E3X-DA-N

Digital Fiber Amplifier

Amplifier

- Select from Three Clear Display Methods:
  Digital incident level
  Digital percent level
  LED Bar Display
- Save-wiring Connector
- Auto Power Control

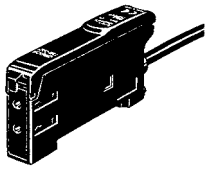
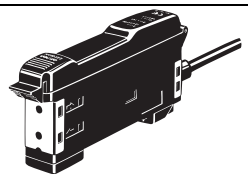
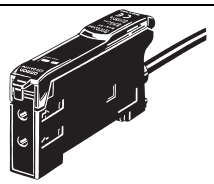
Mobile Console

- Remote Tuning and Adjustment
- “Copy and Paste” Function
- “Mode Lock” Function

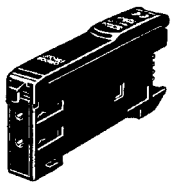
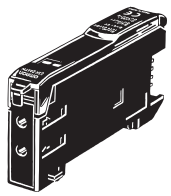
Ordering Information: Amplifier Units, Connectors, Mobile Console, and Accessories

■ Amplifier Units

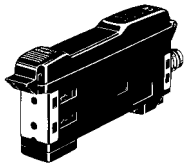
Amplifier Units with Cables

Item		Appearance	Control output	Model	
				NPN output	PNP output
Standard models			ON/OFF output	E3X-DA11-N	E3X-DA41-N
Monitor-output models			ON/OFF output Monitor output	E3X-DA21-N	E3X-DA51-N
Mark-detecting models	Blue LED		ON/OFF output	E3X-DAB11-N	E3X-DAB41-N
	Green LED			E3X-DAG11-N	E3X-DAG41-N
Infrared models				E3X-DAH11-N	E3X-DAH41-N
Water-resistant models				E3X-DA11V	E3X-DA41V
Twin-output models				E3X-DA11TW	E3X-DA41TW

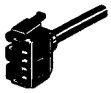
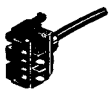
Amplifier Units with Standard Connectors

Item		Appearance	Applicable Connector (order separately)		Control output	Model	
						NPN output	PNP output
Standard models			Master	E3X-CN11	ON/OFF output	E3X-DA6	E3X-DA8
			Slave	E3X-CN12			
Monitor-output models			Master	E3X-CN21	ON/OFF output Monitor output	E3X-DA7	E3X-DA9
			Slave	E3X-CN22			
Mark-detecting models	Blue LED		Master	E3X-CN11	ON/OFF output	E3X-DAB6	E3X-DAB8
			Slave	E3X-CN12			
	Green LED		Master	E3X-CN11		E3X-DAG6	E3X-DAG8
			Slave	E3X-CN12			
Infrared models			Master	E3X-CN11		E3X-DAH6	E3X-DAH8
			Slave	E3X-CN12			
Twin-output models			Master	E3X-CN21		E3X-DA6TW	E3X-DA8TW
			Slave	E3X-CN22			

Amplifier Units with M8 Connectors

Item	Appearance	Applicable Connector (order separately)	Control output	Model	
				NPN output	PNP output
Standard models		XS3F-M421-40□-A XS3F-M422-40□-A	ON/OFF output	E3X-DA14V	E3X-DA44V

■ Amplifier Unit Connectors (Order Separately)

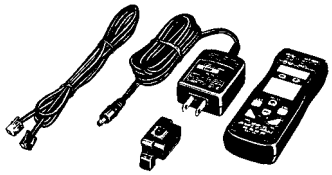
Item	Appearance	Cable length	No. of conductors	Model
Master Connector		2 m	3	E3X-CN11
			4	E3X-CN21
Slave Connector			1	E3X-CN12
			2	E3X-CN22

Note Stickers for Connectors are included as accessories.

■ Sensor I/O Connectors (Order Separately)

Size	Cable specifications	Appearance	Cable type		Model
M8	Standard cable	Straight connector 	2 m	Four-core cable	XS3F-M421-402-A
			5 m		XS3F-M421-405-A
		L-shaped connector 	2 m		XS3F-M422-402-A
			5 m		XS3F-M422-405-A

■ Mobile Console (Order Separately)

Appearance	Model	Remarks
	E3X-MC11	Mobile Console with head, cable, and AC adapter provided as accessories. Power supply method: chargeable battery
	E3X-MC11-C1	Mobile Console
	E3X-MC11-H1	Head
	E39-Z12-1	Cable (1. 5 m)

■ Combining Amplifier Units and Connectors

Refer to the following tables when placing an order. Basically Amplifier Units and Connectors are sold separately.

Amplifier Units		
Type	NPN	PNP
Standard models	E3X-DA6	E3X-DA8
Mark-detecting models	E3X-DAB6	E3X-DAB8
	E3X-DAG6	E3X-DAG8
Infrared models	E3X-DAH6	E3X-DAH8
Monitor-output models	E3X-DA7	E3X-DA9
Twin-output models	E3X-DA6TW	E3X-DA8TW

+

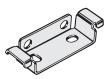
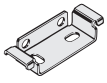
Applicable Connectors (Order Separately)	
Master Connector	Slave Connector
E3X-CN11 (3-wire)	E3X-CN12 (1-wire)
E3X-CN21 (4-wire)	E3X-CN22 (2-wire)

When Using 5 Amplifier Units

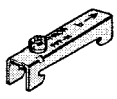
Amplifier Units (5 Units)	+	1 Master Connector + 4 Slave Connectors

■ Accessories (Order Separately)

Mounting Brackets

Appearance	Applicable model	Model	Quantity
	E3X-DA□-N E3X-DA□	**E39-L143**	1
	E3X-DA□V	**E39-L148**	1

End Plate

Appearance	Model	Quantity
	**PFP-M**	1

Operating Instructions Sticker

Model	Remarks
E39-Y1	Attach near the sensor.

Specifications: Amplifier Units

■ Ratings/Characteristics

Amplifier Units with Cables

Item		Standard models	Monitor-output models	Mark-detecting models		Infrared models	Water-resistant models	Twin-output models
Output type	NPN output	E3X-DA11-N	E3X-DA21-N	E3X-DAB11-N	E3X-DAG11-N	E3X-DAH11-N	E3X-DA11V	E3X-DA11TW
	PNP output	E3X-DA41-N	E3X-DA51-N	E3X-DAB41-N	E3X-DAG41-N	E3X-DAH41-N	E3X-DA41V	E3X-DA41TW
Light source (wavelength)		Red LED (660 nm)		Blue LED (470 nm)	Green LED (525 nm)	Infrared LED (870 nm)	Red LED (660 nm)	
Supply Voltage		12 to 24 VDC ± 10%, ripple (p-p) 10% max.						
Power consumption		Normally: 960 mW max. (current consumption: 40 mA max. at power supply voltage of 24 VDC) Eco Mode: 720 mW max. (current consumption: 30 mA max. at power supply voltage of 24 VDC) Digital display not lit: 600 mW max. (current consumption: 25 mA max. at power supply voltage of 24 VDC)						
Control output	ON/OFF output	NPN/PNP (depends on model) open collector; load current: 50 mA max.; residual voltage: 1 V max.; Light ON/Dark ON mode selector						
	Monitor output	---	Load 1 to 5 VDC, 10 kΩ min.	---				
Circuit protection		Reverse polarity, output short-circuit, mutual interference prevention (supported for up to 10 Units)						
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						Super-high-speed mode: 0.5 ms for operation and reset respectively Standard mode: 2 ms for operation and reset respectively Super-long-distance mode: 7 ms for operation and reset respectively
Sensitivity setting		Teaching or manual method						
Functions	Timer function	OFF-delay timer: 0 to 200 ms, 1 to 20 ms (set in 1 ms units); 20 to 200 ms (set in 5 ms units)						
	Automatic power control (APC)	Fiber-optic current digital control		---			Fiber-optic current digital control	
	Zero-reset	Display can be reset to zero when required (negative values can be displayed).						
	Initial reset	Settings can be returned to defaults as required.						
	Monitor focus	---	Upper and lower limits can be set as required for every 100 digital values.	---				
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 (receiver side)		Incandescent lamp: 10,000 lux max. Sunlight: 20,000 lux max.						
Ambient temperature		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 (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 MΩ min. (at 500 VDC)						
Dielectric strength (destruction)		1,000 VAC at 50/60 Hz for 1 minute						
Vibration resistance (destruction)		10 to 55 Hz with a 1.5-mm double amplitude for 2 hrs each in X, Y and Z directions						
Shock resistance (destruction)		500 m/s^2, for 3 times each in X, Y and Z directions						
Enclosure rating		IEC 60529 IP50 (with Protective Cover attached)					IEC 60529 IP66 (with Protective Cover attached)	IEC 60529 IP50 (with Protective Cover attached)
Connection method		Pre-wired (standard cable length: 2 m)						
Weight (packed state)		Approx. 100 g					Approx. 110 g	Approx. 100 g
Material	Case	Polybutylene terephthalate (PBT)						
	Cover	Polycarbonate					Polyethersulfone	Polycarbonate
Accessories		Instruction sheet						

Amplifier Units with Connectors

(Specifications different to those for Amplifier Units with cables)

Item		Standard models	Monitor-output models	Mark-detecting models		Infrared models	Water-resistant models (See note.)	Twin-output models
Output type	NPN output	E3X-DA6	E3X-DA7	E3X-DAB6	E3X-DAG6	E3X-DAH6	E3X-DA14V	E3X-DA6TW
	PNP output	E3X-DA8	E3X-DA9	E3X-DAB8	E3X-DAG8	E3X-DAH8	E3X-DA44V	E3X-DA8TW
Connection method		Standard connector					M8 connector	Standard connector
Weight (packed state)		Approx. 55 g					Approx. 65 g	Approx. 55 g

Note: The dielectric strength for water-resistant models is 500 VAC at 50/60 Hz for 1 minute.

Connectors

Item		E3X-CN11/21/22	E3X-CN12
Rated current		2.5 A	
Rated voltage		50 V	
Contact resistance		20 mΩ max. (20 mVDC max., 100 mA max.) (See note 1.)	
No. of insertions		50 times (See note 2.)	
Material	Housing	Polybutylene terephthalate (PBT)	
	Contacts	Phosphor bronze/gold-plated nickel	
Weight (packed state)		Approx. 55 g	Approx. 25 g

Note: **1.** The figure is for connection to the Amplifier Unit and the adjacent Connector. It does not include the conductor resistance of the cable.

2. The figure for the number of insertions is for connection to the Amplifier Unit and the adjacent Connector.

Mobile Console

Item	E3X-MC11
Supply voltage	Charged with AC adapter
Connection method	Connected via adapter
Weight (packed state)	Approx. 580 g (Console only: 120 g)

Ordering Information: Fiber Units

■ Through-beam Fiber Units

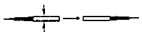
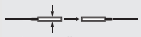
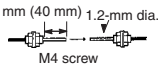
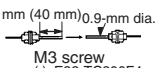
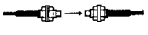
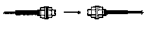
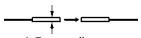
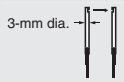
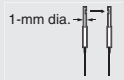
Refer to the end of the following table for notes and precautions.

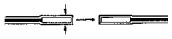
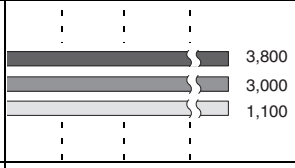
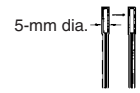
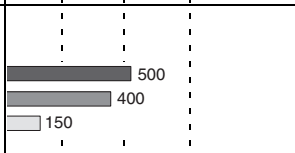
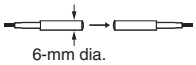
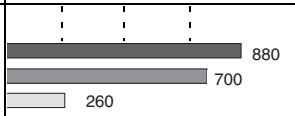
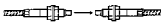
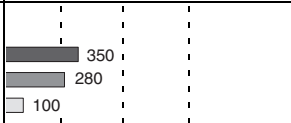
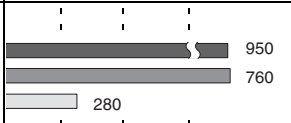
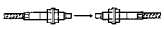
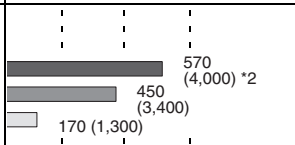
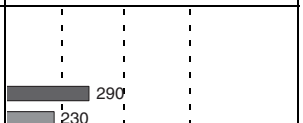
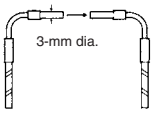
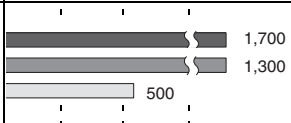
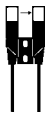
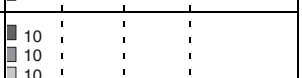
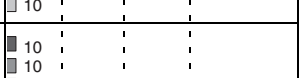
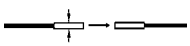
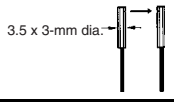
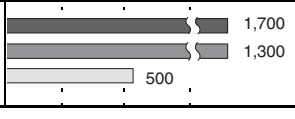
Note: Specifications for the E3X-DA□V and E3X-DA□TW are included in those for the E3X-DA□N, and specifications for the E3X-DAG□-N are included in those for the E3X-DAB□-N.

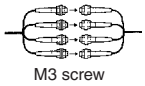
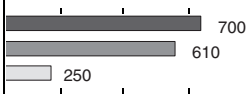
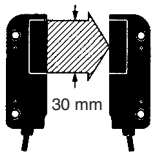
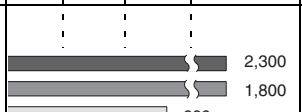
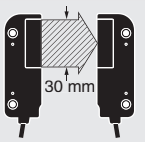
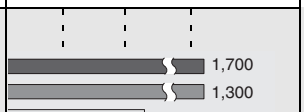
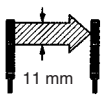
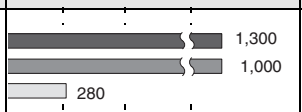
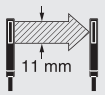
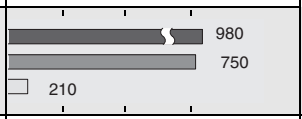
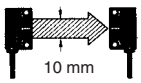
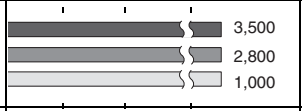
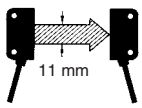
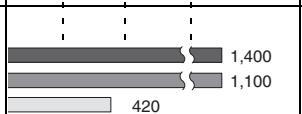
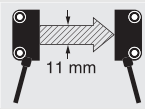
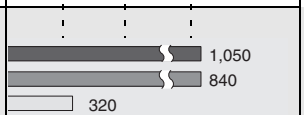
(Free-cut) Indicates models that allow free cutting. Models without this mark do not allow free cutting.

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

Application	Features	Appearance	Applicable Amplifier Unit	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 (Free-cut)	M4 screw	E3X-DA□-N	1,660 (4,000) 1,330 (3,200) 490 (1,200)	1.4-mm dia. (0.02-mm dia.)	E32-T11L	25 mm
			E3X-DAB11-N	150 120 75			
			E3X-DAH□-N	430 350 120			
	3-mm dia. (Free-cut)	3-mm dia.	E3X-DA□-N	1,660 1,330 490	1.4-mm dia. (0.01-mm dia.)	E32-T12L	
	M3 (Free-cut)	M3 screw	E3X-DA□-N	500 440 180	0.9-mm dia. (0.01-mm dia.)	E32-T21L	10 mm
	2-mm dia.; small diameter (Free-cut)	2-mm dia.	E3X-DA□-N	500 440 180		E32-T22L	
	M14; with lens; ideal for explosion-proof applications (Free-cut)	M14 screw	E3X-DA□-N	20,000 *1 20,000 *1 9,800	10-mm dia. (0.01-mm dia.)	E32-T17L	25 mm
General-purpose	M4 (Free-cut)	M4 screw	E3X-DA□-N	950 (4,000) *2 760 (4,000) *2 280 (2,100)	1.0-mm dia. (0.01-mm dia.)	E32-TC200	25 mm
			E3X-DAB11-N	100 (700) 75 (550) 45 (350)			
			E3X-DAH□-N	250 200 70			
	M4 screw (Free-cut)	M4 screw	E3X-DA□-N	670 (4,000) *2 530 (3,700) 200 (1,400)		E32-T11R	1 mm
	3-mm dia. (Free-cut)	3-mm dia.	E3X-DA□-N	670 530 200		E32-T12R	
	M3; possible to mount the reflective side-view conversion attachment E39-F5 (Free-cut)	M3 screw	E3X-DA□-N	850 680 250		E32-TC200A	25 mm
	M3; for detecting minute sensing objects (Free-cut)	M3 screw	E3X-DA□-N	250 220 90	0.5-mm dia. (0.01-mm dia.)	E32-TC200E	10 mm
			E3X-DAB11-N	25 20 10			
	M3 screw; small diameter (Free-cut)	M3 screw	E3X-DA□-N	150 130 50		E32-T21R	1 mm

Application	Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)	Standard object *3 (min. sensing object: opaque)	Model	Permissible bending radius
Thin fiber	2-mm dia.; for detecting minute sensing objects (Free-cut)	 2-mm dia.	E3X-DA□-N	250 220 90	0.5-mm dia. (0.01-mm dia.)	**E32-T22**	10 mm
	2-mm dia.; small diameter (Free-cut)	 2-mm dia.	E3X-DA□-N	150 130 50		**E32-T22R**	1 mm
	1.2-mm dia.; with sleeve (Free-cut)	 90 mm (40 mm) 1.2-mm dia. M4 screw ( ): E32-TC200B4	E3X-DA□-N	950 760 280	1.0-mm dia. (0.01-mm dia.)	**E32-TC200B** **E32-TC200B4**	25 mm
			E3X-DAB11-N	100 75 45			
	0.9-mm dia.; with sleeve (Free-cut)	 90 mm (40 mm) 0.9-mm dia. M3 screw ( ): E32-TC200F4	E3X-DA□-N	250 220 90	0.5-mm dia. (0.01-mm dia.)	**E32-TC200F** **E32-TC200F4**	10 mm
Flexible (resists breaking) (R4)	Ideal for mounting on moving sections (R4) (Free-cut)	 M4 screw	E3X-DA□-N	850 (4,000) *2 680 (3,600) 250 (1,300)	1.0-mm dia. (0.01-mm dia.)	**E32-T11**	4 mm
		 M3 screw	E3X-DA□-N	220 200 80	0.5-mm dia. (0.01-mm dia.)	**E32-T21**	
		 1.5-mm dia.	E3X-DA□-N	220 200 80		**E32-T22B**	
Side-view	Long distance; space-saving (Free-cut)	 3-mm dia.	E3X-DA□-N	570 460 170	1.0-mm dia. (0.01-mm dia.)	**E32-T14L**	25 mm
			E3X-DAB11-N	50 40 25			
			E3X-DAH□-N	150 120 40			
	Space-saving (Free-cut)	 3-mm dia.	E3X-DA□-N	270 210 90		**E32-T14LR**	1 mm
	Suitable for detecting minute sensing objects (Free-cut)	 1-mm dia.	E3X-DA□-N	150 130 55	0.5-mm dia. (0.01-mm dia.)	**E32-T24**	10 mm
	Suitable for detecting minute sensing objects; small diameter (Free-cut)	 1-mm dia.	E3X-DA□-N	60 50 25		**E32-T24R**	1 mm
	Screw-mounting type (Free-cut)		E3X-DA□-N	4,000 3,400 1,250	4.0-mm dia. (0.01-mm dia.)	**E32-T14**	25 mm
			E3X-DAB11-N	320 260 160			
			E3X-DAH□-N	1,120 900 330			

Application	Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)	Standard object *3 (min. sensing object: opaque)	Model	Permissible bending radius
Chemical-resistant	Fluororesin-covered; withstands chemicals and harsh environments (operating ambient temperature: –30°C to 70°C) (Free-cut)	 5-mm dia.	E3X-DA□-N	 3,800 3,000 1,100	4.0-mm dia. (0.01-mm dia.)	**E32-T12F**	40 mm
	Fluororesin covered; side-view; withstands chemicals and harsh environments (operating ambient temperature: –30°C to 70°C) (Free-cut)	 5-mm dia.	E3X-DA□-N	 500 400 150	3.0-mm dia. (0.01-mm dia.)	**E32-T14F**	
	Fluororesin; withstands chemicals and harsh environments (operating ambient temperature: –40°C to 200°C)	 6-mm dia.	E3X-DA□-N	 880 700 260	1.0-mm dia. (0.01-mm dia.)	**E32-T81F**	10 mm
Heat-resistant	Resists 200°C; flexible (R10); fiber sheath material: fluororesin (operating ambient temperature: –40°C to 200°C)	 M4 screw	E3X-DA□-N	 350 280 100	1.0-mm dia. (0.01-mm dia.)	**E32-T81R**	10 mm
	Resists 150°C *4; fiber sheath material: fluororesin (operating ambient temperature: –40°C to 150°C) (Free-cut)	 M4 screw	E3X-DA□-N	 950 760 280	1.5-mm dia. (0.01-mm dia.)	**E32-T51**	35 mm
	Resists 300°C *5, with spiral tube; high mechanical strength; fiber sheath material: stainless steel (operating ambient temperature: –40°C to 300°C)	 M4 screw	E3X-DA□-N	 570 (4,000) *2 450 (3,400) 170 (1,300)	1.0-mm dia. (0.01-mm dia.)	**E32-T61**	25 mm
	Side-view; resists 150°C *4; suitable for detecting minute sensing objects; fiber sheath material: fluororesin (operating ambient temperature: –40°C to 150°C) (Free-cut)	 2-mm dia.	E3X-DA□-N	 290 230 80		**E32-T54**	35 mm
	Resists 200°C *5; L-shaped; fiber sheath material: stainless steel	 3-mm dia.	E3X-DA□-N	 1,700 1,300 500	1.7-mm dia. (0.01-mm dia.)	**E32-T84S**	25 mm
Slot Sensor	Suitable for film sheet detection; no optical axis adjustment required; easy to mount (Free-cut)		E3X-DA□-N	 10 10 10	4.0-mm dia. (2.0-mm dia.)	**E32-G14**	25 mm
			E3X-DAB11-N	 10 10 10			
			E3X-DAH□-N	 10 10 10			
Narrow vision field	Suitable for detecting wafers; (Free-cut)	 3-mm dia.	E3X-DA□-N	 2,300 1,900 700	1.7-mm dia. (0.01-mm dia.)	**E32-T22S**	10 mm
	Side-view; suitable for detecting wafer (Free-cut)	 3.5 x 3-mm dia.	E3X-DA□-N	 1,700 1,300 500	2.0-mm dia. (0.01-mm dia.)	**E32-T24S**	

Application	Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)	Standard object *3 (min. sensing object: opaque)	Model	Permissible bending radius
Area sensing	**Multi-point detection (4-head)**		E3X-DA□-N		2.0-mm dia. (0.01-mm dia.)	**E32-M21**	25 mm
	Detects in a 30-mm area (Free-cut)		E3X-DA□-N		(0.3-mm dia.) *6	**E32-T16W**	10 mm
			E3X-DA□-N			**E32-T16WR**	1 mm
	Side-view; suitable for applications with limited spatial depth (Free-cut)		E3X-DA□-N		(0.2-mm dia.) *6	**E32-T16J**	10 mm
			E3X-DA□-N			**E32-T16JR**	1 mm
	Suitable for detecting over a 10-mm area; long distance (Free-cut)		E3X-DA□-N		(0.6-mm dia.) *7	**E32-T16**	25 mm
	Stable for detecting minute sensing objects in a wide area; degree of protection: IEC60529 IP50 (Free-cut)		E3X-DA□-N		(0.2-mm dia.) *6	**E32-T16P**	10 mm
			E3X-DA□-N			**E32-T16PR**	1 mm

*1The E32-T17L allows a longer sensing distance because its optical fiber length is 10 m.

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

*3Indicates values for standard mode.

*4For continuous operation, use the products within a temperature range of –40°C to 130°C.

*5Indicates the heat-resistant temperature at the fiber tip.

*6These figures are for a sensing distance of 300 mm. (Figures for the diameter of sensing objects are in the still state.)

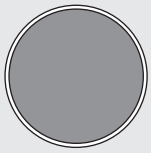
*7These figures are ones for which detection is possible in each sensing area at a digital incident level of 1,000. (Figures for the diameter of sensing objects are in the still state.)

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).
3. Greater freedom with wiring at no loss in light intensity enabled by a comprehensive lineup of flexible fiber models (permissible bending radius: 1 mm). Refer to the following illustration.

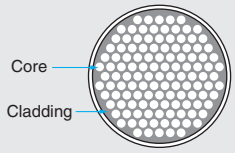
Flexible fiber models are indicated by an "R" at the end of the model number.

Flexible fiber contains multiple cores. These cores are all surrounded by cladding, giving a minimum bending radius of 1 mm. The fiber can be bent at right angles without affecting the light intensity. Handle it just like any other cable.



Conventional Fiber

Conventional fiber uses just one core and one cladding section. Bending the fiber may break it or reduce the light intensity.



Flexible Fiber

Flexible fiber contains multiple independent cores all surrounded by cladding. The fiber can be bent without breaking or reducing the light intensity.

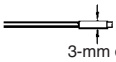
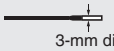
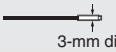
■ Fiber Units with Reflective Sensors

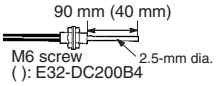
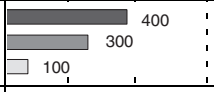
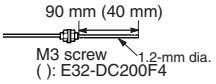
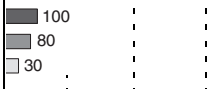
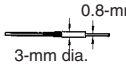
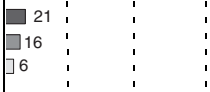
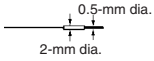
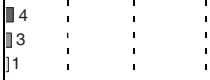
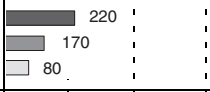
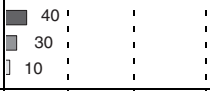
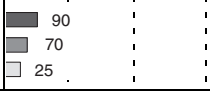
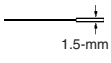
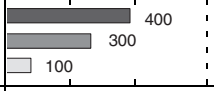
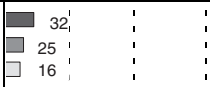
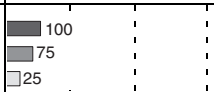
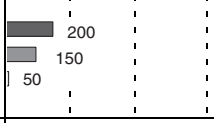
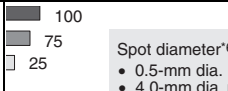
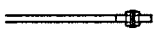
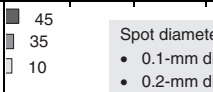
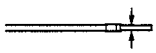
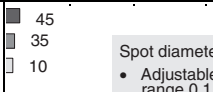
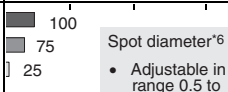
Refer to the end of the following table for notes and precautions.

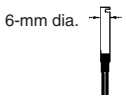
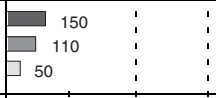
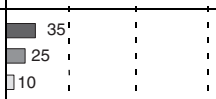
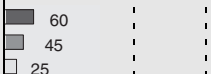
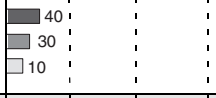
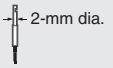
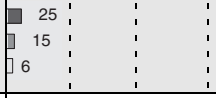
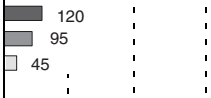
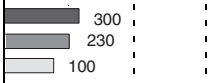
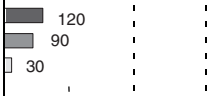
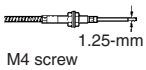
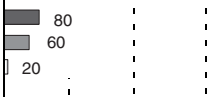
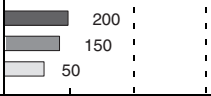
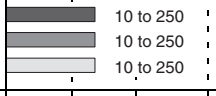
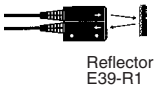
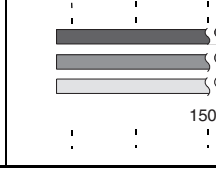
Note: Specifications for the E3X-DA□V and E3X-DA□TW are included in those for the E3X-DA□N, and specifications for the E3X-DAG□-N are included in those for the E3X-DAB□-N.

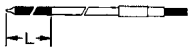
(Free-cut) Indicates models that allow free cutting. Models without this mark do not allow free cutting.

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

Application	Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm) *1	Standard object (min. sensing object *2: Gold wire)	Model	Permissible bending radius
Long distance	M6 (Free-cut)	 M6 screw	E3X-DA□-N	500 / 400 / 150	500×500 (0.01-mm dia.)	**E32-D11L**	25 mm
			E3X-DAB11-N	44 / 35 / 22	100×100 (0.1-mm dia.)		
			E3X-DAH□-N	130 / 100 / 30	200×200 (0.01-mm dia.)		
	3-mm dia.; small diameter (Free-cut)	 3-mm dia.	E3X-DA□-N	300 / 230 / 100	300×300 (0.01-mm dia.)	**E32-D12**	
	M4 (Free-cut)	 M4 screw	E3X-DA□-N	160 / 130 / 45	200×200 (0.01-mm dia.)	**E32-D21L**	10 mm
	3-mm dia.; small diameter (Free-cut)	 3-mm dia.	E3X-DA□-N	160 / 130 / 45		**E32-D22L**	
General-purpose	M6 (Free-cut)	 M6 screw	E3X-DA□-N	400 / 300 / 100	400×400 (0.01-mm dia.)	**E32-DC200**	25 mm
			E3X-DAB11-N	32 / 25 / 16	100×100 (0.1-mm dia.)		
			E3X-DAH□-N	100 / 75 / 25	100×100 (0.01-mm dia.)		
	M6 (Free-cut)	 M6 screw	E3X-DA□-N	220 / 170 / 80	300×300 (0.01-mm dia.)	**E32-D11R**	1 mm
	3-mm dia. (Free-cut)	 3-mm dia.	E3X-DA□-N	220 / 170 / 80		**E32-D12R**	
	M3; small diameter (Free-cut)	 M3 screw	E3X-DA□-N	100 / 80 / 30	100×100 (0.01-mm dia.)	**E32-DC200E**	10 mm
			E3X-DAB11-N	8 / 6 / 4	25×25 (0.2-mm dia.)		
	M3; small diameter (Free-cut)	M3 screw	E3X-DA□-N	40 / 30 / 10	50×50 (0.01-mm dia.)	**E32-D21R**	1 mm
	3-mm dia.; small diameter (Free-cut)	 3-mm dia.	E3X-DA□-N	40 / 30 / 10		**E32-D22R**	

Application	Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm) *1	Standard object (min. sensing object *2: Gold wire)	Model	Permissible bending radius
Thin fiber	2.5-mm dia.; with sleeve (Free-cut)		E3X-DA□-N		400×400 (0.01-mm dia.)	E32-DC200B E32-DC200B4	25 mm
			E3X-DAB11-N		100×100 (0.1-mm dia.)		
	1.2-mm dia.; with sleeve (Free-cut)		E3X-DA□-N		100×100 (0.01-mm dia.)	E32-DC200F E32-DC200F4	10 mm
	0.8-mm dia.; for detecting minute sensing objects (Free-cut)		E3X-DA□-N		25×25 (0.01-mm dia.)	E32-D33	4 mm
	0.5-mm dia.; for detecting minute sensing objects		E3X-DA□-N			E32-D331	
Flexible (resists breaking) (R4)	Ideal for mounting on moving sections (R4) (Free-cut)		E3X-DA□-N		300×300 (0.01-mm dia.)	E32-D11	4 mm
	(Free-cut)		E3X-DA□-N		50×50 (0.01-mm dia.)	E32-D21	
	(Free-cut)		E3X-DA□-N		100×100 (0.01-mm dia.)	E32-D21B	
			E3X-DA□-N		50×50 (0.01-mm dia.)	E32-D22B	
Coaxial	M6 coaxial; high-precision positioning (Free-cut)		E3X-DA□-N		500×500 (0.01-mm dia.)	E32-CC200	25 mm
			E3X-DAB11-N		100×100 (0.1-mm dia.)		
			E3X-DAH□-N		100×100 (0.01-mm dia.)		
	3-mm dia.; small diameter; coaxial; high-precision positioning (Free-cut)		E3X-DA□-N		300×300 (0.01-mm dia.)	E32-D32L	
	M3 coaxial; high-precision positioning (Free-cut)		E3X-DA□-N	 Spot diameter*6 • 0.5-mm dia. • 4.0-mm dia. max.	100×100 (0.01-mm dia.)	E32-C31	
	M3 coaxial; high-precision positioning		E3X-DA□-N	 Spot diameter*6 • 0.1-mm dia. • 0.2-mm dia. • 4.0-mm dia. max.	50×50 (0.01-mm dia.)	E32-C41	
	2-mm dia. coaxial; high-precision positioning		E3X-DA□-N	 Spot diameter*6 • Adjustable in the range 0.1 to 0.6-mm dia.		E32-C42	
	2-mm dia. coaxial; high-precision positioning (Free-cut)		E3X-DA□-N	 Spot diameter*6 • Adjustable in the range 0.5 to 1.0-mm dia.	100×100 (0.01-mm dia.)	E32-D32	

Application	Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm) *1	Standard object (min. sensing object *2: Gold wire)	Model	Permissible bending radius
Side-view	**6-mm dia.; long distance** (Free-cut)		E3X-DA□-N		200×200 (0.01-mm dia.)	**E32-D14L**	25 mm
			E3X-DAH□-N		50×50 (0.01-mm dia.)		
	6-mm dia. (Free-cut)		E3X-DA□-N		100×100 (0.01-mm dia.)	**E32-D14LR**	1 mm
	2-mm dia.; small diameter space-saving (Free-cut)		E3X-DA□-N		50×50 (0.01-mm dia.)	**E32-D24**	10 mm
			E3X-DA□-N			**E32-D24R**	1 mm
Chemical-resistant	**Fluororesin-covered; withstands chemicals and harsh environments (operating ambient temperature: –30°C to 70°C)** (Free-cut)		E3X-DA□-N		200×200 (0.01-mm dia.)	**E32-D12F**	40 mm
Heat-resistant	**Resists 150°C *3; fiber sheath material: fluororesin (operating ambient temperature: –40°C to 150°C)** (Free-cut)		E3X-DA□-N		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)		E3X-DA□-N			**E32-D61**	25 mm
	Resists 400°C *4; fiber sheath material: stainless steel (operating ambient temperature: –40°C to 400°C)		E3X-DA□-N		100×100 (0.01-mm dia.)	**E32-D73**	
Area sensing	**Side-view; detection over wide areas** (Free-cut)		E3X-DA□-N		300×300 (0.01-mm dia.)	**E32-D36P1**	25 mm
Retroreflective	**Transparent object detection** (Free-cut)		E3X-DA□-N		35-mm dia. (0.1-mm dia.)	**E32-R21 + E39-R3 (Attachment)**	10 mm
	Transparent object detection (operating ambient temperature: –25°C to 55°C); degree of protection: IEC60529 IP66 (Free-cut)		E3X-DA□-N		35-mm dia. (0.2-mm dia.)	**E32-R16 + E39-R1 (Attachment)**	25 mm

Application	Features	Appearance	Applicable Amplifier Unit	Sensing distance (mm) *1	Standard object (min. sensing object *2: Gold wire)	Model	Permissible bending radius
Limited reflective	Suitable for positioning crystal glass (Free-cut)		E3X-DA□-N	4 to 12	100×100 Soda glass with reflection factor of 7%	**E32-L56E1** **E32-L56E2**	35 mm
	Detects wafers and small differences in height; (operating ambient temperature: –40°C to 105°C); degree of protection: IEC60529 IP50 (Free-cut)		E3X-DA□-N	4±2 4±2 4±2	25×25 (0.01-mm dia.)	**E32-L24L**	10 mm
			E3X-DA□-N	7.2±1.8 7.2±1.8 7.2±1.8		**E32-L25L**	
	Detects wafers and small differences in height; degree of protection: IEC60529 IP50 (Free-cut)		E3X-DA□-N	3.3 3.3 3.3		**E32-L25**	25 mm
			E3X-DA□-N	3.3 3.3 3.3		**E32-L25A**	
Fluid-level detection	Fluid contact type: unbendable section L 150 mm, 350 mm (two types)		E3X-DA□-N	---	Pure water at 25°C	**E32-D82F1** **E32-D82F2**	40 mm
	Tube-mounting type (Free-cut)		E3X-DA□-N	---	Fluid	**E32-L25T**	10 mm

*1Sensing distance indicates values for white paper.

*2Indicates values for standard mode.

*3For continuous operation, use the products within a temperature range of –40°C to 130°C.

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

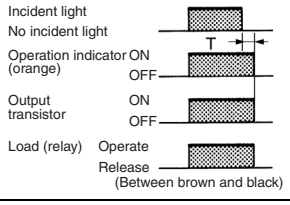
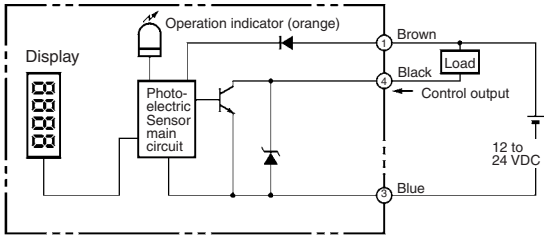
*5The values indicated are for use with a Lens Unit (order separately).

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.

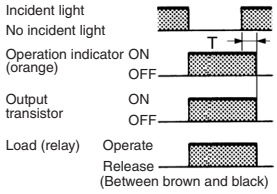
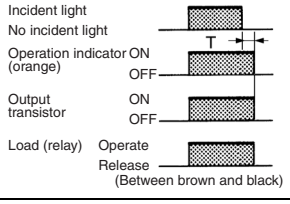
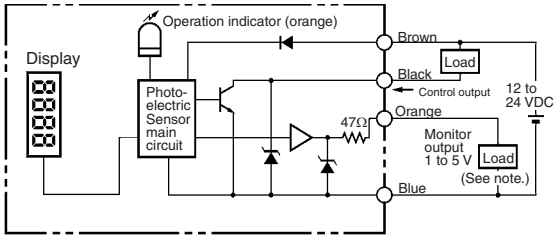
2. When set to the maximum sensitivity setting for the internal reflective light, incident light may continue to be received. In such case, use under two-point teaching or without-object teaching.

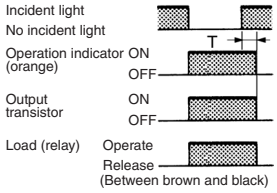
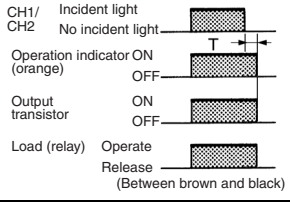
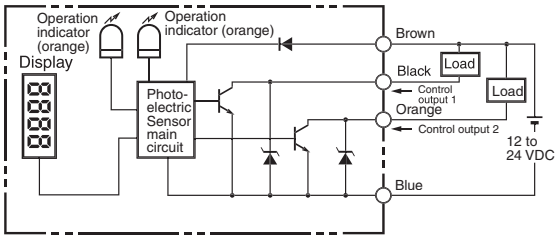
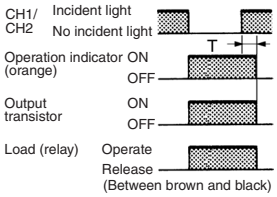
Output Circuits

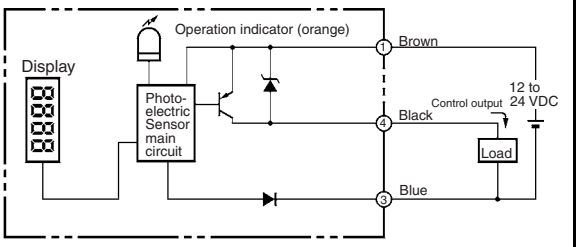
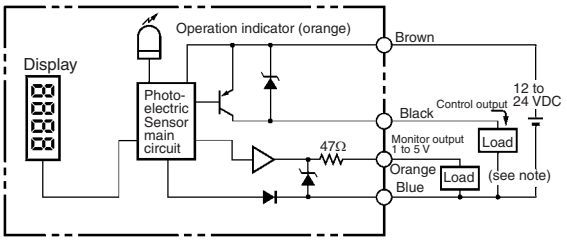
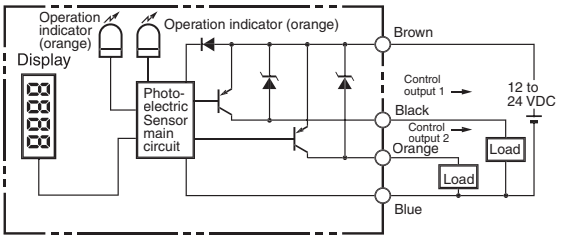
Refer to the end of the following table for notes and precautions.

<table>
<tr><th>Output</th><th>Model</th><th>Mode selector</th><th>Timing chart</th><th>State of output transistor</th><th>Output circuit</th></tr>
<tr><td rowspan="5">NPN</td><td rowspan="2">E3X-DA11-N
E3X-DAB11-N
E3X-DAG11-N
E3X-DAH11-N
E3X-DA11V
E3X-DA6
E3X-DAB6
E3X-DAG6
E3X-DAH6
E3X-DA14V</td><td>LIGHT ON (L/ON)</td><td> 
</td><td>Light ON</td><td rowspan="2"> 

Connector Pin Arrangement

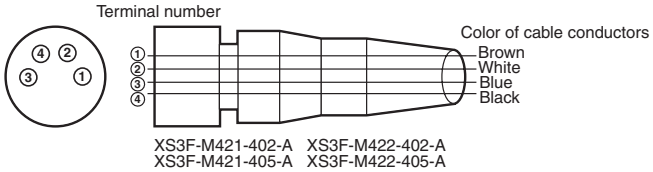

Note: Pin 2 is not used.</td></tr>
<tr><td>DARK ON (D/ON)</td><td> 
</td><td>Dark ON</td></tr>
<tr><td rowspan="2">E3X-DA21-N
E3X-DA7</td><td>LIGHT ON (L/ON)</td><td> 
</td><td>Light ON</td><td rowspan="2"> 

Note: Load resistance: 10 kΩ min.</td></tr>
<tr><td>DARK ON (D/ON)</td><td> 
</td><td>Dark ON</td></tr>
<tr><td rowspan="2">E3X-DA11TW
E3X-DA6TW</td><td>LIGHT ON (L/ON)</td><td> 
</td><td>Light ON</td><td rowspan="2"> 
</td></tr>
<tr><td>DARK ON (D/ON)</td><td> 
</td><td>Dark ON</td></tr>
</table>

Output	Model	Mode selector	Timing chart	State of output transistor	Output circuit
PNP	E3X-DA41-N E3X-DAB41-N E3X-DAG41-N E3X-DAH41-N E3X-DA41V E3X-DA8 E3X-DAB8 E3X-DAG8 E3X-DAH8 E3X-DA44V	LIGHT ON (L/ON)	Incident light No incident light Operation indicator (orange) ON / OFF Output transistor ON / OFF Load (relay) Operate / Release (Between blue and black)	Light ON	 Connector Pin Arrangement  **Note:** Pin 2 is not used.
		DARK ON (D/ON)	Incident light No incident light Operation indicator (orange) ON / OFF Output transistor ON / OFF Load (relay) Operate / Release (Between blue and black)	Dark ON	
	E3X-DA51-N E3X-DA9	LIGHT ON (L/ON)	Incident light No incident light Operation indicator (orange) ON / OFF Output transistor ON / OFF Load (relay) Operate / Release (Between blue and black)	Light ON	 **Note:** Load resistance: 10 kΩ min.
		DARK ON (D/ON)	Incident light No incident light Operation indicator (orange) ON / OFF Output transistor ON / OFF Load (relay) Operate / Release (Between blue and black)	Dark ON	
	E3X-DA41TW E3X-DA8TW	LIGHT ON (L/ON)	CH1/CH2 Incident light / No incident light Operation indicator (orange) ON / OFF Output transistor ON / OFF Load (relay) Operate / Release (Between blue and black)	Light ON	
		DARK ON (D/ON)	CH1/CH2 Incident light / No incident light Operation indicator (orange) ON / OFF Output transistor ON / OFF Load (relay) Operate / Release (Between blue and black)	Dark ON	

Note: With E3X-DA□TW models, only channel 1 is output when set for area sensing operation.
LIGHT ON: ON when the incident level is between the thresholds for channels 1 and 2.
DARK ON: OFF when the incident level is between the thresholds for channels 1 and 2. (Channel 2 is always OFF.)

Connectors (Sensor I/O Connectors)

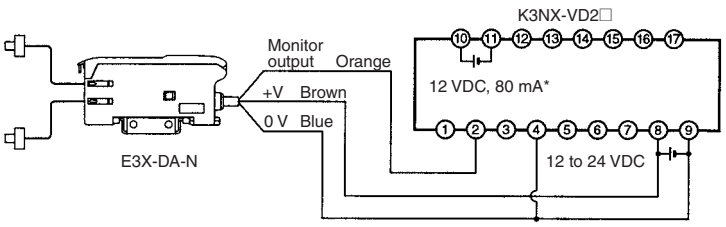


Classification	Color of cable conductors	Connection pin number	Application
DC	Brown	1	Power supply (+V)
	White	2	---
	Blue	3	Power supply (0 V)
	Black	4	Output

Note: Pin 2 is not used.

Connection

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.

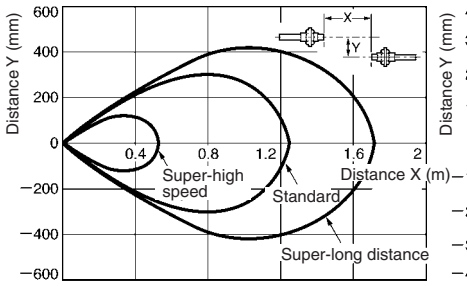
Engineering Data (Typical)

■ E3X-DA□-N/E3X-DA□V/E3X-DA□TW

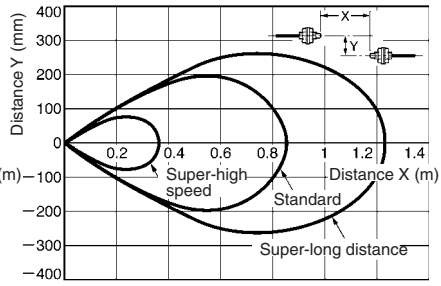
Parallel Operating Range

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

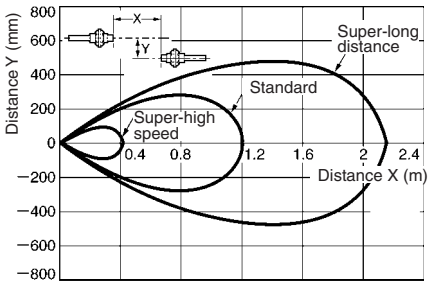
E32-TC200 (Through-beam)



E32-T11R (Through-beam)



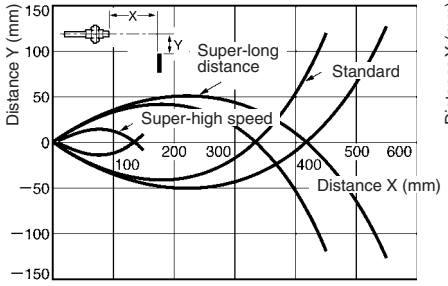
E32-T11 (Through-beam)



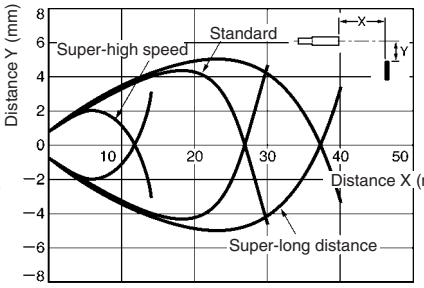
Operating Range

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

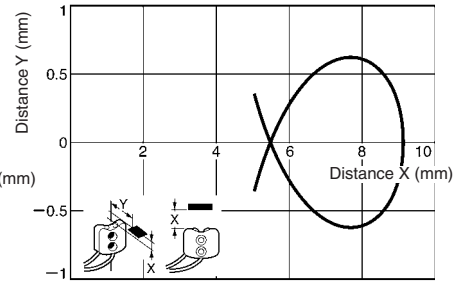
E32-DC200 (Reflective)



E32-D33 (Reflective)



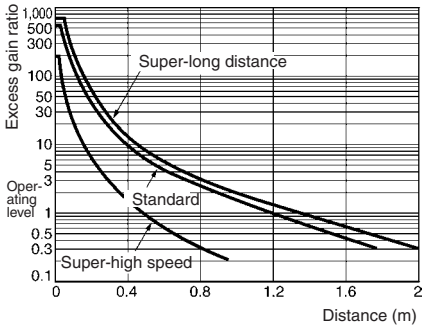
E32-L25L (Limited Reflective)



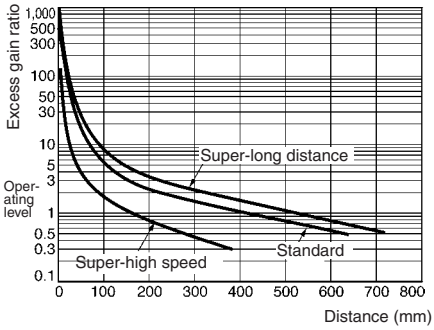
Excess Gain Ratio vs. Distance

With standard sensing object. At max. sensitivity.

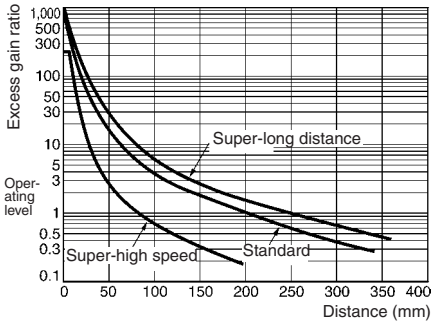
E32-TC200 (Through-beam)



E32-DC200 (Reflective)

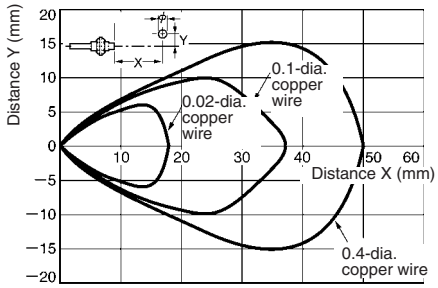


E32-D21L (Reflective)

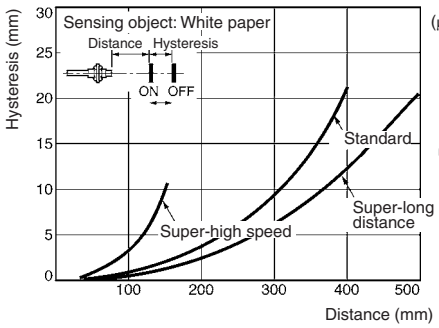


■E3X-DA□-N/E3X-DA□V/E3X-DA□TW

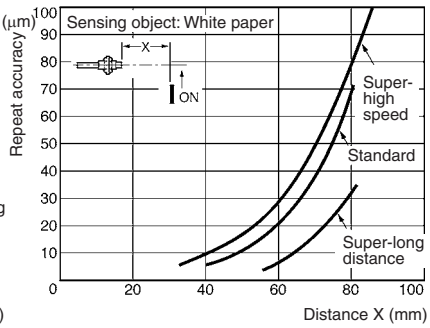
Sensing Distance vs. Operating Range
E32-DC200 (Reflective)



Hysteresis vs. Sensing Distance
E32-D11L (Reflective)

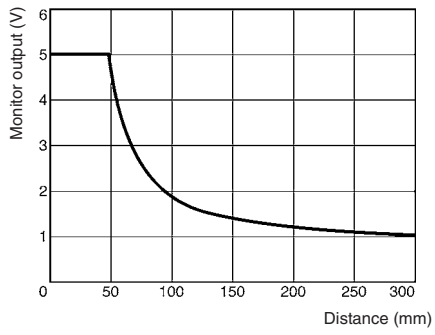


Repeat Accuracy vs. Sensing Distance
E32-DC200 (Reflective)



Monitor Output vs. Distance (Standard Mode)

E32-TC200 (Through-beam)



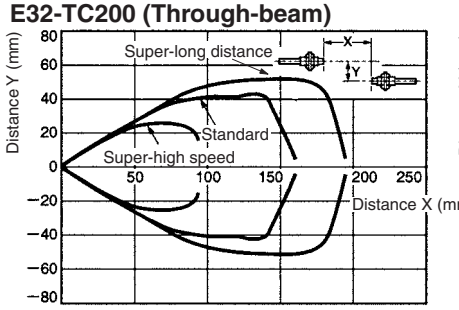
E32-DC200 (Reflective)

■ E3X-DAB□-N/E3X-DAG□-N

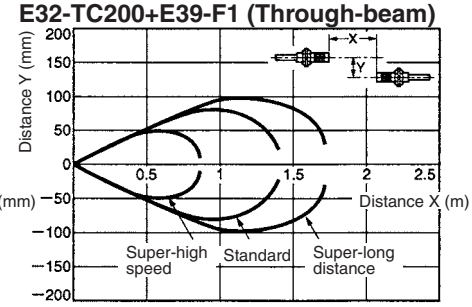
Parallel Operating Range

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

E32-TC200 (Through-beam)



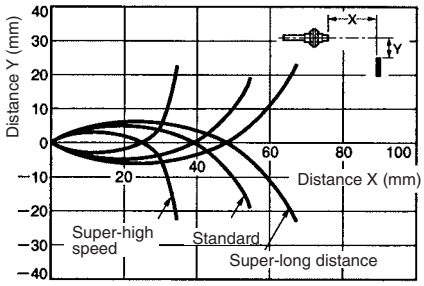
E32-TC200+E39-F1 (Through-beam)



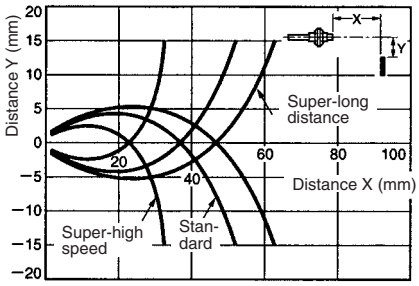
Operating Range

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

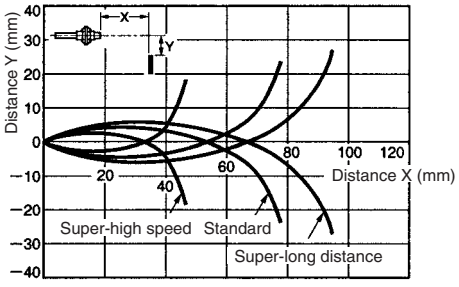
E32-DC200 (Reflective)



E32-CC200 (Reflective)



E32-D11L (Limited Reflective)

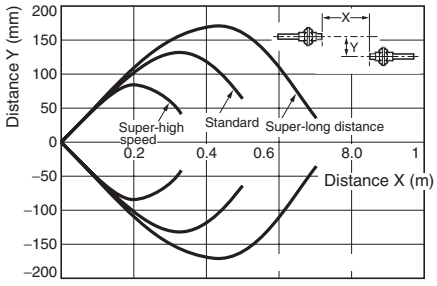


■ E3X-DAH-N

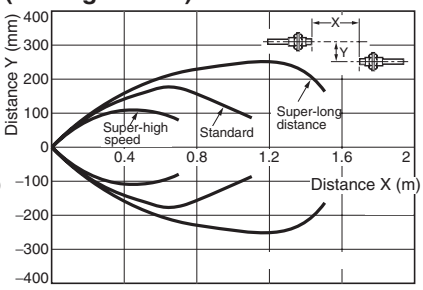
Parallel Operating Range

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

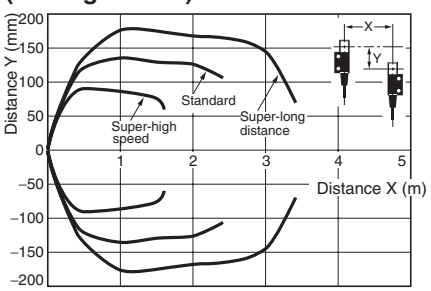
E32-TC200 (Through-beam)



E32-T11L (Through-beam)



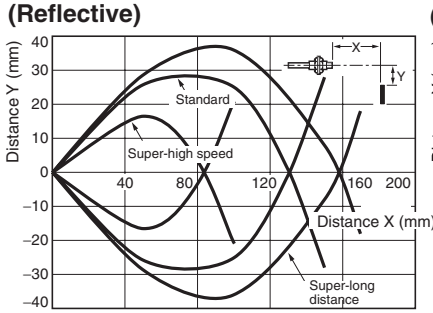
E32-T14 (Through-beam)



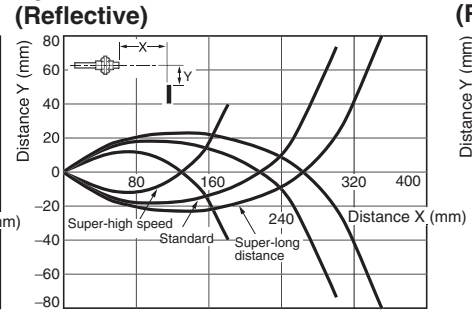
Operating Range

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

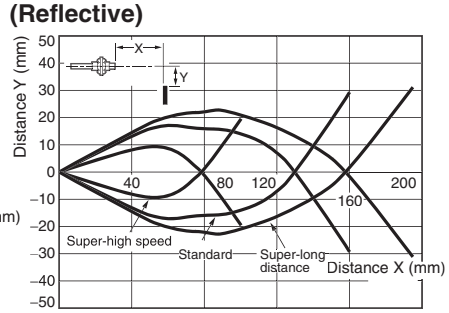
E32-DC200 (Reflective)



E32-D11L (Reflective)



E32-CC200 (Reflective)

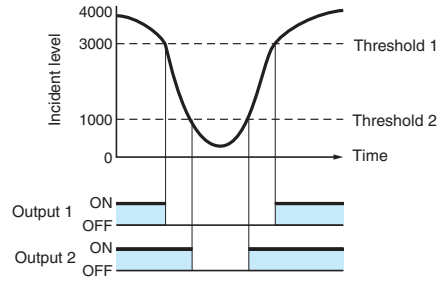


Technical Reference (for E3X-DA-TW Twin-output Models)

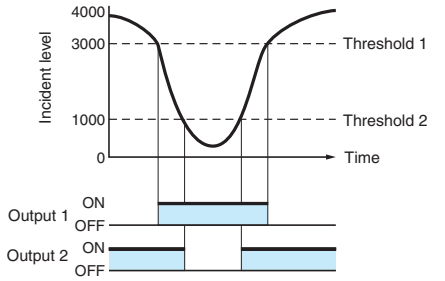
Output Patterns for Normal Operation

Outputs 1 and 2 can be set to operate independently and either Light ON mode or Dark ON mode can be selected (independently) for channels 1 and 2 making a total of 4 possible output patterns (In the following examples, threshold 1 is set to 3,000, and threshold 2 is set to 1,000.).

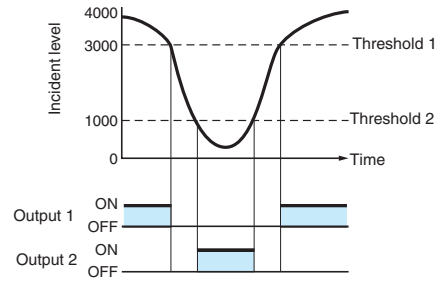
Threshold 1: Light ON; Threshold 2: Light ON



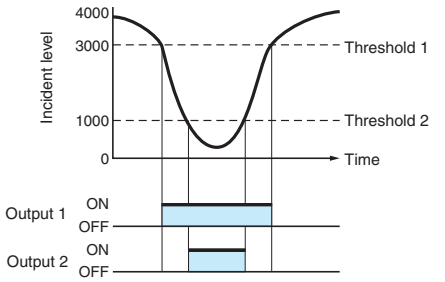
Threshold 1: Dark ON; Threshold 2: Light ON



Threshold 1: Light ON; Threshold 2: Dark ON



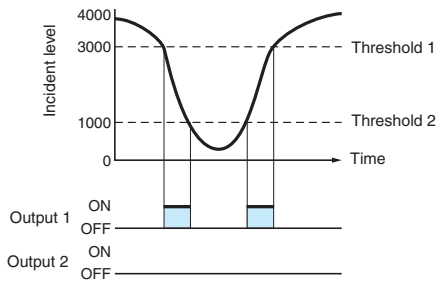
Threshold 1: Dark ON; Threshold 2: Dark ON



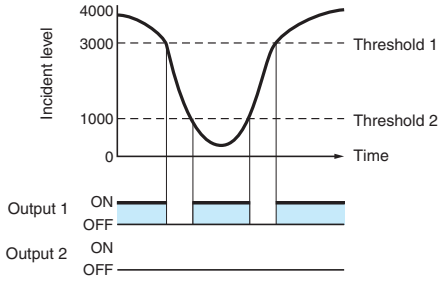
Output Patterns for Area Sensing

This series includes models equipped with area sensing functionality, a first for Digital Fiber Amplifiers. This functionality can be used to monitor whether the incident level is inside or outside the threshold area. The 2 output patterns below are possible for this kind of operation.

ON inside threshold area



ON outside threshold area



Note: Output 2 is always OFF.

Application

■ Wiring Precautions

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

Power Supply Voltage

Do not impose any voltage exceeding the rated voltage on the E3X-DA-N. Do not impose AC power (100 VAC) on models that operate with DC. In both cases, the E3X-DA-N may rupture or burn.

Load Short-circuits

Do not short-circuit the load connected to the E3X-DA-N, otherwise the E3X-DA-N may rupture or burn.

Polarity

When supplying power to the E3X-DA-N, make sure that the polarity of the power is correct, otherwise the E3X-DA-N may rupture or burn.

No-load Operation

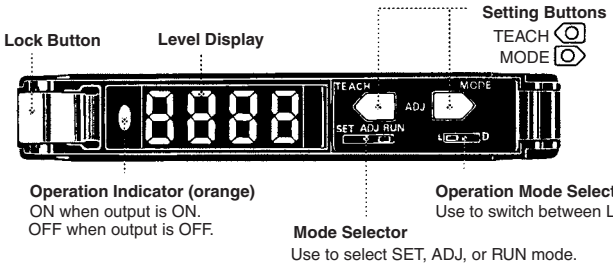
A load must be connected to the E3X-DA-N during operation, otherwise internal elements may rupture or burn. Always wire through a load.

Operating Environment

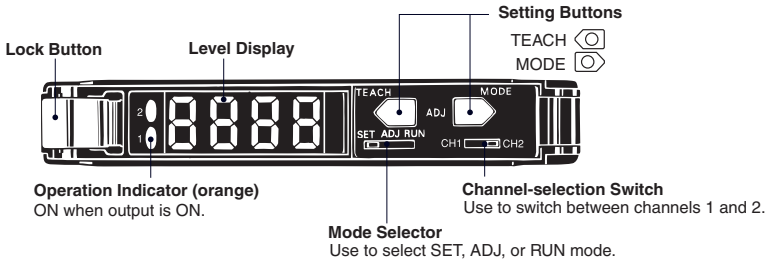
- Do not use the Amplifier Unit or Sensor in places with flammable or explosive gas.
- Do not use the Amplifier Unit or Sensor underwater.
- Do not disassemble, repair, or modify the Amplifier Unit or Sensor.

■ Amplifier Units

Nomenclature: Standard, Monitor-output, Mark-detecting, Infrared, and Water-resistant Models



Nomenclature: Twin-output Models



Installation

Turning Power ON

The Sensor is ready to operate within 200 ms after the power supply is turned ON. If the Sensor and load are connected to power supplies separately, be sure to turn ON the power supply to the Sensor first.

Power Supply Type

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

Wiring

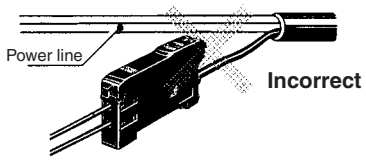
Cable

The cable can be extended, provided that the extension wire applied is at least 0.3 mm^2 thick and the total distance no more than 100 m.

Do not pull the cable with a force exceeding 30 N.

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 as far as possible 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, otherwise faulty operation may result from the switching noise of the power supply.

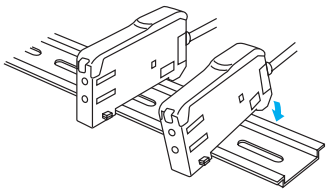
M8 Metal Connectors (Water-resistant Models)

- Turn OFF the power before inserting or removing connectors.
- Hold the connector cover when inserting or removing the connector.
- Tighten the fixing screws by hand. Using tools such as pliers may cause damage.
- The applicable tightening torque range is 0.3 to 0.4 N·m. If tightening is insufficient, the enclosure rating may not be maintained, and vibrations may cause the connector to come loose.

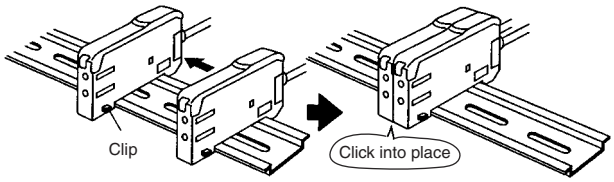
Mounting

Joining Amplifier Units

1. Mount the Amplifier Units one at a time onto the DIN track.



2. Slide the Amplifier Units together, line up the clips, and press the Amplifier Units together until they click into place.



Separating Amplifier Units

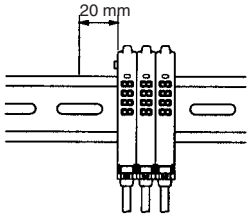
Slide Amplifier Units away from each other, and remove from the DIN track one at a time. (Do not attempt to remove Amplifier Units from the DIN track without separating them first.)

Note: **1.** The specifications for ambient temperature will vary according to the number of Amplifier Units used together. For details, refer to *Ratings/Characteristics*.

2. Always turn OFF the power supply before joining or separating Amplifier Units.

Mounting the Mobile Console Head

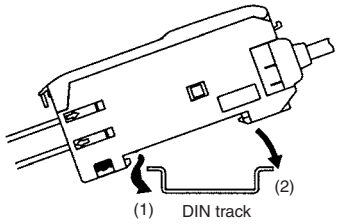
Leave a gap of at least 20 mm between the nearest Amplifier Unit and the Mobile Console head.



Mounting

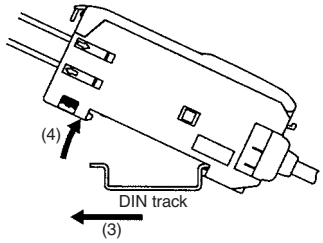
1. Mount the front part on the mounting bracket (order separately) or a DIN track.
2. Press the back part onto the mounting bracket or the DIN track.

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

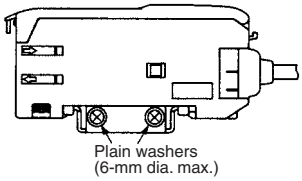


Dismounting

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



When side-mounting using a mounting bracket, secure the mounting bracket to the Amplifier Unit and then mount using M3 screws. Use plain washers of diameter 6 mm or less when mounting.



Adjustment

Mutual Interference Protection Function

There may be some instability in the digital display values due to light from other sensors. If this occurs, decrease the sensitivity (i.e., increase the threshold) to perform stable detection.

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.

Optical Communications

Several Amplifier Units can be slid together and used in groups. Do not, however, slide the Amplifier Units or attempt to remove any of the Amplifier Units during operation.

Hysteresis Adjustment

The hysteresis setting can be adjusted using the Mobile Console. Do not, however, set the hysteresis to a value lower than the factory setting. Using a setting less than the factory setting may result in incorrect operation.

Operating Environment

Water Resistance

Although the E3X-DA□V has water-resistant specifications, if dirt (via water) adheres to the hole for optical communications, it may prevent normal communications. As a countermeasure, regularly (e.g., when performing inspections) wipe the area around the hole with a dry cloth.

Ambient Conditions

If dust or dirt adheres to the hole for optical communications, it may prevent normal communications. Be sure to remove any dust or dirt before using the Units.

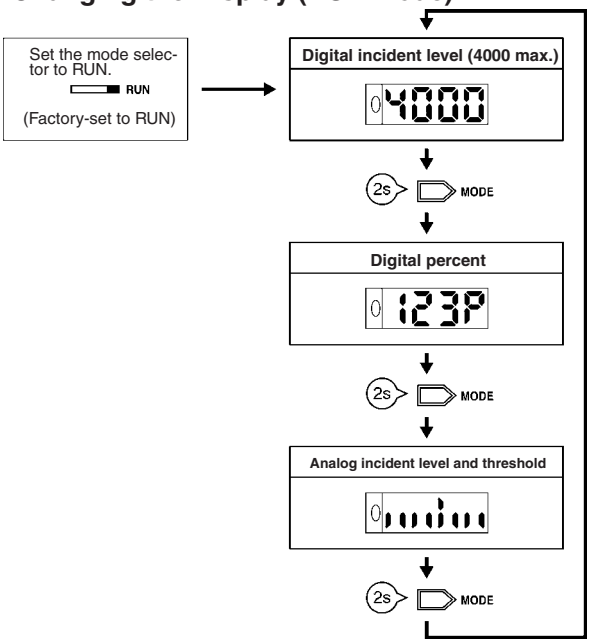
Miscellaneous

Ratings and Specifications

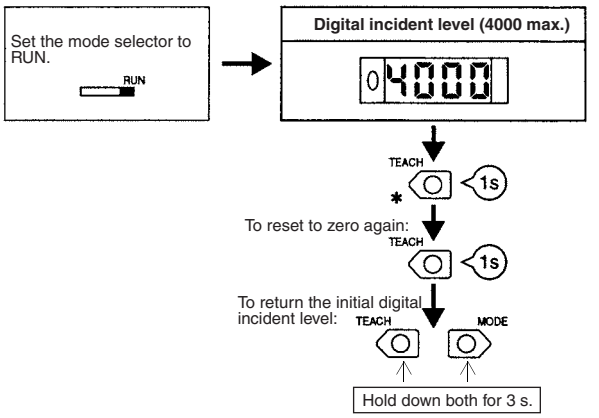
The ratings and performance specifications for items such as the minimum sensing object and characteristics are based on products taken at random from certain production lots. Use this data as reference only.

Amplifier Adjustments: All Models

Changing the Display (RUN Mode)

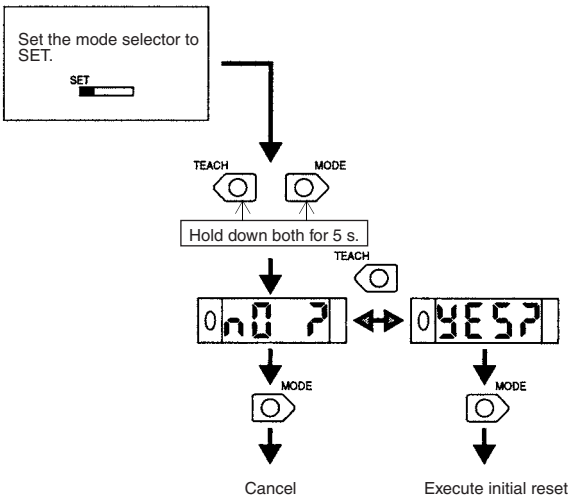


Zero-reset (RUN Mode)



Note: There is no limit on the number of times zero-reset can be used.

Initial Reset (SET Mode)



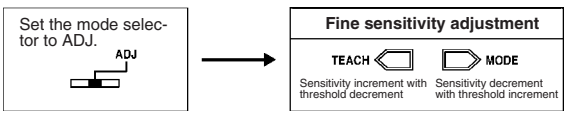
Manual Tuning (Fine Sensitivity Adjustment) in ADJ Mode

Perform fine sensitivity adjustment after teaching and manual tuning (without using the teaching function) in the way shown below:

Twin-output Models

First, select the channel to be adjusted using the channel selection switch.

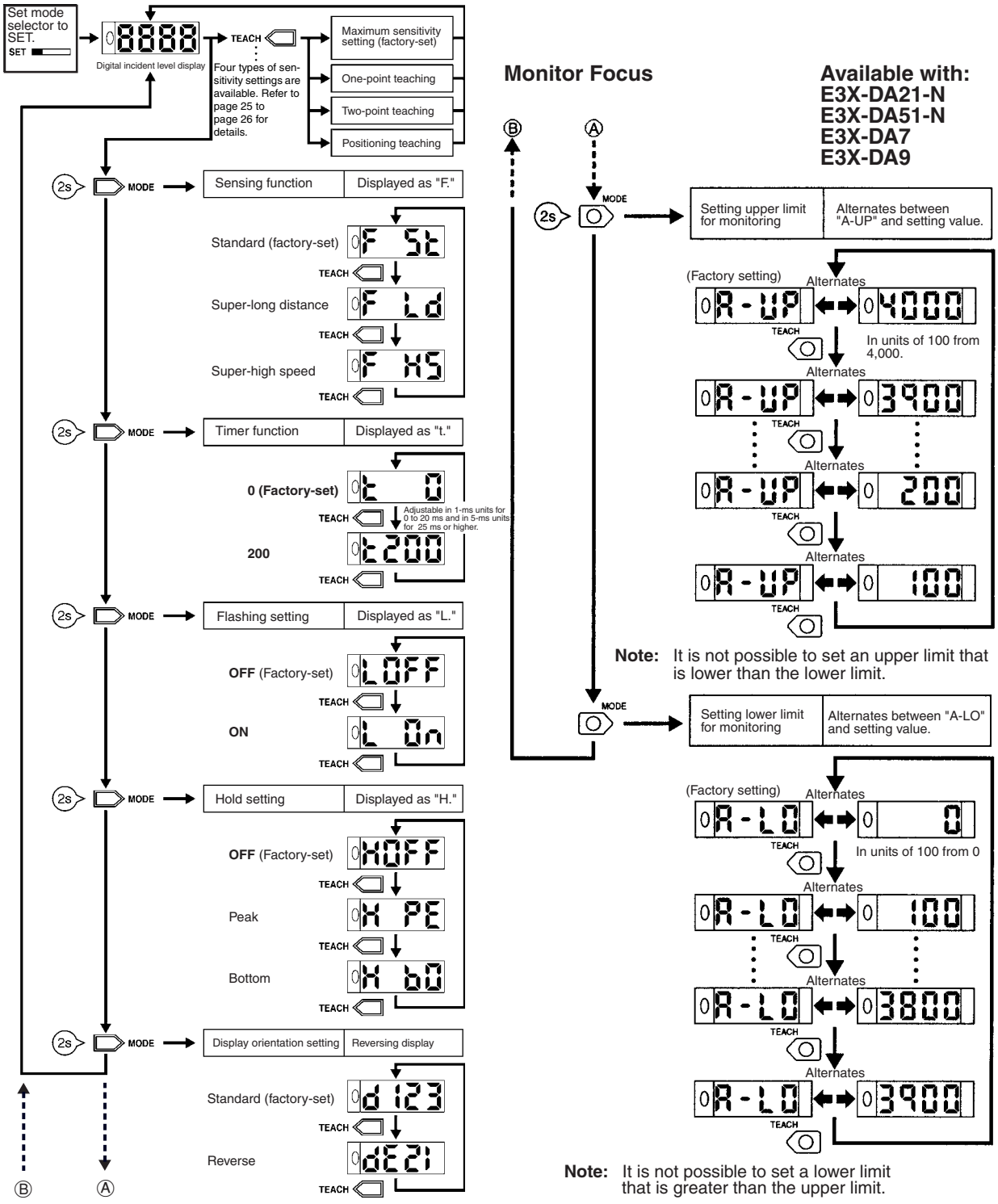
CH1 CH2



The items displayed in ADJ mode vary with the display setting in RUN mode.

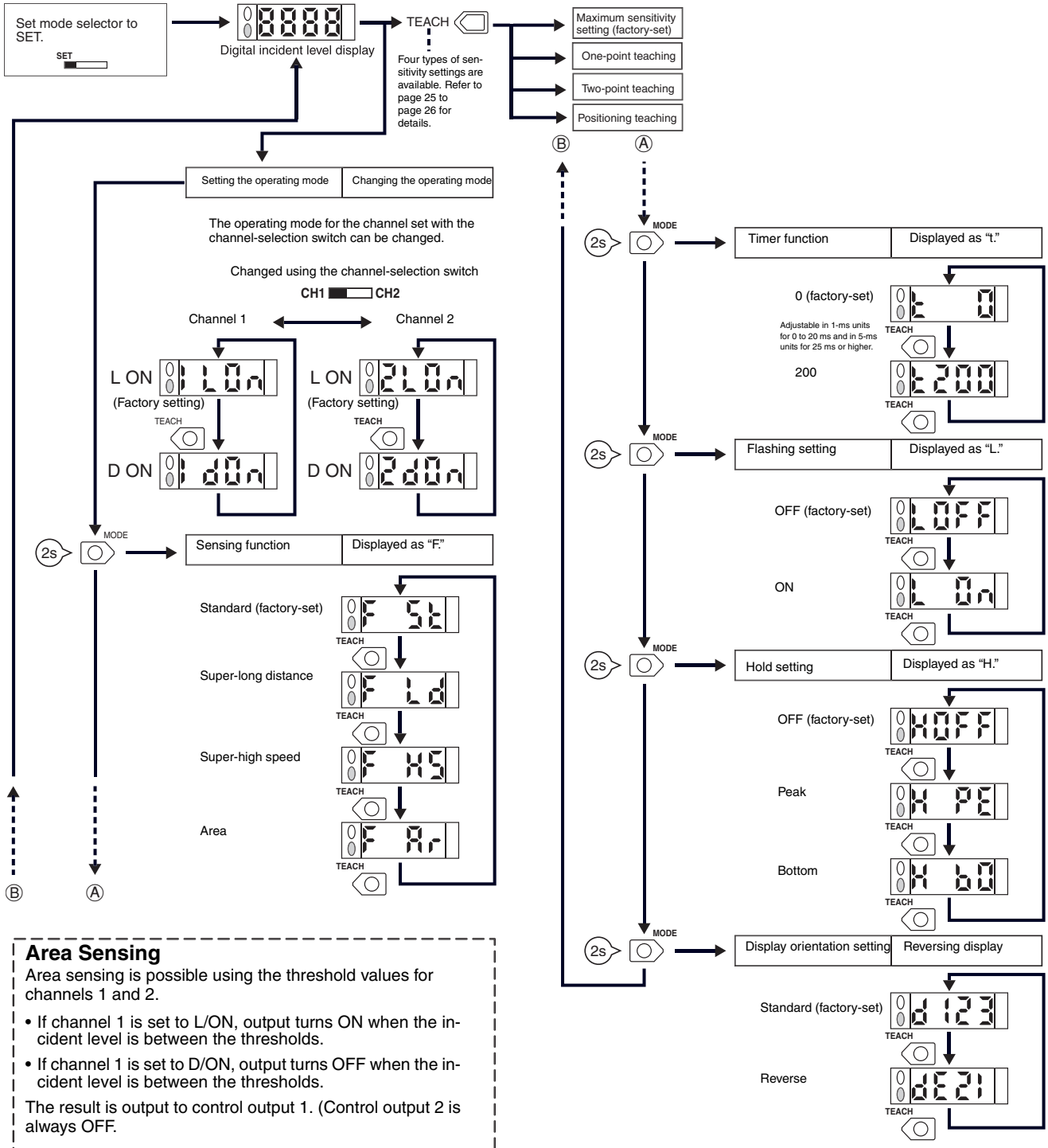
RUN mode	ADJ mode
Digital incident level	Digital threshold
Digital percent	Digital percent
Analog value	Analog value

Setting Functions in SET Mode



Adjustments: Twin-output Models Only

Setting Functions (SET Mode)



Area Sensing

Area sensing is possible using the threshold values for channels 1 and 2.

- If channel 1 is set to L/ON, output turns ON when the incident level is between the thresholds.
- If channel 1 is set to D/ON, output turns OFF when the incident level is between the thresholds.

The result is output to control output 1. (Control output 2 is always OFF.

Adjustments: Teaching (All Models, SET Mode)

The four types of teaching given below 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.

With twin-output models, switch to the channel to be adjusted using the channel-selection switch.

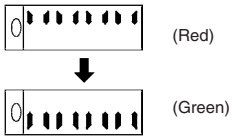
Set the mode selector to SET to start teaching.

Maximum Sensitivity Setting

1. Set the mode selector to SET.

2. Press the TEACH button for 3 seconds min.

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

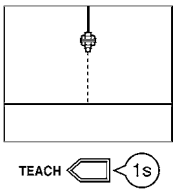


4. Set to RUN mode.

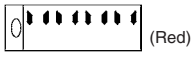
One-point Without-object Teaching

1. Set the mode selector to SET.

2. Press the TEACH button for approximately 1 second.

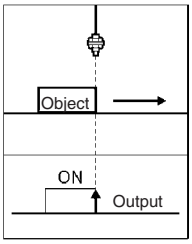


3. Teaching is complete when the red level display is lit.
   The level display will display the digital incident level later.



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

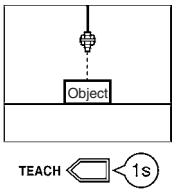
Operation mode		Operation
Light ON	L• ON	L (Factory-set)
Dark ON	D• ON	D

Note: There is no operation mode selector for twin-output models.

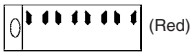
Two-point With/Without-object Teaching

1. Set the mode selector to SET.

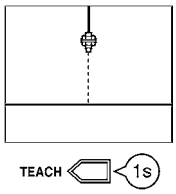
2. Press the TEACH button for approximately 1 second when the object is at the sensing position.



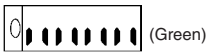
3. The red level display is lit.



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.



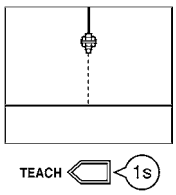
6. Set to RUN mode.

Note: The order of “with-object” and “without-object” setting procedures above can be reversed.

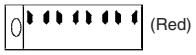
Pin-point Teaching (for Positioning)

1. Set the mode selector to SET.

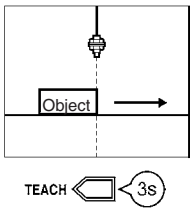
2. Press the TEACH button for approximately 1 second with no object.



3. The red level display is lit.



4. Place the object in the desired position, and press the TEACH button for 3 seconds min.



5. Teaching is complete when the green level display is lit. The level display will display the digital incident level later. (The red level display will flash if a teaching error occurs.)

6. Set to RUN mode.

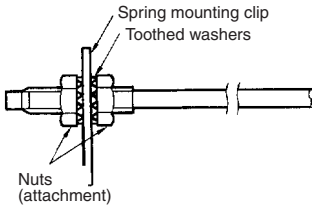
■ Fiber Units

Mounting

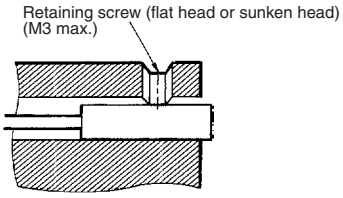
Tightening Force

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

Screw-mounting Model

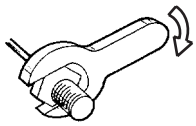


Cylindrical Model



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. fluororesin model	0.78 N • m max.
E32-D12F 6-mm dia. fluororesin model	
E32-T16	0.49 N • m max.
E32-R21	0.39 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.

Use a proper-sized wrench.

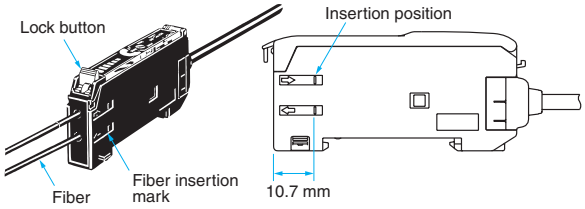


Fiber Connection and Disconnection

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

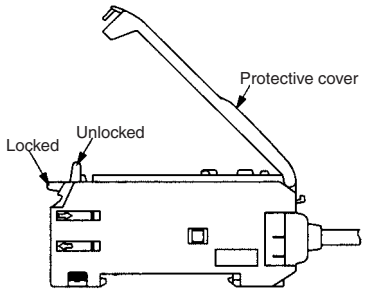
1. Connection

Open the protective cover, insert the fibers according to the fiber insertion marks on the side of the Amplifier Unit, and lower the lock button.



2. Disconnection

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



Note: To maintain the fiber properties, confirm that the lock is released before removing the fiber.

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.

Cutting Fiber

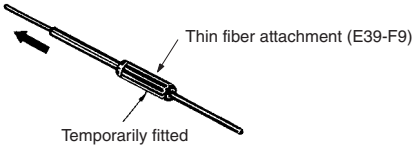
Insert a fiber into the Fiber Cutter and determine the length of the fiber to be cut.

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

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.

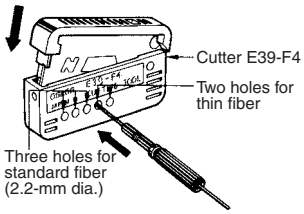
Cut a thin fiber as follows:

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

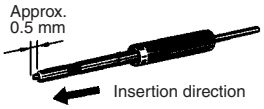


2. Secure the attachment after adjusting the position of it in the direction indicated by the arrow.

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



4. Finished state (proper cutting state)



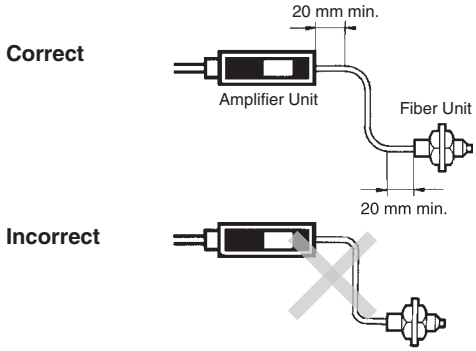
Note: Insert the fiber in the direction indicated by the arrow.

Connection

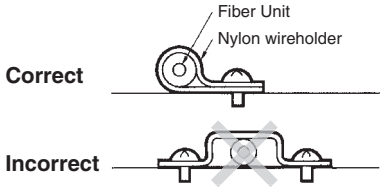
Do not pull or press the Fiber Units. The Fiber Units have a withstand force of 9.8 N or 29.4 N max. (pay utmost attention because the fibers are thin).

Do not bend the Fiber Unit beyond the permissible bending radius given under *Specifications: Amplifier Units* on page 4.

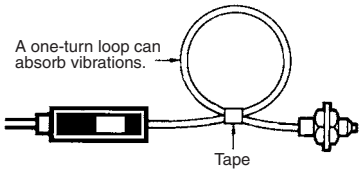
Do not bend the edge of the Fiber Units (excluding the E32-T□R and E32-D□R).



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:

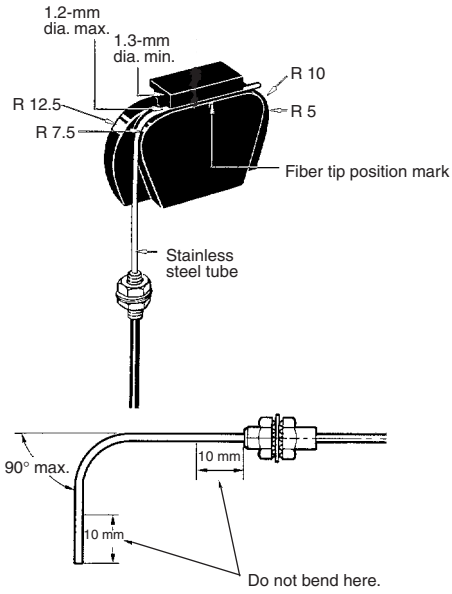


Bending Radius

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).

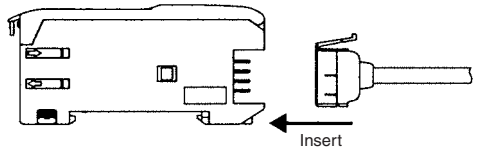


■ Amplifier Units with Connectors

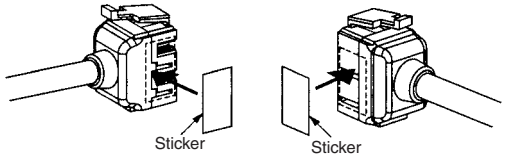
Mounting

Mounting Connectors

1. Insert the Master or Slave Connector into the Amplifier Unit until it clicks into place.



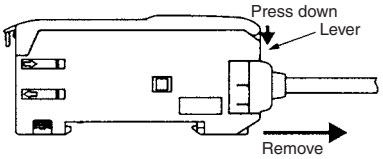
2. Join Amplifier Units together as required after all the Master and Slave Connectors have been inserted.
3. Attach the stickers (provided as accessories) to the sides of Master and Slave Connectors that are not connected to other Connectors.



Note: Attach the stickers to the sides with grooves.

Removing Connectors

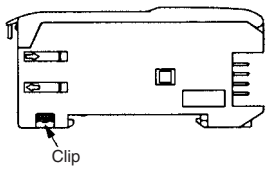
1. Slide the slave Amplifier Unit(s) for which the Connector is to be removed away from the rest of the group.
2. After the Amplifier Unit(s) has been separated, press down on the lever on the Connector and remove it. (Do not attempt to remove Connectors without separating them from other Amplifier Units first.)



Mounting End Plate (PFP-M)

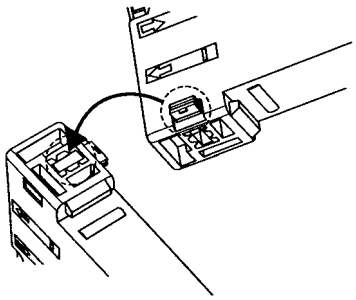
Depending on how it is mounted, an Amplifier Unit may move during operation. In this case, use an End Plate.

Before mounting an End Plate, remove the clip from the master Amplifier Unit using a nipper or similar tool.

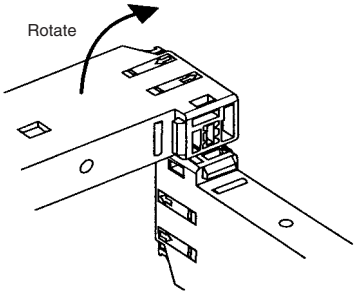


The clip can also be removed using the following mechanism, which is incorporated in the construction of the section underneath the clip.

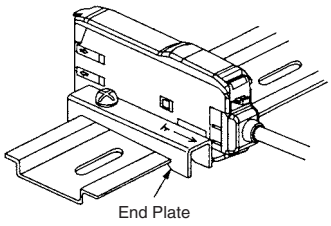
1. Insert the clip to be removed into the slit underneath the clip on another Amplifier Unit.



2. Remove the clip by rotating the Amplifier Unit.



When using the E3X-DA-N with the Mobile Console, mount the End Plate in the way shown below.



Pull Strengths for Connectors (Including Cables)

E3X-CN11, E3X-CN21, E3X-CN22: 30 N max.
E3X-CN12: 12 N max.

■ Reflector

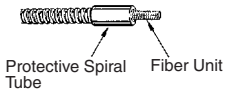
Use of E39-R3 Reflector

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.

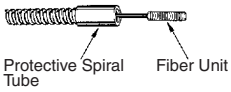
The E39-R3 cannot be used in places where it is exposed to oil or chemicals.

E39-F32□ Protective Spiral Tubes

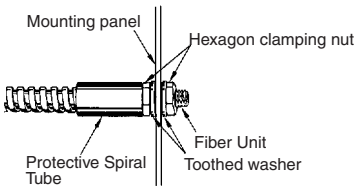
Insert a fiber to the Protective Spiral Tube from the head connector side (screwed) of the tube.



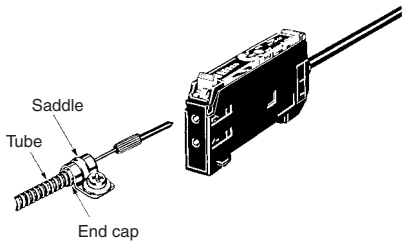
Push the fiber into the Protective Spiral Tube. The tube should be straight so that the fiber is not twisted when inserted. Then turn the end cap of the spiral tube.



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

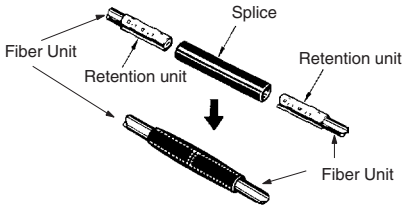


Use the attached saddle to secure the end cap of the Protective Spiral Tube. To secure the Protective Spiral Tube at a position other than the end cap, apply tape to the tube so that the portion becomes thicker in diameter.



E39-F10 Fiber Connector

Mount the Fiber Connector as shown in the following illustration.



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

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

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

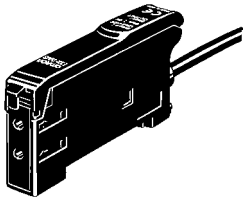
Dimensions

Note: All units are in millimeters unless otherwise indicated.

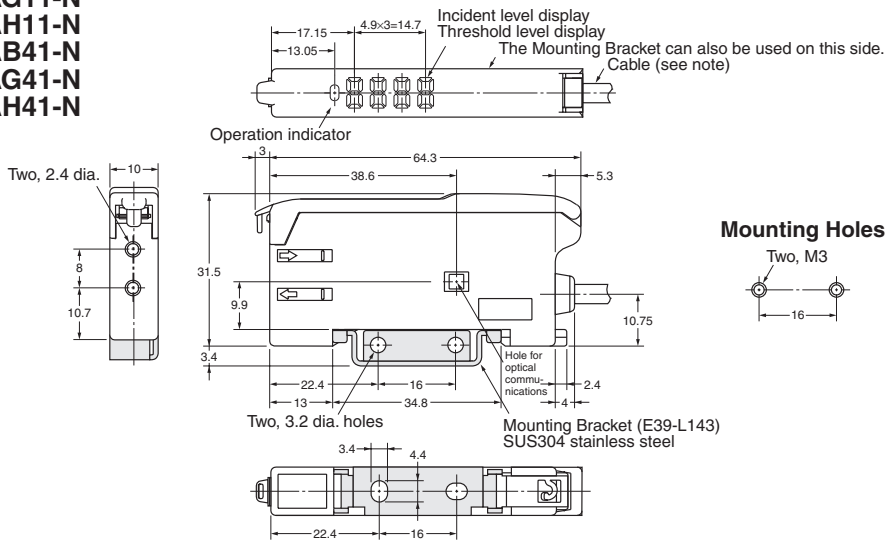
■ Amplifier Units

Amplifier Units with Cables

E3X-DA11-N **E3X-DAG11-N**
E3X-DA21-N **E3X-DAH11-N**
E3X-DAB11-N **E3X-DAB41-N**
E3X-DA41-N **E3X-DAG41-N**
E3X-DA51-N **E3X-DAH41-N**



With Mounting Bracket Attached

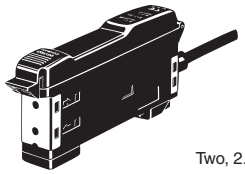


Note: E3X-DA11-N/DA41-N/DAB11-N: A 4-dia., 3-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.2 mm^2; insulation diameter: 1.1 mm) is used.
Standard length: 2 m.

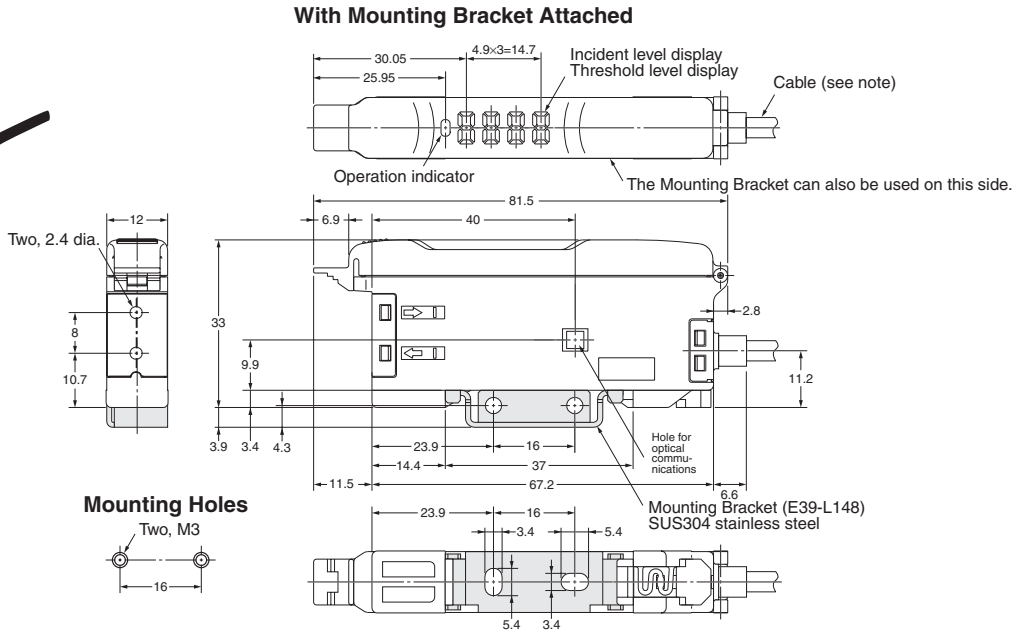
E3X-DA21-N/DA51-N: A 4-dia., 4-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.2 mm^2; insulation diameter: 1.1 mm) is used.
Standard length: 2 m.

Amplifier Units with Cables, Water-resistant Models

E3X-DA11V
E3X-DA41V



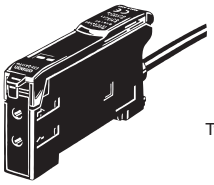
With Mounting Bracket Attached



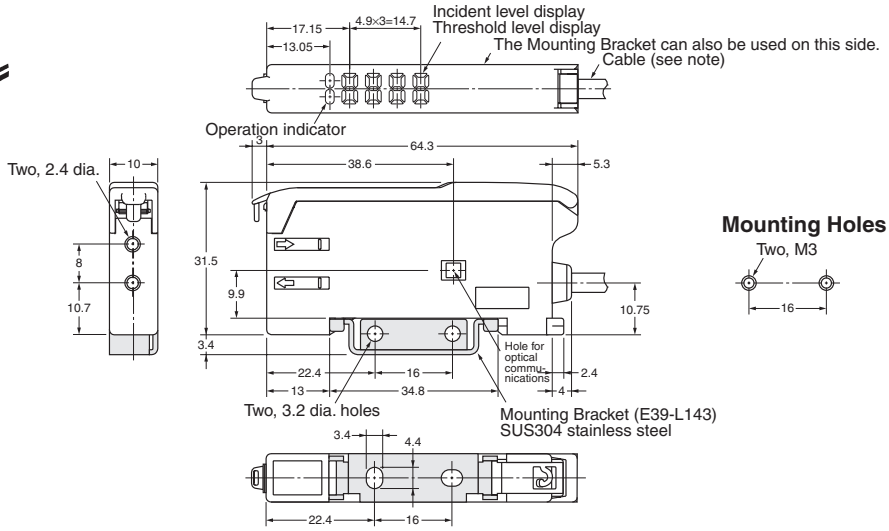
Note: A 4-dia., 3-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.2 mm^2; insulation diameter: 1.1 mm) is used.
Standard length: 2 m.

Amplifier Units with Cables, Twin-output Models

E3X-DA11TW
E3X-DA41TW



With Mounting Bracket Attached

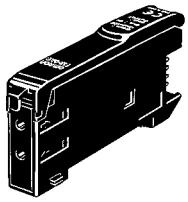


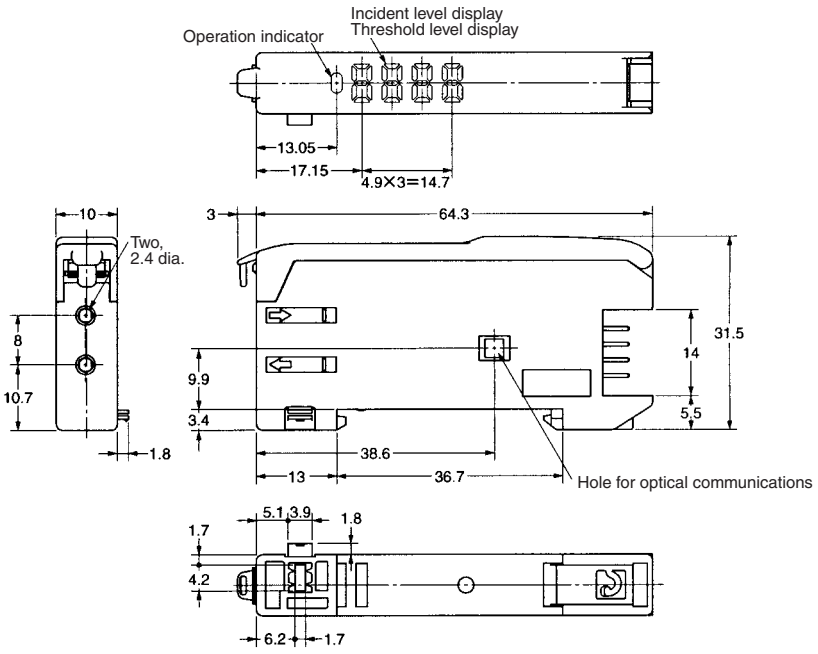
Mounting Holes

Note: A 4-dia., 4-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.2 mm^2; insulation diameter: 1.1 mm) is used. Standard length: 2 m.

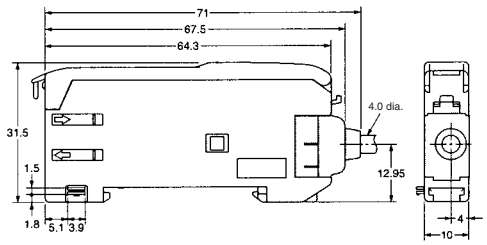
Amplifier Units with Standard Connectors

E3X-DA6 **E3X-DAG6**
E3X-DA7 **E3X-DAH6**
E3X-DA8 **E3X-DAB8**
E3X-DA9 **E3X-DAG8**
E3X-DAB6 **E3X-DAH8**

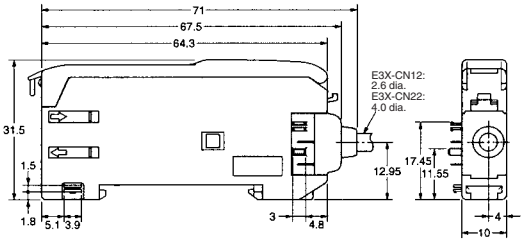




Dimensions with Master Connector Connected

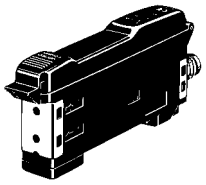


Dimensions with Slave Connector Connected

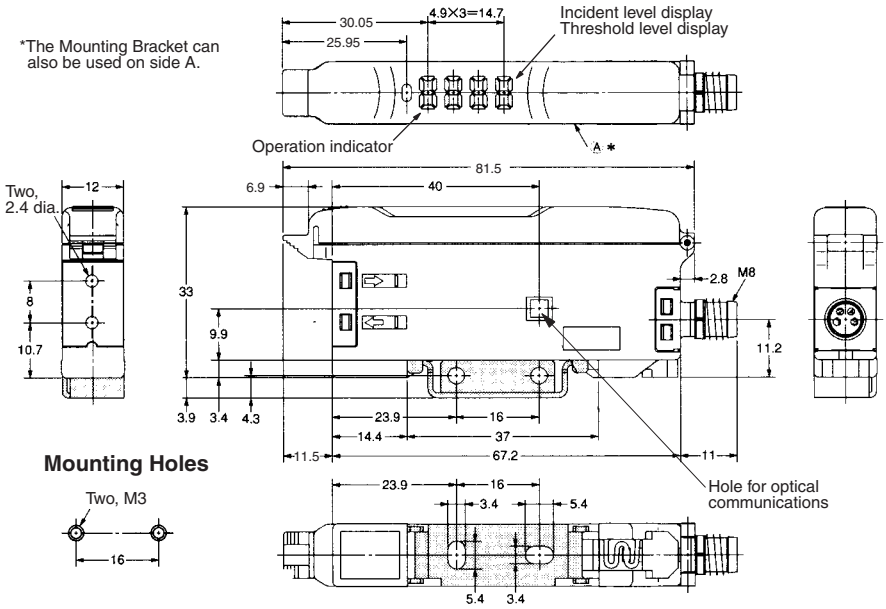


Amplifier Units with M8 Connectors, Water-resistant Models

E3X-DA14V
E3X-DA44V

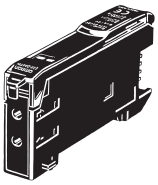


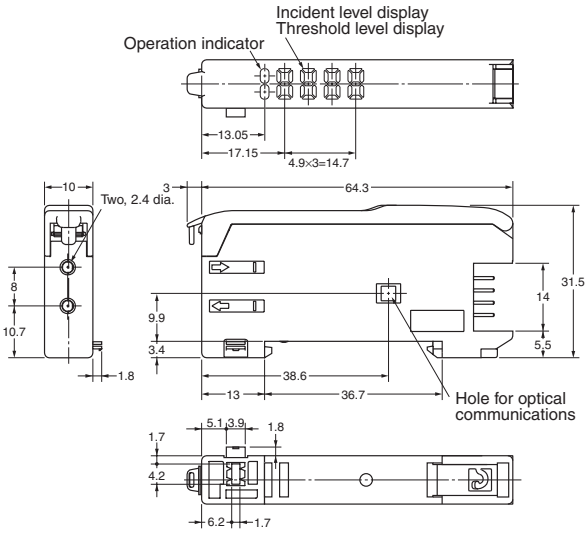
With Mounting Bracket Attached



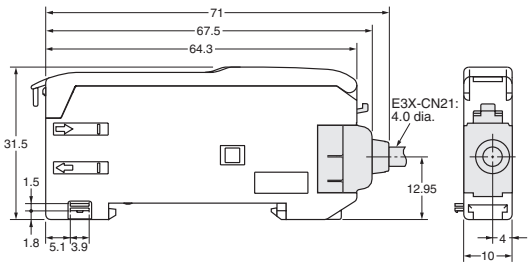
Amplifier Units with Standard Connectors, Twin-output Models

E3X-DA6TW
E3X-DA8TW

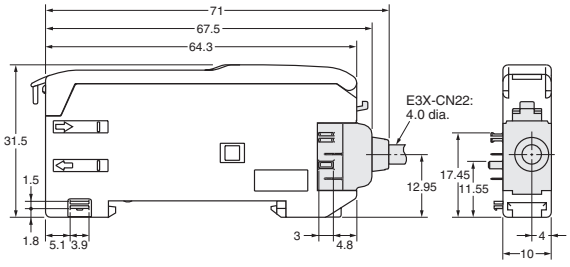




Dimensions with Master Connector Connected

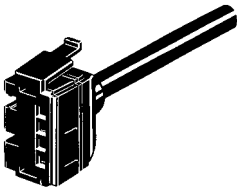


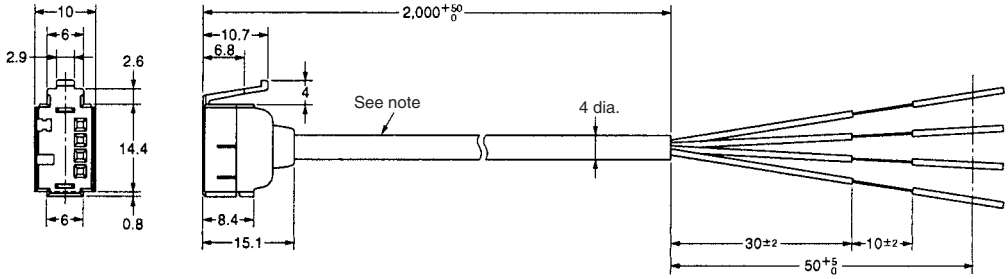
Dimensions with Slave Connector Connected



■ Amplifier Units with Connectors

Master Connectors
E3X-CN11
E3X-CN21

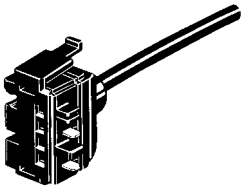


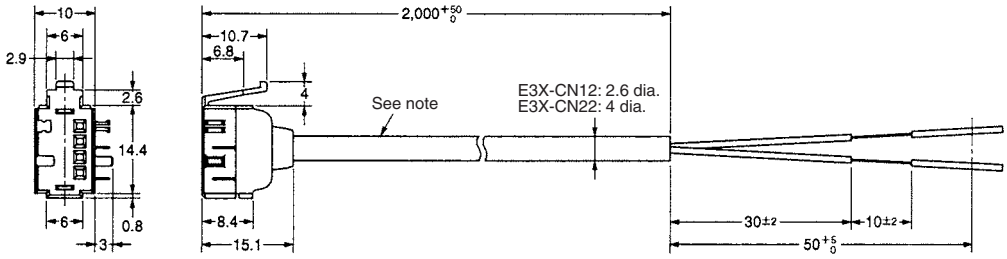


Note: E3X-CN11: A 4-dia., 3-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.2 mm^2; insulation diameter: 1.1 mm) is used.

E3X-CN21: A 4-dia., 4-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.2 mm^2; insulation diameter: 1.1 mm) is used.

Slave Connectors
E3X-CN12
E3X-CN22



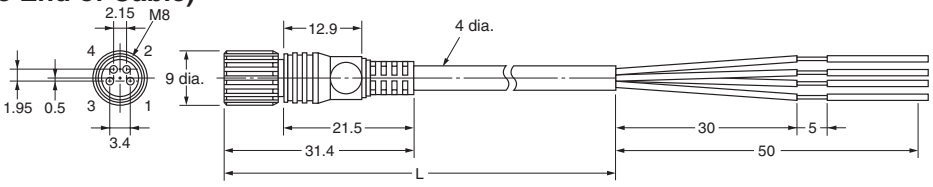


Note: E3X-CN12: A 2.6-dia., single-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.2 mm^2; insulation diameter: 1.1 mm) is used.

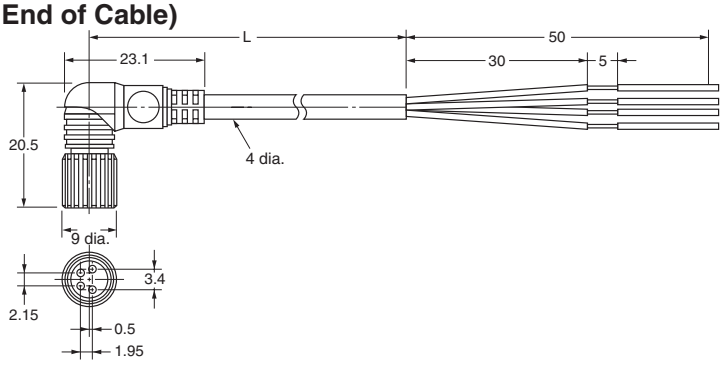
E3X-CN22: A 4-dia., 2-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.2 mm^2; insulation diameter: 1.1 mm) is used.

■ Sensor I/O Connectors

Straight Connector (at One End of Cable)
XS3F-M421-402-A (L=2 m)
XS3F-M421-405-A (L=5 m)

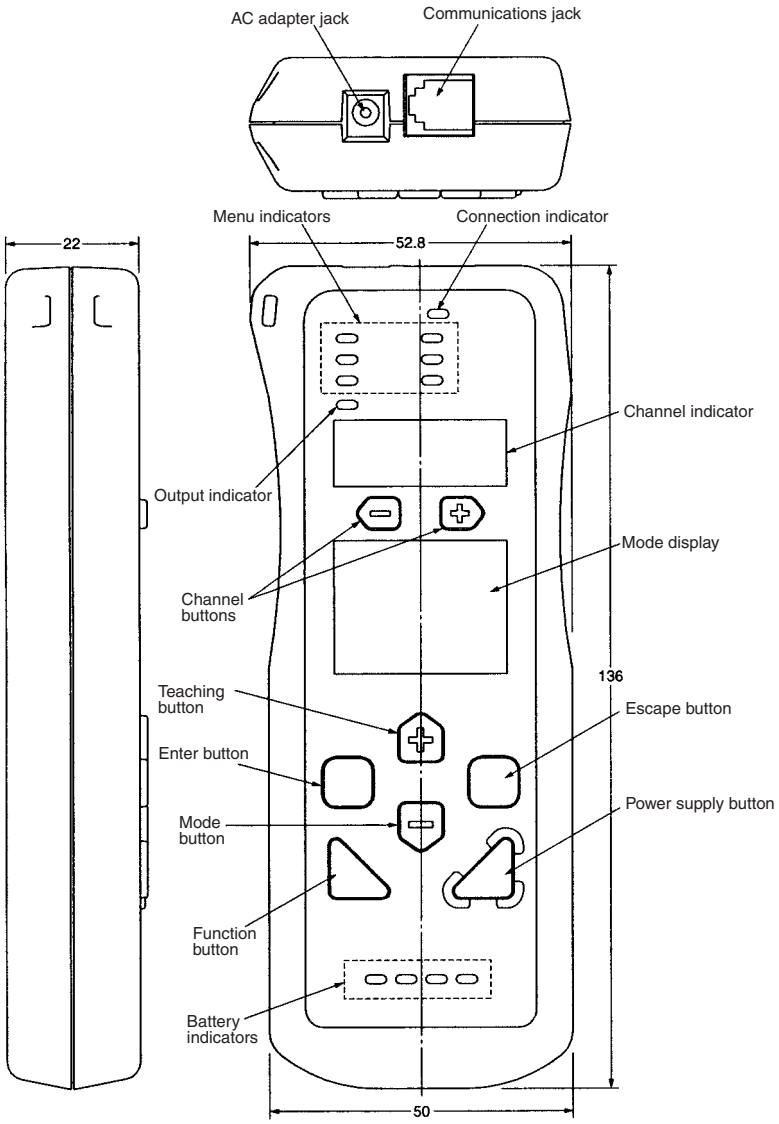


L-shaped Connector (at One End of Cable)
XS3F-M422-402-A (L=2 m)
XS3F-M422-405-A (L=5 m)

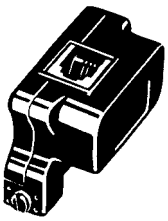


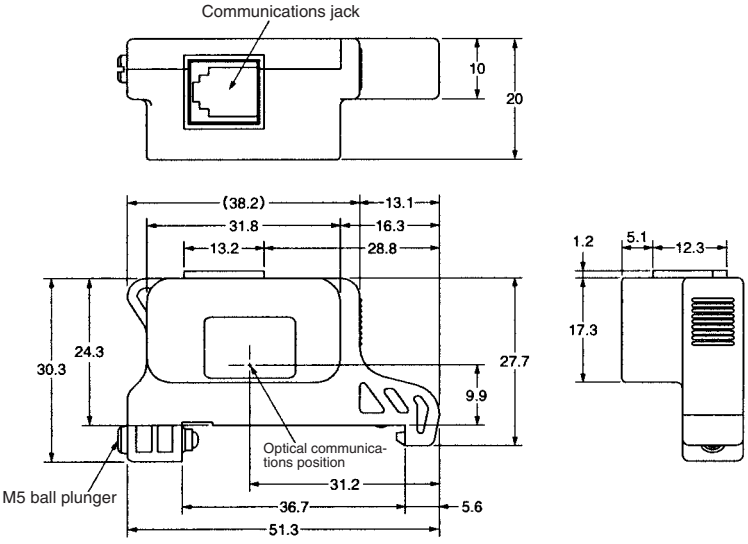
■ Mobile Console

(Set: E3X-MC11)
(Console only: E3X-MC11-C1)



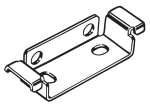
Mobile Console Head
(E3X-MC11-H1)



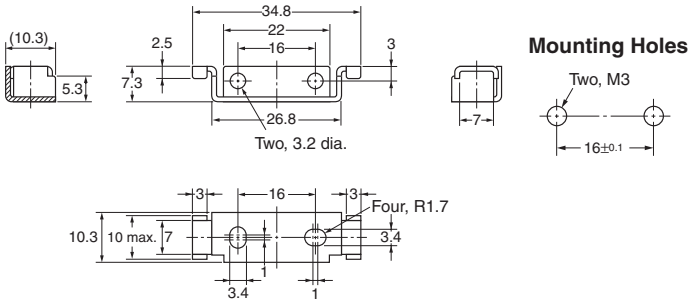


Mounting Brackets

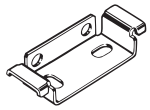
E39-L143



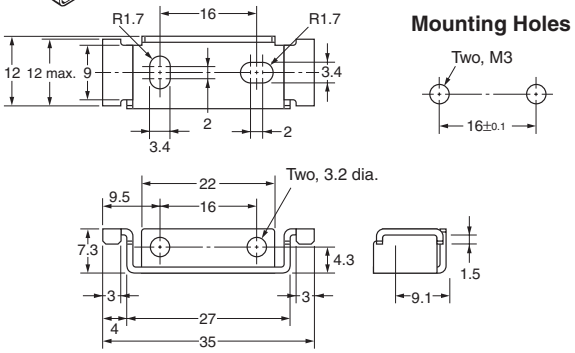
Material: Stainless steel (SUS304)



E39-L148

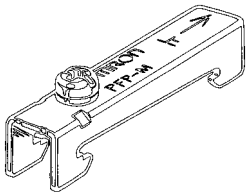


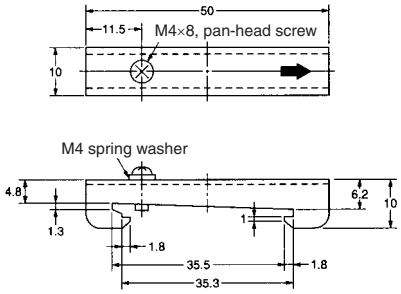
Material: Stainless steel (SUS304)



End Plate

PFP-M

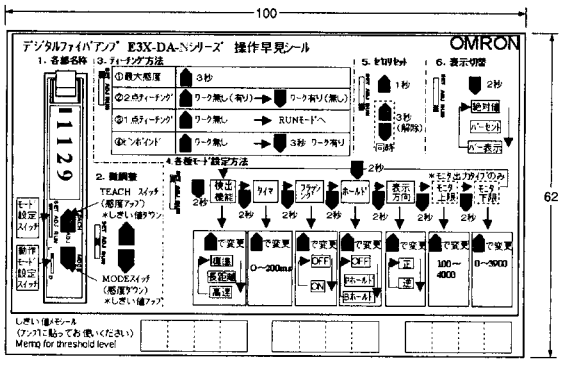




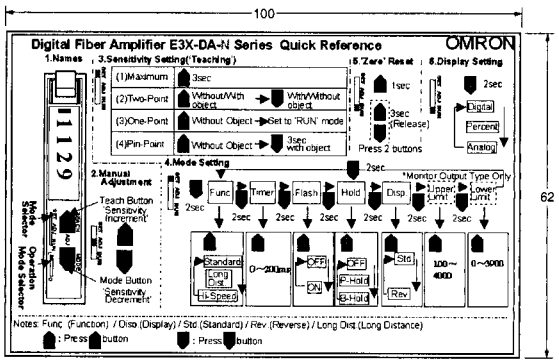
Operating Instructions Sticker
E39-Y1 (1 English and 1 Japanese sticker per set)

Material
Front side: Paper
Reverse side: Adhesive tape

Japanese Sticker



English Sticker

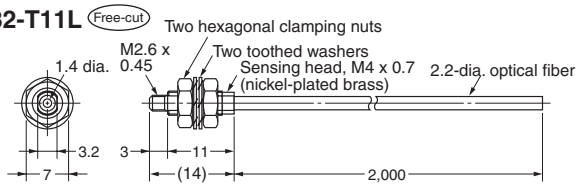


■ Fiber Units

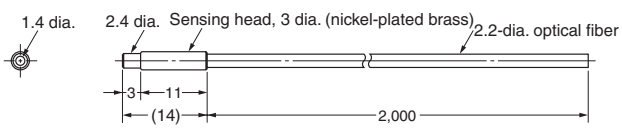
Through-beam Fiber Units (Sold in Pairs)

(Free-cut) Indicates models that allow free cutting. Models without this mark do not allow free cutting.

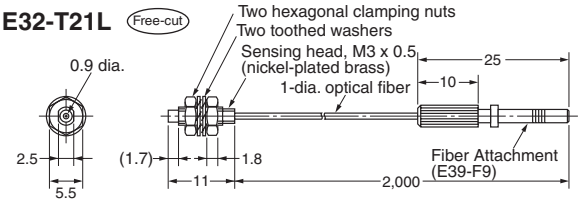
E32-T11L (Free-cut)



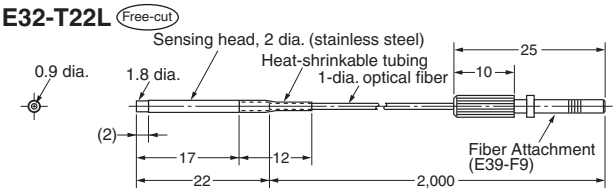
E32-T12L (Free-cut)



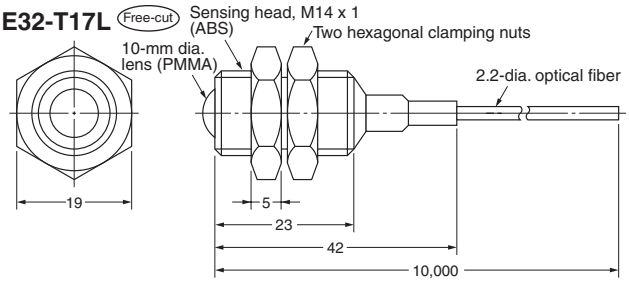
E32-T21L (Free-cut)



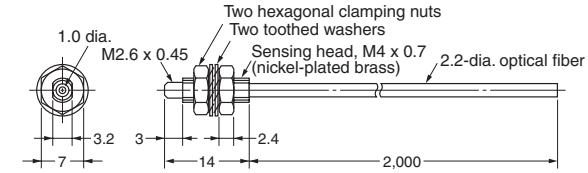
E32-T22L (Free-cut)



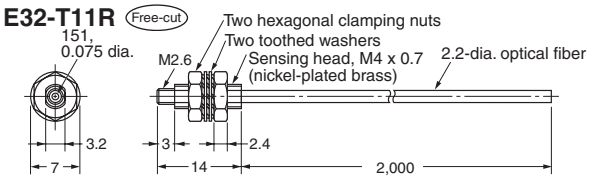
E32-T17L (Free-cut)



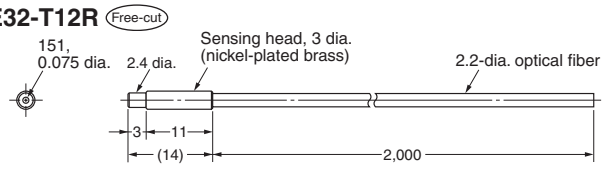
E32-TC200 (Free-cut)



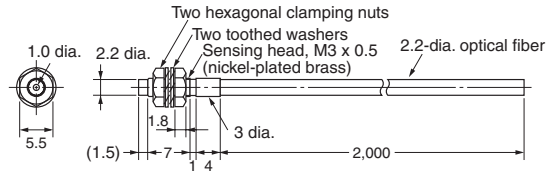
E32-T11R (Free-cut)



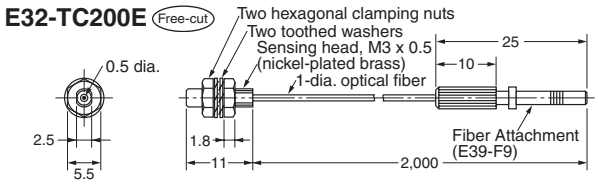
E32-T12R (Free-cut)



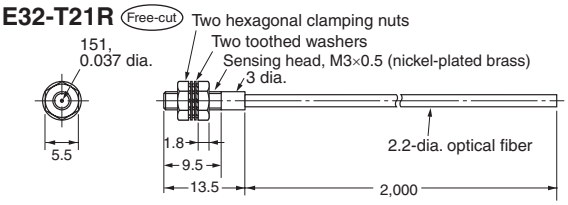
E32-TC200A (Free-cut)



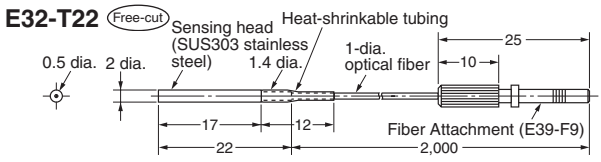
E32-TC200E (Free-cut)



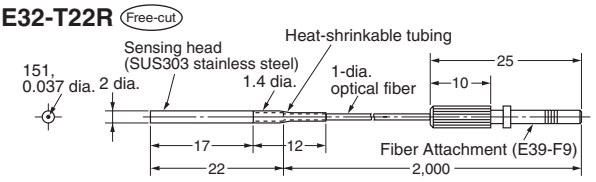
E32-T21R (Free-cut)



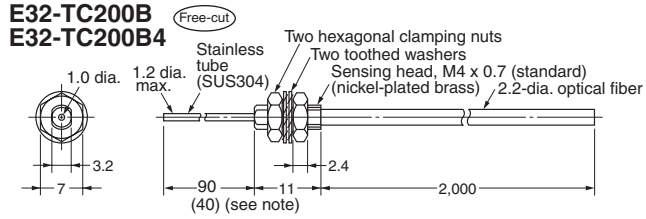
E32-T22 (Free-cut)



E32-T22R (Free-cut)



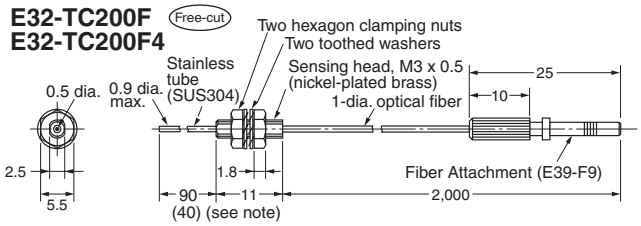
E32-TC200B
E32-TC200B4 (Free-cut)



Note: The value in the parentheses is for the E32-TC200B4.

E32-TC200F
E32-TC200F4

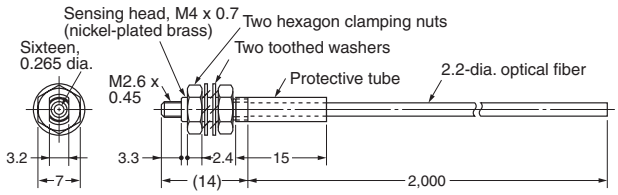
Free-cut



Note: The value in the parentheses is for the E32-TC200F4.

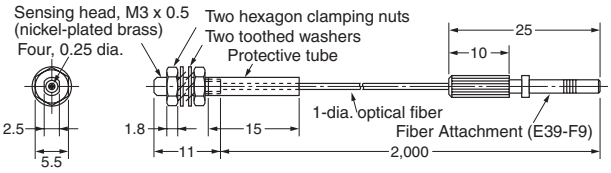
E32-T11

Free-cut



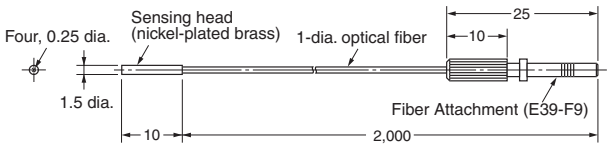
E32-T21

Free-cut



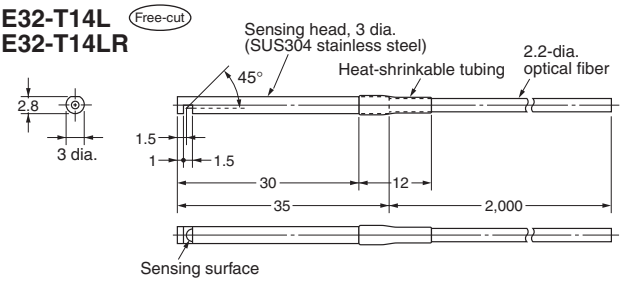
E32-T22B

Free-cut



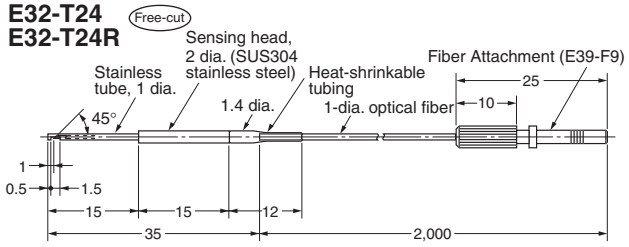
E32-T14L
E32-T14LR

Free-cut



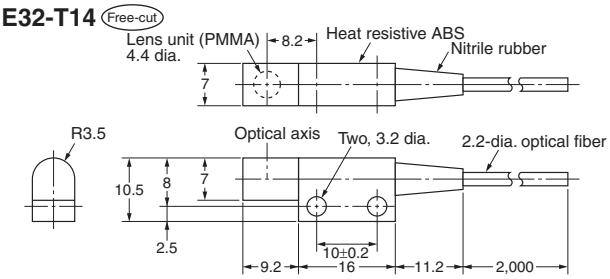
E32-T24
E32-T24R

Free-cut



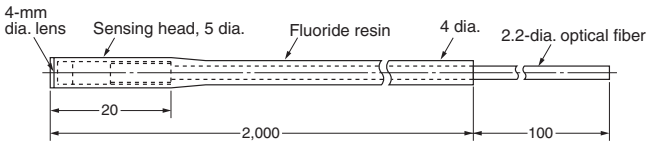
E32-T14

Free-cut



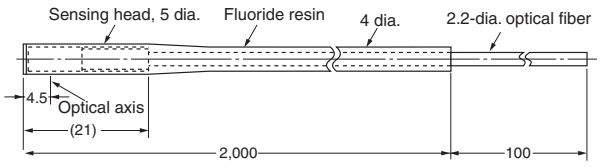
E32-T12F

Free-cut

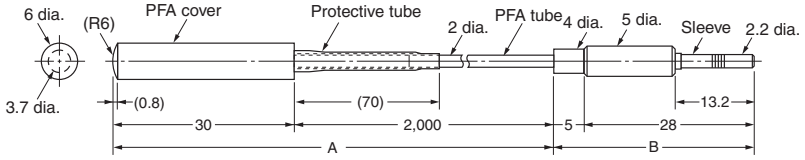


E32-T14F

Free-cut

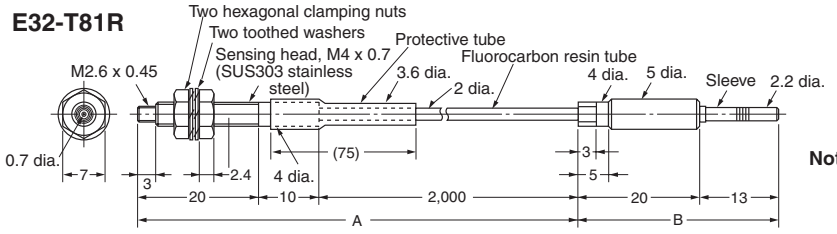


E32-T81F



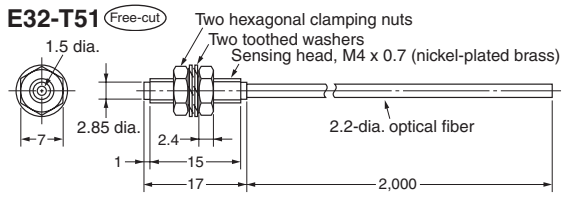
Note: Section A resists 200°C and section B resists 110°C.

E32-T81R



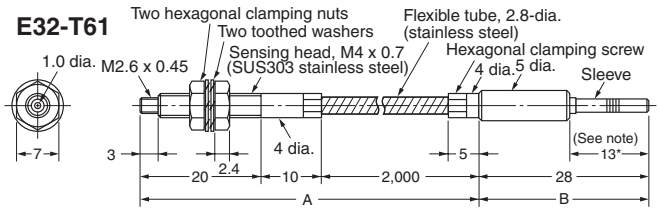
Note: Section A resists 200°C and section B resists 110°C.

E32-T51 (Free-cut)



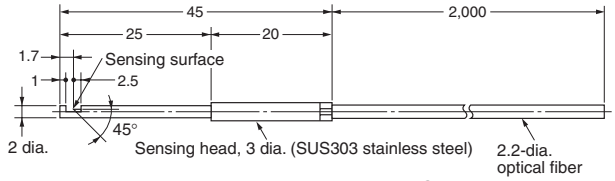
Note: Resistant temperature is 150°C.
Resistant temperature is 130°C when used continuously.

E32-T61



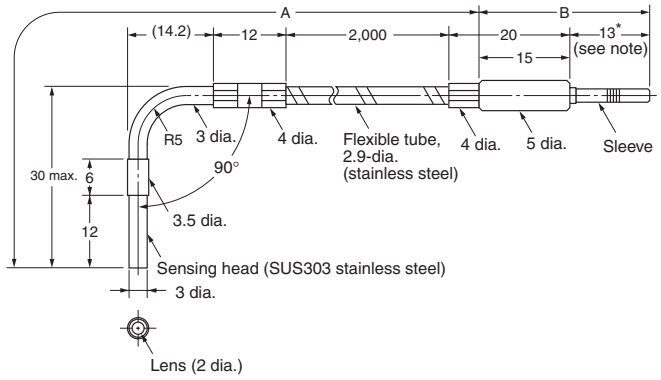
Note: Section A resists 300°C and section B (which is inserted to the Amplifier) resists 110°C.
The operating temperature of the section to be inserted into the Sensor (marked with *) must be within the operating temperature range of the Amplifier.

E32-T54 (Free-cut)



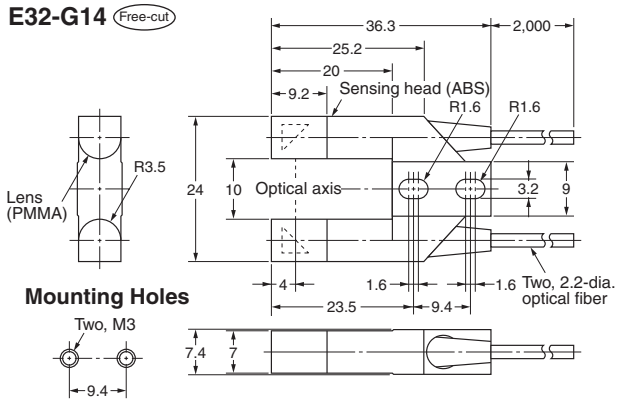
Note: Resistant temperature is 150°C.
Resistant temperature is 130°C when used continuously.

E32-T84S

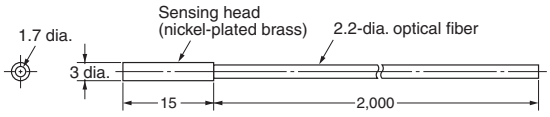


Note: Section A resists 200°C and section B (which is inserted to the Amplifier) resists 110°C.
The operating temperature of section to be inserted into the Sensor (marked with *) must be within the operating temperature range of the Amplifier.

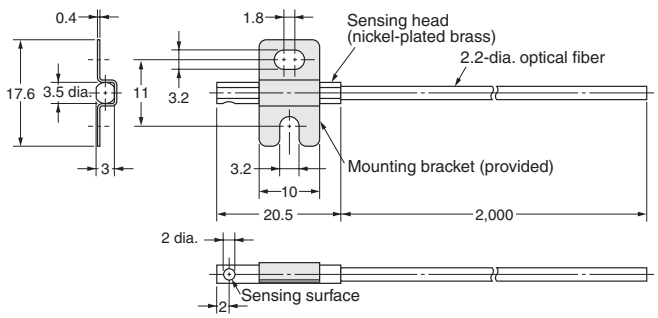
E32-G14 (Free-cut)



E32-T22S (Free-cut)

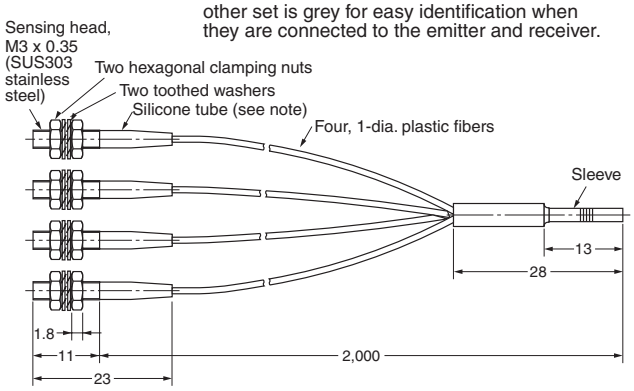


E32-T24S (Free-cut)



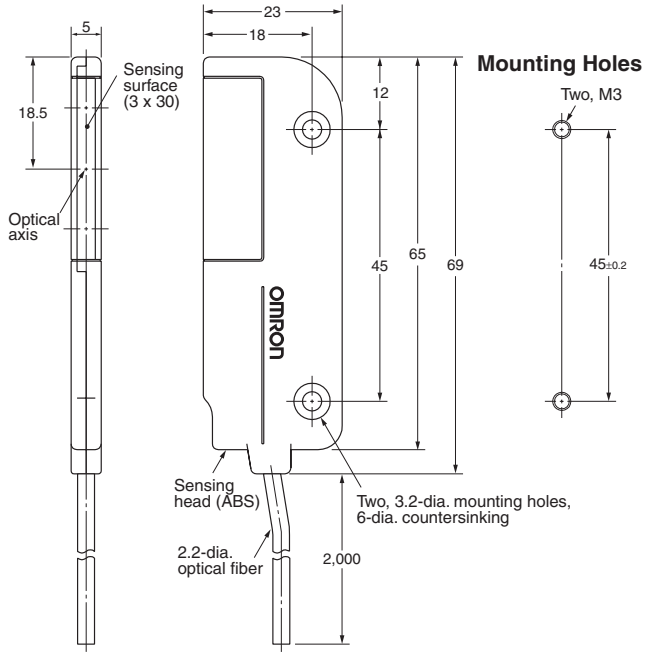
E32-M21

Note: One set of silicone tubes is black while the other set is grey for easy identification when they are connected to the emitter and receiver.



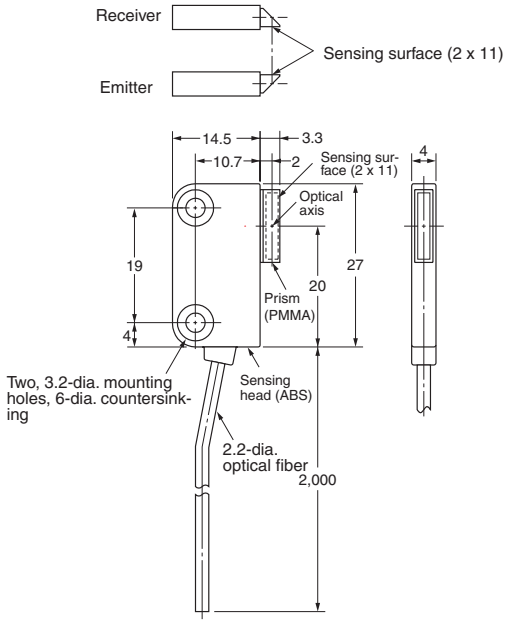
E32-T16W
E32-T16WR

Free-cut



E32-T16J
E32-T16JR

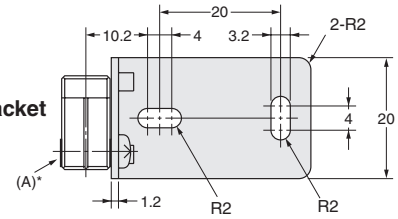
Free-cut



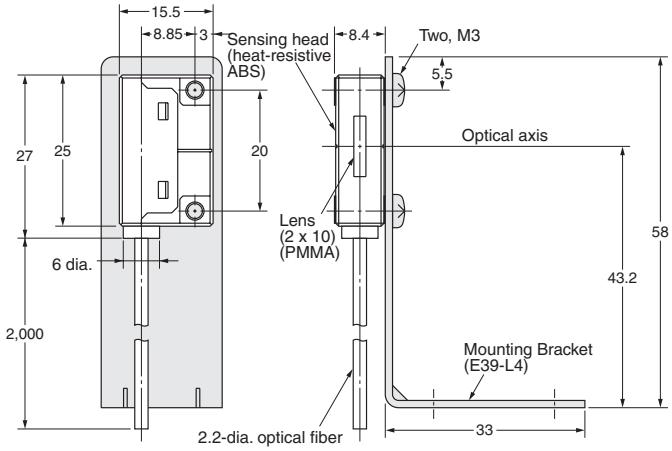
E32-T16

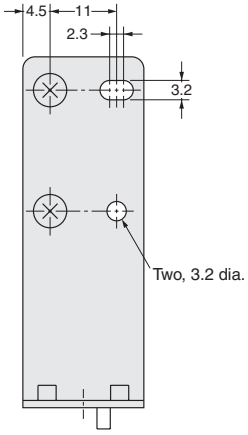
Free-cut

With Mounting Bracket

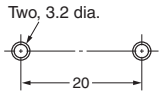


* Mounting bracket can be attached to side A.

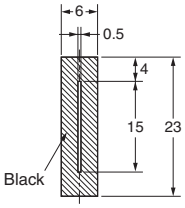




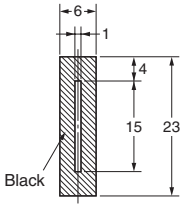
Mounting Holes



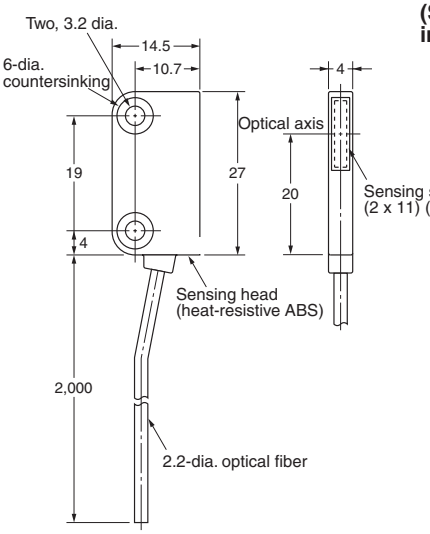
0.5-mm-wide Slit Seal (Supplied with the Unit in Pairs)



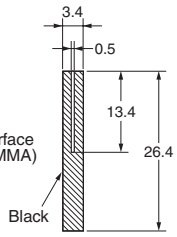
1-mm-wide Slit Seal (Supplied with the Unit in Pairs)



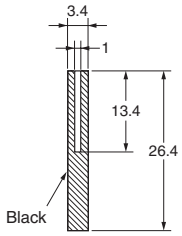
E32-T16P
E32-T16PR Free-cut



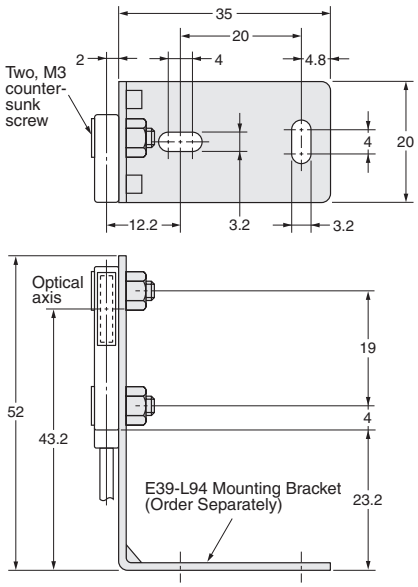
0.5-mm-wide Slit Seal (Supplied with the Unit in Pairs)



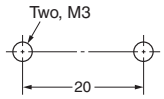
1-mm-wide Slit Seal (Supplied with the Unit in Pairs)



With Mounting Bracket



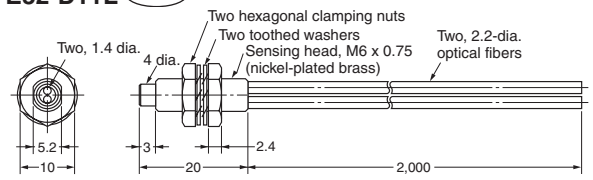
Mounting Holes



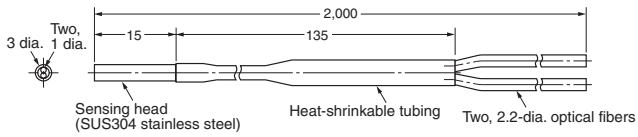
■ Reflective Fiber Units

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

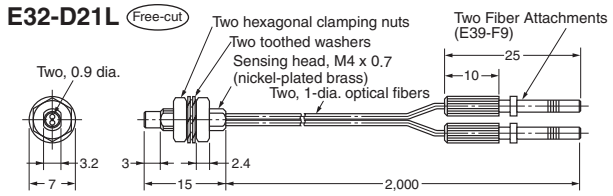
E32-D11L Free-cut



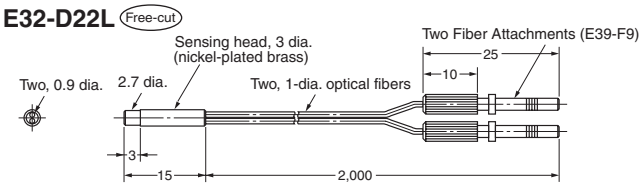
E32-D12 Free-cut



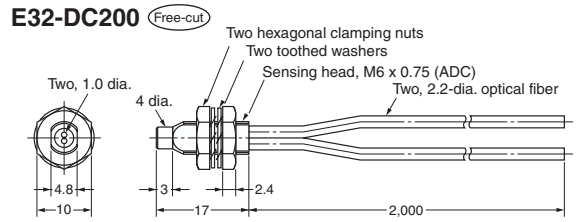
E32-D21L Free-cut



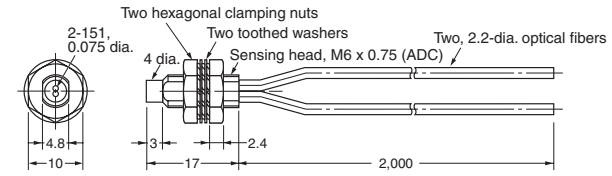
E32-D22L Free-cut



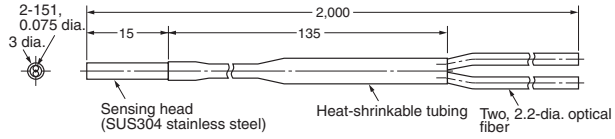
E32-DC200 Free-cut



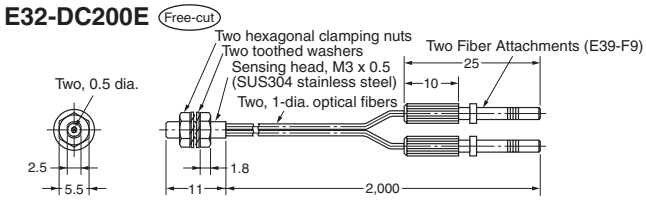
E32-D11R Free-cut



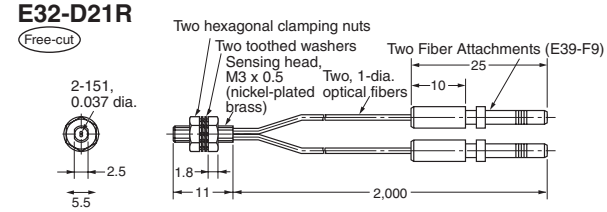
E32-D12R Free-cut



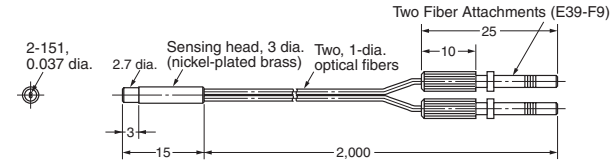
E32-DC200E Free-cut



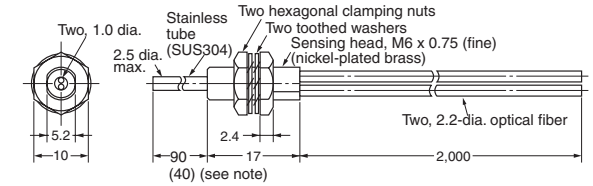
E32-D21R Free-cut



E32-D22R Free-cut

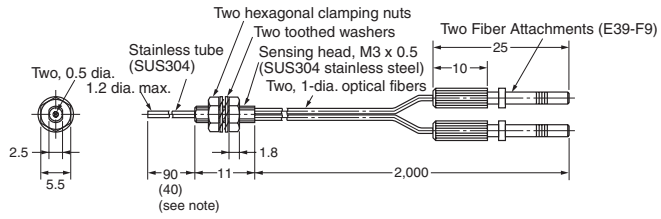


E32-DC200B Free-cut
E32-DC200B4



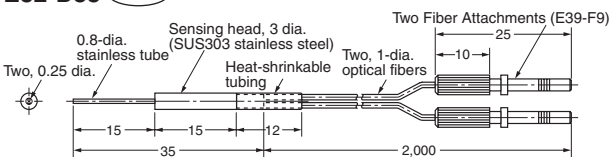
Note: The value in the parentheses is for the E32-DC200B4.

E32-DC200F Free-cut
E32-DC200F4

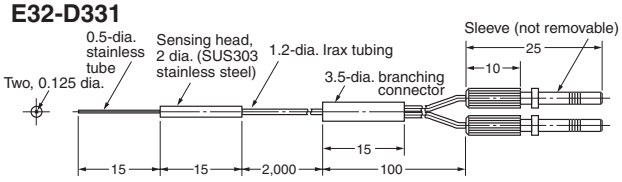


Note: The value in the parentheses is for the E32-DC200F4.

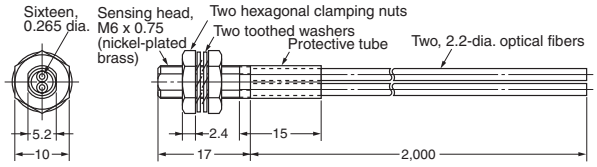
E32-D33 (Free-cut)



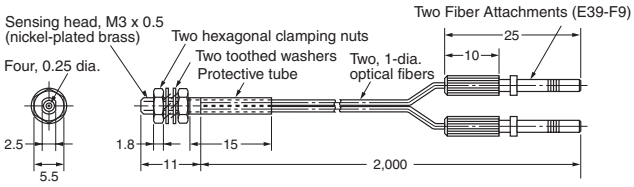
E32-D331



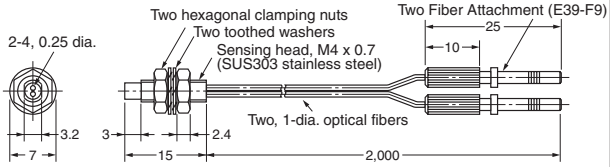
E32-D11 (Free-cut)



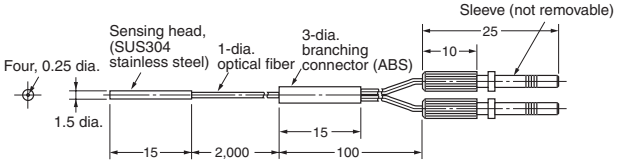
E32-D21 (Free-cut)



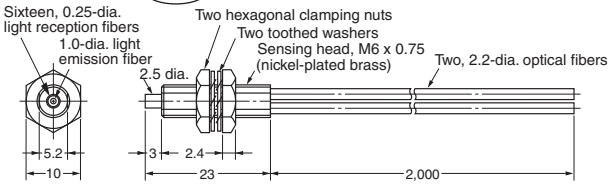
E32-D21B (Free-cut)



E32-D22B

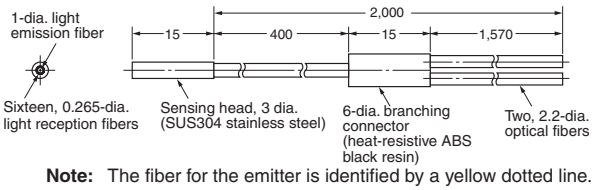


E32-CC200 (Free-cut)



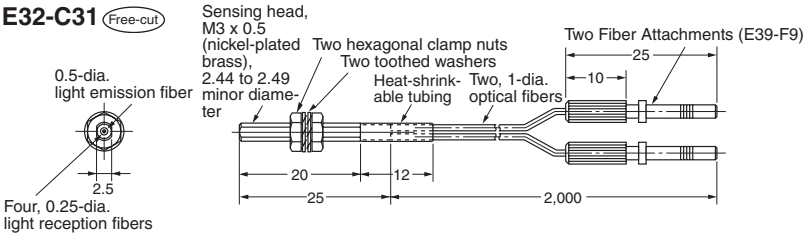
Note: The fiber for the emitter is identified by a white line.

E32-D32L (Free-cut)



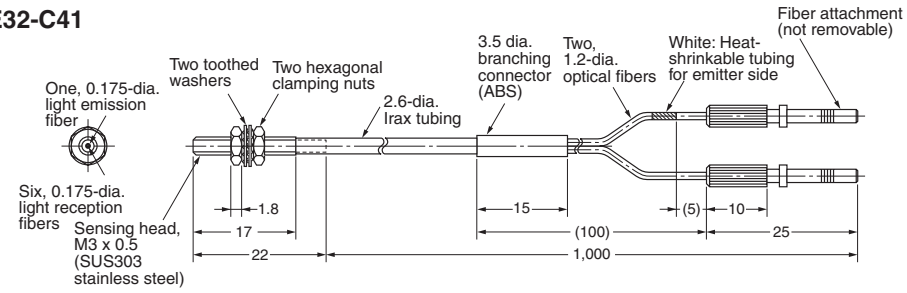
Note: The fiber for the emitter is identified by a yellow dotted line.

E32-C31 (Free-cut)

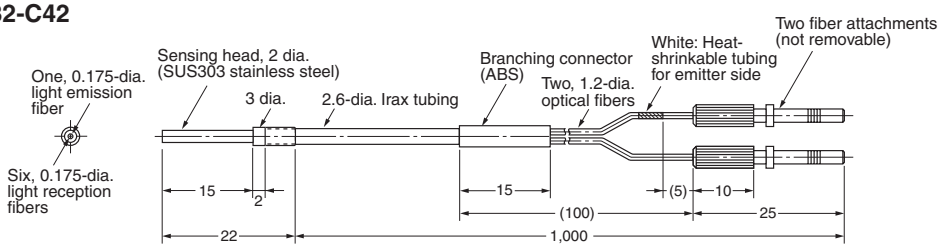


Note: The fiber for the emitter is identified by a white line.

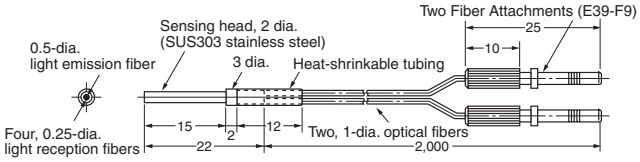
E32-C41



E32-C42

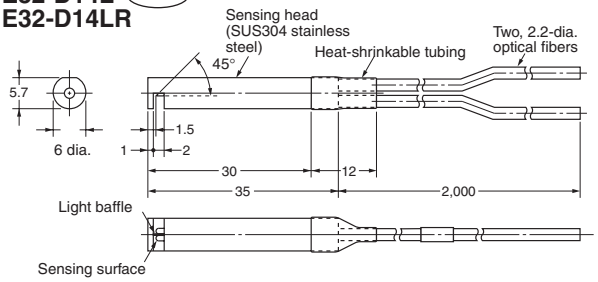


E32-D32 (Free-cut)

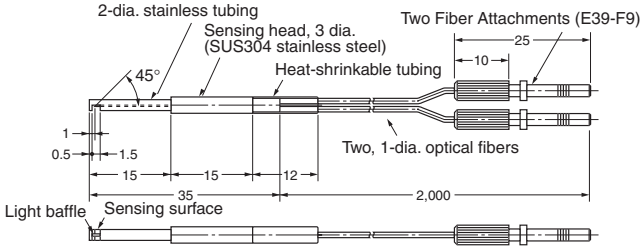


Note: The fiber for the emitter is identified by a white line.

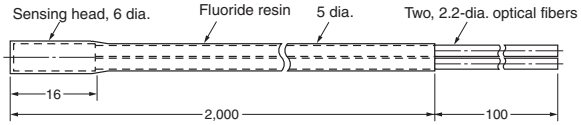
E32-D14L (Free-cut)
E32-D14LR



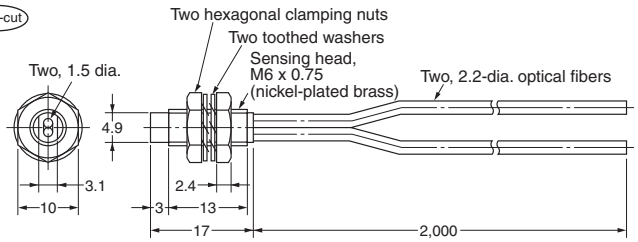
E32-D24 (Free-cut)
E32-D24R



E32-D12F (Free-cut)

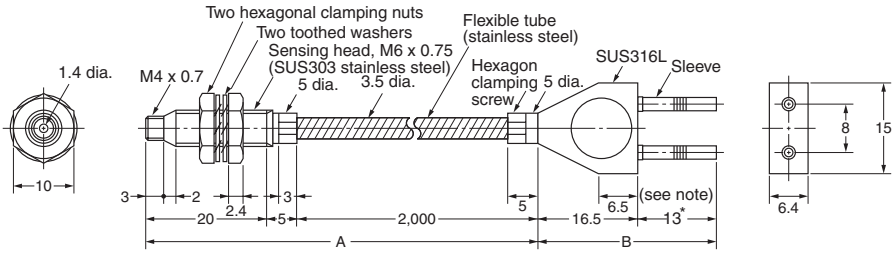


E32-D51 (Free-cut)



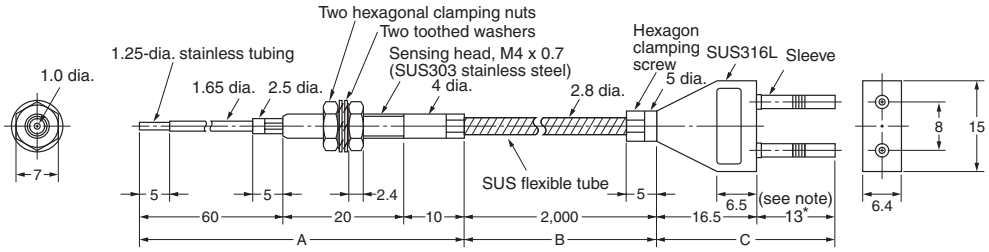
Note: Resistant temperature is 150°C. Resistant temperature is 130°C when used continuously.

E32-D61



Note: Section A resists 300°C and section B (which is inserted to the Amplifier) resists 110°C. The operating temperature of the section to be inserted into the Sensor (marked with *) must be within the operating temperature range of the Amplifier.

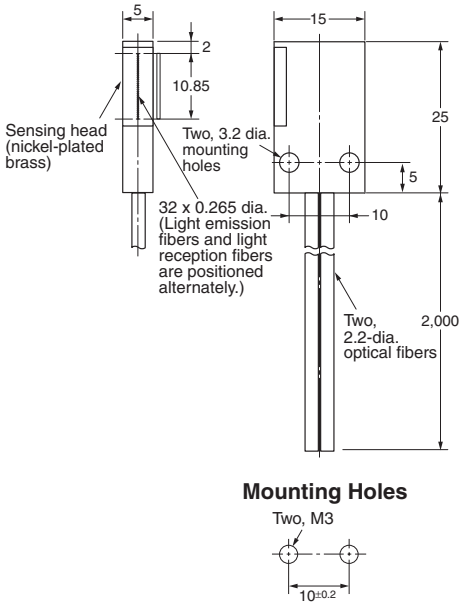
E32-D73



Note: Section A resists 400°C, section B resists 300°C, and section C (which is inserted to the Amplifier) resists 110°C. The operating temperature of the section to be inserted into the Sensor (marked with *) must be within the operating temperature range of the Amplifier.

E32-D36P1

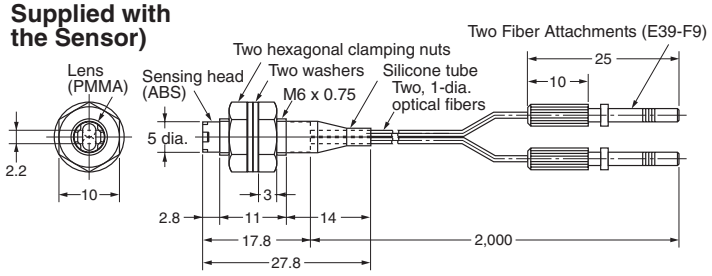
Free-cut



Mounting Holes

E32-R21 (One E39-R3 Reflector is Supplied with the Sensor)

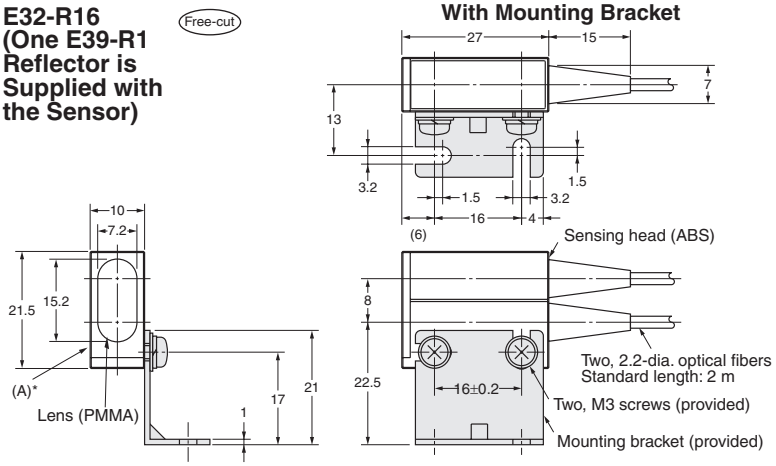
Free-cut



E32-R16 (One E39-R1 Reflector is Supplied with the Sensor)

Free-cut

With Mounting Bracket

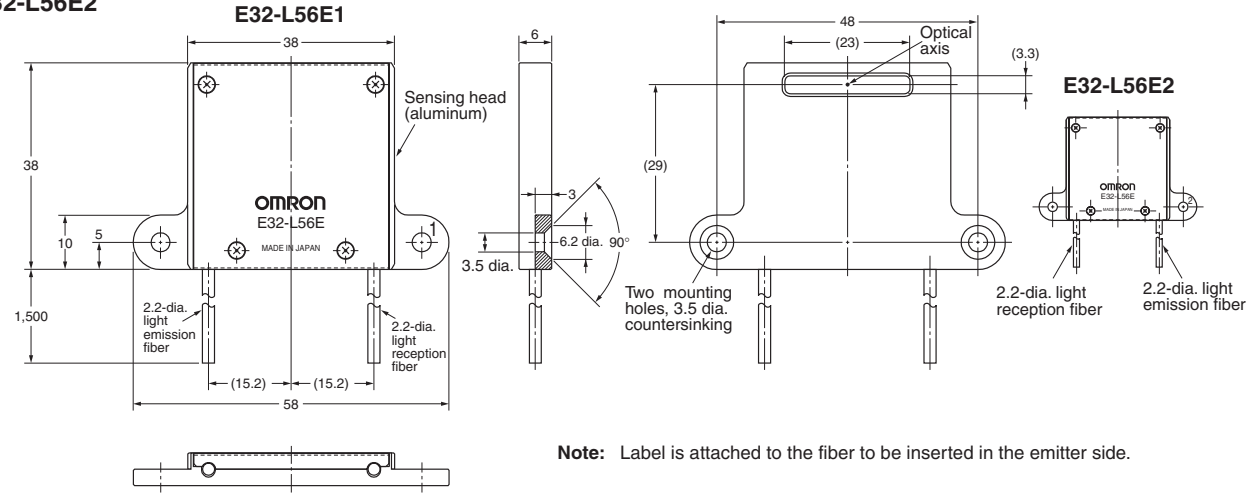


* Mounting bracket can be attached to side A.

E32-L56E1 E32-L56E2

Free-cut

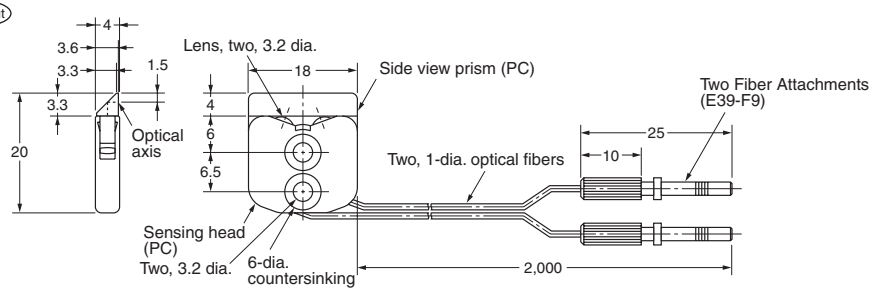
E32-L56E1



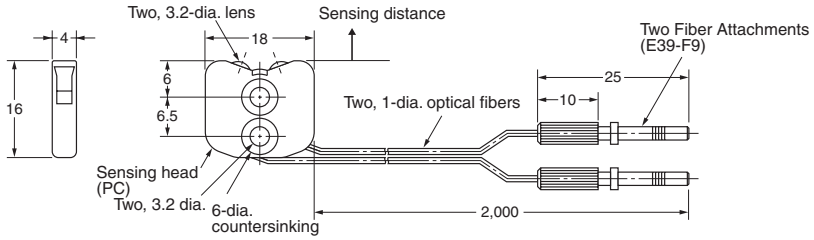
E32-L56E2

Note: Label is attached to the fiber to be inserted in the emitter side.

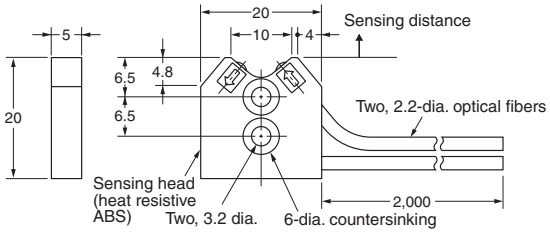
E32-L24L (Free-cut)



E32-L25L (Free-cut)

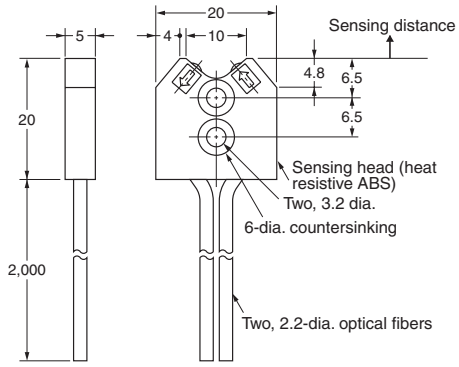


E32-L25 (Free-cut)



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

E32-L25A (Free-cut)



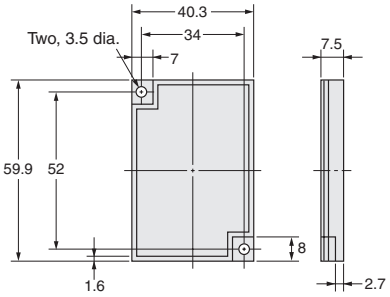
Note: The fiber for the emitter is identified by a white line.

■ Accessories (Order Separately)

Reflectors

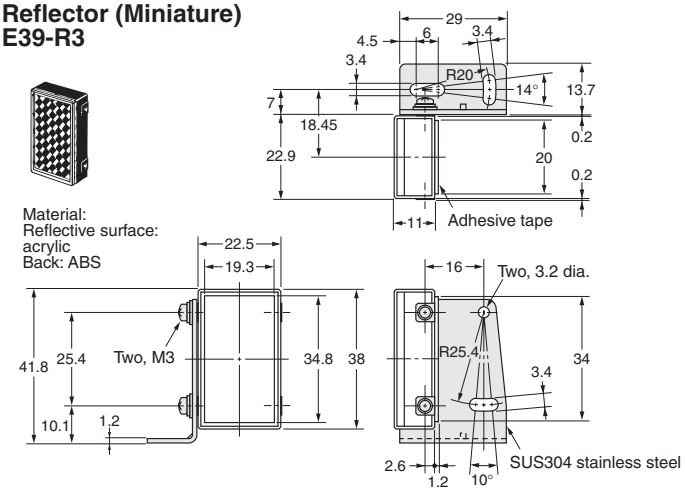
Reflector
E39-R1

Material:
Reflective surface: acrylic
Back: ABS

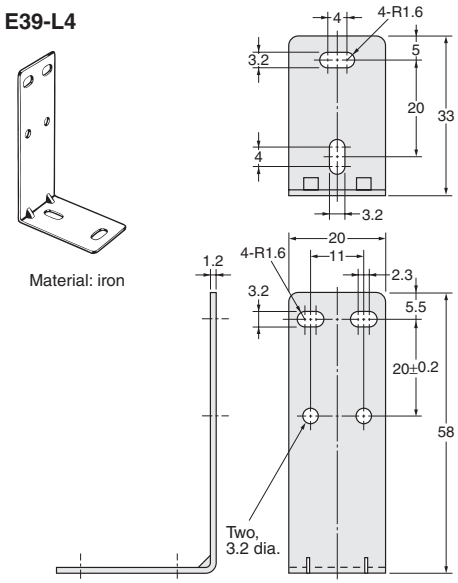


Reflector (Miniature)
E39-R3

Material:
Reflective surface: acrylic
Back: ABS

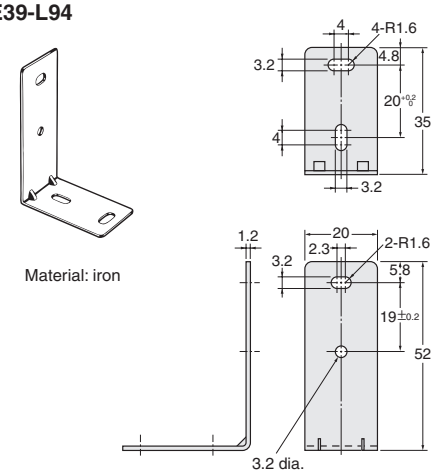


E39-L4



Material: iron

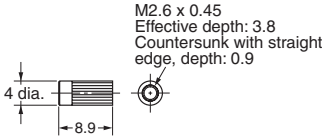
E39-L94



Material: iron

Lens Units

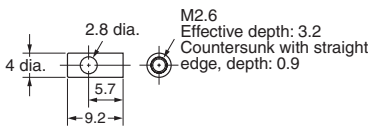
E39-F1
Long Distance Lens Unit



Material:
Tube: Brass
Lens: Optical glass

Note: One set includes two units.

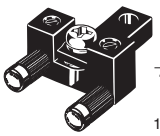
E39-F2
Side-view Unit

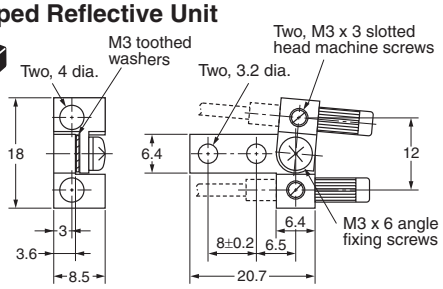


Material:
Tube: Brass
Lens: Optical glass

Note: One set includes two units.

E39-F3
Lens-equipped Reflective Unit

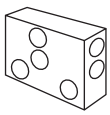


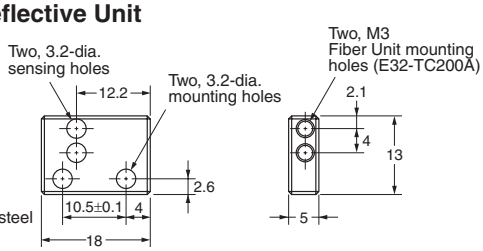


Material:
Tube: Brass
Base: Aluminum

Note: Fix the fiber head using the slotted head machine screw. Do not insert the E39-F1 Lens.

E39-F5
Side-view Reflective Unit

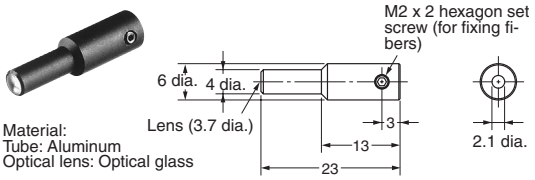




Material:
Base: Brass
Reflector: Stainless steel

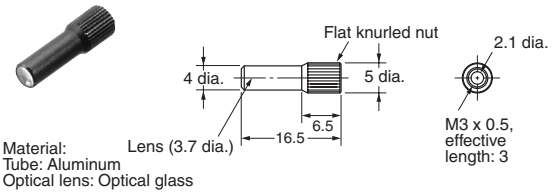
Note: Only E32-TC200A can be mounted. When mounting, remove all of the accompanying screws first and then screw the E32-TC200A into the E39-F5 until the stopper comes into contact.

E39-F3A
Small Spot Lens Unit



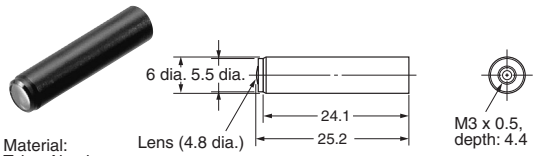
Note: E39-F3A is a Lens Unit for the E32-D32 and E32-C42.

E39-F3A-5
Small Spot Lens Unit



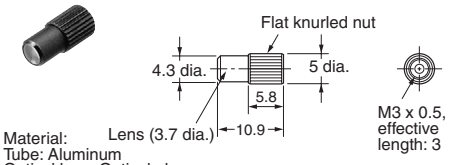
Note: E39-F3A-5 is a Lens Unit for the E32-C31 and E32-C41.

E39-F3B
Small Spot Lens Unit



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

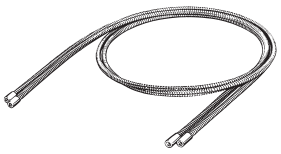
E39-F3C
Small Spot Lens Unit

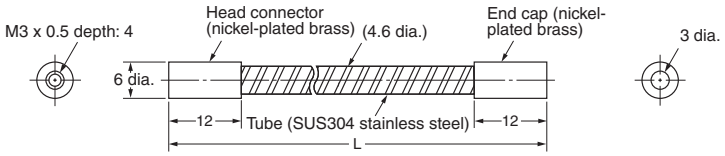


Note: E39-F3C is a Lens Unit for the E32-C31 and E32-C41.

Protective Spiral Tubes

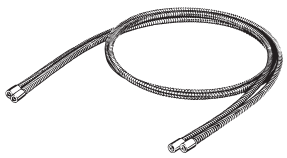
E39-F32A, E39-F32A5
E39-F32B, E39-F32B5

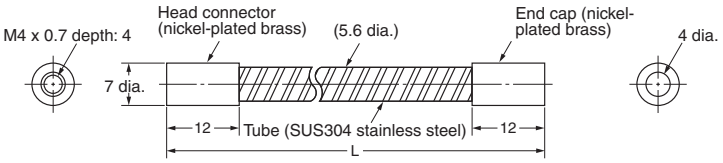




Note: 1. L is as follows:
E39-F32A and E39-F32B: 1,000
E39-F32A5, E39-F32B5: 500
2. A pair of E39-F32A(5)'s is sold as E39-F32B(5).

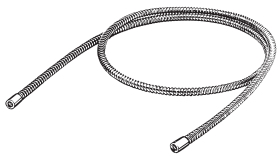
E39-F32C, E39-F32C5

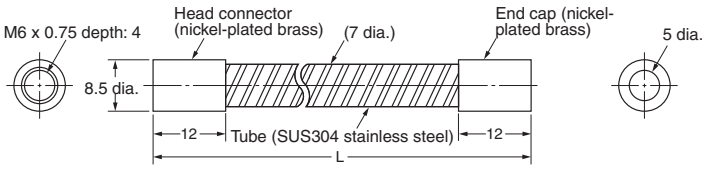




Note: L is as follows:
E39-F32C: 1,000
E39-F32C5: 500

E39-F32D, E39-F32D5

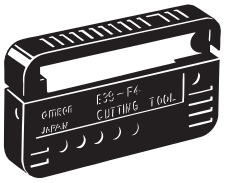


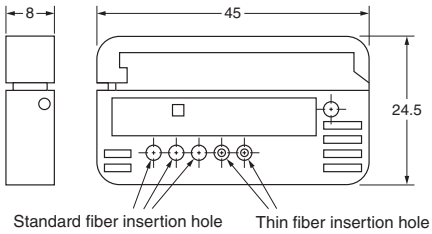


Note: L is as follows:
E39-F32D: 1,000
E39-F32D5: 500

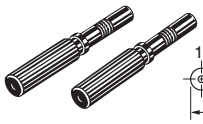
Other Accessories

E39-F4 Fiber Cutter

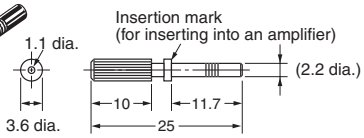




E39-F9 Attachment for Thin Fiber

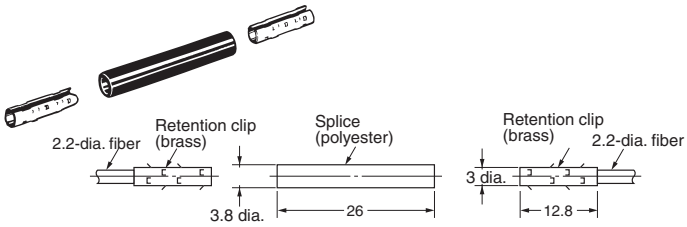


Material: ABS

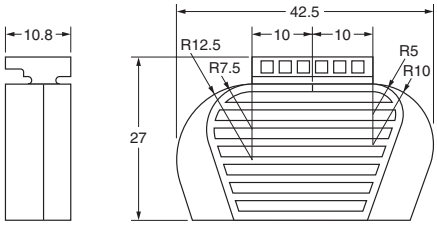


Note: One set includes two units.
Included with Thin Fiber Unit.

E39-F10 Fiber Connector

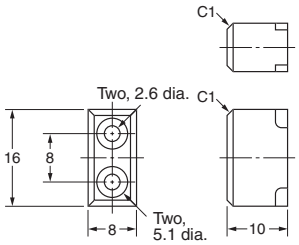


E39-F11 Sleeve Bender



E39-K2 Protective Attachment

Material: ABS



Application Example