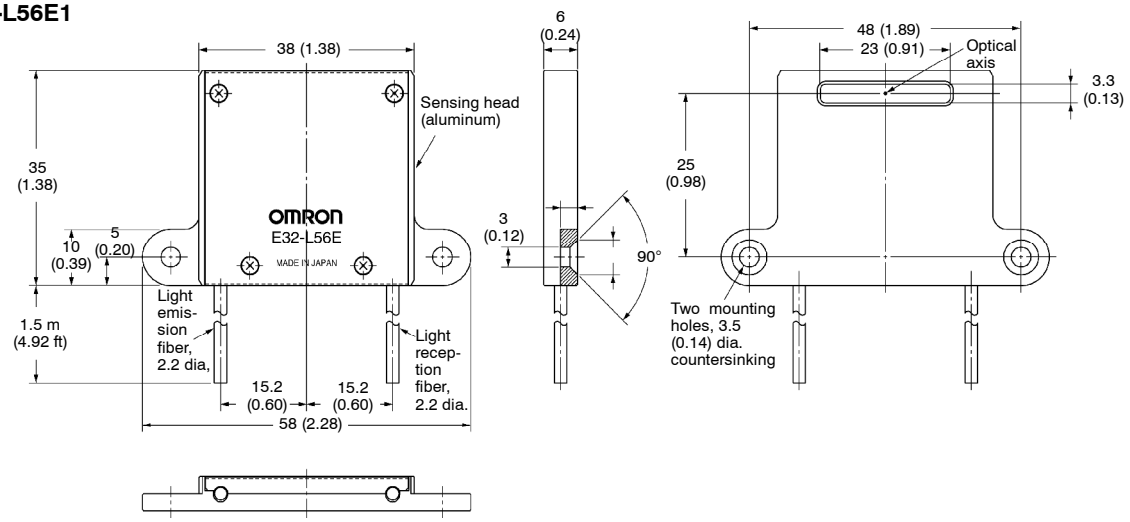


Unit: mm (inch)

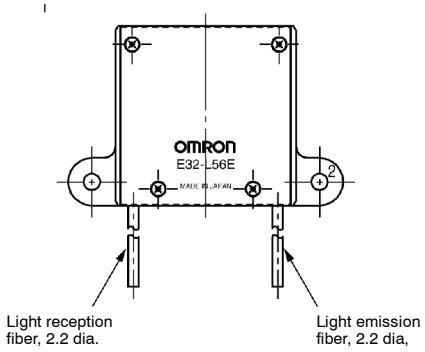
E32-C42



E32-L56E1



E32-L56E2

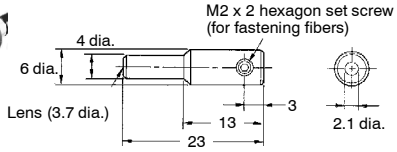


Note: Insert the fiber with the label into the emitter side of the amplifier.

■ ACCESSORIES (ORDER SEPARATELY)

Small Spot Lens Unit E39-F3A



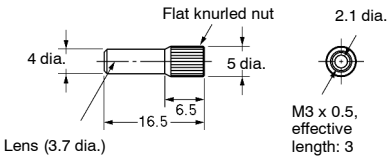


Material:
Tube: Aluminum
Optical lens: Optical glass

Note: E39-F3A is a Lens Unit for E32-C42 and E32-D32 cables.

Small Spot Lens Unit E39-F3A-5



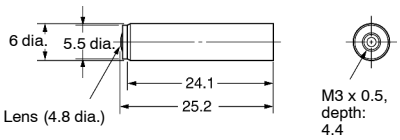


Material:
Tube: Aluminum
Optical lens: Optical glass

Note: E39-F3A-5 is a Lens Unit for E32-C31 and E32-C41 cables.

Small Spot Lens Unit E39-F3B



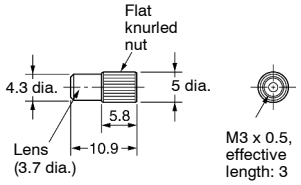


Material:
Tube: Aluminum
Optical lens: Optical glass

Note: E39-F3B is a Lens Unit for E32-C31 and E32-C41 cables.

Small Spot Lens Unit E39-F3C





Material:
Tube: Aluminum
Optical lens: Optical glass

Note: E39-F3C is a Lens Unit for E32-C31 and E32-C41 cables.

Installation

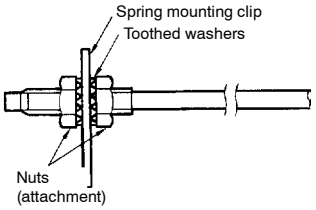
■ FIBER-OPTIC CABLES

Mounting

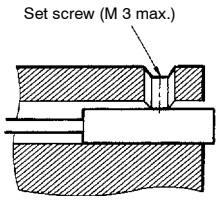
Tightening Force

The tightening force applied to the sensing head should be as follows:

Threaded Model

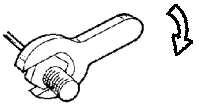


Unthreaded Model



Sensing head	Tightening torque
M3/M4 screw	0.78 N • m max.
M6 screw/ 6-mm dia. column	0.98 N • m max.
1.5-mm dia. column	0.2 N • m max.
2-mm dia./3-mm dia. column	0.29 N • m max.
E32-T12F 5-mm dia. Teflon model	0.78 N • m max.
E32-D12F 6-mm dia. Teflon model	
E32-T16	0.49 N • m max.
E32-L25A	0.78 N • m max.

Use a proper-sized wrench.

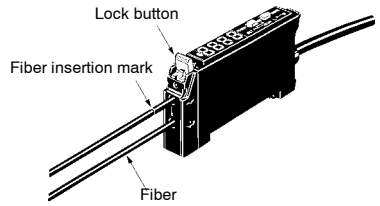


Fiber Connection and Disconnection

The E3X amplifier has a lock button. Connect or disconnect the fibers to or from the E3X amplifier using the following procedures:

1. Connection

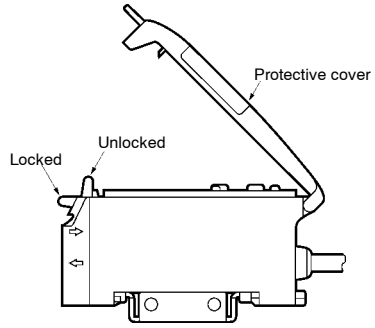
Remove the protective cover, insert the fiber into the amplifier, and lower the lock button until a click is heard.



After cutting the fiber using the E39-F4 Fiber Cutter, put an insertion mark on the fiber as a guide for correct insertion into the amplifier, and then insert the fiber up to this mark.

2. Disconnection

Remove the protective cover and raise the lock button to pull out the fiber.



Note: Remove the protective cover and raise the lock lever to pull out the fiber. (Before removing the fiber, be sure to confirm that the lock is released so as to maintain the fiber properties.)

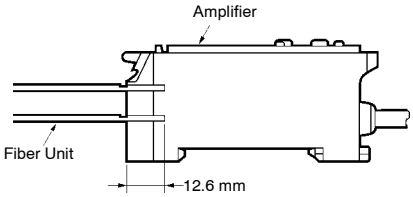
3. Precautions for Fiber Connection/Disconnection

Be sure to lock or unlock the lock button within an ambient temperature range between -10°C and 40°C.

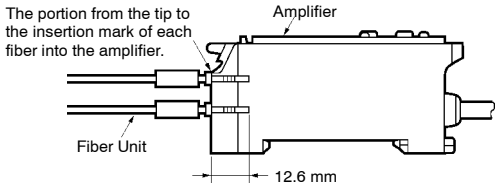
■ FIBER INSERTION

Make sure that the fiber is fully inserted in the amplifier. The sensing distance may decrease if the fiber is not fully inserted.

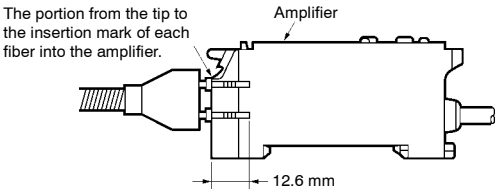
Standard 2.2-mm dia. Fiber



Thin Fiber with the E39-F9 Attachment



Fiber with Fixed Length



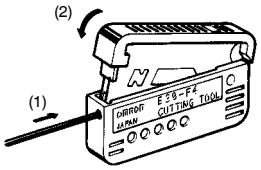
■ CUTTING FIBER

Insert a fiber into the Fiber Cutter and determine the length of the fiber to be cut.

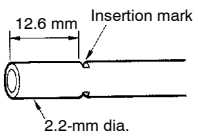
Press down the Fiber Cutter in a single stroke to cut the fiber.

An insertion mark can be placed on the fiber to serve as a reference when inserting the fiber into the amplifier. Use the following procedure.

Confirm through the cutter hole that the fiber is inserted beyond the insertion mark hole so that the insertion mark is properly indicated, and then press firmly down on the cutter.



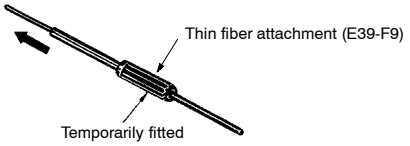
Insert the fiber into the amplifier up to the insertion mark. Proper fiber performance will not be achieved unless the fiber is inserted all the way to the insertion mark. (This method is applicable to standard, 2.2-mm-dia. fibers only.)



The cutting holes cannot be used twice. If the same hole is used twice, the cutting face of the fiber will be rough and the sensing distance will be reduced. Always use a new hole.

Use either one of the two holes on the right (refer to the following figure) to cut a thin fiber as follows:

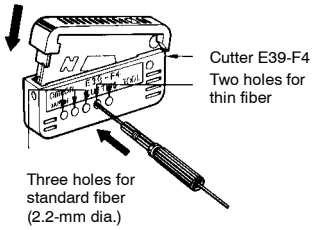
1. An attachment is temporarily fitted to a thin fiber before shipment.



2. Secure the attachment after adjusting the position of the thin fiber in the direction indicated by the arrow.



3. Insert the fiber to be cut into the E39-F4.



4. Finished state (proper cutting state)



Note: Insert the fiber in the direction indicated by the arrow.

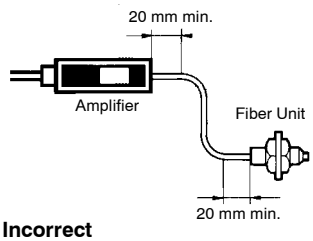
Connection

Do not pull or press the fiber units. The fiber units have a withstand force of 9.8 N to 29.4 N (pay utmost attention because the fibers are thin).

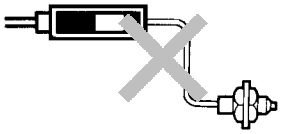
Do not bend the fiber unit beyond the permissible bending radius.

Do not bend the edge of the fiber units (excluding the E32-T□R and E32-D□R).

Correct

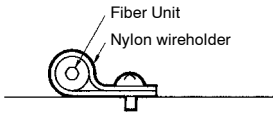


Incorrect



Note: Do not apply excess force on Fiber units.

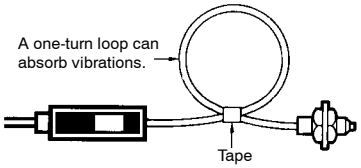
Correct



Incorrect

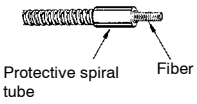


Excessive vibration can break the fiber head. Use the following method to prevent fiber head breakage.

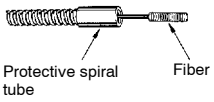


E39-F32□ Protective Spiral Tubes

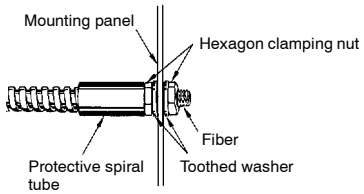
Insert a fiber to the protective spiral tube from the head connector side (screwed) of the tube.



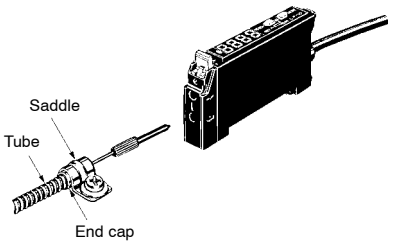
Push the fiber into the protective spiral tube. The tube should be straight so that the fiber is not twisted when inserted. Then turn the end cap of the spiral tube.



Secure the protective spiral tube on a suitable place with the attached nut.

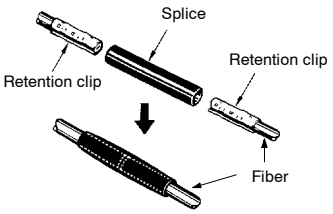


Use the attached saddle to secure the end cap of the protective spiral tube. To secure the protective spiral tube at a position other than the end cap, apply tape to the tube so that the portion becomes thicker in diameter.



E39-F10 Fiber Connector

Mount the fiber connector as shown in the following illustrations



Each fiber unit should be as close as possible before they are connected.

Sensing distance will be reduced by approximately 25% when fibers are connected.

Only 2.2-mm-dia. fibers can be connected.

NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches divide by 25.4.

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