

Easy-to-use

- Select from Three Clear Display Methods:
 - Digital incident level display
 - Digital percent display
 - Analog display
- Large Character Size
- Reversible Digital Display (in Reverse Mode)

High Performance

- Select from Three High-performance Modes:
 - Super-long-distance mode
 - Standard mode
 - Super-high-speed mode
- Reflective Model:
 - Long Sensing Distance of 500 mm.



Ordering Information

Amplifier Units

Item	Appearance	Connections	Output	Model	
				NPN output	PNP output
Standard models		Pre-wired type	ON/OFF output	E3X-DA11	E3X-DA41
Monitor-output models			ON/OFF output Monitor output	E3X-DA21	E3X-DA51

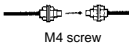
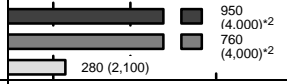
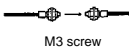
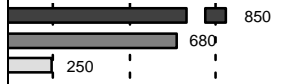
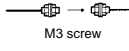
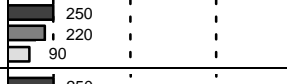
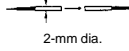

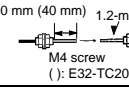
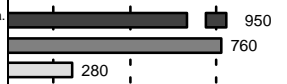
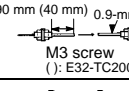

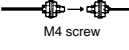

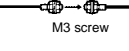

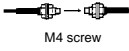
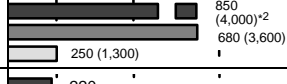
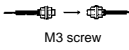

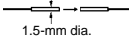
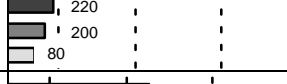
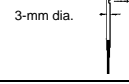

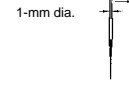
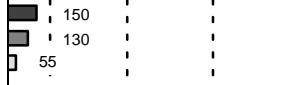
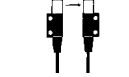
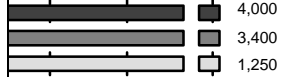
Fiber Units

Through-beam

Indicates models that allow free cutting. Models without this mark do not allow free cutting.

: Super-long-distance mode : Standard mode : Super-high-speed mode

Application	Features	Appearance	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)	Standard object*3 (min. sensing object: opaque)	Model	Permissible bending radius
Long distance	M4	 M4 screw	<ul style="list-style-type: none"> 1,660 (4,000) 1,330 490 (1,200) 180 	1.4-mm dia. (0.02-mm dia.)	E32-T11L	25 mm
	3-mm dia.	 3-mm dia.	<ul style="list-style-type: none"> 1,660 1,330 490 	1.4-mm dia. (0.01-mm dia.)	E32-T12L	
	M3	 M3 screw	<ul style="list-style-type: none"> 500 440 180 	0.9-mm dia. (0.01-mm dia.)	E32-T21L	
	2-mm dia.; small diameter	 2-mm dia.	<ul style="list-style-type: none"> 500 440 180 		E32-T22L	
	M14; with lens; ideal for explosion-proof applications	 M4 screw	<ul style="list-style-type: none"> 20,000*1 20,000*1 9,800 	10-mm dia. (0.01-mm dia.)	E32-T17L	

Application	Features	Appearance	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)	Standard object* ³ (min. sensing object: opaque)	Model	Permissible bending radius
General-purpose	M4		 950 (4,000) ² 760 (4,000) ² 280 (2,100)	1.0-mm dia. (0.01-mm dia.)	E32-TC200	25 mm
	M3; possible to mount the reflective side-view conversion attachment E39-F5		 850 680 250		E32-TC200A	
	M3; for detecting minute sensing objects		 250 220 90	0.5-mm dia. (0.01-mm dia.)	E32-TC200E	
Thin fiber	2-mm dia.; for detecting minute sensing objects		 250 220 90	0.5-mm dia. (0.01-mm dia.)	E32-T22	25 mm
	1.2-mm dia.; with sleeve		 950 760 280	1.0-mm dia. (0.01-mm dia.)	E32-TC200B E32-TC200B4	
	0.9-mm dia.; with sleeve		 250 220 90	0.5-mm dia. (0.01-mm dia.)	E32-TC200F E32-TC200F4	
Flexible (resists breaking) (R1)	Possible to bend like electric wires (R1);		 670 (4,000) ² 530 (3,700) 200 (1,400)	1-mm dia. (0.01-mm dia.)	E32-T11R	1 mm
			 150 130 50	0.5-mm dia. (0.01-mm dia.)	E32-T21R	
Flexible (resists breaking) (R4);	Ideal for mounting on moving sections (R4)		 850 (4,000) ² 680 (3,600) 250 (1,300)	1.0-mm dia. (0.01-mm dia.)	E32-T11	4 mm
			 220 200 80	0.5-mm dia. (0.01-mm dia.)	E32-T21	
			 220 200 80		E32-T22B	
Side-view	Long distance; space-saving		 570 460 170	1.0-mm dia. (0.01-mm dia.)	E32-T14L	25 mm
	Suitable for detecting minute sensing objects		 150 130 55	0.5-mm dia. (0.01-mm dia.)	E32-T24	
	Screw-mounting type		 4,000 3,400 1,250	4.0-mm dia. (0.01-mm dia.)	E32-T14	

Note: 1. The size of standard sensing object is the same as the fiber core diameter (lens diameter for models with lens).
 2. The values of the minimum sensing object for the through-beam models indicate those obtained where the models are set to receive light when the digital incident level exceeds 1,000 (set to digital incident level display).

*1 The E32-T17L allows a longer sensing distance because its optical fiber length is 10 m.
 *2 These models allow a longer sensing distance because their optical fiber length is 2 m.
 *3 Indicates values for standard mode.

Through-beam/Slot Sensors



Indicates models that allow free cutting. Models without this mark do not allow free cutting.

: Super-long-distance mode

: Standard mode

: Super-high-speed mode

Application	Features	Appearance	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)	Standard object (min. sensing object*4: opaque)	Model	Permis- sible bending radius	
Chemical-resistant	Teflon-covered*1; withstands chemicals and harsh environments (operating ambient temperature: -30°C to 70°C)	5-mm dia.	3,800 3,000 1,100	4.0-mm dia. (0.01-mm dia.)	E32-T12F	40 mm	
	Teflon covered*1; side-view; withstands chemicals and harsh environments (operating ambient temperature: -30°C to 70°C)	5-mm dia.	500 400 150	3.0-mm dia. (0.01-mm dia.)	E32-T14F		
Heat-resis- tant	Resists 150°C*2; fiber sheath material: fluororesin (operating ambient temperature: -40°C to 150°C)	M4 screw	950 760 280	1.5-mm dia. (0.01-mm dia.)	E32-T51	35 mm	
	Side-view; resists 150°C*2; suitable for detecting minute sensing objects; fiber sheath material: fluororesin (operating ambient temperature: -40°C to 150°C)	2-mm dia.	290 1230 80	1.0-mm dia. (0.01-mm dia.)	E32-T54		
	Resists 300°C*3, with spiral tube; high mechanical strength; fiber sheath material: stainless steel (operating ambient temperature: -40°C to 300°C)	M4 screw	570 (4,000)*5 450 (3,400) 170 (1,300)	1.0-mm dia. (0.01-mm dia.)	E32-T61		25 mm
	Resists 200°C*3; L-shaped; fiber sheath material: stainless steel	3-mm dia.	1,700 1,300 500	1.7-mm dia. (0.01-mm dia.)	E32-T84S		
Slot	Suitable for film sheet detection; no optical axis adjustment required; easy to mount		10 10 10	4.0-mm dia. (0.16-mm dia.)	E32-G14	25 mm	
Narrow vision field	Suitable for detecting wafers;	3-mm dia.	2,300 1,900 700	1.7-mm dia. (0.01-mm dia.)	E32-T22S	10 mm	
	Side-view; suitable for detecting wafers;	3.5 x 3-mm dia.	1,700 1,300 500	2-mm dia. (0.01-mm dia.)	E32-T24S		
Area sens- ing through- beam	Multi-point detection (4-head)	M3 screw	700 610 250	2.0-mm dia. (0.01-mm dia.)	E32-M21	25 mm	
	Stable for detecting minute sensing objects in a wide area; degree of protection: IEC60529 IP50	11 mm	1,400 1,100 420	(0.2-mm dia.)	E32-T16P	10 mm	
	Suitable for detecting over a 10-mm area; long distance	10 mm	3,500 2,800 1,000	(0.6-mm dia.)	E32-T16	25 mm	

Note: 1. The size of standard sensing object is the same as the fiber core diameter (lens diameter for models with lens).

2. The values of the minimum sensing object for the through-beam models indicate those obtained where the models are set to receive light when the digital incident level exceeds 1,000 (set to digital incident level display).

*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.




*3 Indicates the heat-resistant temperature at the fiber tip.


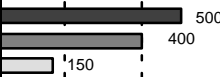

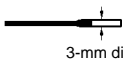
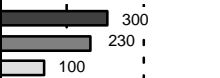


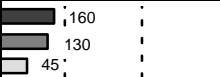

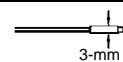
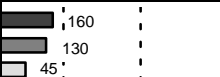





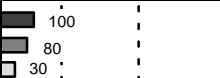

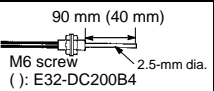



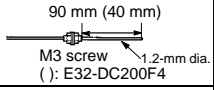
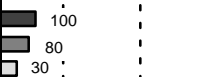


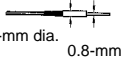
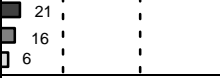

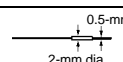
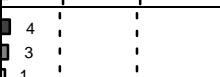


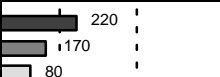


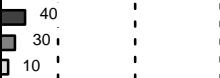


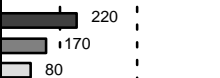





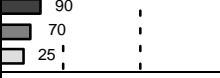

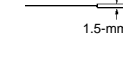


*4 Indicates values for standard mode.

*5 These models allow a longer sensing distance because their optical fiber length is 2 m.

Reflective Sensors

 Indicates models that allow free cutting. Models without this mark do not allow free cutting.

 : Super-long-distance mode  : Standard mode  : Super-high-speed mode

Application	Features	Appearance	Sensing distance (mm)*1	Standard object (min. sensing object*2: Gold wire)	Model	Permissible bending radius
Long distance	M6	 M6 screw		500 × 500 (0.01-mm dia.)	E32-D11L 	25 mm
	3-mm dia.; small diameter	 3-mm dia.		300 × 300 (0.01-mm dia.)	E32-D12 	
	M4	 M4 screw		200 × 200 (0.01-mm dia.)	E32-D21L 	
	3-mm dia.; small diameter	 3-mm dia.			E32-D22L 	
General-purpose	M6	 M6 screw		400 × 400 (0.01-mm dia.)	E32-DC200 	25 mm
	M3; small diameter	 M3 screw		100 × 100 (0.01-mm dia.)	E32-DC200E 	
Thin fiber	2.5-mm dia.; with sleeve	 90 mm (40 mm) M6 screw 2.5-mm dia. (): E32-DC200B4		400 × 400 (0.01-mm dia.)	E32-DC200B  E32-DC200B4 	25 mm
	1.2-mm dia.; with sleeve	 90 mm (40 mm) M3 screw 1.2-mm dia. (): E32-DC200F4		100 × 100 (0.01-mm dia.)	E32-DC200F  E32-DC200F4 	
	Minute object detection (0.8-mm dia.)	 3-mm dia. 0.8-mm dia.		25 × 25 (0.01-mm dia.)	E32-D33 	
	Minute object detection (0.5-mm dia.)	 2-mm dia. 0.5-mm dia.			E32-D331 	
Flexible (R1)	Possible to bend like electric wires (R1);	 M6 screw		300 × 300 (0.01-mm dia.)	E32-D11R 	1 mm
		 M3 screw		50 × 50 (0.01-mm dia.)	E32-D21R 	
Flexible (resists breaking) (R4)	Ideal for mounting on moving sections (R4)	 M6 screw		300 × 300 (0.01-mm dia.)	E32-D11 	4 mm
		 M3 screw		50 × 50 (0.01-mm dia.)	E32-D21 	
		 M4 screw		100 × 100 (0.01-mm dia.)	E32-D21B 	
		 1.5-mm dia.		50 × 50 (0.01-mm dia.)	E32-D22B 	


Note: 1. The values of the minimum sensing object indicate those obtained at a distance where the smallest object can be sensed with the Reflective Fiber Unit.

2. When set to the maximum sensitivity setting for the internal reflective light, incident light may continue to be received. In such case, use under two-point teaching or without-object teaching.


*1 Sensing distance indicates values for white paper.


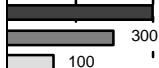


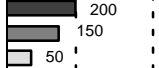


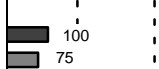


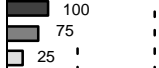


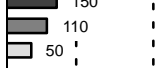


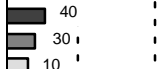


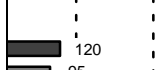





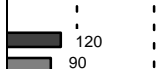

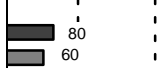
*2 Indicates values for standard mode.

 Indicates models that allow free cutting. Models without this mark do not allow free cutting.

 : Super-long-distance mode

 : Standard mode

 : Super-high-speed mode

Application	Features	Appearance	Sensing distance (mm)*1	Standard object (min. sensing object*5: Gold wire)	Model	Permissible bending radius
Coaxial reflective	M6 Coaxial; positioning accuracy	 M6 screw		500 × 500 (0.01-mm dia.)	E32-CC200 	25 mm
	3-mm dia. Coaxial; positioning accuracy	 3-mm dia.		300 × 300 (0.01-mm dia.)	E32-D32L 	
	2-mm dia. Coaxial; high-precision positioning possible; possible to mount small-spot (0.5 dia) lens (E39-F3A)	 2-mm dia.		100 × 100 (0.01-mm dia.)	E32-D32 	
	M3 Coaxial; positioning accuracy	 M3 screw			E32-C31 	
Side-view reflective	6-mm dia.; long distance	 6-mm dia.		200 × 200 (0.01-mm dia.)	E32-D14L 	25 mm
	2-mm dia.; small diameter space-saving	 2-mm dia.		50 × 50 (0.01-mm dia.)	E32-D24 	
Chemical-resisting reflective	Teflon-covered*3; withstands chemicals and harsh environments (operating ambient temperature: -30°C to 70°C)	 6-mm dia.		200 × 200 (0.01-mm dia.)	E32-D12F 	40 mm
Heat-resisting reflective	Resists 150°C*2; fiber sheath material: fluororesin (operating ambient temperature: -40°C to 150°C)	 M6 screw		200 × 200 (0.01-mm dia.)	E32-D51 	35 mm
	Resists 300°C*4; fiber sheath material: stainless steel (operating ambient temperature: -40°C to 300°C)	 M6 screw			E32-D61	25 mm
	Resists 400°C*4; fiber sheath material: stainless steel (operating ambient temperature: -40°C to 400°C)	 M4 screw 1.25-mm dia.			E32-D73	

Note: 1. The values of the minimum sensing object indicate those obtained at a distance where the smallest object can be sensed with the Reflective Fiber Unit.

2. When set to the maximum sensitivity setting for the internal reflective light, incident light may continue to be received. In such case, use under two-point teaching or without-object teaching.

*1 Sensing distance indicates values for white paper.


*2 For continuous operation, use the products within the temperature ranging from -40°C to 130°C.

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


*4 Indicates the heat-resistant temperature at the fiber tip.

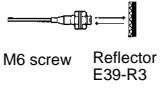
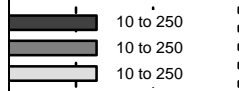

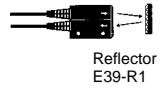








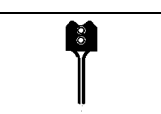

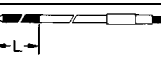


*5 Indicates values for standard mode.

 Indicates models that allow free cutting. Models without this mark do not allow free cutting.

 : Super-long-distance mode

 : Standard mode

 : Super-high-speed mode

Application	Features	Appearance	Sensing distance (mm) ^{*1}	Standard object (min. sensing object ^{*2} : Gold wire)	Model	Permissible bending radius
Retroreflective	Transparent object detection	 M6 screw Reflector E39-R3	 10 to 250 10 to 250 10 to 250	35-mm dia. (0.1-mm dia.)	E32-R21 +E39-R3 (Attachment) 	25 mm
	Transparent object detection (operating ambient temperature: -25°C to 55°C); degree of protection: IEC60529 IP66	 Reflector E39-R1	 150 to 1,500	35-mm dia. (0.2-mm dia.)	E32-R16 +E39-R1 (Attachment) 	
Limited reflective	Detects wafers and small differences in height; (operating ambient temperature: -40°C to 105°C); degree of protection: IEC60529 IP50		7.2±1.8 7.2±1.8 7.2±1.8	25 × 25 (0.01-mm dia.)	E32-L25L 	10 mm
			4±2 4±2 4±2		E32-L24L 	
	Detects wafers and small differences in height; degree of protection: IEC60529 IP50		3.3 3.3 3.3		E32-L25 	25 mm
			3.3 3.3 3.3		E32-L25A 	
Fluid-level detection	Fluid contact type: unbendable section L 150 mm, 350 mm (two types)		---	Pure water at 25°C	E32-D82F1 E32-D82F2	40 mm
	Tube-mounting type		---	Fluid	E32-L25T 	10 mm

Note: 1. The values of the minimum sensing object indicate those obtained at a distance where the smallest object can be sensed with the Reflective Fiber Unit.

2. When set to the maximum sensitivity setting for the internal reflective light, incident light may continue to be received. In such case, use under two-point teaching or without-object teaching.

*1 Sensing distance indicates values for white paper.

*2 Indicates values for standard mode.

Specifications

■ Ratings/Characteristics

Amplifier Unit

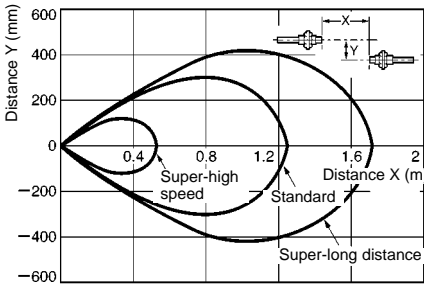
Item		E3X-DA11	E3X-DA41	E3X-DA21	E3X-DA51
		NPN output	PNP output	NPN output	PNP output
Light source (wavelength)		Red LED (660 nm)			
Power supply voltage		12 to 24 VDC \pm 10%, ripple (p-p) 10% max.			
Current consumption		75 mA max.			
Control output	ON/OFF output	NPN open collector, load current 50 mA max., residual voltage 1 V max., Light ON/Dark ON mode selector	PNP open collector, load current 50 mA max., residual voltage 2 V max., Light ON/Dark ON mode selector	NPN open collector, load current 50 mA max., residual voltage 1 V max., Light ON/Dark ON mode selector	PNP open collector, load current 50 mA max., residual voltage 2 V max., Light ON/Dark ON mode selector
	Monitor output	---		Load 1 to 5 VDC, 10 k Ω min.	
Circuit protection		Reverse polarity, output short-circuit, mutual interference prevention			
Response time		Super-high-speed mode: 0.25 ms for operation and reset respectively Standard mode: 1 ms for operation and reset respectively Super-long-distance mode: 4 ms for operation and reset respectively			
Sensitivity setting		Teaching or manual method			
Timer function		OFF-delay timer, range: 0 to 200 ms (set in 5 ms units)			
Display		Operation indicator (orange), 7-segment digital incident level display (red), 7-segment digital incident level percentage display (red), threshold and excess gain 2-color indication bar (green and red), 7-segment digital threshold display (red)			
Display timing		Switching between normal/peak-hold/bottom-hold possible			
Display orientation		Switching between normal/reverse possible			
Optical axis adjustment		Optical axis adjustment possible (hyper-flashing function)			
Ambient illumination		Illumination intensity at light-intercepting surface: Incandescent lamp: 3,000 lx max.; Sunlight: 10,000 lx max.			
Ambient temperature		Operating: -25°C to 55°C (with no icing or condensation) Storage: -30°C to 70°C (with no icing or condensation)			
Ambient humidity		Operating and storage: 35% to 85% (with no condensation)			
Insulation resistance		20 M Ω min. (at 500 VDC)			
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute			
Vibration resistance		10 to 55 Hz with a 1.5-mm double amplitude or 300 m/s ² for 2 hrs each in X, Y and Z directions			
Shock resistance		500 m/s ² , for 3 times each in X, Y and Z directions			
Degree of protection		IEC60529 IP50 (when protective cover attached)			
Connection method		Pre-wired (standard cable length: 2 m)			
Weight (packed state)		Approx. 100 g			
Material	Case	PBT			
	Cover	Polycarbonate			
Accessories		Mounting brackets, instruction sheet			

Engineering Data

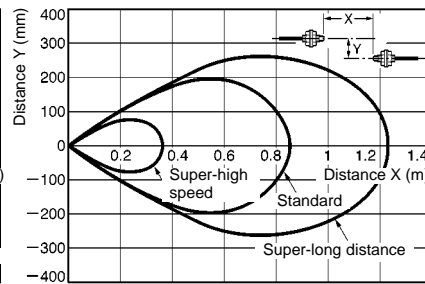
Parallel Operating Range (Typical)

At max. sensitivity. (Use for optical axis adjustment at installation.)

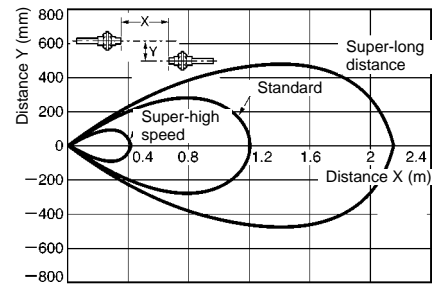
E32-TC200 (Through-beam)



E32-T11R (Through-beam)



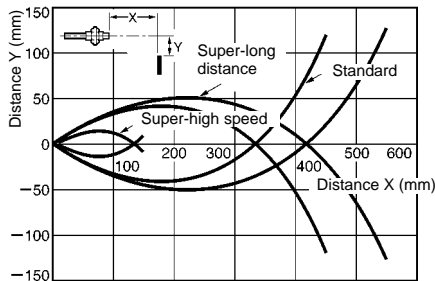
E32-T11 (Through-beam)



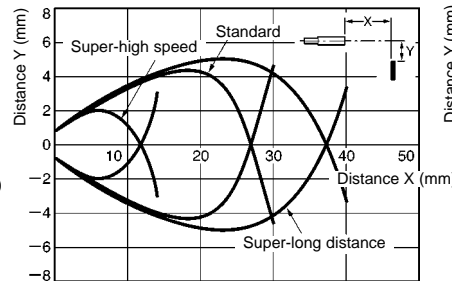
Operating Range (Typical)

With standard sensing object at max. sensitivity. (Use for the positioning of the object and Sensor.)

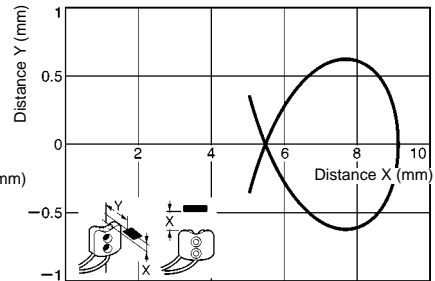
E32-DC200 (Reflective)



E32-D33 (Reflective)



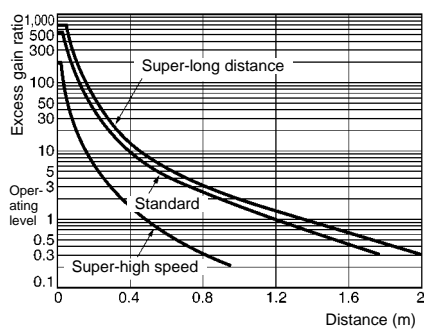
E32-L25L (Convergent Reflective)



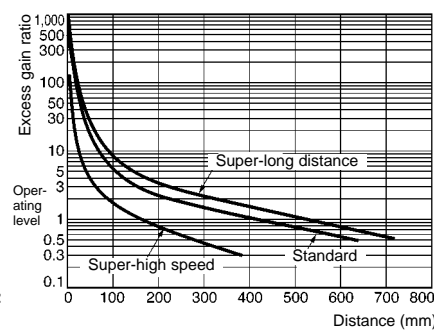
Excess Gain Ratio vs. Distance (Typical)

With standard sensing object. At max. sensitivity.

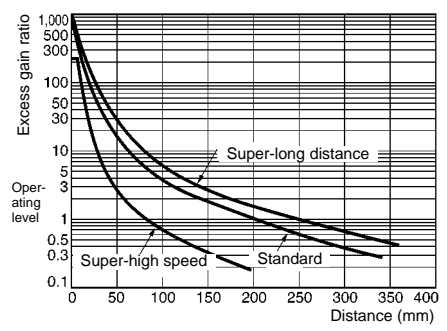
E32-TC200 (Through-beam)



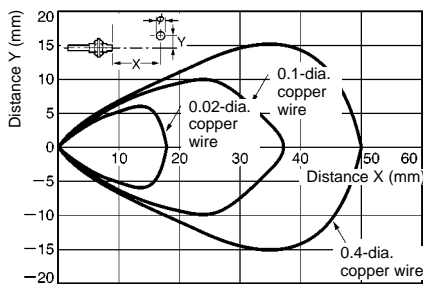
E32-DC200 (Reflective)



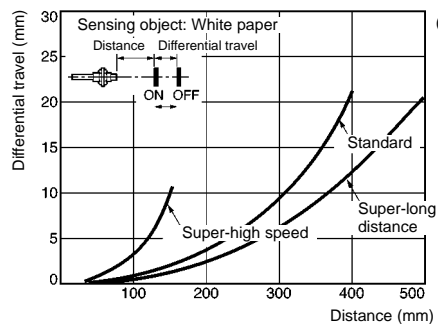
E32-D21L (Reflective)



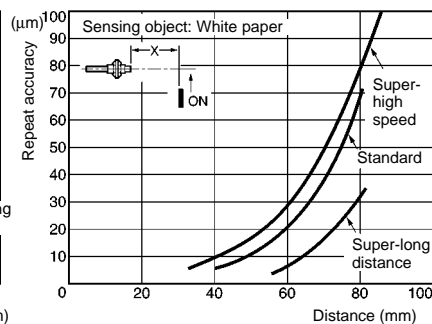
Sensing Distance vs. Operating Range
E32-DC200
(Reflective)



Differential Travel vs. Sensing Distance
E32-D11L
(Reflective)

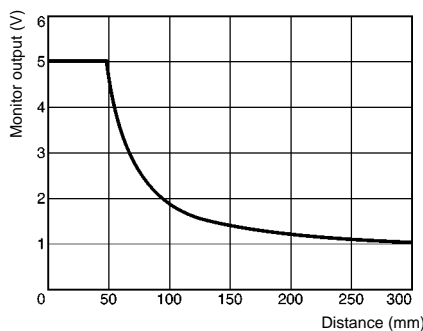


Repeat Accuracy vs. Sensing Distance
E32-DC200
(Reflective)

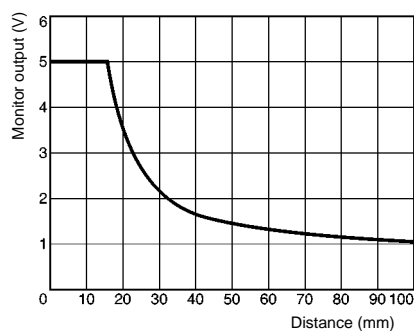


Monitor Output vs. Distance (Standard Mode)

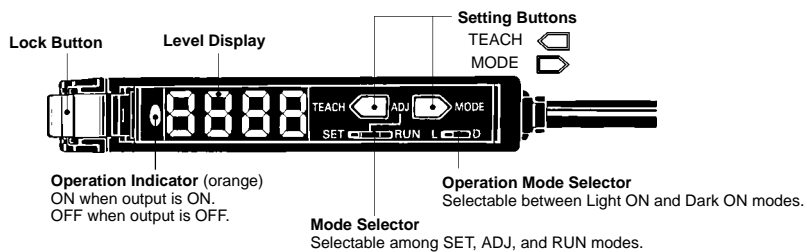
E32-TC200
(Through-beam)



E32-DC200
(Through-beam)



Nomenclature



Operation

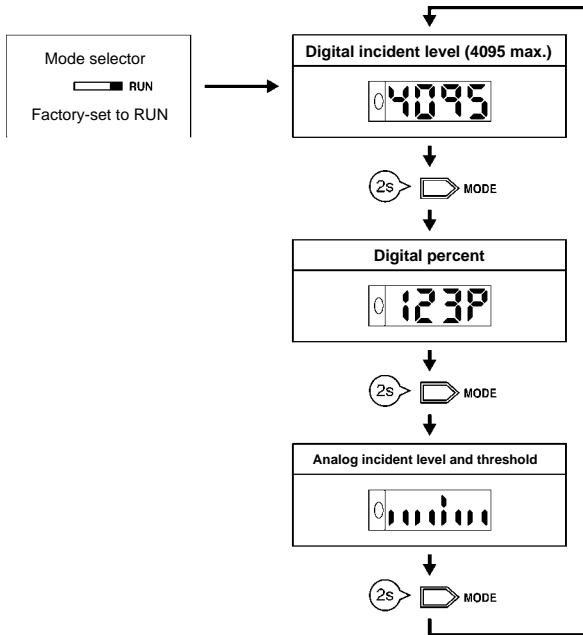
■ Output Circuits

Output	Model	Mode selector	State of output transistor	Output circuit	Timing chart
NPN	E3X-DA11	LIGHT ON (L/ON)	Light ON		
		DARK ON (D/ON)	Dark ON		
	E3X-DA21	LIGHT ON (L/ON)	Light ON		
		DARK ON (D/ON)	Dark ON		
PNP	E3X-DA41	LIGHT ON (L/ON)	Light ON		
		DARK ON (D/ON)	Dark ON		
	E3X-DA51	LIGHT ON (L/ON)	Light ON		
		DARK ON (D/ON)	Dark ON		

Operation

Easy-to-use

Display Settings in RUN Mode

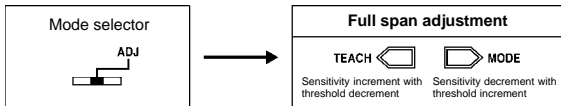


Manual-tuning (Fine Sensitivity Adjustment) in ADJ Mode

Fine Sensitivity Adjustment after Teaching



Manual-tuning without Using Teaching Function

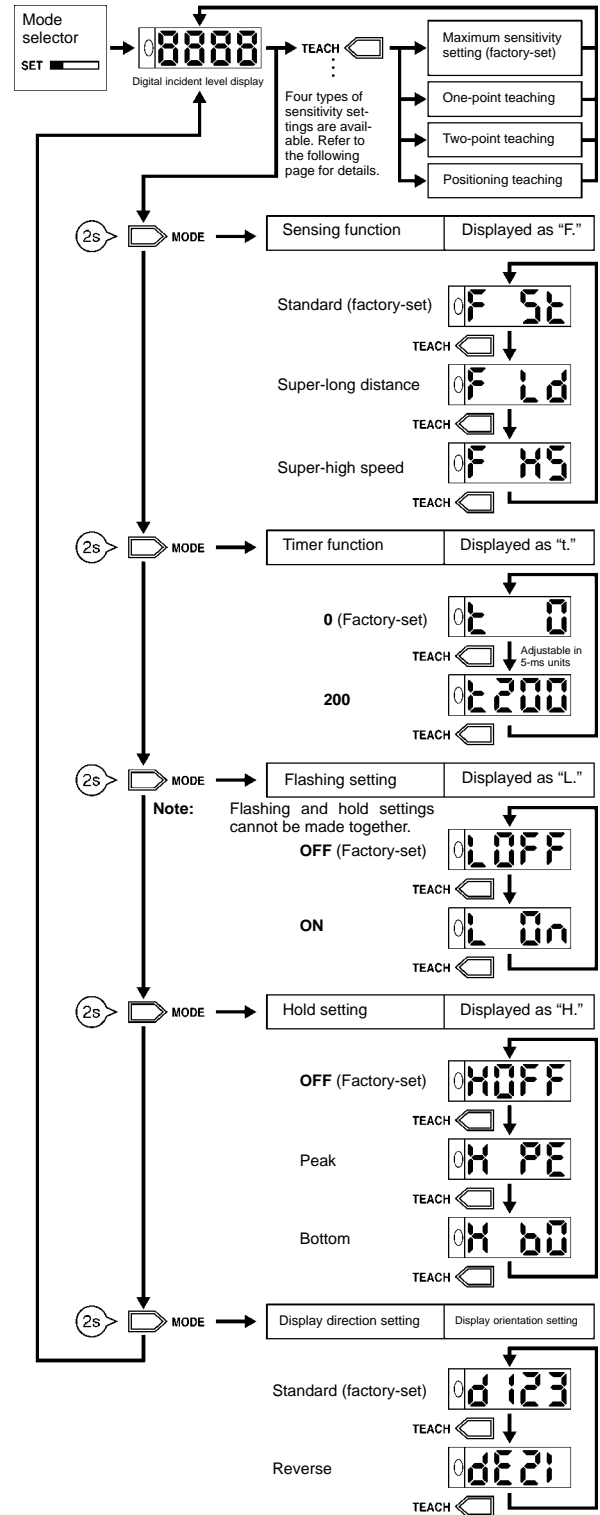


Approximately 4,000 threshold steps

The items displayed in ADJ mode are different from those displayed in RUN mode.

RUN mode	ADJ mode
Digital incident level	Digital threshold
Digital percent	Digital percent
Analog value	Analog value

Sensitivity Setting (Teaching) in SET Mode



■ Sensitivity Setting (Teaching)

Set the mode selector to SET to start teaching.
The following four types of teaching are available.

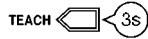
Once the setting is made, the Amplifier Unit operates according to the settings. The red level display will flash if a teaching error occurs. In that case, repeat the whole teaching procedure.

Maximum Sensitivity Setting

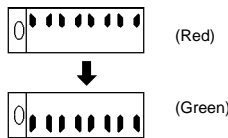
1. Set the mode selector to SET.



2. Press the TEACH button for 3 seconds min.



3. Teaching is complete when the level display changes from red to green.
The level display will display the digital incident level later.



4. Set to RUN mode.

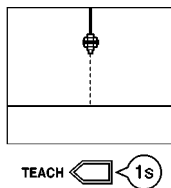


One-point Without-object Teaching

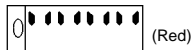
1. Set the mode selector to SET.



2. Press the TEACH button for approximately 1 second.



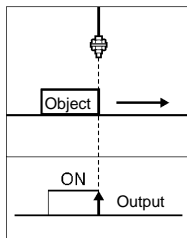
3. Teaching is complete when the red level display is lit.
The level display will display the digital incident level later.



4. Set to RUN mode.



5. The threshold is automatically set with the object.



Note: If one-point teaching is not available because the difference in level is too fine, try two-point teaching.

Operation Mode Selector

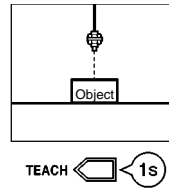
Operation mode		Operation
Light ON	L• ON	L (Factory-set)
Dark ON	D• ON	D

Two-point With/Without-object Teaching

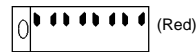
1. Set the mode selector to SET.



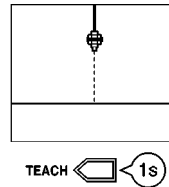
2. Press the TEACH button for approximately 1 second when the object is at the sensing position.



3. The red level display is lit.



4. Press the TEACH button for approximately 1 second with no object.



5. Teaching is complete when the green level display is lit.
The level display will display the digital incident level later.



6. Set to RUN mode.

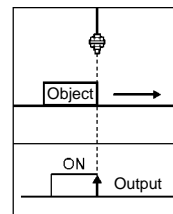


One-point Teaching (Positioning)

1. Set the sensitivity with one-point teaching first.
2. Set the Sensor to ADJ mode.



3. Change the threshold with the buttons so that the operation indicator turns ON.



Sensitivity increment with threshold decrement

Sensitivity decrement with threshold increment

4. Set to RUN mode.

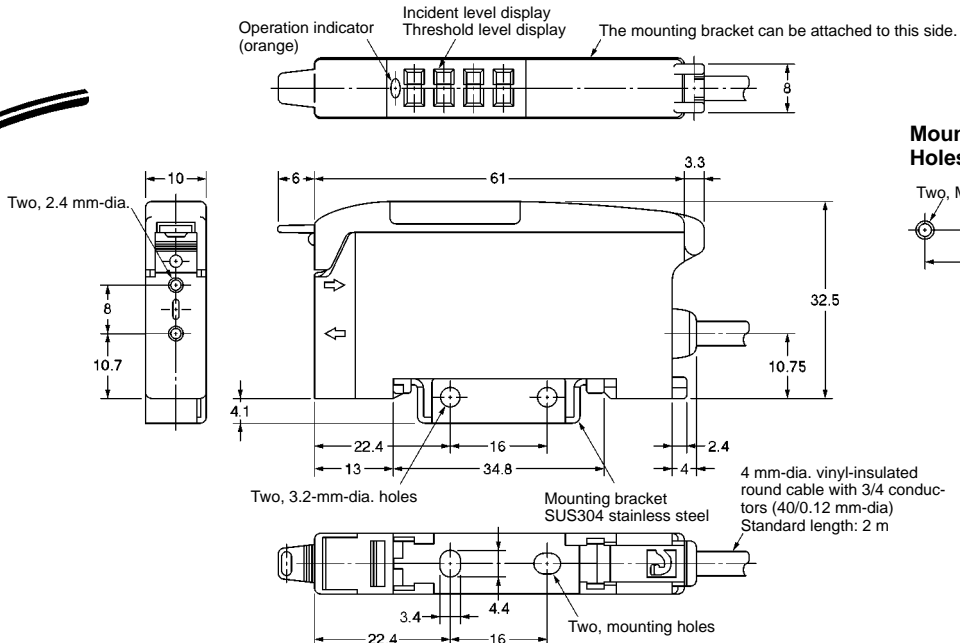
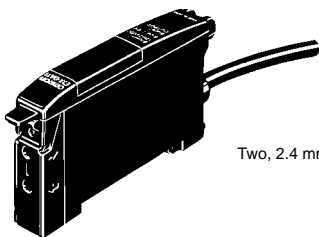


Dimensions

Note: All units are in millimeters unless otherwise indicated.

■ Amplifier

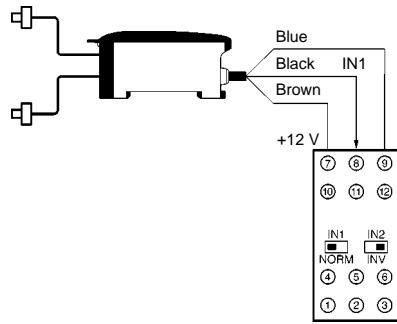
E3X-DA□1



Installation

■ Connection

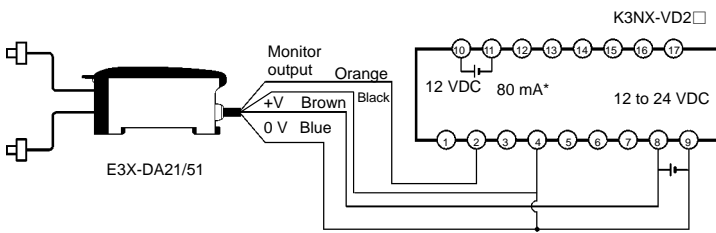
Connection with S3D2 Sensor Controller



Note: A maximum of two Sensors can be connected.

Power supply voltage	Output	Functions	Model
100 to 240 VAC	Relay	AND, OR	S3D2-AK
		AND, OR, and timer	S3D2-CK
		Flip-flop	S3D2-BK
	Transistor	AND, OR, and timer	S3D2-CC
	Relay	2 inputs, 2 outputs,	S3D2-DK
2 inputs, 2 outputs, and timer		S3D2-EK	
24 VDC	Relay	AND, OR	S3D2-AKD
		AND, OR, and timer	S3D2-CKD

Connection with K3NX-VD2□ Process Meter



* Use this service power supply for the Sensor with reference to the power consumption of each Sensor.

- Note:**
1. Various I/O Units are available for the K3NX. Select an appropriate output type depending on the application.
 2. For details about the K3NX, refer to the *K3NX Datasheet (N084)* or the *K3NX Operation Manual (N090)*.
 3. This wiring is for the K3NX with DC power supply specifications and the Monitor (Analog) Sensor with DC power supply specifications. Check respective power supply specifications before wiring them.

Precautions

Read the following before using the Amplifier Unit and Sensor to ensure safety.

Wiring

General

Do not impose any voltage exceeding the rated voltage on the E3X-DA. Do not impose 100 VAC or more on models that operate with DC. In both cases, the E3X-DA may be damaged.

Do not short-circuit the load connected to the E3X-DA, otherwise the E3X-DA may be damaged.

When supplying power to the E3X-DA, make sure that the polarity of the power is correct, otherwise the E3X-DA may be damaged.

The load must be connected to the E3X-DA in operation, otherwise the E3X-DA may be damaged.

Operating Environment

- Do not use the Amplifier Unit or Sensor in places with flammable or explosive gas.
- Do not use the Amplifier Unit or Sensor underwater.
- Do not disassemble, repair, or modify the Amplifier Unit or Sensor.

■ Amplifier Unit

Installation

Turning Power ON

The Sensor is ready to operate within 100 ms after Sensor is turned ON. If the Sensor and load are connected to power supplies separately, be sure to turn ON the Sensor first.

Power Supply Type

A full or half-wave rectifying power supply without a smoothing circuit cannot be used.

Wiring

Indicator

The operation indicator will turn ON momentarily when the Amplifier Unit is turned ON or OFF, and can be ignored because no control signals are output at that time.

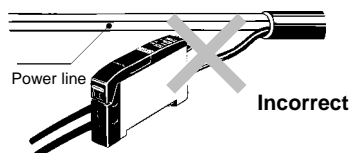
Cable

The cable can be extended, provided that the extension wire applied is at least 0.3 mm² thick and the total distance no more than 100 m.

Do not pull the cable with a force exceeding 50N.

Separation from Power or High-tension Lines

Do not wire power lines or high-tension lines alongside the lines of the Amplifier Unit in the same conduit, otherwise the Amplifier Unit may be damaged or malfunction due to induction. Be sure to wire the lines of the Amplifier Unit separated from power lines or high-tension lines or laid in an exclusive, shielded conduit.



Power Supply

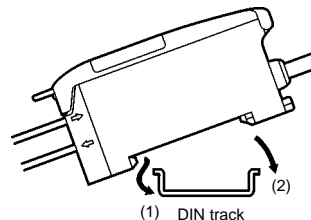
If a standard switching regulator is used as a power supply, the frame ground (FG) terminal and the ground (G) terminal must be grounded, or otherwise the Sensor can malfunction due to influence by the switching noise of the power supply.

Mounting

Mounting

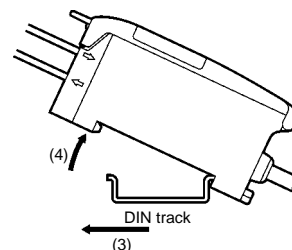
1. Mount the front part on the mounting bracket (attachment) or a DIN track.
2. Press the back part onto the mounting bracket or the DIN track.

Note: Do not mount the back part onto the mounting bracket or the DIN track first and then mount the front part on the mounting bracket or the DIN track, otherwise the mounting strength of the Amplifier Unit may be reduced.

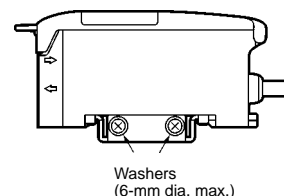


Dismounting

By pressing the Amplifier Unit in direction (3) and lifting the fiber insertion part in direction (4) as shown in the following, the Amplifier Unit can be dismounted with ease.



In the case of side mounting, attach the mounting bracket on the Amplifier Unit first, and secure the Amplifier Unit with M3 screws and washers. The diameter of the washers should be no more than 6 mm.



Adjustment

Mutual Interference Protection Function

Perform two-point teaching if two to three Fiber Units are closely mounted together, at which time supply power only to the Unit in teaching operation in turn or block the emitters of the Fiber Units not in teaching operation.

EEPROM Writing Error

If the data is not written to the EEPROM correctly due to a power failure during teaching or static-electric noise, repeat the whole teaching procedure.

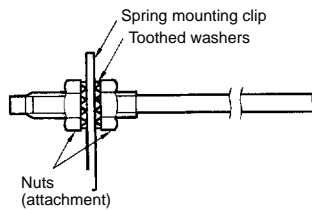
■ Fiber Unit

Mounting

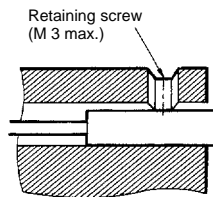
Tightening Force

The tightening force applied to the Fiber Unit should be as follows:

Screw-mounting Model



Cylindrical Model



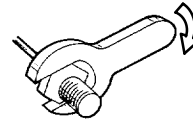
Fiber Units	Clamping torque
M3/M4 screw	0.78 N • m max.
M6 screw/ 6-mm dia. column	0.98 N • m max.
1.5-mm dia. column	0.2 N • m max.
2-mm dia./3-mm dia. column	0.29 N • m max.
E32-T12F 5-mm dia. Teflon model	0.78 N • m max.
E32-D12F 6-mm dia. Teflon model	
E32-T16	0.49 N • m max.
E32-R21	0.59 N • m max.
E32-M21	Up to 5 mm to the tip: 0.49 N • m max. More than 5 mm from the tip: 0.78 N • m max.
E32-L25A	0.78 N • m max.
E32-T16P E32-T24S E32-L24L E32-L25L	0.29 N • m max.

Others

Typical Values

Minimum sensing object and characteristic data values are typical values checked on actual products selected at random. None of these values represent a guaranteed rating or performance value.

Use a proper-sized wrench.

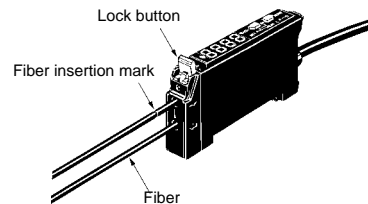


Fiber Connection and Disconnection

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

1. Connection

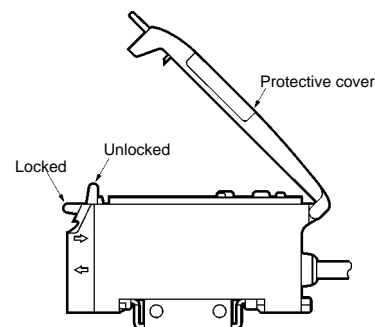
Remove the protective cover, insert the fiber into the Amplifier Unit, and lower the lock button until a click is heard.



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 Unit, 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.)

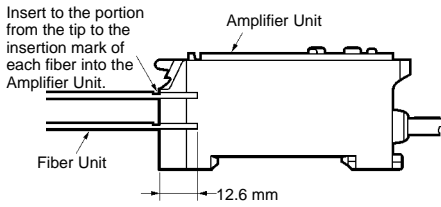
3. Precautions for Fiber Connection/Disconnection

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

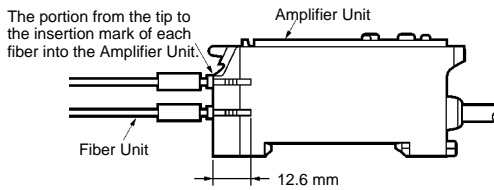
Fiber Insertion

Be sure to insert the Fiber Unit into the Amplifier Unit to the position of the insertion mark on the fiber as shown below. The sensing distance may decrease if the fiber is not inserted sufficiently.

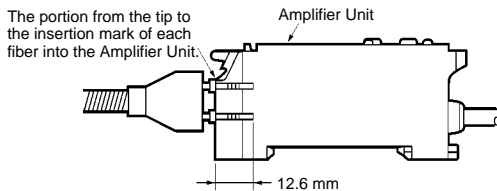
2.2-mm dia. Fiber



Thin Fiber with the E39-F9 Attachment



Fiber with Fixed Length



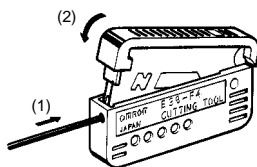
Cutting Fiber

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

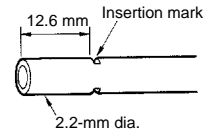
Press down the Fiber Cutter in a single stroke to cut the fiber.

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.



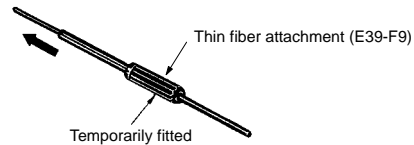
Insert the fiber into the Amplifier up to the insertion mark. Proper fiber performance will not be achieved unless the fiber is inserted all the way to the insertion mark. (This method is applicable to standard, 2.2-mm-dia. fibers only.)



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 an unused hole.

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

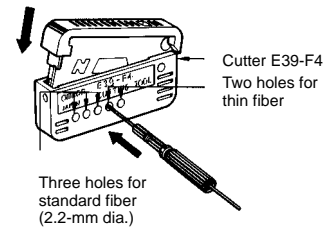
1. An attachment is temporarily fitted to a thin fiber before shipment.



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



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



4. Finished state (proper cutting state)



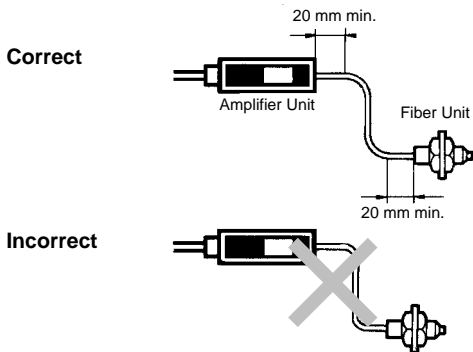
Note: Insert the fiber in the direction indicated by the arrow.

Connection

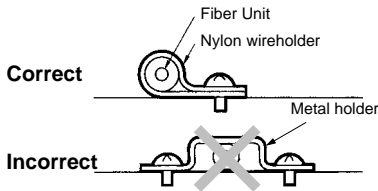
Do not pull or press the Fiber Units. The Fiber Units have a withstand force of 9.8 N or 29.4 N (pay utmost attention because the fibers are thin).

Do not bend the Fiber Unit beyond the permissible bending radius.

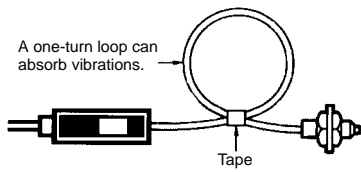
Do not bend the edge of the Fiber Units (excluding the E32-T□R and E32-D□R).



Do not apply excess force on the Fiber Units.



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

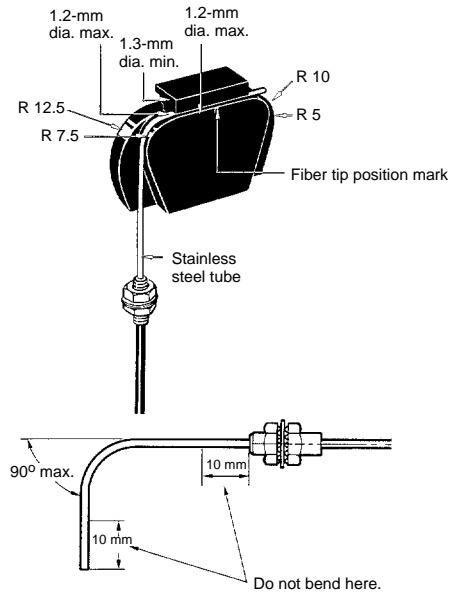


Bending Radius

E39-F11 Sleeve Bender

The bending radius of the stainless steel tube should be as large as possible. The smaller the bending radius becomes, the shorter the sensing distance will be.

Insert the tip of the stainless steel tube to the Sleeve Bender and bend the stainless steel tube slowly along the curve of the Sleeve Bender (refer to the figure).



■ Reflector

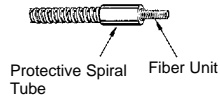
Use of E39-R3 Reflector

Use detergent, etc., to remove any dust or oil from the surfaces where tape is applied. Adhesive tape will not be attached properly if oil or dust remains on the surface.

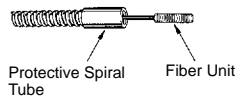
The E39-R3 cannot be used in places where it is exposed to oil or chemicals.

E39-F32 □ Protective Spiral Tubes

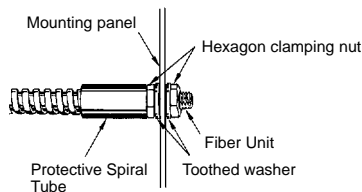
Insert a fiber into the Protective Spiral Tube from the head connector side (screwed) of the tube.



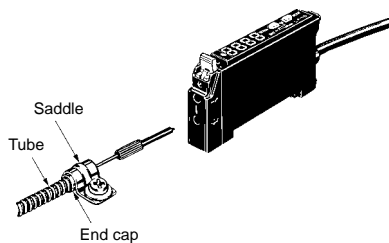
Push the fiber into the Protective Spiral Tube. The tube should be straight so that the fiber is not twisted when inserted. Then turn the end cap of the spiral tube.



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

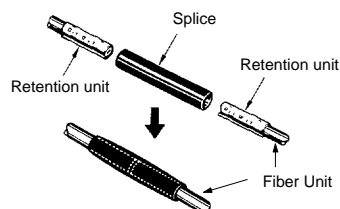


Use the attached saddle to secure the end cap of the Protective Spiral Tube. To secure the Protective Spiral Tube at a position other than the end cap, apply tape to the tube so that the portion becomes thicker in diameter.



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.

Check the Actual Performance of OMRON's Digital Fiber Amplifier



Two-point With/Without-object Teaching

Steps

1. Set the mode selector to SET.
2. Make two point settings. Press the TEACH button for 1 second after each setting.
3. Set the mode selector to RUN.

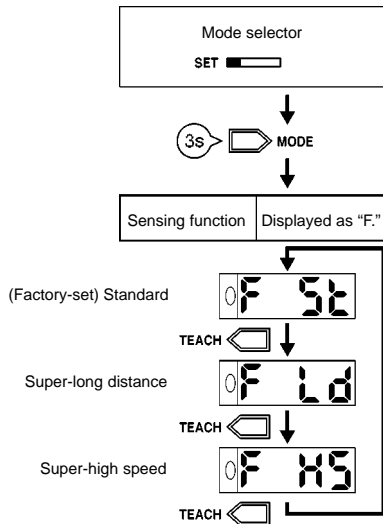


Maximum Sensitivity Setting for Longest Possible Distance

Setting Items

Super-long Distance Mode: 500 mm

Standard mode: 400 mm



Set to super-long-distance or standard mode.

Conditions

Fiber Unit: E32-D11L

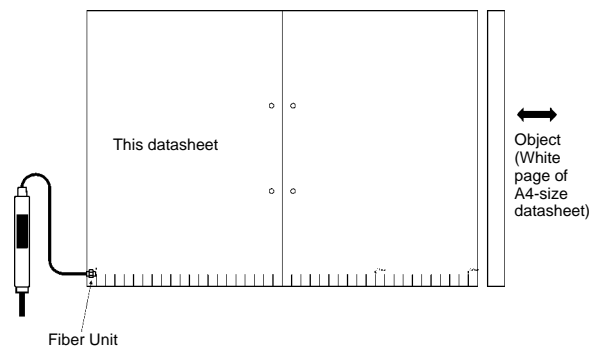
Object: White page of A4-size datasheet (200 x 200 mm min.)

Sensitivity: Maximum

Steps

1. Set the mode selector to SET.
2. Press the TEACH button for 3 seconds min.
3. Set the mode selector to RUN.
4. Test with the simple scale below.
5. If the operation indicator remains ON, set the Amplifier Unit to ADJ mode and press the MODE button to decrease the sensitivity.

Setting



Fiber position: Provide a distance of more than 100 mm from the floor level when using the Fiber Unit.



One-point Without-object Teaching

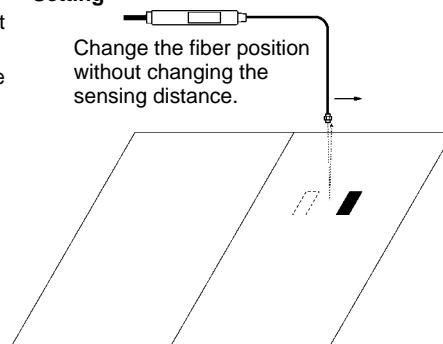
Steps

1. Set the mode selector to SET.
2. Apply the optical axis.
3. Press the TEACH button for 1 second.
4. Set the mode selector to RUN without changing the sensing distance.
5. Detect the black portion to complete the teaching.



Setting

Change the fiber position without changing the sensing distance.



Testing on Sensing Thinnest Possible Object

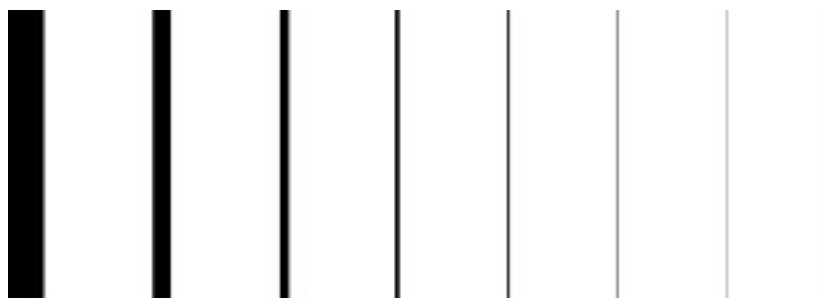
Conditions

- Fiber Unit: E32-D11L (E32-D33 is the most suitable model)
- Objects: The following black lines.

Step

Perform one-point without-object teaching.

Setting



Hyper-flashing Function

Steps

1. Set the mode selector to SET.
2. Press the MODE button three times for 3 seconds each so that the following display will appear.



3. Press the TEACH button so that the following display will appear.

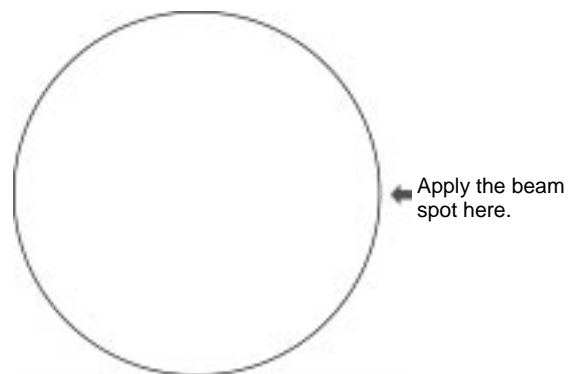


4. Press the MODE button three times for 3 seconds each so that the incident level will be displayed.



The setting is complete when the Sensor starts flashing.

Set the mode selector to RUN so that the Sensor stops flashing.



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E305-E1-1 **In the interest of product improvement, specifications are subject to change without notice.**

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