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High-precision Sensing with Auto- and Manual-tuning

Solves All the Problems of Conventional Models

- Suitable for high-precision positioning using the fine sensitivity adjustment function.
- Manual-tuning allows threshold adjustments while sensing objects are moving.
- Operation conditions can be seen at a glance through the incident level indicators and threshold indicators.
- Auto-tuning feature incorporates an automatic sensitivity compensation function ensuring an optimum margin for changes in sensing objects or ambient environments.
- Offers the longest sensing distance.
- Newly added mark-sensing models (blue LED).



Ordering Information

■ Amplifier Units

Item		General-purpose models		Timer-function models		Mark-sensing models
		NPN	PNP	NPN	PNP	
Output						NPN
Model		E3X-NH11	E3X-NH41	E3X-NH21	E3X-NH51	E3X-NHB11
Appearance						
Light source (Wave length)		Red LED (680 nm)				Blue LED (470 nm)
Power supply voltage		12 to 24 VDC ±10%, ripple (p-p) 10% max.				
Current consumption		75 mA max.				
Output	Control output	NPN open collector, load current: 50 mA max., residual voltage: 1 V max.	PNP open collector, load current: 50 mA max., residual voltage: 1 V max.	NPN open collector, load current: 50 mA max., residual voltage: 1 V max.	PNP open collector, load current: 50 mA max., residual voltage: 1 V max.	NPN open collector, load current: 50 mA max., residual voltage: 1 V max.
	Alarm output					
Circuit protection		Output short-circuit, reverse polarity, mutual interference prevention				
Response time		1 ms max. for operation and reset respectively				
Sensitivity setting		Teaching method				
Fine sensitivity adjustment		Automatic or manual fine threshold adjustment (13 levels)				
Timer function		---		OFF-delay timer set to 40 ms		---

■ Fiber Units

Through-beam/Slot Sensors



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

■ : E3X-NH

□ : E3X-NHB

Application	Features	Appearance	Sensing distance (mm) * (Values in parentheses: when using the E39-F1 Lens Unit)	Standard object (min. sensing object: opaque)	Model	Permissible bending radius
Long distance	M4		700 (2,000) 90 (250)	1.4-mm dia. (0.06-mm dia.)	E32-T11L	25 mm
	3 dia.		700 90		E32-T12L	
	M3		200	0.9-mm dia. (0.04-mm dia.)	E32-T21L	
	2 dia.; small diameter		200		E32-T22L	
	M14; with lens; ideal for explosion-proof applications		14,000 2,000	10-mm dia. (0.2-mm dia.)	E32-T17L	
General-purpose	M4		400 (3,000) 55 (420)	1.0-mm dia. (0.04-mm dia.)	E32-TC200	25 mm
	M3; possible to mount the reflective side-view conversion attachment E39-F5		360 55		E32-TC200A	
	M3; for detecting minute sensing objects		100	0.5-mm dia. (0.04-mm dia.)	E32-TC200E	
Thin fiber	2 dia.; for detecting minute sensing objects		100	0.5-mm dia. (0.04-mm dia.)	E32-T22	25 mm
	1.2 dia.; with sleeve		400 55	1.0-mm dia. (0.04-mm dia.)	E32-TC200B E32-TC200B4	
	0.9 dia.; with sleeve		100	0.5-mm dia. (0.04-mm dia.)	E32-TC200F E32-TC200F4	
Flexible (resists breaking) (R1)	Possible to bend like electric wires (R1);		280 (2,100)	1-mm dia. (0.1-mm dia.)	E32-T11R	1 mm
			60	0.5-mm dia. (0.1-mm dia.)	E32-T21R	
Flexible (resists breaking) (R4);	Ideal for mounting on moving sections (R4)		360 50	1.0-mm dia. (0.04-mm dia.)	E32-T11	4 mm
			100	0.5-mm dia. (0.04-mm dia.)	E32-T21	
Side-view	Long distance; space-saving		240 30	1.0-mm dia. (0.08-mm dia.)	E32-T14L	25 mm
	Suitable for detecting minute sensing objects		90	0.5-mm dia. (0.04-mm dia.)	E32-T24	
	Screw-mounting type		1,800 200	4.0-mm dia. (0.08-mm dia.)	E32-T14	

- Note:**
- For common specifications of the Fiber Unit, refer to page 6.
 - The size of standard sensing object is the same as the fiber core diameter (lens diameter for models with lens).
 - The sensing distance of the minimum sensing object indicates the rated sensing distance unless otherwise specified.
 - Curled-cord models are also available for through-beam and reflective models.
- * Sensing distance indicates values for white paper.



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


: E3X-NH

: E3X-NHB






















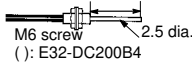
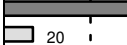




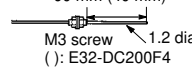

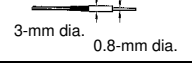















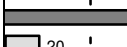









Application	Features	Appearance	Sensing distance (mm) *1 (Values in parentheses: when using the E39-F1 Lens Unit)	Standard object (min. sensing object: opaque)	Model	Permissible bending radius
Chemical-resistant	Teflon-covered ^{*4} ; withstands chemicals and harsh environments (operating ambient temperature: -30°C to 70°C)	 5-mm dia.	 1,600 220	4.0-mm dia. (0.12-mm dia.)	E32-T12F	40 mm
	Teflon covered ^{*4} ; side-view; withstands chemicals and harsh environments (operating ambient temperature: -30°C to 70°C)	 5-mm dia.	 200	3.0-mm dia. (0.12-mm dia.)	E32-T14F	
Heat-resistant	Resists 150°C ^{*3} ; fiber sheath material: fluoro-resin (operating ambient temperature: -40°C to 150°C)	 M4 screw	 400 35	1.5-mm dia. (0.4-mm dia.)	E32-T51	35 mm
	Side-view; resists 150°C ^{*3} ; suitable for detecting minute sensing objects; fiber sheath material: fluoro-resin (operating ambient temperature: -40°C to 150°C)	 2-mm dia.	 130	1.0-mm dia. (0.16-mm dia.)	E32-T54	
	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	 300 (3,000)	1.0-mm dia. (0.12-mm dia.)	E32-T61	25 mm
	Resists 200°C ^{*5} ; L-shaped; fiber sheath material: stainless steel		 700	1.7-mm dia. (0.12-mm dia.)	E32-T84S	
Slot	Suitable for film sheet detection; no optical axis adjustment required; easy to mount		 10	4.0-mm dia. (0.16-mm dia.)	E32-G14	25 mm
Narrow vision field	Suitable for detecting wafers;	 3-mm dia.	 1,000	1.7-mm dia. (0.08-mm dia.)	E32-T22S	10 mm
	Side-view; suitable for detecting wafers;	 3.5 x 3 mm dia.	 700	2-mm dia. (0.04-mm dia.)	E32-T24S	
Area sensing through-beam	Multi-point sensing (4-head)	 M3 screw	 300	2.0-mm dia. (0.04-mm dia.)	E32-M21	25 mm
	Stable for detecting minute sensing objects in a wide area; degree of protection: IEC60529 IP50	 11 mm	 600	(0.4-mm dia.) ^{*6}	E32-T16P	10 mm
	Suitable for detecting over a 10-mm area; long distance	 10 mm	 1,500 700	(2.0-mm dia.) ^{*6}	E32-T16	25 mm

- Note:**
- For common specifications of the Fiber Unit, refer to page 6.
 - The size of standard sensing object is the same as the fiber core diameter (lens diameter for models with lens).
 - The sensing distance of the minimum sensing object indicates the rated sensing distance unless otherwise specified.
 - *1 Sensing distance indicates values for white paper.
 - *2 For continuous operation, use the products within the temperature ranging from -40°C to 130°C.
 - *3 Teflon is a registered trademark of the Dupont Company and the Mitsui Dupont Chemical Company for their fluoride resin.
 - *4 Indicates the heat-resistant temperature at the fiber tip. For further details, refer to page 26.
 - *5 Indicates values for the sensing distance of 100 mm.

Reflective Sensors

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

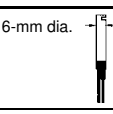


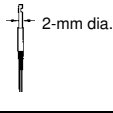


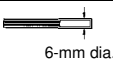



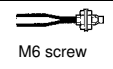



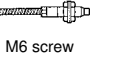

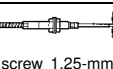

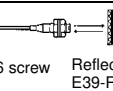


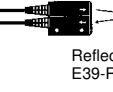















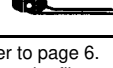
 : E3X-NH  : E3X-NHB

Application	Features	Appearance	Sensing distance (mm) *	Min. sensing object (Copper strand)	Model	Permissible bending radius
Long distance	M6	 M6 screw	 200  26	0.012-mm dia.	E32-D11L E32-D12 E32-D21L E32-D22L	   
	3 dia.; small diameter	 3-mm dia.	 120  16			
	M4	 M4 screw	 50			
	3 dia.; small diameter	 3-mm dia.	 50			
General-purpose	M6	 M6 screw	 150  20	0.012-mm dia.	E32-DC200 E32-DC200E	 
	M3; small diameter	 M3 screw	 36			
Thin fiber	2.5 dia.; with sleeve	 90 mm (40 mm) M6 screw 2.5 dia. (): E32-DC200B4	 150  20	0.012-mm dia.	E32-DC200B E32-DC200B4 E32-DC200F E32-DC200F4 E32-D33	  
	1.2 dia.; with sleeve	 90 mm (40 mm) M3 screw 1.2 dia. (): E32-DC200F4	 36			
	Minute object sensing (0.8 mm dia.)	 3-mm dia. 0.8-mm dia.	 10			
Flexible (R1)	Possible to bend like electric wires (R1);	 M6 screw	 90	0.02-mm dia.	E32-D11R E32-D21R	 
		 M3 screw	 14			
Flexible (resists breaking) (R4)	Ideal for mounting on moving sections (R4)	 M6 screw	 90  12	0.012-mm dia.	E32-D11 E32-D21	 
		 M3 screw	 14			
Coaxial reflective	M6 Coaxial; positioning accuracy	 M6 screw	 150  20	0.012-mm dia.	E32-CC200 E32-D32L E32-D32	  
	3-dia. Coaxial; positioning accuracy	 3-mm dia.	 80  10			
	2-dia. Coaxial; high-precision positioning possible; possible to mount small-spot (0.5-mm dia) lens (E39-F3A)	 2-mm dia.	 40			

- Note:**
- For common specifications of the Fiber Unit, refer to page 6.
 - The size of standard sensing object is the same as the fiber core diameter (lens diameter for models with lens).
 - The sensing distance of the minimum sensing object indicates the rated sensing distance unless otherwise specified. In case of the reflective Fiber Units, however, the sensing distance indicates the distance where the smallest object can be sensed.
- * Sensing distance indicates values for white paper.

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

 : E3X-NH  : E3X-NHB

Application	Features	Appearance	Sensing distance (mm) *1	Min. sensing object	Model	Permissible bending radius
Side-view reflective	6 dia.; long distance		 40	0.015-mm dia.	E32-D14L 	25 mm
	2 dia.; small diameter space-saving		 15	0.012-mm dia.	E32-D24 	
Heat-resisting reflective	Teflon-covered*3; withstands chemicals and harsh environments (operating ambient temperature: -30°C to 70°C)		 50  10	0.012-mm dia.	E32-D12F 	40 mm
	Resists 150°C*2; fiber sheath material: fluoro resin (operating ambient temperature: -40°C to 150°C)		 120  12		E32-D51 	35 mm
	Resists 300°C*4; fiber sheath material: stainless steel (operating ambient temperature: -40°C to 300°C)		 45		E32-D61	25 mm
	Resists 400°C*4; fiber sheath material: stainless steel (operating ambient temperature: -40°C to 400°C)		 30		E32-D73	
Retroreflective	Transparent object detection		 10 to 250	0.3-mm dia.	E32-R21 +E39-R3 	25 mm
	Transparent object detection (operating ambient temperature: -25°C to 55°C); degree of protection: IEC60529 IP66		 150 to 1,500	0.5-mm dia.	E32-R16 +E39-R1 	
Limited reflective	Detects wafers and small differences in height; (operating ambient temperature: -40°C to 105°C); degree of protection: IEC60529 IP50		 7.2±0.8	0.012-mm dia.	E32-L25L 	10 mm
			 4±2		E32-L24L 	
	Detects wafers and small differences in height; degree of protection: IEC60529 IP50		 3.3		E32-L25 	25 mm
			 3.3		E32-L25A 	
Fluid-level detection	Fluid contact type: unbendable section L 150 mm, 350 mm (two types)			Pure water at 25°C	E32-D82F1 E32-D82F2	40 mm
	Tube-mounting type			Fluid	E32-L25T	10 mm

- Note:**
- For common specifications of the Fiber Unit, refer to page 6.
 - The size of standard sensing object is the same as the fiber core diameter (lens diameter for models with lens).
 - The sensing distance of the minimum sensing object indicates the rated sensing distance unless otherwise specified. In case of the reflective Fiber Units, however, the sensing distance indicates the distance where the smallest object can be sensed.
- *1 Sensing distance indicates values for white paper.
*2 For continuous operation, use the products within the temperature ranging from -40°C to 130°C.
*3 Teflon is a registered trademark of the Dupont Company and the Mitsui Dupont Chemical Company for their fluoride resin.
*4 Indicates the heat-resistant temperature at the fiber tip. For further details, refer to page 26.

Specifications

Item	General-purpose models		Timer-function models		Mark-sens-ing models
	NPN	PNP	NPN	PNP	NPN
Output	NPN	PNP	NPN	PNP	NPN
Model	E3X-NH11	E3X-NH41	E3X-NH21	E3X-NH51	E3X-NHB11
Indicator	Operation indicator (orange LED), 8-level incident level indicator (green LED), 13-level threshold indicator (red LED)				
Ambient illumination	Incandescent lamp: 3,000 lx max.; Sunlight: 10,000 lx max.				
Ambient temperature	Operating: -25°C to 55°C (with no icing) Storage: -40°C to 70°C (with no icing)				
Ambient humidity	Operating: 35% to 85% (with no condensation)				
Insulation resistance	20 MΩ min. (at 500 VDC)				
Dielectric strength	1,000 VAC at 50/60 Hz for 1 minute				
Vibration resistance	10 to 55 Hz, 1.5-mm double amplitude or 300 m/s ² (approx. 30G) for 2 hrs each in X, Y, and Z directions				
Shock resistance	500 m/s ² (approx. 50G) for 3 times each in X, Y, and Z directions				
Degree of protection	IEC60529 IP50				
Connection method	Prewired (standard cord length: 2 m)				
Weight (packed state)	Approx. 100 g				
Material	Case: PBT; Cover: Polycarbonate				
Accessory	Mounting Brackets				


Fiber Sheath Materials


E32-T11R, -T21R, -T22S, -T24S, -D11R, -D21R	Copolymer vinyl chloride
E32-T11, -T21, -T16P, -D11, -D21	Vinyl chloride
E32-L25L, -L24L	Reinforced polyethylene
Other than the above	Black polyethylene

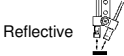
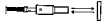
Specifications of Models Other than those in the Left Table

Operating ambient temperature	-40°C to 70°C
Operating ambient humidity	35% to 85% (with no icing)
Differential travel (Reflective models)	20% max. of sensing distance
Degree of protection	IEC 60529 IP67

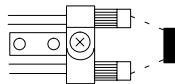
Attachments


Name		Long Distance Lens Unit			
Applications		Increasing sensing distance			
Model		E39-F1			
Appearance		Through-beam (separate) 			
Applicable fibers		E32-T11L	E32-TC200 E32-T61	E32-T11R	E32-T11
With E3X-NH11/41	Sensing distance	2,000 mm	3,000 mm	2,100 mm	2,000 mm
	Standard object	Opaque objects: 4-mm dia. min.			
Directivity		5° to 40°			
Differential travel		---			
Ambient temperature		E32-T61: -40°C to 200°C (Do not exceed the operating temperature of the fiber.)			
Material	Shaft	Brass			
	Lens	Optical glass			
	Base	---			
	Reflector	---			

Name		Side-view Unit			
Applications		Changing the sensing direction at °90			
Model		E39-F2			
Appearance		Through-beam (separate) 			
Applicable fibers		E32-T11L	E32-TC200	E32-T11R	E32-T61/11
With E3X-NH11/41	Sensing distance	400 mm	500 mm	350 mm	400 mm
	Standard object	Opaque objects: 3-mm dia. min.			
Directivity		20° to 60°			
Differential travel		---			
Ambient temperature		E32-T61: -40°C to 200°C (Do not exceed the operating temperature of the fiber.)			
Material	Shaft	Brass			
	Lens	Optical glass			
	Base	---			
	Reflector	---			

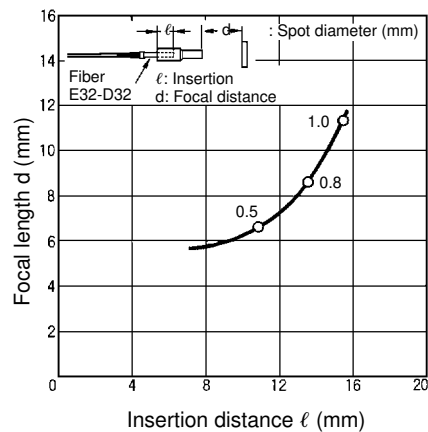
Name			Lens-equipped Reflective Unit				Small Spot Lens Unit
Applications			Converting through-beam sensors to reflective sensors				Detection over 0.5-mm-dia. spots
Model			E39-F3				E39-F3A
Appearance							Reflective 
Applicable fibers			E32-T11L	E32-TC200	E32-T61	E32-T11R	E32-T11
With E3X-NH11/41	Sensing distance (standard object)	White paper	10 to 300 mm* ¹ (20 x 20 cm)	35 to 180 mm* ¹ (20 x 20 cm)		25 to 120 mm (20 x 20 cm)	35 to 180 mm* ¹ (20 x 20 cm)
		Black paper	---	5 to 120 mm* ¹ (200 x 200 cm)	5 to 80 mm* ¹ (200 x 200 cm)	25 to 120 mm	5 to 70 mm* ¹ (200 x 200 cm)
Directivity			---				---
Differential travel			20% of sensing distance				20% of sensing distance
Ambient temperature			E32-T61: -40°C to 200°C (Do not exceed the operating temperature of the fiber.)				Operating: -40°C to 70°C
Material	Shaft	Brass					Aluminum
	Lens	Optical glass					Optical glass
	Base	Aluminum					---
	Reflector	---					---

*1These values are possible when the angle of the E39-F3 is smallest (parallel).



Name			Side-view Reflective Unit	
Applications			Converting through-beam to reflective sensor	
Model			E39-F5	
Appearance			Reflective 	
Applicable fibers			E32-TC200A	
With E3X-NH11/41	Sensing distance (standard object)	White paper	60 mm (10 x 10 cm)	
		Black paper	5 to 20 mm (10 x 10 cm)	
Directivity			---	
Differential travel			20% of sensing distance	
Ambient temperature			Operating: -40°C to 70°C	
Material	Shaft	---		
	Lens	---		
	Base	Brass		
	Reflector	Stainless		

Beam Spot Characteristics
E39-F3A with E32-D32



Spiral Tubes

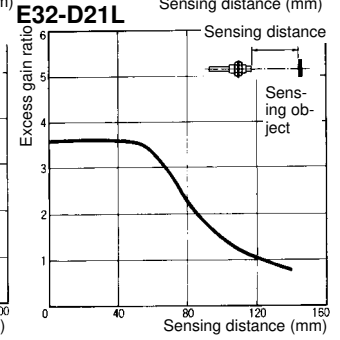
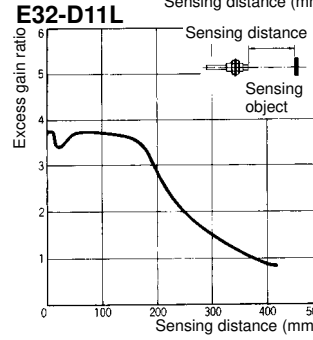
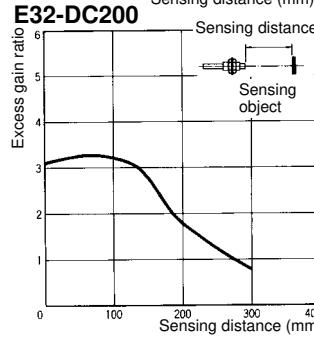
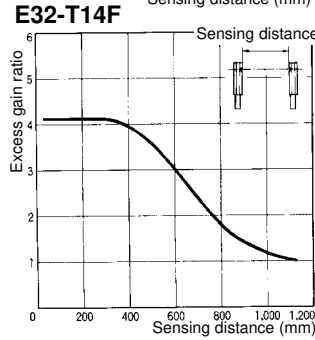
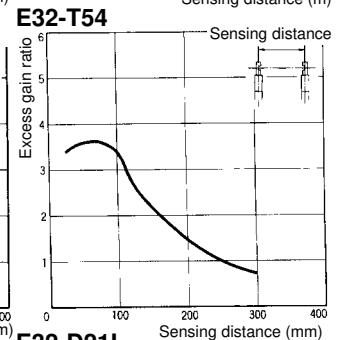
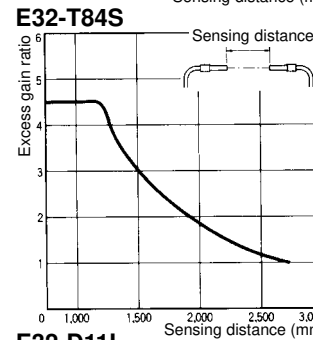
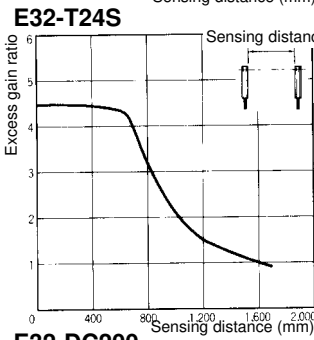
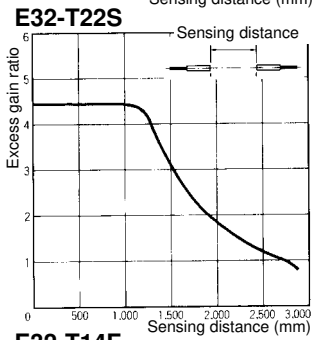
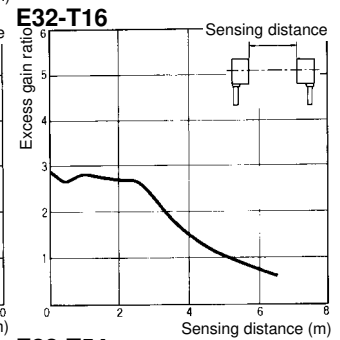
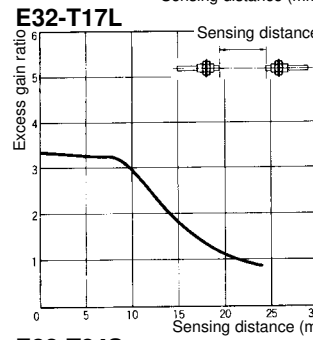
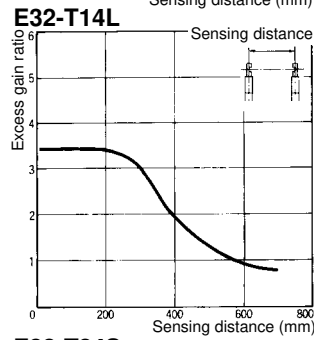
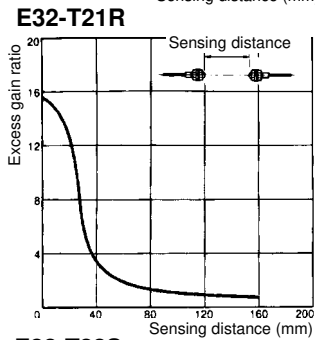
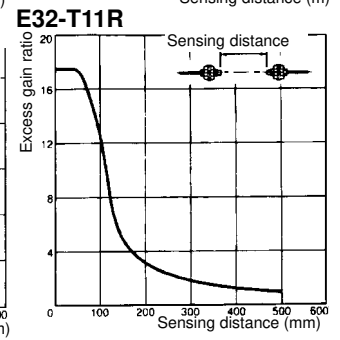
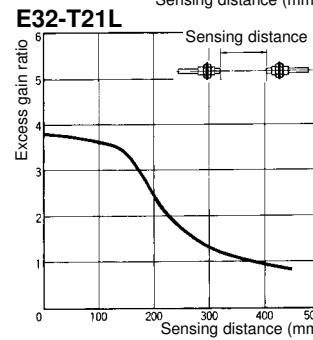
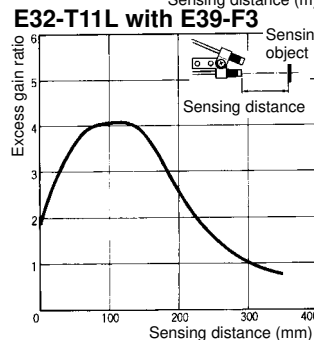
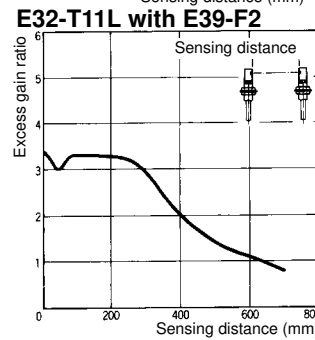
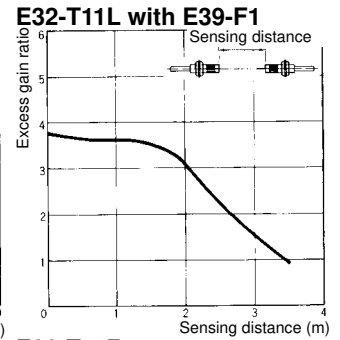
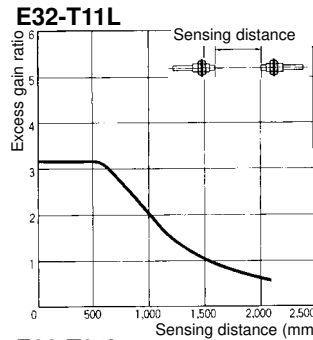
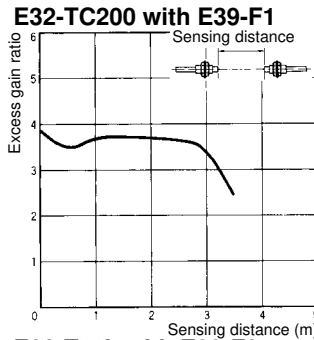
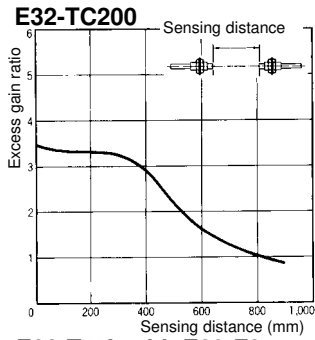
Model	E39-F32A5	E39-F32A	E39-F32B5	E39-F32B	E39-F32C5	E39-F32C	E39-F32D5	E39-F32D
Appearance								
Length (L)	500 mm	1,000 mm	500 mm	1,000 mm	500 mm	1,000 mm	500 mm	1,000 mm
Head outer diameter (A)	6 dia.				7 dia.		8.5 dia.	
Head inner diameter (B)	M3 x 0.5, depth: 4				M4 x 0.7, depth: 4		M6 x 0.75, depth: 4	
Tube outer diameter (C)	4.6 dia.				5.6 dia.		7 dia.	
Applicable fiber	E32-DC200E E32-DC200F(4) E32-D21		E32-TC200E E32-TC200F(4) E32-T21 E32-T21L		E32-TC200 E32-TC200B(4) E32-T11 E32-T51 E32-T11L		E32-DC200 E32-DC200B(4) E32-CC200 E32-D11 E32-D51 E32-D11L	
Ambient temperature	Operating: -40°C to 150°C (Do not exceed the operating temperature of the fiber)							
Ambient humidity	Operating: 35% to 85%							
Permissible bending radius	30 mm min.							
Tensile strength	Between head connector and end cap with tube: 1.5 N • m (15 kgf • cm) Tube: 2 N • m (20 kgf • cm)							
Compression load	Tube: 29.4 N (3 kgf)							

Accessories

Name	Fiber Cutter	Fine-fiber Attachment	Fiber Connector	Sleeve Bender
Model	E39-F4	E39-F9	E39-F10	E39-F11
Appearance				
Features	Used to cut fibers to desired lengths	Used when inserting fine fibers into the amp	Used to connect additional fibers for extension	Used to bend fiber sleeves
Applicable fiber	All models equipped with fibers that can be trimmed.	E32-DC200E, -TC200E E32-DC200F(4), -TC200F(4) E32-D21, -D21L, -D22L E32-T21, -T21L, -T22L E32-D32, -T22 E32-D24, -T24 E32-D33 E32-R21, E32-D21R	E32-DC200, -TC200 E32-DC200B(4), -TC200B(4) E32-TC200A E32-T14, -G14 E32-D11L, -T11L, -T12L E32-D14L, -T14L E32-T17L	E32-TC200B(4) E32-DC200F(4), -TC200F(4) E32-DC9G(4)
	Provided with Fiber Units		Sold Separately	

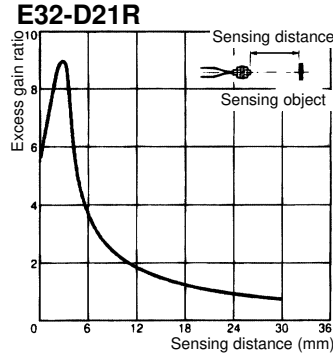
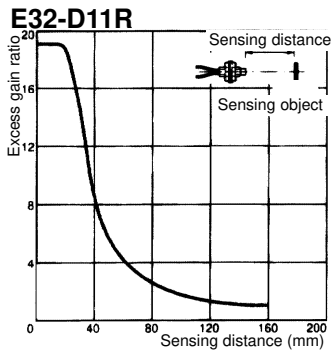
Engineering Data

- **Excess Gain Ratio (Typical)** With standard sensing object.
- **E3X-NH 1**



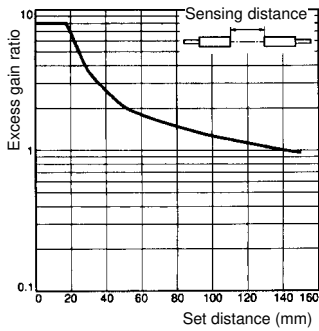
■ **Excess Gain Ratio (Typical)**

With standard sensing object

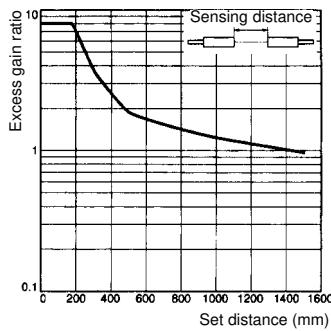


● **E3X-NHB11**

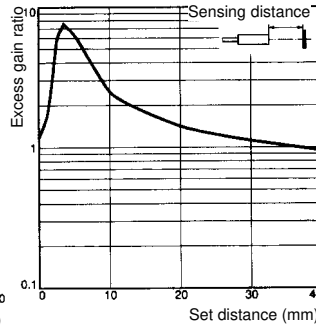
E32-TC200



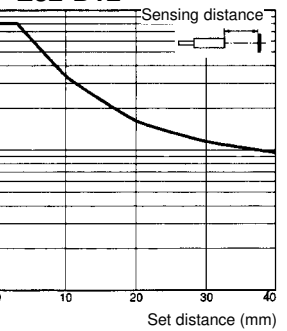
E32-TC200 + E39-F1



E32-D11



E32-D12

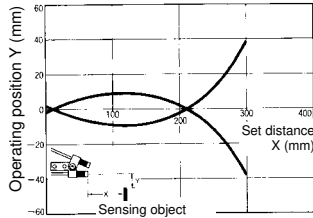


■ **Operating Range (Typical)**

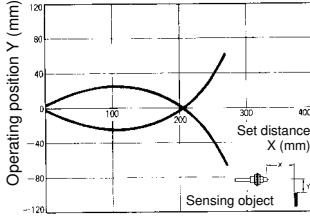
With standard sensing object at max. sensitivity.

● **E3X-NH 1**

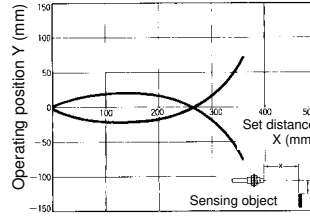
E32-T11L with E39-F3



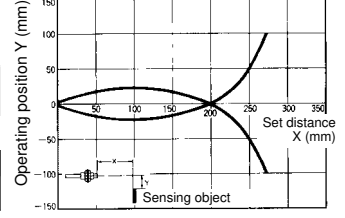
E32-DC200



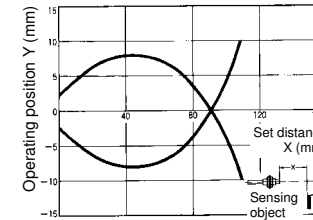
E32-D11L



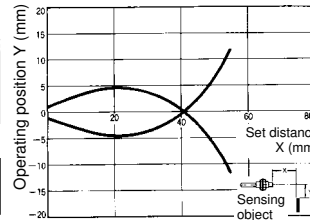
E32-D12



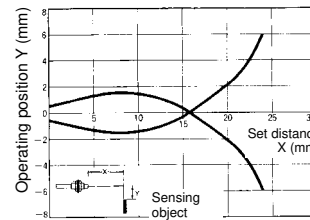
E32-D21L



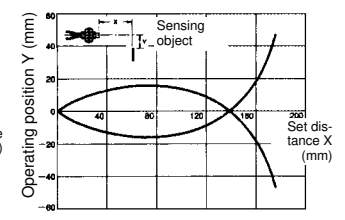
E32-DC200E



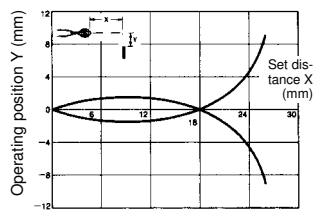
E32-D21



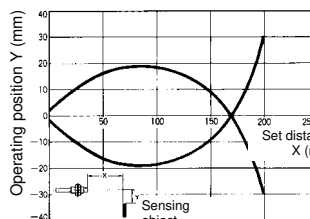
E32-D11R



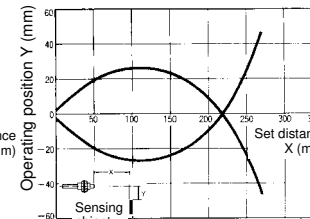
E32-D21R



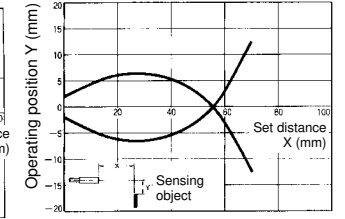
E32-D11



E32-CC200



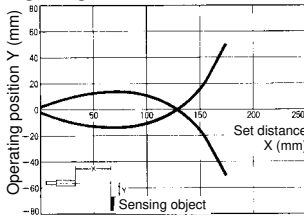
E32-D32



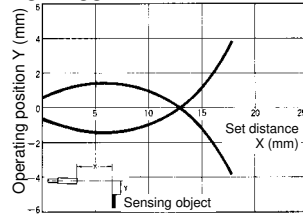
■ Operating Range (Typical)

With standard sensing object at max. sensitivity.

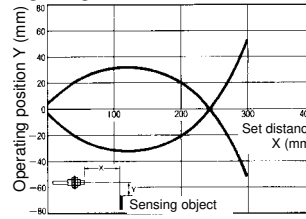
E32-D32L



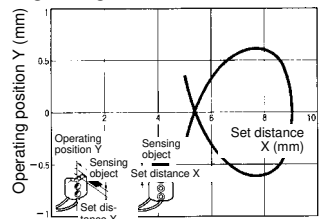
E32-D33



E32-D51

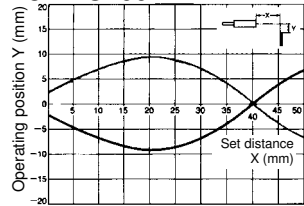


E32-L25L

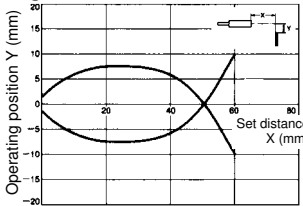


● E3X-NHB11

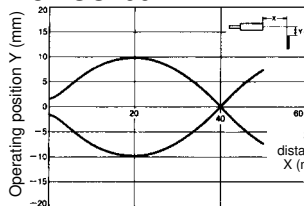
E32-DC200



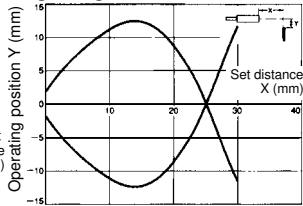
E32-D11L



E32-CC200



E32-D51

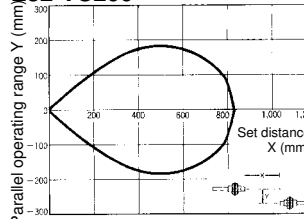


■ Parallel Operating Range (Typical)

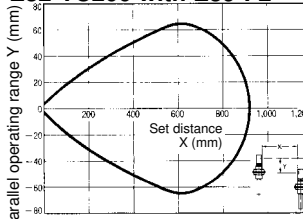
At max. sensitivity.

● E3X-NH 1

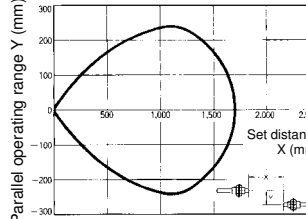
E32-TC200



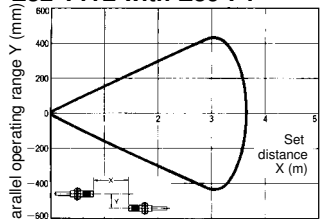
E32-TC200 with E39-F2



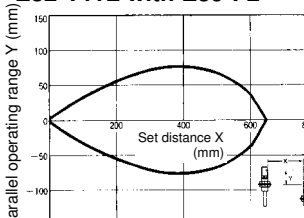
E32-T11L



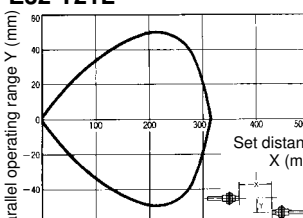
E32-T11L with E39-F1



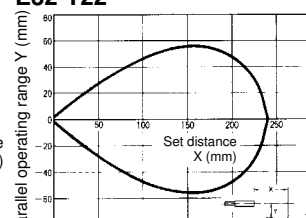
E32-T11L with E39-F2



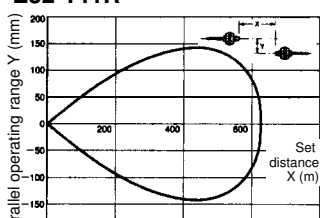
E32-T21L



E32-T22

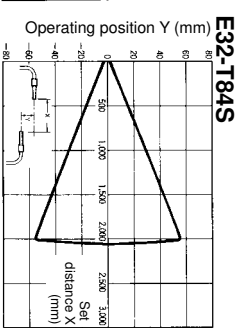
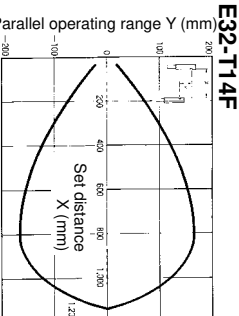
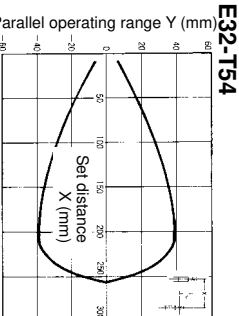
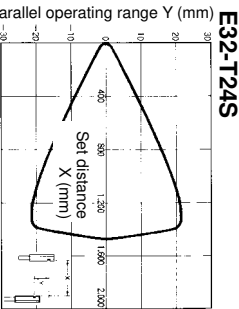
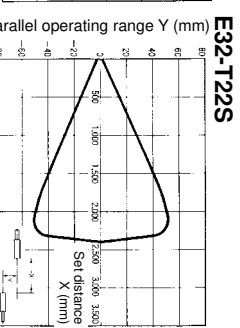
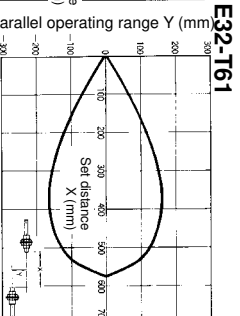
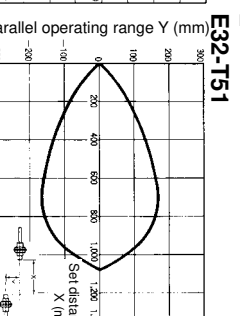
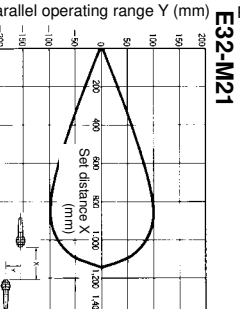
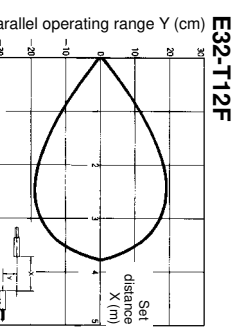
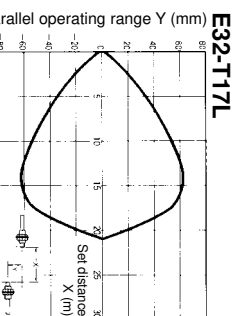
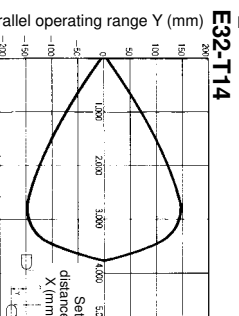
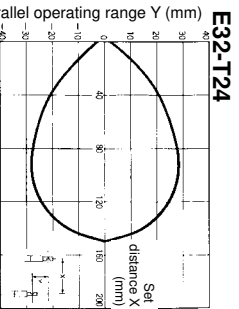
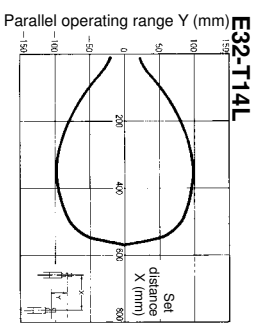
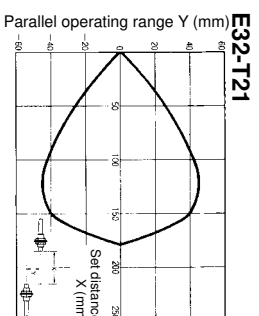
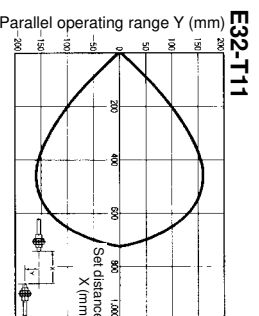
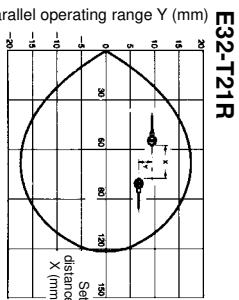


E32-T11R

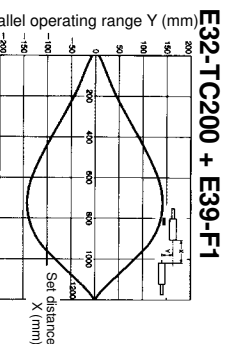
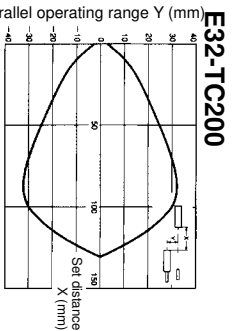


■ Parallel Operating Range (Typical)

At max. sensitivity.

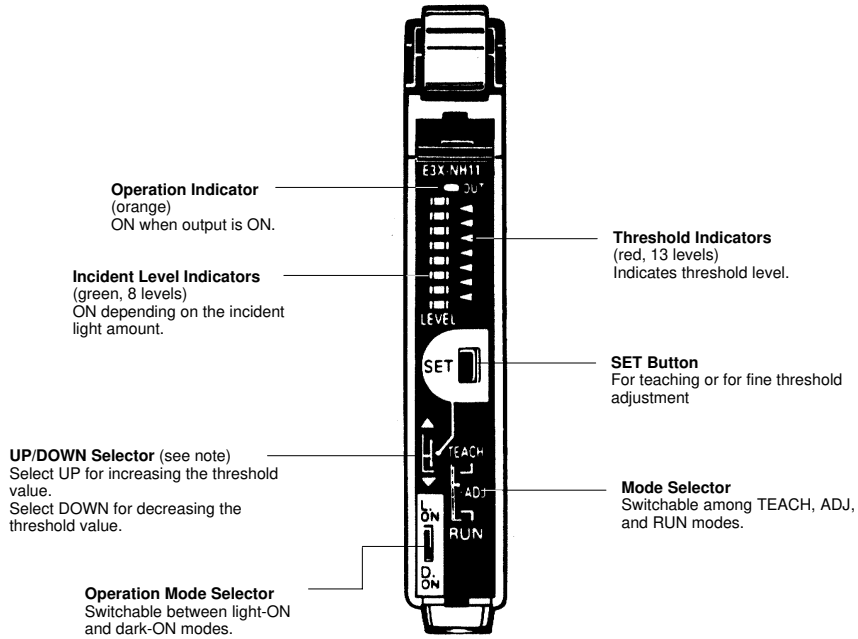


- E3X-NHB11



Nomenclature

- E3X-NH11 (NPN)
- E3X-NH21 (NPN)
- E3X-NHB11 (NPN)
- E3X-NH41 (PNP)
- E3X-NH51 (PNP)



Note: Used for making fine-sensitivity adjustments.

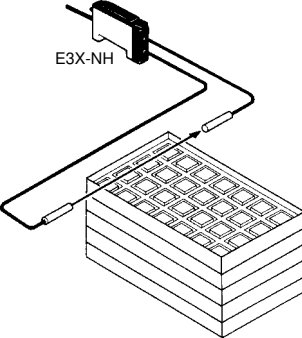
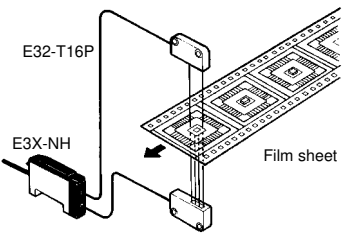
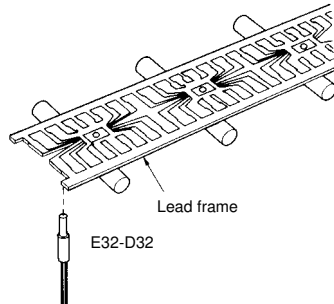
Operation

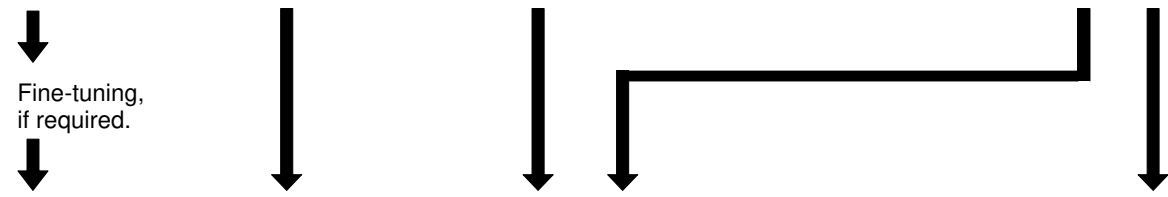
Output Circuits

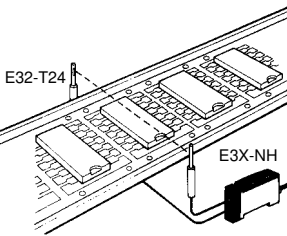
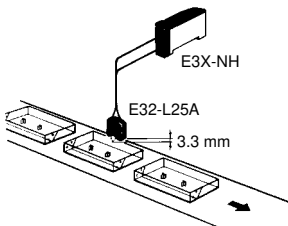
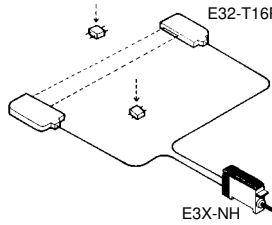
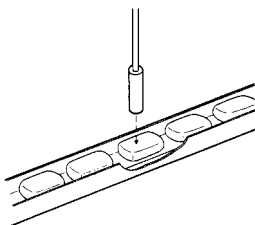
Output	Model	Mode selector	State of output transistor	Output circuit	Timing chart
NPN	E3X-NH11 E3X-NHB11	LIGHT ON (L/ON)	Light ON		Light received Light not received Operation indicator (orange) ON OFF Output transistor ON OFF Load (relay) Operate Release (Between brown and black)
		DARK ON (D/ON)	Dark ON		Light received Light not received Operation indicator (orange) ON OFF Output transistor ON OFF Load (relay) Operate Release (Between brown and black)
	E3X-NH21	LIGHT ON (L/ON)	Light ON		Light received Light not received Operation indicator (orange) ON OFF Output transistor ON OFF Load (relay) Operate Release T: OFF-delay timer set to 40 ms
		DARK ON (D/ON)	Dark ON		Light received Light not received Operation indicator (orange) ON OFF Output transistor ON OFF Load (relay) Operate Release T: OFF-delay timer set to 40 ms
PNP	E3X-NH41	LIGHT ON (L/ON)	Light ON		Light received Light not received Operation indicator (orange) ON OFF Output transistor ON OFF Load (relay) Operate Release (Between blue and black)
		DARK ON (D/ON)	Dark ON		Light received Light not received Operation indicator (orange) ON OFF Output transistor ON OFF Load (relay) Operate Release (Between blue and black)
	E3X-NH51	LIGHT ON (L/ON)	Light ON		Light received Light not received Operation indicator (orange) ON OFF Output transistor ON OFF Load (relay) Operate Release T: OFF-delay timer set to 40 ms
		DARK ON (D/ON)	Dark ON		Light received Light not received Operation indicator (orange) ON OFF Output transistor ON OFF Load (relay) Operate Release T: OFF-delay timer set to 40 ms

■ Sensitivity Setting and Adjustment

Refer to the following to select the most suitable sensitivity setting method. It is recommended that with/without-object teaching and manual-tuning be tried first.

Sensitivity Setting	<p>Using the Sensor at the Maximum Sensitivity</p> <p>Application Examples Detection of passing objects with through-beam sensor. Detection of the existence of objects that interrupt light perfectly. Detection of objects with no background objects.</p> <p>Checking IC Tray Arrangements</p> 	<p>Sensing Slight Differences</p> <p>Application Examples Detection of slight differences in reflection. Detection of translucent objects. Detection of object surface irregularities. Color discrimination.</p> <p>Detecting IC Chips on Film Sheet</p> 	<p>Sensitivity Setting Without Objects</p> <p>Application Examples Detection of minute passing objects. Detection of lead wires. High-precision positioning.</p> <p>Detecting Lead Frame Position</p> 
	1. Maximum Sensitivity Setting	2. With/Without-object Teaching	3. Positioning/No-object Teaching



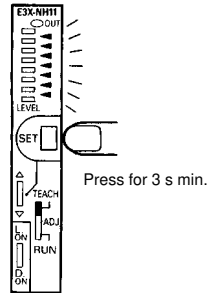
Sensitivity Adjustment (Fine-tuning)	<p>Fine-tuning on Production Lines</p> <p>Occasion Marginal sensitivity adjustment is required considering the differences of objects. High-precision positioning of electronic parts is required.</p> <p>Detecting Lead Frame Rises</p>  <p>Detecting Cassette Tape Cases</p> <p>Ensuring reliable detection without being influenced by the difference in color or mark.</p> 	<p>Ideal Operation Under Frequently Changing Environments</p> <p>Occasion Dust sticking to the fiber head. Sensing objects are slightly different to one another in color or surface conditions.</p> <p>Detecting Passing Chip Parts</p>  <p>Counting Number Of Pills</p> 
	A. Manual-tuning (Fine Sensitivity Adjustment)	B. Auto-tuning (Automatic Sensitivity Compensation)

■ Sensitivity Setting (Teaching)

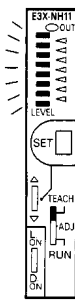
Note: The sensitivity of the E3X-NH/NHB is factory-set to maximum. When resetting the sensitivity of the E3X-NH to maximum after with/without-object teaching, follow the steps described below.

1. Maximum Sensitivity Setting

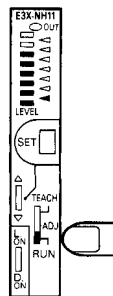
1. Set the mode selector to TEACH.
Press the SET button for three seconds minimum. Be sure that all the threshold indicators (red) are ON. The built-in buzzer beeps once when the threshold indicators are ON.



2. The sensitivity will be set when the built-in buzzer beeps continuously and all the incident level indicators (green) are ON.

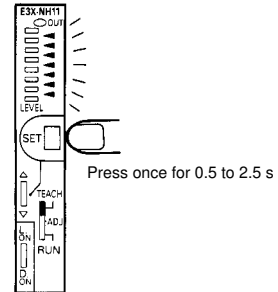


3. Set the mode selector to RUN. Be sure that only the bottom threshold indicator is ON.

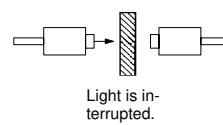


2. With/Without-object Teaching

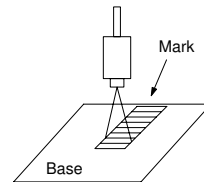
1. Set the mode selector to TEACH.
Locate the sensing object in the sensing area and press the SET button once. Be sure that all the threshold indicators (red) are ON. The built-in buzzer beeps once when the threshold indicators are ON.



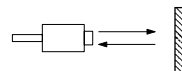
Through-beam Model



Reflective Model



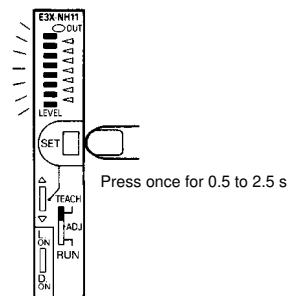
Reflective Model



2. Move the object and press the SET button.

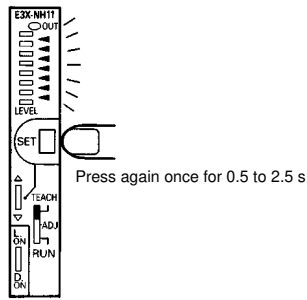
If teaching is OK:

All the incident level indicators (green) are ON. The built-in buzzer beeps once.

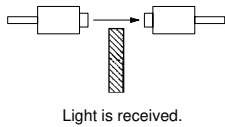


If teaching is NG:

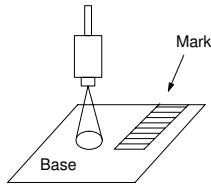
The threshold indicator (red) flashes. The built-in buzzer beeps 3 times. Change the position of the object and the sensing distance that have been set and repeat from the beginning.



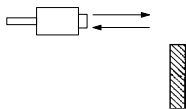
Through-beam Model



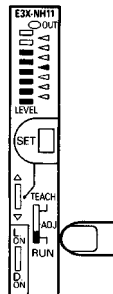
Reflective Model



Reflective Model

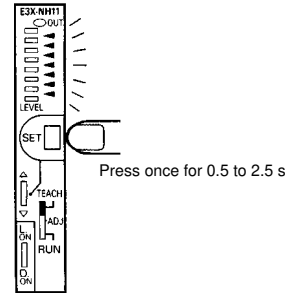


3. Set the mode selector to RUN. Be sure that the middle threshold indicator is ON, which means the threshold will be set to the middle between the values obtained with and without the sensing object.



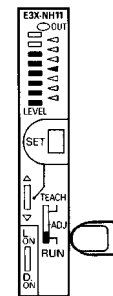
3. Positioning/No-object Teaching

1. Set the mode selector to TEACH. Press the SET button once without a sensing object in the sensing area. Be sure that all the threshold indicators (red) are ON. The built-in buzzer beeps once when the threshold indicators are ON.



2. Set the mode selector to RUN. The threshold is set automatically.

Use the manual tuning function for making fine adjustments.

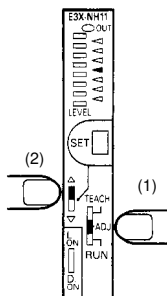


■ Sensitivity Adjustment (Tuning)

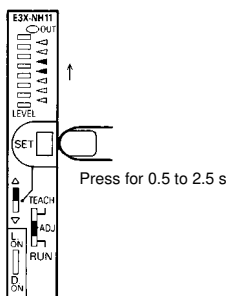
A. Manual-tuning (Fine Sensitivity Adjustment)

Note: The auto-tuning function will be disabled if manual-tuning is executed.

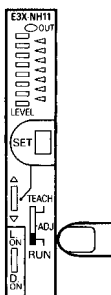
1. After setting the sensitivity of the E3X-NH, select the adjustment direction with the UP/DOWN selector in the ADJ mode.



2. Press the SET button in ADJ mode. Be sure that the threshold changes whenever the SET button is pressed. If two threshold indicators are ON, the threshold will be set to the middle value between the values corresponding to these indicators.

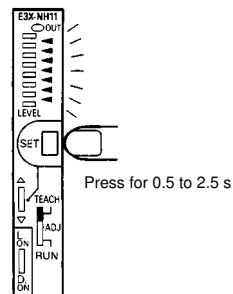


3. Set the mode selector to RUN.

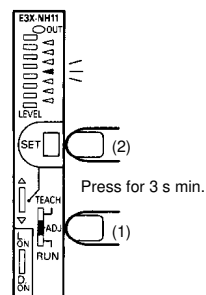


B. Auto-tuning (Automatic Sensitivity Compensation)

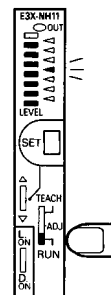
1. Set the mode selector to TEACH. Press the SET button once without a sensing object in the sensing area. Be sure that all the threshold indicators (red) are ON. The built-in buzzer beeps once when the threshold indicators are ON.



2. Set the mode selector to ADJ and press the SET button for three seconds minimum. Be sure that the threshold indicator (red) flashes. The built-in buzzer beeps continuously.



3. Set the mode selector to RUN. The threshold indicator (red) will continue to flash while the the auto-tuning function is enabled.



■ Threshold Setting and Indicators at Sensitivity Setting

Threshold indicators													
Level	1	2	3	4	5	6	7	8	9	10	11	12	13

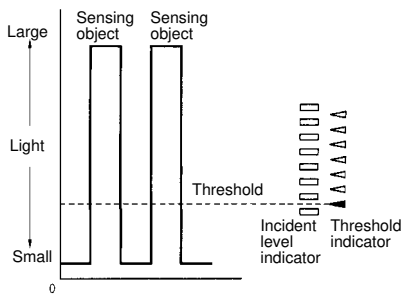
Maximum Sensitivity Setting

- Use the Through-beam Sensor for detection of opaque objects.
- Use the Reflective Sensor for detection of objects with no background objects.

The threshold will be set to a level slightly higher than the no-light received by the E3X-NH if the sensitivity is set to maximum for the detection of objects that completely interrupt light or the incident of the Sensor is very low.

Reflective Sensor

The number of lit indicators of the incident level indicators will depend on the incident. The bottom indicator of the threshold indicators is ON.

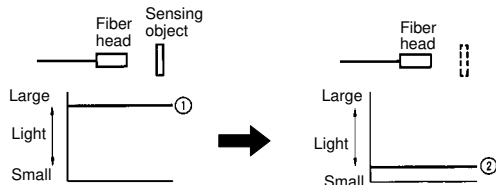


With/Without-object Teaching

- Ideal for the detection of object surface irregularities or minute objects.
- Ideal for the detection of objects with background objects reflecting light irregularly.

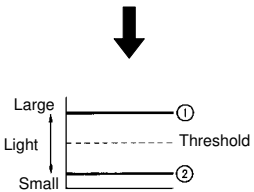
1. With/Without-object Teaching

Reflective Sensor:



Press the SET button with the sensing object in the sensing area.

Press the SET button without sensing object in the sensing area.

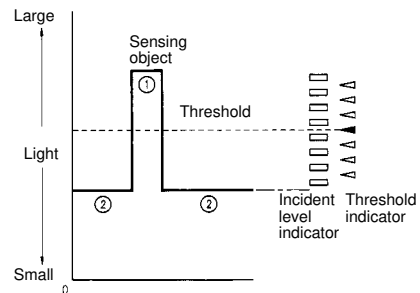


Set the threshold to the middle value between the values obtained with and without the sensing object.

2. RUN/ADJ Mode

Reflective Sensor:

The number of lit indicators of the incident level depends on the incident. At the time of manual-tuning, it is possible to adjust the threshold in six levels. The default threshold is set to 7.

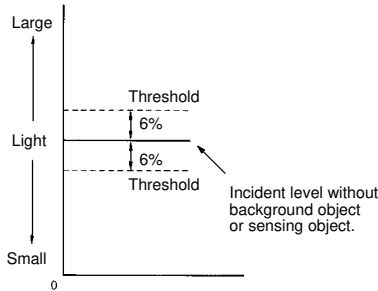


Positioning/No-object Teaching

- Ideal if it is impossible to perform teaching with the sensing object stationary in the sensing area.
- Ideal for high-precision positioning.
- Ideal for teaching with only background objects for the detection of bright or dark objects.

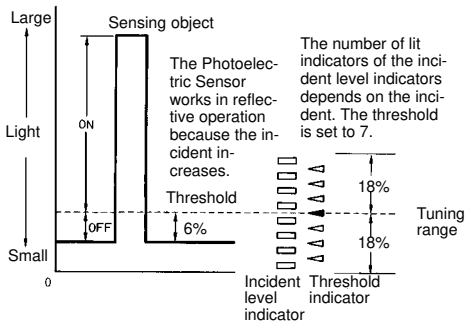
Reflective (Light-ON) Fiber Unit

1. Press the SET button without sensing object in the sensing area.
Tentatively set the threshold to the value that is $\pm 6\%$ of the incident level.



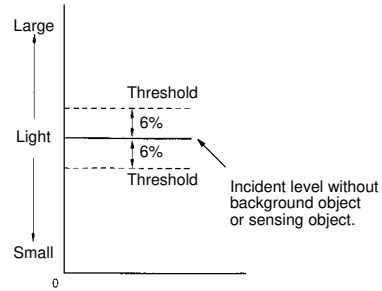
Note: If the incident is low at the time of teaching and the threshold cannot be set to the position corresponding to -6% of the incident level, the sensitivity will be set to maximum automatically when the E3X-NH is in RUN mode.

2. Detecting the first object in RUN/ADJ mode.



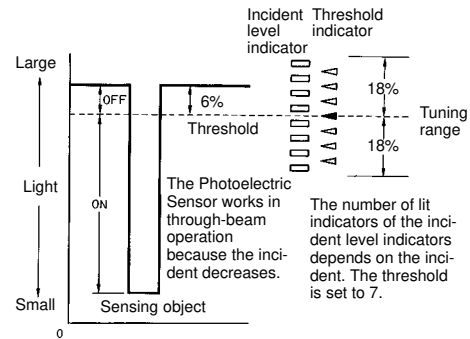
Through-beam (Dark-ON) Fiber Unit

1. Press the SET button without sensing object in the sensing area.
Tentatively set the threshold to the value that is $\pm 6\%$ of the incident level.



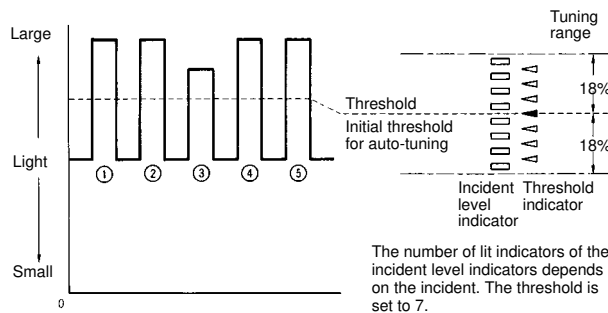
Note: If the incident is low at the time of teaching and the threshold cannot be set to the position corresponding to -6% of the incident level, the sensitivity will be set to maximum automatically when the E3X-NH is in RUN mode.

2. Detecting the first object in RUN/ADJ mode.



Threshold vs. Indicators after Auto-tuning Setting

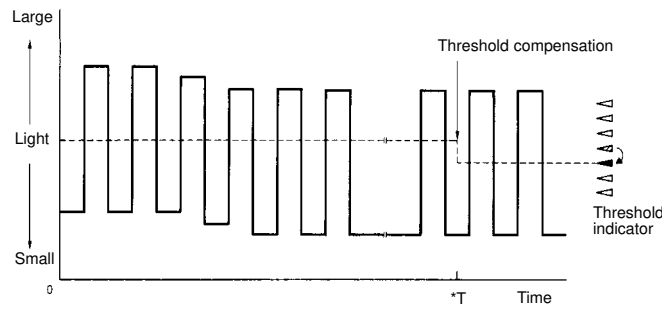
1. Set the initial threshold by performing positioning/no-object teaching in TEACH mode.
2. Press the SET button for three seconds minimum in ADJ mode.



Taking into consideration the vibration of the sensing objects on the in-line operation, sample the incident with the first five sensing objects after setting the threshold and set the threshold again to the middle value between the highest and lowest incident values obtained with the sensing objects. The E3X-NH will then perform auto-tuning within a range of $\pm 18\%$ of this value.

3. With sensing objects passing.

The threshold is automatically compensated within the tuning area that has been preset. When the threshold is automatically compensated, the threshold indicator will be flash according to the adjusted value.



*T The threshold is compensated 1, 3, 6, 10, 15, 22, and 30 minutes after the E3X-NH/NHB is turned on. After that, the threshold is compensated every 30-minute period.

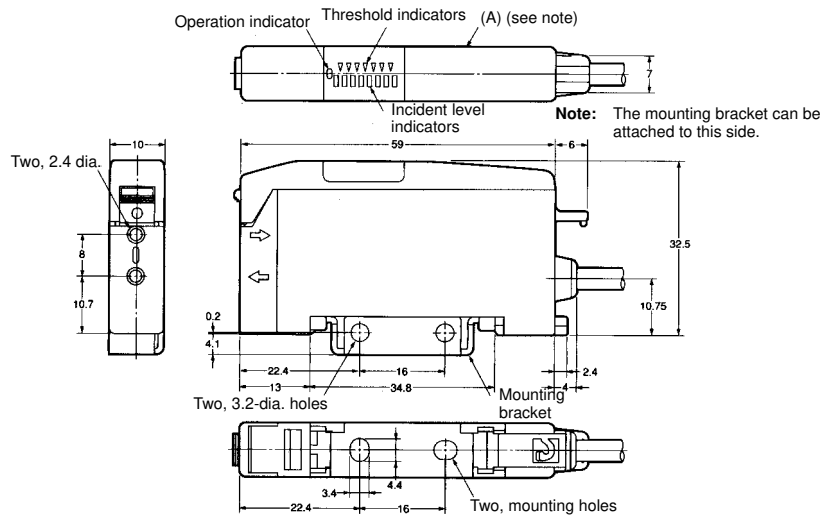
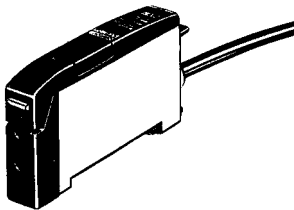
- Note:** 1. The alarm signal is output if the threshold compensation range is not within the tuning range.
 2. Perform sensitivity setting again if the alarm signal is output.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

■ Amplifier

E3X-NH 1
 E3X-NHB11




Cord: Polyvinyl chloride-covered cord
 4-mm dia. (18/0.12 dia), 4 cores
 Standard length: 2 m

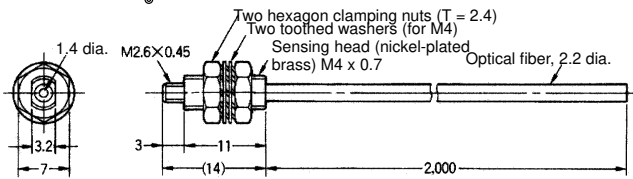
Weight: Approx. 100 g


Fiber Units

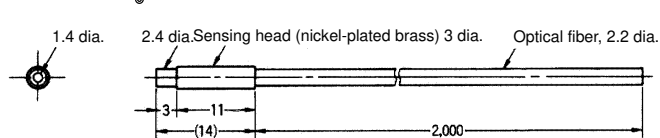
Through-beam (Sold in Pairs)


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

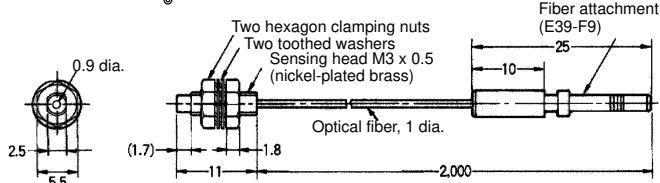
E32-T11L 



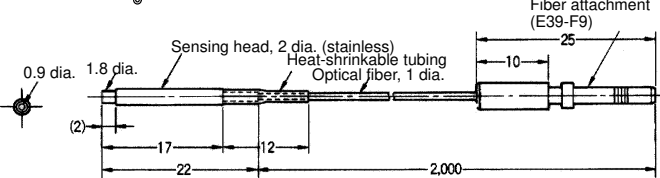
E32-T12L 



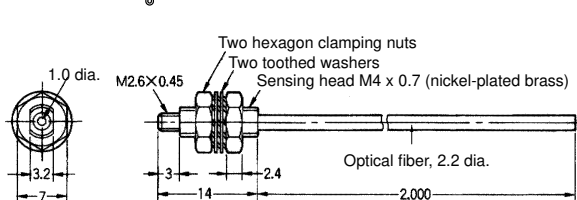
E32-T21L 



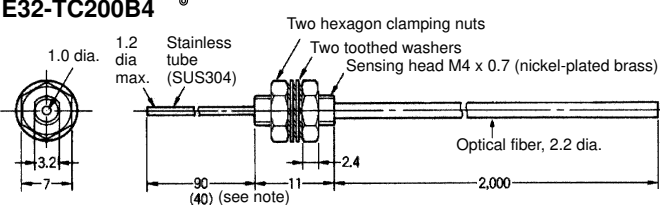
E32-T22L 




E32-TC200 

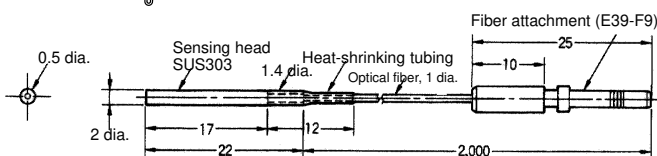


E32-TC200B
E32-TC200B4 

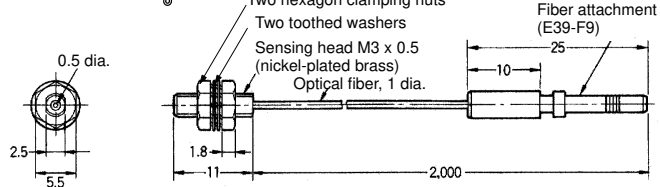


Note: The value in the parentheses is for the E32-TC200B4.

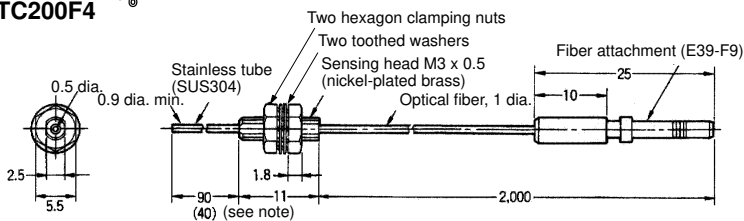
E32-T22 



E32-TC200E 

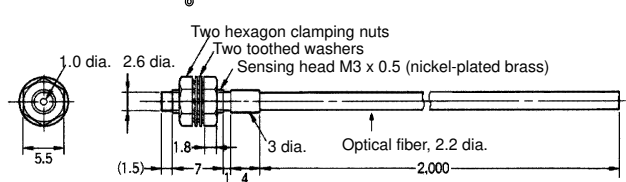



E32-TC200F
E32-TC200F4 

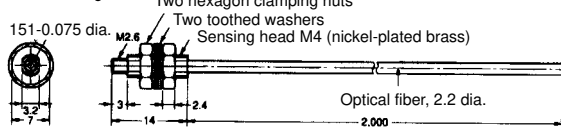


Note: The value in the parentheses is for the E32-TC200F4.

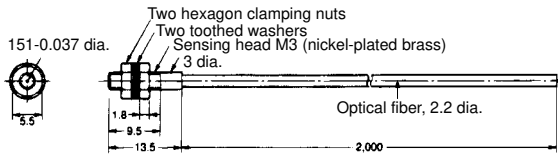
E32-TC200A 



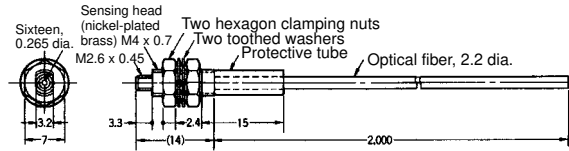
E32-T11R 



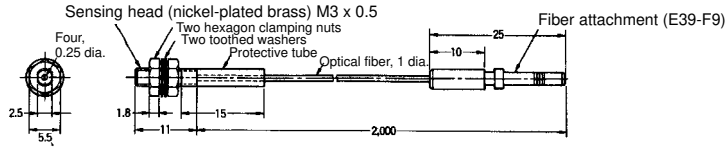
E32-T21R



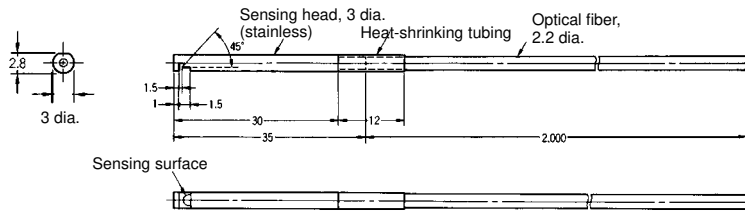
E32-T11



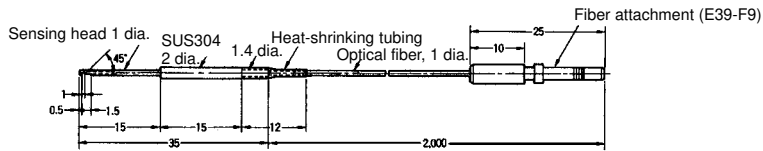
E32-T21



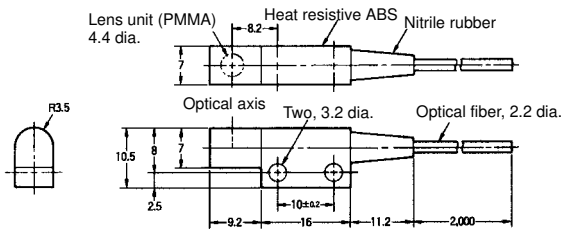
E32-T14L



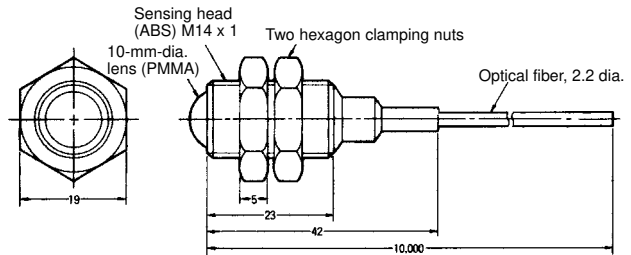
E32-T24



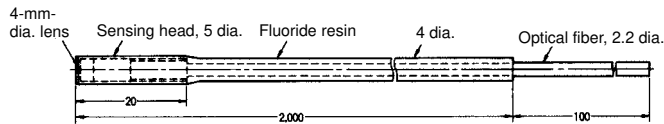
E32-T14



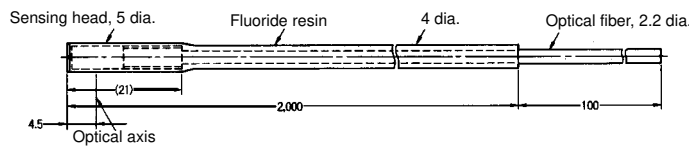
E32-T17L



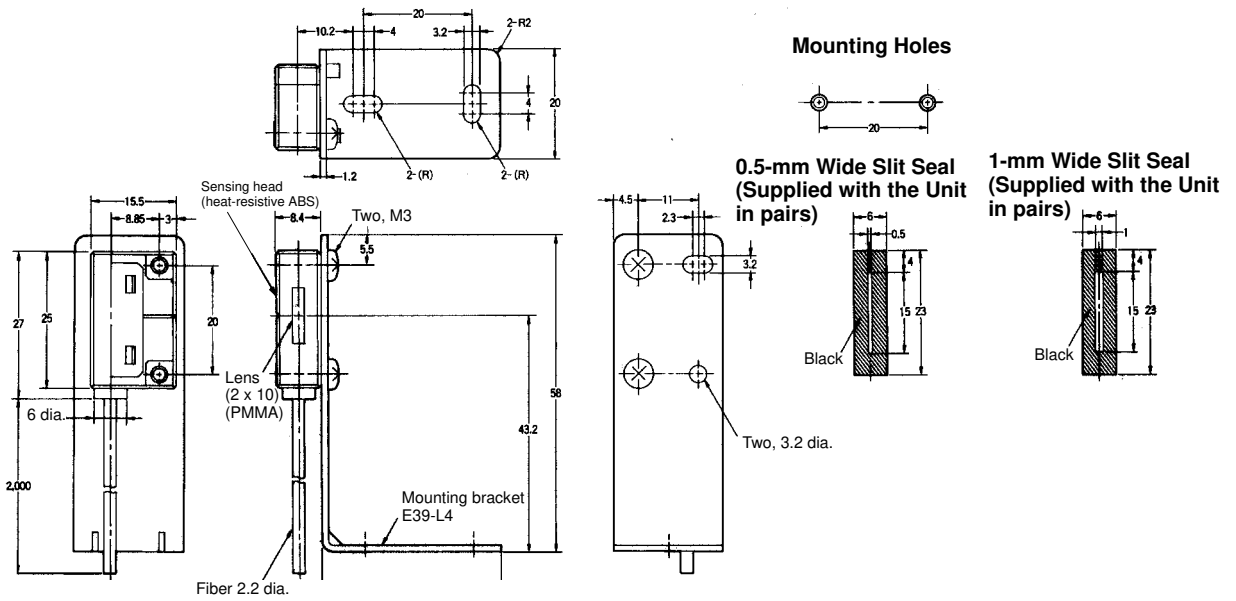
E32-T12F



E32-T14F



E32-T16



E32-T16P

