

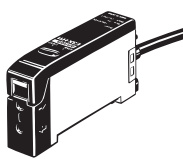
Fiber Amplifiers with Adjuster



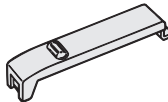
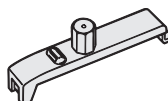
 Be sure to read *Safety Precautions* on page 18.



Ordering Information

Type	Appearance	Connection method	Functions	Model	
				NPN output	PNP output
Standard models		Pre-wired models	---	E3X-A11	E3X-A41
Long-range detection models			  	E3X-A21	E3X-A51
High-speed detection models			---	E3X-H11	---
Mark-detecting models (green light source)			  	E3X-F21	E3X-F51
LED indicator testing models			---	E3X-VG11	---
			  	E3X-VG21	---
			---	E3X-A11-8	---

Accessories (Order Separately)

Appearance	Name	Model	Quantity	Remarks
	Protective Cover	E39-G4 *	1	- Attached to the E3X-A/F/VG. - Order a replacement if the Protective Cover is damaged or lost.
	Manual Sensitivity Adjustment Knob	E39-G3 *	1	Order if the Protective Cover is damaged or lost.

* The design was changed as of June 1995. The new model of Protective Cover cannot be used with old models of Fiber Photoelectric Sensors.



Fiber Unit Ordering Information

Through-beam Fiber Units

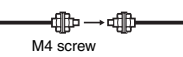
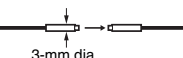
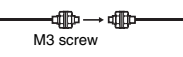
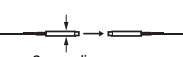
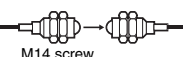
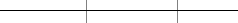
Note 1. (Free-cut): Indicates models that allow free cutting.

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

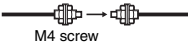
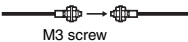
3. The sensing distance of the minimum sensing object indicates the rated distance unless otherwise specified.

Long-distance Fiber Units

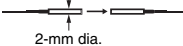
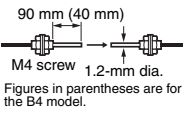
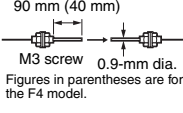
Red light Green light

Features (See note 1 for free-cutting ca- pability.)	Appearance	Amplifier	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)	Standard object (mm) (min. sensing object: opaque)	Fiber Unit	Permissible bending radi- us
M4 (Free-cut)	 M4 screw	E3X-A	 350 (1,000)	1.4 dia. (0.5 dia.)	E32-T11L	25 mm
		E3X-H	 700 (2,000)			
		E3X-F	 150			
		E3X-VG	 40 (120)			
3-mm dia. (Free-cut)	 3-mm dia.	E3X-A	 350	1.4 dia. (0.5 dia.)	E32-T12L	25 mm
		E3X-H	 700			
		E3X-F	 150			
		E3X-VG	 40			
M3 (Free-cut)	 M3 screw	E3X-A	 100	0.9 dia. (0.2 dia.)	E32-T21L	10 mm
		E3X-H	 200			
		E3X-F	 50			
		E3X-VG	 10			
2 dia. (small di- ameter) (Free-cut)	 2-mm dia.	E3X-A	 100	0.9 dia. (0.2 dia.)	E32-T22L	10 mm
		E3X-H	 200			
		E3X-F	 50			
		E3X-VG	 10			
M14; with lens; ideal for ex- plosion-proof ap- plications (Free-cut)	 M14 screw	E3X-A	 7,000	10 dia. (0.8 dia.)	E32-T17L	25 mm
		E3X-H	 14,000	10 dia. (2.1 dia.)		
		E3X-F	 3,000	10 dia. (1.5 dia.)		
		E3X-VG	 800	10 dia. (2.1 dia.)		

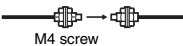
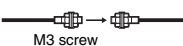
General-purpose Fiber Units

Features (See note 1 for free-cutting ca- pability.)	Appearance	Amplifier	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)		Standard object (mm) (min. sensing object: opaque)	Fiber Unit	Permissible bending ra- dius
M4 Free-cut	 M4 screw	E3X-A		200 (1,500)	1.0 dia. (0.2 dia.)	E32-TC200	25 mm
		E3X-H		400 (3,000)			
		E3X-F		80			
		E3X-VG		28 (190)			
M3; possi- ble to mount the reflective side- view conversion attachment E39- F5 Free-cut	 M3 screw	E3X-A		180	1.0 dia. (0.2 dia.)	E32-TC200A	25 mm
		E3X-H		360	1.0 dia. (0.3 dia.)		
		E3X-F		80	1.0 dia. (0.2 dia.)		
		E3X-VG		28			
M3; for de- tecting minute sensing objects Free-cut	 M3 screw	E3X-A		50	0.5 dia. (0.1 dia.)	E32-TC200E	10 mm
		E3X-H		100			
		E3X-F		26			
		E3X-VG		8			

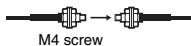
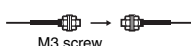
Thin-fiber Fiber Units

Features (See note 1 for free-cutting ca- pability.)	Appearance	Amplifier	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)	Standard object (mm) (min. sensing object: opaque)	Fiber Unit	Permissible bending radi- us
2 dia.; for de- tecting minute sensing objects (Free-cut)	 2-mm dia.	E3X-A	 50	0.5 dia. (0.1 dia.)	E32-T22	10 mm
		E3X-H	 100			
		E3X-F	 26			
		E3X-VG	 7			
1.2 dia.; with sleeve (Free-cut)	 90 mm (40 mm) M4 screw 1.2-mm dia. Figures in parentheses are for the B4 model.	E3X-A	 180	1.0 dia. (0.2 dia.)	E32-TC200B E32-TC200B4	25 mm
		E3X-H	 400			
		E3X-F	 80			
		E3X-VG	 28			
0.9 dia.; with sleeve (Free-cut)	 90 mm (40 mm) M3 screw 0.9-mm dia. Figures in parentheses are for the F4 model.	E3X-A	 50	0.5 dia. (0.1 dia.)	E32-TC200F E32-TC200F4	10 mm
		E3X-H	 100			
		E3X-F	 26			
		E3X-VG	 8			

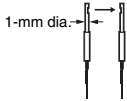
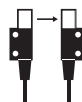
Flexible Fiber Units: R1

Features (See note 1 for free-cutting ca- pability.)	Appearance	Amplifier	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)	Standard object (mm) (min. sensing object: opaque)	Fiber Unit	Permissible bending radi- us
Possible to bend like electric wires (R1) (Free-cut)	 M4 screw	E3X-A	 140 (1,000)	1.0 dia. (0.2 dia.)	E32-T11R	1 mm
	 M3 screw	E3X-A	 30	0.5 dia. (0.2 dia.)	E32-T21R	

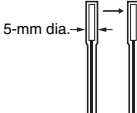
Flexible Fiber Units: R4

Features (See note 1 for free-cutting capability.)	Appearance	Amplifier	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)	Standard object (mm) (min. sensing object: opaque)	Fiber Unit	Permissible bending radius
Mounting on moving object (R4)	 M4 screw	E3X-A	 180 (1,000)	1.0 dia. (0.3 dia.)	E32-T11	4 mm
		E3X-H	 360	1.0 dia. (0.2 dia.)		
		E3X-F	 80	1.0 dia. (0.2 dia.)		
		E3X-VG	 10 (120)			
	 M3 screw	E3X-A	 50	0.5 dia. (0.1 dia.)	E32-T21	
		E3X-H	 100			
		E3X-F	 26			
		E3X-VG	 6			

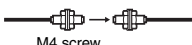
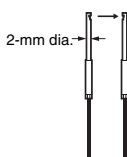
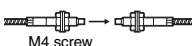
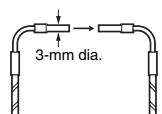
Side-view Fiber Units

Features (See note 1 for free-cutting capability.)	Appearance	Amplifier	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)			Standard object (mm) (min. sensing object: opaque)	Fiber Unit	Permissible bending radius
Long distance space saving	 3-mm dia.	E3X-A	120			1.0 dia. (0.1 dia.)	E32-T14L	25 mm
		E3X-H	240			1.0 dia. (0.2 dia.)		
		E3X-F	30			1.0 dia. (0.1 dia.)		
		E3X-VG	10					
Suitable for de- tecting minute sensing objects	 1-mm dia.	E3X-A	45			0.5 dia. (0.1 dia.)	E32-T24	10 mm
		E3X-H	90			0.5 dia. (0.3 dia.)		
		E3X-F	15					
		E3X-VG	2			0.5 dia. (0.2 dia.)		
Screw-mount- ing type		E3X-A	900			4.0 dia. (0.2 dia.)	E32-T14	25 mm
		E3X-H	1,800					
		E3X-F	380					
		E3X-VG	80					

Chemical-resistant Fiber Unit

Features (See note 1 for free-cutting capability.)	Appearance	Amplifier	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)	Standard object (mm) (min. sensing object: opaque)	Fiber Unit	Permissible bending radius
Fluororesin covered; withstands harsh environments (operating ambient temperature: -30 to 70°C)		E3X-A	 800	4.0 dia. (0.9 dia.)	E32-T12F	40 mm
		E3X-H	 1,600	4.0 dia. (0.7 dia.)		
		E3X-F	 300			
		E3X-VG	 70	4.0 dia. (0.6 dia.)		
Fluororesin covered; side-view; withstands harsh environments (operating ambient temperature: -30 to 70°C)		E3X-A	 100	3.0 dia. (0.7 dia.)	E32-T14F	
		E3X-H	 200	3.0 dia. (0.9 dia.)		

Heat-resistant Fiber Units

Features (See note 1 for free-cutting capability.)	Appearance	Amplifier	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)			Standard object (mm) (min. sensing object: opaque)	Fiber Unit	Permissible bending radi- us		
Resists 150°C*1; fi- ber sheath material: fluororesin (operating ambient temperature: -40 to 150°C)		E3X-A		200		1.5 dia. (1.0 dia.)	E32-T51			
		E3X-H		400						
		E3X-F		80						
		E3X-VG		20						
Side-view; resists 150°C*1; suitable for detecting minute sensing objects; fiber sheath material: fluo- roresin (operating am- bient temperature: -40 to 150°C)		E3X-A		60		1.0 dia. (0.2 dia.)	E32-T54	35 mm		
		E3X-H		130		1.0 dia. (0.3 dia.)				
Resists 300°C *2, with spiral tube; high mechanical strength; fiber sheath material: stainless steel (oper- ating ambient temper- ature: -40 to 300°C)		E3X-A		150 (1,500)		1.0 dia. (0.2 dia.)	E32-T61	25 mm		
		E3X-H		300 (3,000)		1.0 dia. (0.3 dia.)				
		E3X-F		60 (450)		1.0 dia. (0.5 dia.)				
		E3X-VG		18 (130)						
Resists 200°C *2, L-shaped; fiber sheath material: stain- less steel		E3X-H		700		1.7 dia. (0.4 dia.)	E32-T84S			

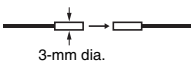
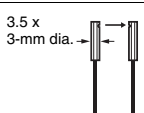
*1. For continuous operation, use the products within a temperature range from -40 to 130°C.

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

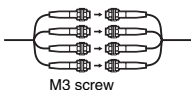
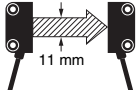
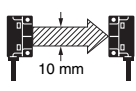
Slot Fiber Units

Features (See note 1 for free-cutting capability.)	Appearance	Amplifier	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)			Standard object (mm) (min. sensing object: opaque)	Fiber Unit	Permissible bending radi- us
Suitable for film sheet de- tection; no optical axis adjustment required; easy to mount		E3X-A		10		4.0 dia. (0.5 dia.)	E32-G14	25 mm
		E3X-H		10		4.0 dia. (1.0 dia.)		
		E3X-F		10		4.0 dia. (0.6 dia.)		
		E3X-VG		10				

Narrow-vision-field Fiber Units

Features (See note 1 for free-cutting capability.)	Appearance	Amplifier	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)			Standard object (mm) (min. sensing object: opaque)	Fiber Unit	Permissible bending radi- us
Suitable for detecting wa- fers		E3X-H		1,000		1.7 dia. (0.5 dia.)	E32-T22S	10 mm
		E3X-H		700		2.0 dia. (0.5 dia.)	E32-T24S	

Area-sensing Fiber Units

Features (See note 1 for free-cutting ca- pability.)	Appearance	Amplifier	Sensing distance (mm) (Values in parentheses: when using the E39-F1 Lens Unit)		Standard object (mm) (min. sensing object: opaque)	Fiber Unit	Permissible bending radi- us
Multi-point sens- ing (4-head)	 M3 screw	E3X-A		150		E32-M21	25 mm
		E3X-H		300			
		E3X-F		65			
		E3X-VG		20			
Stable for detecting minute sensing objects in a wide area; degree of protec- tion: IEC IP50	 11 mm	E3X-A		300		E32-T16P	10 mm
		E3X-H		600			
Suitable for de- tecting over a 10-mm area; long distance	 10 mm	E3X-A		750		E32-T16	25 mm
		E3X-H		1,500			
		E3X-F		330			
		E3X-VG		150			

* At a sensing distance of 100 mm, an object of this size is detectable in a sensing area with a width of 11 mm. For the E32-T16, however, the value applies to a width of 10 mm. (The value for the diameter of the sensing object applies when the sensing object is stationary.)

Reflective Fiber Units

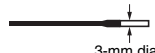
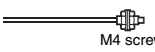
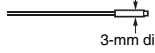
Note 1. (Free-cut) : Indicates models that allow free cutting.

2. The value for the minimum sensing object is the distance at which the smallest object can be detected with a Reflective Fiber Unit.

3. Internal reflected light may cause detection of an incident light condition to continue if the sensitivity is set to the maximum. If this occurs, use teaching with no-workpiece teaching or 2-point teaching.

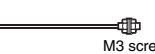
Long-distance Fiber Units

Red light Green light

Features (See note 1 for free-cutting ca- pability.)	Appearance	Amplifier	Sensing distance (mm)*			Standard object (mm) (min. sens- ing object: copper wire)	Fiber Unit	Permissible bending radi- us
M6 (Free-cut)		E3X-A	100			100 × 100 (0.015 dia.)	E32-D11L	25 mm
		E3X-H	200			200 × 200 (0.015 dia.)		
		E3X-F	45			50 × 50 (0.2 dia.)		
		E3X-VG	10			25 × 25 (3 dia.)		
3 dia. (small di- ameter) (Free-cut)		E3X-A	60			100 × 100 (0.04 dia.)	E32-D12	25 mm
		E3X-H	120			200 × 200 (0.015 dia.)		
		E3X-F	15			25 × 25 (2.4 dia.)		
		E3X-VG	2			25 × 25 (1.6 dia.)		
M4 (Free-cut)		E3X-A	25			25 × 25 (0.03 dia.)	E32-D21L	10 mm
		E3X-H	50			50 × 50 (0.015 dia.)		
		E3X-F	11			25 × 25 (0.26 dia.)		
		E3X-VG	1			25 × 25 (1 dia.)		
3 dia. (small di- ameter) (Free-cut)		E3X-A	25			25 × 25 (0.03 dia.)	E32-D22L	10 mm
		E3X-H	50			50 × 50 (0.015 dia.)		
		E3X-F	11			25 × 25 (0.26 dia.)		
		E3X-VG	1			25 × 25 (1 dia.)		

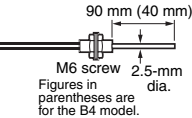
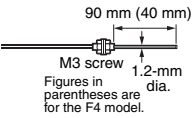
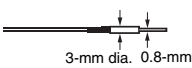
* Sensing distances are given for white paper.

General-purpose Fiber Units

Features (See note 1 for free-cutting ca- pability.)	Appearance	Amplifier	Sensing distance (mm)*			Standard object (mm) (min. sens- ing object: copper wire)	Fiber Unit	Permissible bending radi- us
M6 (Free-cut)		E3X-A	75			100 × 100 (0.015 dia.)	E32-DC200	25 mm
		E3X-H	150			200 × 200 (0.015 dia.)		
		E3X-F	33			50 × 50 (0.015 dia.)		
		E3X-VG	10			25 × 25 (0.2 dia.)		
M3 (small di- ameter) (Free-cut)		E3X-A	18			25 × 25 (0.03 dia.)	E32-DC200E	10 mm
		E3X-H	36			50 × 50 (0.015 dia.)		
		E3X-F	8			25 × 25 (0.03 dia.)		
		E3X-VG	2			25 × 25 (1 dia.)		

* Sensing distances are given for white paper.

Thin-fiber Fiber Unit

Features (See note 1 for free-cutting ca- pability.)	Appearance	Amplifier	Sensing distance (mm)*			Standard object (mm) (min. sens- ing object: copper wire)	Fiber Unit	Permissible bending radi- us
2.5 dia.; with sleeve		E3X-A	75			100 × 100 (0.03 dia.)	E32-DC200B E32-DC200B4	25 mm
		E3X-H	150			200 × 200 (0.015 dia.)		
		E3X-F	33			50 × 50 (0.015 dia.)		
		E3X-VG	10			25 × 25 (1 dia.)		
1.2 dia.; with sleeve		E3X-A	18			25 × 25 (0.03 dia.)	E32-DC200F E32-DC200F4	10 mm
		E3X-H	36			25 × 25 (0.015 dia.)		
		E3X-F	8			25 × 25 (0.03 dia.)		
		E3X-VG	2			25 × 25 (1 dia.)		
0.8 dia.; Minute object sensing		E3X-A	5			25 × 25 (0.015 dia.)	E32-D33	4 mm
		E3X-H	10					
		E3X-F	1.8			25 × 25 (0.03 dia.)		

* Sensing distances are given for white paper.

Flexible Fiber Units: R1

Features (See note 1 for free-cutting ca- pability.)	Appearance	Amplifier	Sensing distance (mm)*			Standard object (mm) (min. sens- ing object: copper wire)	Fiber Unit	Permissible bending radi- us
Possible to bend like electric wires (R1)		E3X-A	45			100 × 100 (0.03 dia.)	E32-D11R	1 mm
		E3X-A	7			25 × 25 (0.03 dia.)	E32-D21R	

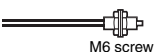
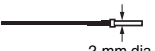
* Sensing distances are given for white paper.

Flexible Fiber Units: R4

Features (See note 1 for free-cutting ca- pability.)	Appearance	Amplifier	Sensing distance (mm)*			Standard object (mm) (min. sens- ing object: copper wire)	Fiber Unit	Permissible bending radi- us
Ideal for mounting on moving sections (R4)	 M6 screw	E3X-A	 45			50 × 50 (0.03 dia.)	E32-D11	4 mm
		E3X-H	 90			100 × 100 (0.015 dia.)		
		E3X-F	 20			25 × 25 (0.03 dia.)		
		E3X-VG	 7			25 × 25 (0.5 dia.)		
	 M3 screw	E3X-A	 7			25 × 25 (0.03 dia.)	E32-D21	
		E3X-H	 14			25 × 25 (0.015 dia.)		
		E3X-F	 3			25 × 25 (0.03 dia.)		
		E3X-VG	 1			25 × 25 (1 dia.)		

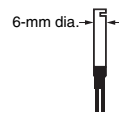
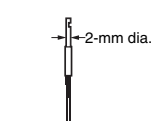
* Sensing distances are given for white paper.

Coaxial Fiber Units

Features (See note 1 for free-cutting capa- bility.)	Appearance	Amplifier	Sensing distance (mm)*			Standard object (mm) (min. sensing object: copper wire)	Fiber Unit	Permissible bending radi- us
M6 Coaxial; positioning accu- racy	 M6 screw	E3X-A	75			100 × 100 (0.03 dia.)	E32-CC200	25 mm
		E3X-H	150			200 × 200 (0.015 dia.)		
		E3X-F	33			50 × 50 (0.03 dia.)		
		E3X-VG	10			25 × 25 (0.5 dia.)		
3-dia. Coaxial (small diameter); positioning accu- racy	 3-mm dia.	E3X-A	40			50 × 50 (0.04 dia.)	E32-D32L	
		E3X-H	80			100 × 100 (0.015 dia.)		
		E3X-F	11			25 × 25 (1.1 dia.)		
		E3X-VG	4			25 × 25 (1 dia.)		
2-dia. Coaxial; high-precision positioning pos- sible; possible to mount small-spot (0.5- to 1-mm dia., variable) lens (E39-F3A)	 2-mm dia.	E3X-A	20			25 × 25 (0.03 dia.)	E32-D32	
		E3X-H	40			50 × 50 (0.015 dia.)		
		E3X-F	9			25 × 25 (0.03 dia.)		
		E3X-VG	2.5			25 × 25 (0.5 dia.)		

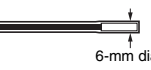
* Sensing distances are given for white paper.

Side-view Fiber Units

Features (See note 1 for free-cutting capability.)	Appearance	Amplifier	Sensing distance (mm)*			Standard object (mm) (min. sensing object: copper wire)	Fiber Unit	Permissible bending radius
6-dia.; Long distance 		E3X-A	40			50 × 50 (0.03 dia.)	E32-D14L	25 mm
		E3X-H	40			25 × 25 (0.5 dia.)		
		E3X-F	12			25 × 25 (0.5 dia.)		
		E3X-VG	1.5			25 × 25 (1 dia.)		
2 dia. (small diameter); space saving 		E3X-A	15			25 × 25 (0.03 dia.)	E32-D24	10 mm
		E3X-H	15			25 × 25 (0.03 dia.)		
		E3X-F	4			25 × 25 (0.03 dia.)		
		E3X-VG	1.6			25 × 25 (1 dia.)		

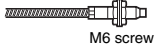
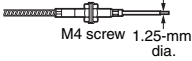
* Sensing distances are given for white paper.

Chemical-resistant Fiber Units

Features (See note 1 for free-cutting capability.)	Appearance	Amplifier	Sensing distance (mm)*			Standard object (mm) (min. sensing object: copper wire)	Fiber Unit	Permissible bending radius
Fluoresin covered; with-stands harsh environments (operating ambient temperature: -30 to 70°C) 		E3X-A	50			50 × 50 (0.03 dia.)	E32-D12F	40 mm
		E3X-H	50			50 × 50 (0.03 dia.)		
		E3X-F	20			25 × 25 (0.5 dia.)		
		E3X-VG	4			25 × 25 (0.5 dia.)		

* Sensing distances are given for white paper.

Heat-resistant Fiber Units

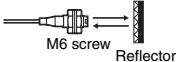
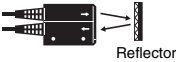
Features (See note 1 for free-cutting ca- pability.)	Appearance	Amplifier	Sensing distance (mm)*			Standard object (mm) (min. sens- ing object: copper wire)	Fiber Unit	Permissible bending radi- us
Resists 150°C*2; fiber sheath ma- terial: fluororesin (operating ambi- ent temperature: -40 to 150°C)		E3X-A	60			100 × 100 (0.03 dia.)	E32-D51	35 mm
		E3X-H	120			200 × 200 (0.03 dia.)		
		E3X-F	26			50 × 50 (0.03 dia.)		
		E3X-VG	5			25 × 25 (1 dia.)		
Resists 300°C*3; fiber sheath ma- terial: stainless steel (operating ambient temper- ature: -40 to 300°C)		E3X-A	45			50 × 50 (0.03 dia.)	E32-D61	25 mm
		E3X-H	45					
		E3X-F	20			25 × 25 (0.03 dia.)		
		E3X-VG	5			25 × 25 (1 dia.)		
Resists 400°C*3; fiber sheath ma- terial: stainless steel (operating ambient temper- ature: -40 to 400°C)		E3X-A	30			50 × 50 (0.03 dia.)	E32-D73	25 mm
		E3X-H	30					
		E3X-F	17			25 × 25 (0.2 dia.)		
		E3X-VG	3			25 × 25 (1 dia.)		

*1. Sensing distances are given for white paper.

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

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

Retroreflective Fiber Units

Features (See note 1 for free-cutting ca- pability.)	Appearance	Amplifier	Sensing distance (mm)*			Standard object (mm) (min. sens- ing object: copper wire)	Fiber Unit	Permissible bending radi- us
Transparent objects sensing		E3X-A	10 to 250			35 dia. (0.3 dia.)	E32-R21 + E39-R3 (provided)	10 mm
		E3X-H	10 to 250					
		E3X-F	20 to 230			35 dia. (0.5 dia.)		
Trans- parent objects detec- tion (operating ambient temper- ature: -25 to 55°C); degree of protection: IEC IP66		E3X-A	150 to 1,500			35 dia. (0.6 dia.)	E32-R16 + E39-R3 (provided)	25 mm
		E3X-H	150 to 1,500					
		E3X-F	50 to 700					

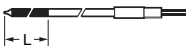
* Sensing distances are given for white paper.

Limited Reflective Fiber Units

Features (See note 1 for free-cutting ca- pability.)	Appearance	Amplifier	Sensing distance (mm)*			Standard object (mm) (min. sens- ing object: copper wire)	Fiber Unit	Permissible bending radi- us
Detects  wafers and small differ- ences in height; (operating ambi- ent temperature −40 to 105°C); degree of protec- tion: IEC IP50		E3X-A	7.2±1.8			25 × 25 (0.015 dia.)	E32-L25L	10 mm
		E3X-H	7.2±1.8					
		E3X-F	7.2±1.8					
		E3X-A	4±2			25 × 25 (0.015 dia.)	E32-L24L	
		E3X-H	4±2					
		E3X-F	4±2					
Detects  wafers and small differ- ences in height; degree of protec- tion: IEC IP50		E3X-A	3.3			25 × 25 (0.03 dia.)	E32-L25	25 mm
		E3X-H	3.3			25 × 25 (0.015 dia.)		
		E3X-F	3.3			25 × 25 (0.5 dia.)		
		E3X-A	3.3			25 × 25 (0.03 dia.)	E32-L25A	
		E3X-H	3.3			25 × 25 (0.015 dia.)		
		E3X-F	3.3			25 × 25 (0.5 dia.)		

* Sensing distances are given for white paper.

Fluid-level Detection Fiber Units

Features (See note 1 for free-cutting ca- pability.)	Appearance	Amplifier	Sensing distance (mm)*			Standard object (mm) (min. sens- ing object: copper wire)	Fiber Unit	Permissible bending radi- us
Fluid contact type: unbendable section L 150 mm, 350 mm (two types)		E3X-A	---			Pure water at a tem- perature of 25°C	E32-D82F1 E32-D82F2	40 mm
		E3X-H						
Tube-mounting type 		E3X-A	---			Liquid	E32-L25T	10 mm
		E3X-H						

* Sensing distances are given for white paper.

Ratings and Specifications

Model		Type NPN output PNP output	General-purpose		Long distance	High-speed detection	Mark sensing	
			E3X-A11	E3X-A21	E3X-H11	E3X-F21	E3X-VG11	E3X-VG21
			E3X-A41	E3X-A51		E3X-F51	---	---
Item								
Light source			Red LED (660 nm)				Green LED (565 nm)	
Power supply voltage			10 to 30 VDC, including 10% ripple (p-p)		10 to 30 VDC, ripple (p-p) 10% max.	12 to 24 VDC ±10%, ripple (p-p) 10% max.	10 to 30 VDC, including 10% ripple (p-p)	
Current consumption			35 mA max.			40 mA max.		
Control output			Load power supply voltage: 30 V max., Load current: 100 mA max (residual voltage: 1 V max.) Open collector (NPN or PNP output, depending on the model) Light-ON/Dark-ON selectable					
Self-diagnosis output			---	Load power supply voltage: 30 VDC max., Load current: 50 mA max. (residual voltage: 1 V max.) Open collector (NPN or PNP output, depending on the model)	---	Load power supply voltage: 30 VDC max., Load current: 50 mA max. (residual voltage: 1 V max.) Open collector (NPN or PNP output, depending on the model)	---	30 VDC, 50 mA max. (residual voltage: 1 V max.)
External check input	Input voltage	---	NPN Models Light OFF: Short to 0 V or 1.5 V max. (leakage current: 0.2 mA max.) Light ON: Open or 3.5 V min. (max. input: 5 V) PNP Models Light OFF: Short to +DC or +DC – 1.5 V max. (induction current: 0.2 mA max.) Light ON: Open or +DC – 3.5 VDC max. (max. input: 5 V)	---	NPN Models Light OFF: Short to 0 V or 1.5 V max. (leakage current: 0.2 mA max.) Light ON: Open or 3.5 V min. (max. input: 5 V) PNP Models Light OFF: Short to +DC or +DC – 1.5 V max. (induction current: 0.2 mA max.) Light ON: Open or +DC – 3.5 VDC max. (max. input: 5 V)	---	Light OFF: 1.5 V max.; short current: 0.2 mA max. Light ON: Open or 3.5 V min. (max. input: 5 V)	
		Response delay	400 μs		200 μs		400 μs	
Response time			Operate or reset: 200 μs max.		Operate or reset: 1 ms max.	ON: 20 μs max. OFF: 30 μs max.	Operate or reset: 200 μs max.	
Sensitivity adjuster			8-turn endless variable resistor (with indicator)					
Circuit protection			Power supply reverse polarity protection, Output short-circuit, Mutual interference prevention					
Timer function			---	Zero or OFF-delay timer (0.01 to 0.1 s; adjustable), Switch selectable	OFF-delay timer (40 ms fixed), ON/OFF selectable	Zero or OFF-delay timer (0.01 to 0.1 s; adjustable), Switch selectable	---	Zero or OFF-delay timer (0.01 to 0.1 s; adjustable), Switch selectable
Ambient illumination (receiver side)			Incandescent lamp: 3,000 lx max., Sunlight: 10,000 lx max.					
Ambient temperature			Operating: –25 to 55°C, Storage: –40 to 70°C (with no icing or condensation)					
Ambient humidity			Operating: 35% to 85%, Storage: 35% to 95% (with no condensation)					
Insulation resistance			20 MΩ min. (at 500 VDC)					
Dielectric strength			1,000 VAC, 50/60 Hz for 1 min					
Vibration resistance (destruction)			10 to 55 Hz with a 1.5-mm double amplitude for 2 h each in X, Y and Z directions					
Shock resistance (destruction)			500 m/s², for 3 times each in X, Y and Z directions					
Degree of protection			IEC IP66 (with Protective Cover in place)*					
Connection method			Pre-wired (standard cable length: 2 m)					
Weight (packed state)			Approx. 100 g					
Material	Case	Heat-resistant ABS						
	Cover	Polycarbonate						
Accessories			Mounting bracket, Adjustment screwdriver, Instruction sheet					

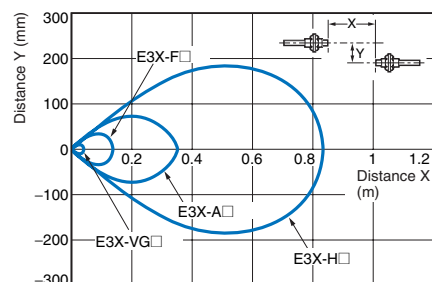
* The degree of protection is IP65 if the Fiber Unit connected is a fine-beam model, high-temperature model (E32-T61, E32-D61, or E32-D73), direct sleeve model, or the E32-M21. The degree of protection is IP50 without the Protective Cover.

Engineering Data (Typical)

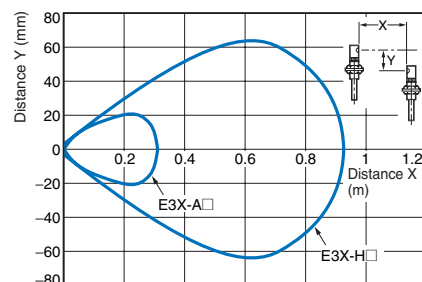
Parallel Operating Range

E3X-A□□/H□□/F□□/VG□□

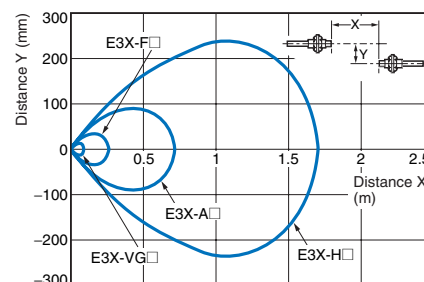
E32-TC200



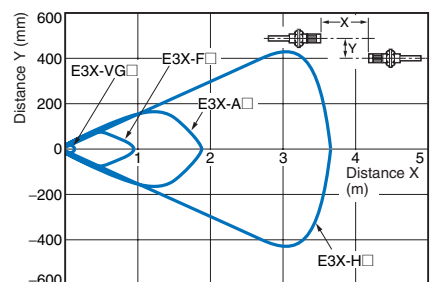
E32-TC200 + E39-F2 Side-view Unit
(Order Separately)



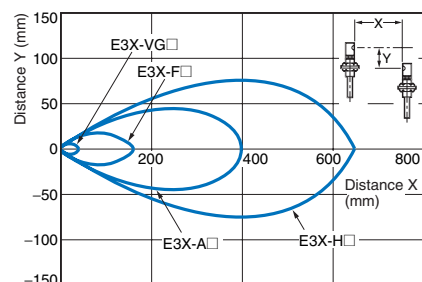
E32-T11L/T12L



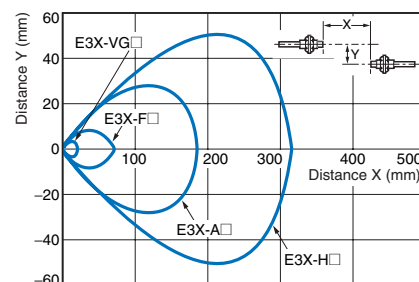
E32-T11L + E39-F1 Long-distance Lens
Unit (Order Separately)



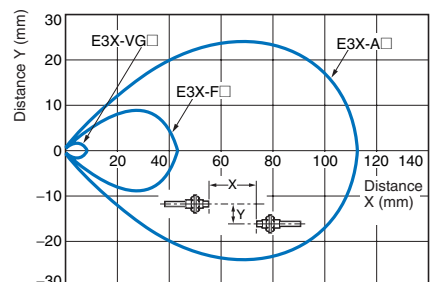
E32-T11L + E39-F2 Side-view Unit
(Order Separately)



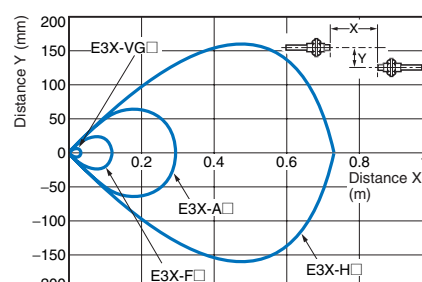
E32-T21L/T22L



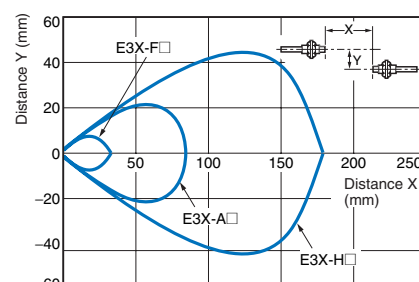
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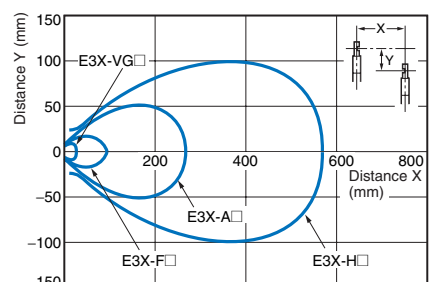
E32-T11



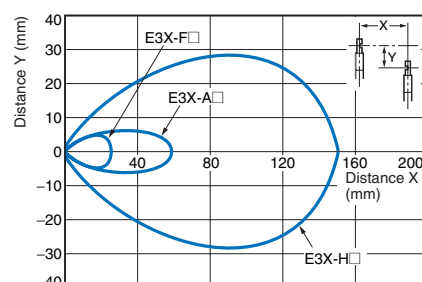
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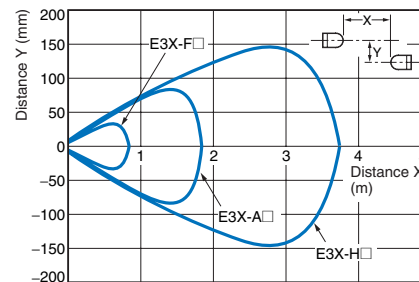
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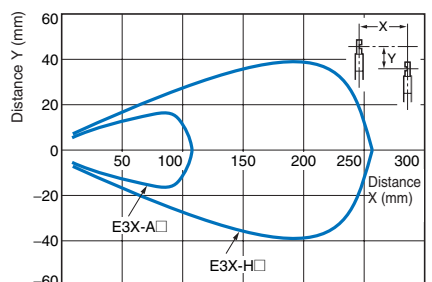
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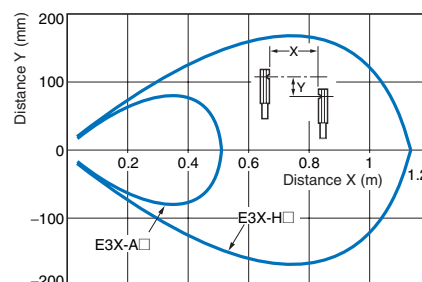
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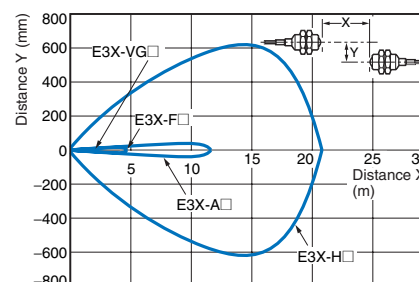
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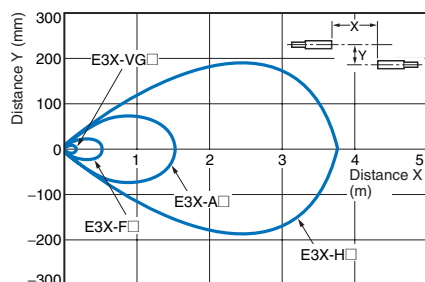
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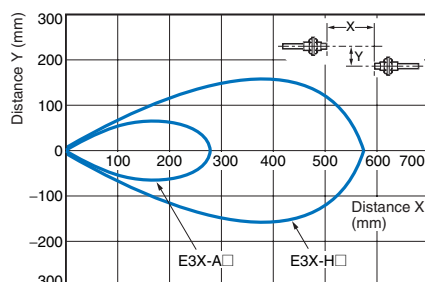
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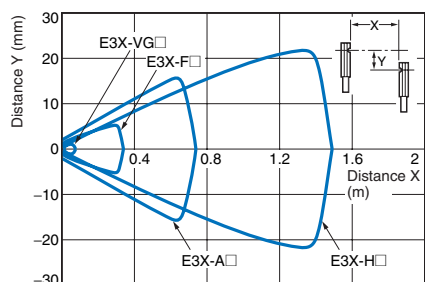
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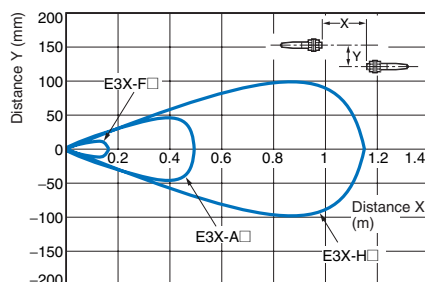
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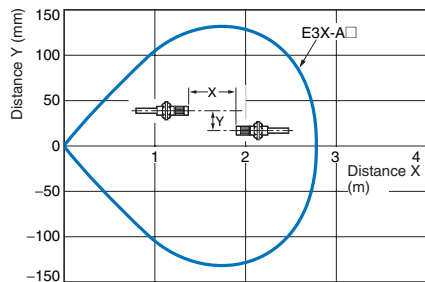
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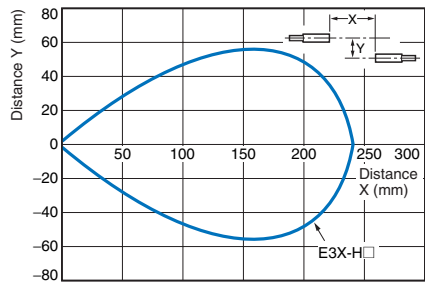
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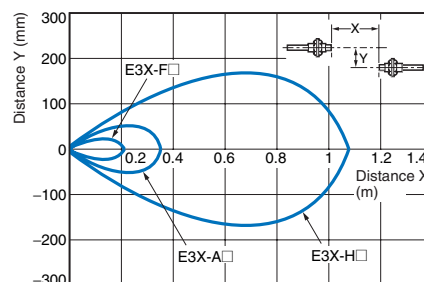
E32-T11L + E39-F1 Long-distance Lens Unit (Order Separately)



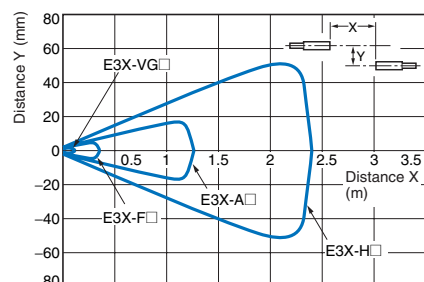
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E32-T51



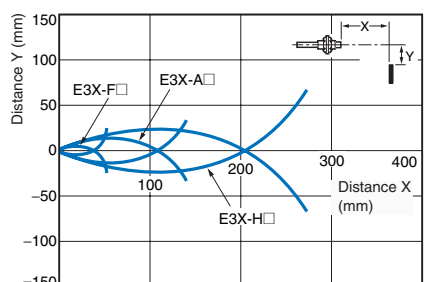
E32-T22S



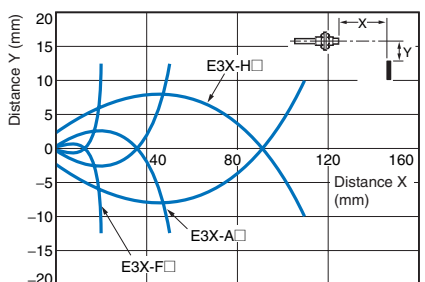
Operating Ranges

E3X-A□□/H□□/F□□/VG□□

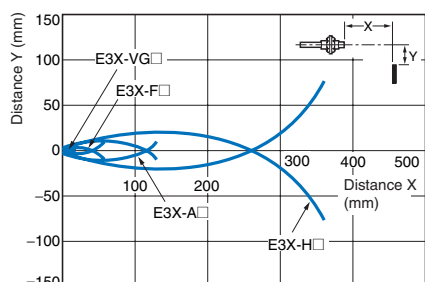
E32-DC200



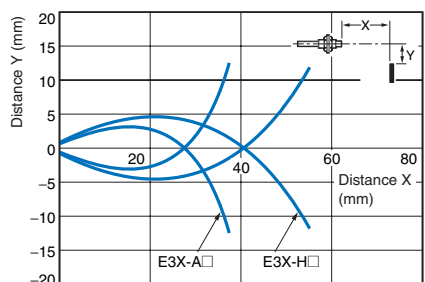
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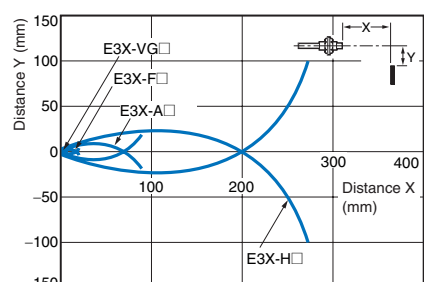
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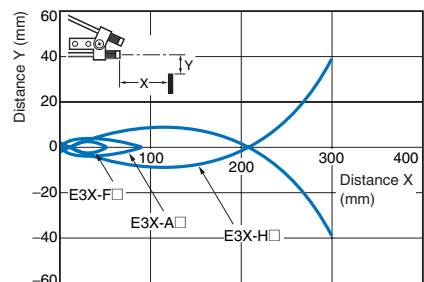
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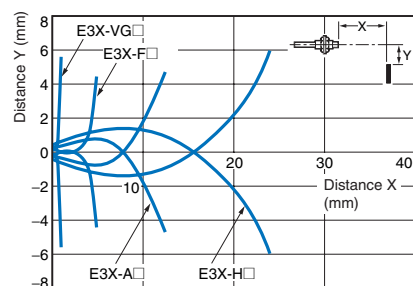
E32-D12



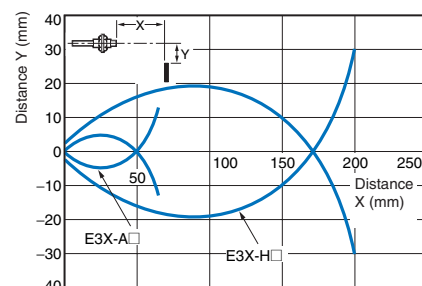
E32-T11L + E39-F3 Reflective Unit with Lens (Order Separately)



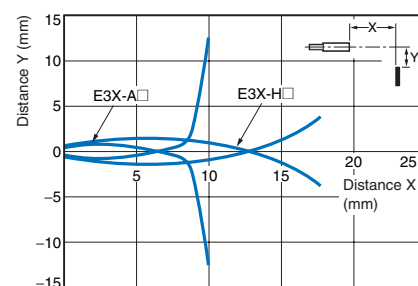
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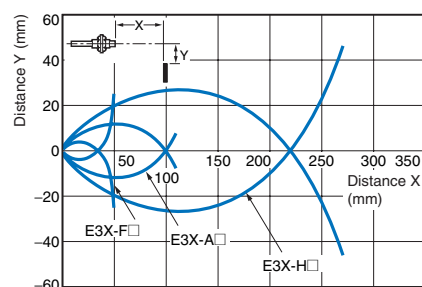
E32-D11



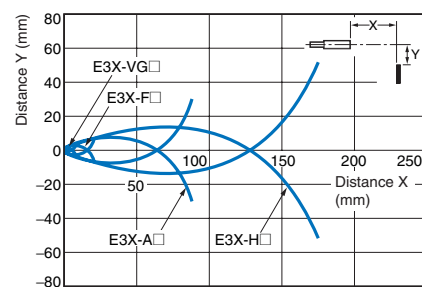
E32-D33



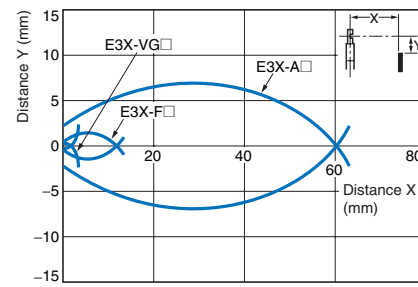
E32-CC200



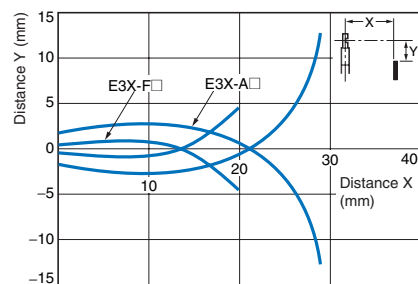
E32-D32L



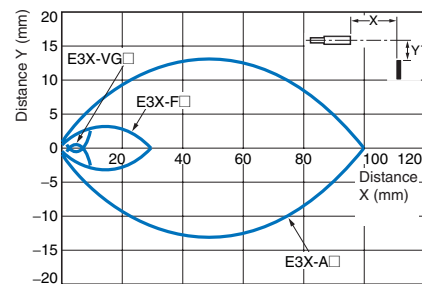
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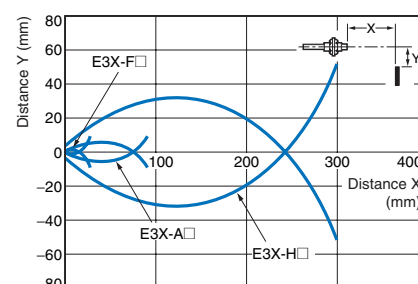
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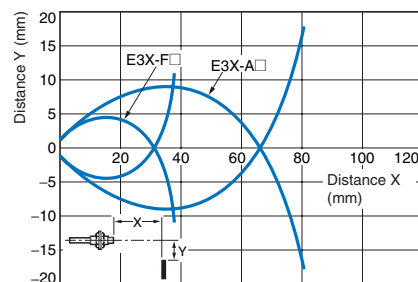
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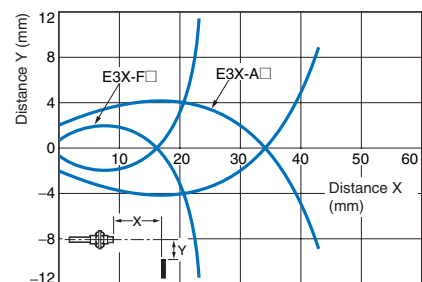
E32-D51



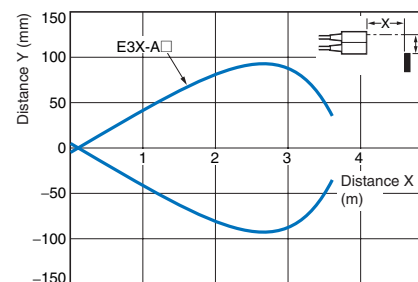
E32-D61



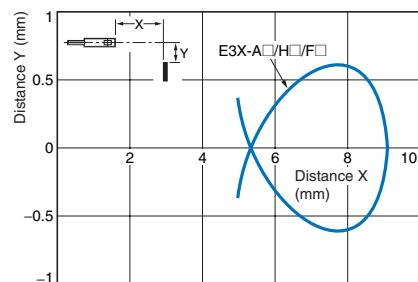
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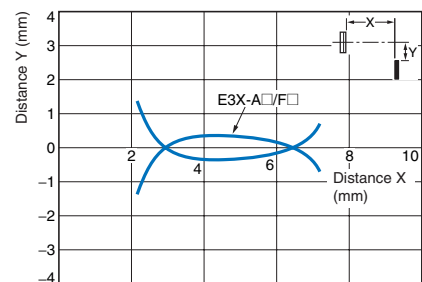
E32-R16



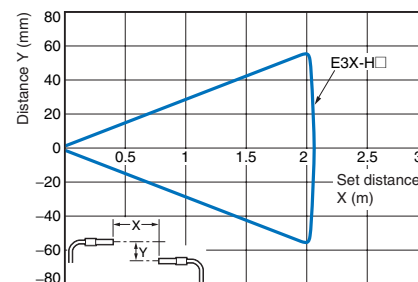
E32-L25L



E32-L24L



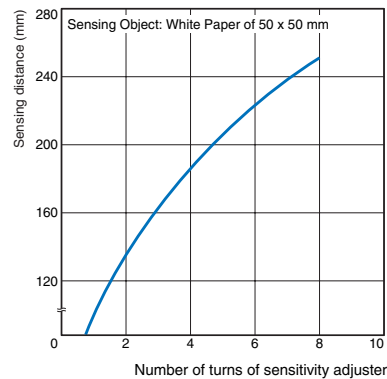
E32-T84S



Number of Turns of Sensitivity Adjuster and Sensing Distance

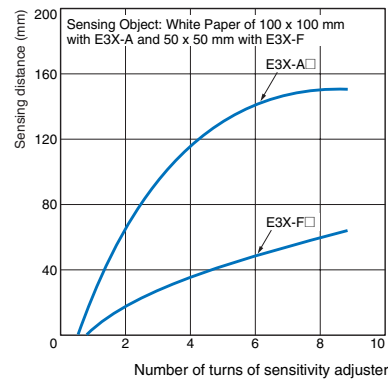
E3X-H□□

E32-D11-L



E3X-A□□/F□□

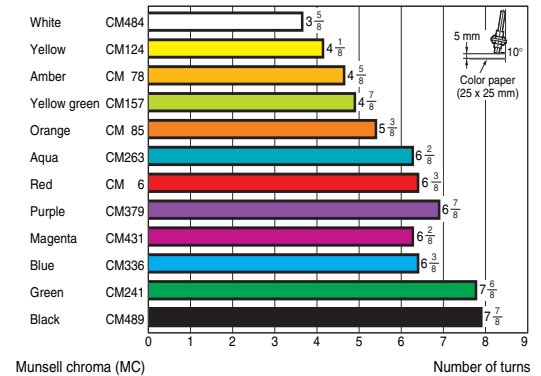
E32-D11-L



Color Sensing

Green Light Source E3X-VG□

E32-D11-L



I/O Circuit Diagrams

NPN Output

Model	State of output transistor	Timing chart	Mode selector switch	Output circuit
E3X-A11 E3X-H11 E3X-VG11	Light-ON	Incident light: ON No incident light: OFF Light indicator (Red): ON OFF Output transistor: ON OFF Load (e.g., relay): Operate Reset (Between brown and black)	L-ON (LIGHT ON)	
	Dark-ON	Incident light: ON No incident light: OFF Light indicator (Red): ON OFF Output transistor: ON OFF Load (e.g., relay): Operate Reset (Between brown and black)	D-ON (DARK ON)	
E3X-A21 E3X-VG21 E3X-F21	Light-ON	Incident light: ON No incident light: OFF Light indicator (Red): ON OFF Output transistor: ON OFF Load (e.g., relay): Operate Reset (Between brown and black)	L-ON (LIGHT ON)	
	Dark-ON	Incident light: ON No incident light: OFF Light indicator (Red): ON OFF Output transistor: ON OFF Load (e.g., relay): Operate Reset (Between brown and black)	D-ON (DARK ON)	

PNP Output

Model	State of output transistor	Timing chart	Mode selector switch	Output circuit
E3X-A41	Light-ON	Incident light No incident light Light indicator (Red) ON OFF Output transistor ON OFF Load Operate (e.g., relay) Reset (Between blue and black)	L-ON (LIGHT ON)	
	Dark-ON	Incident light No incident light Light indicator (Red) ON OFF Output transistor ON OFF Load Operate (e.g., relay) Reset (Between blue and black)	D-ON (DARK ON)	
E3X-A51 E3X-F51	Light-ON	Incident light No incident light Light indicator (Red) ON OFF Output transistor ON OFF Load Operate (e.g., relay) Reset (Between blue and black)	L-ON (LIGHT ON)	
	Dark-ON	Incident light No incident light Light indicator (Red) ON OFF Output transistor ON OFF Load Operate (e.g., relay) Reset (Between blue and black)	D-ON (DARK ON)	

Safety Precautions

⚠ WARNING

This product is not designed or rated for ensuring safety of persons. Do not use it for such purpose.



Precautions for Correct Use

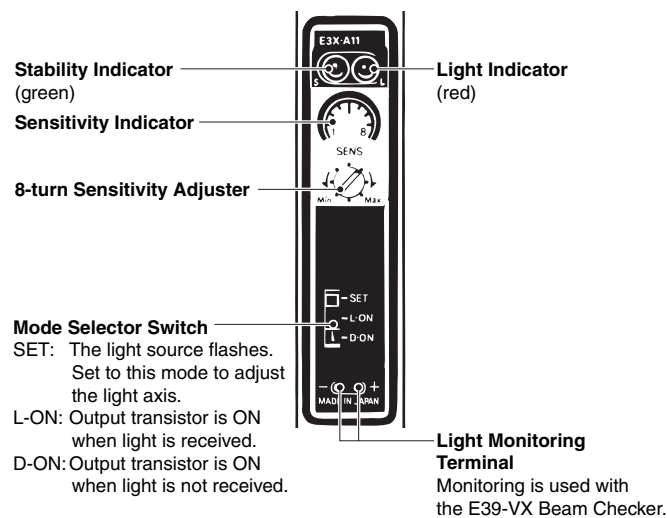
Do not use the Sensor in atmospheres or environments that exceed product ratings.

Amplifiers

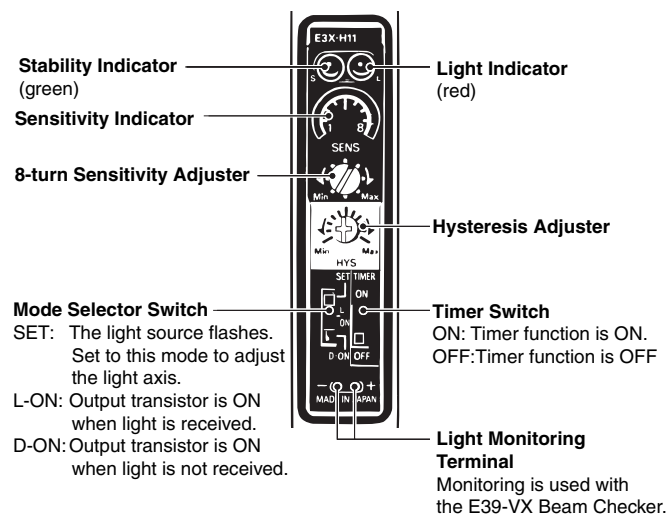
● Nomenclature

E3X-A11/A41

E3X-VG11



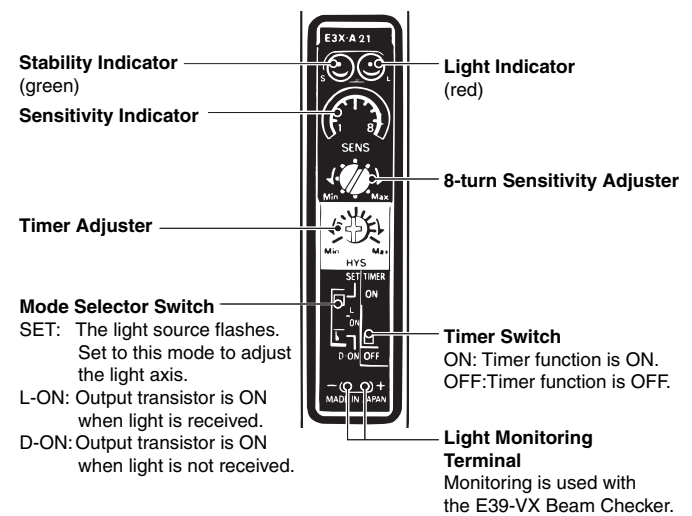
E3X-H11



E3X-A21/A51

E3X-F21/F51

E3X-VG21



Note: Set the mode selector switch to L-ON or D-ON after the light axis is adjusted.

●Designing

External Check Input Function

(E3X-A21/51, E3X-F21/F51, E3X-VG21)

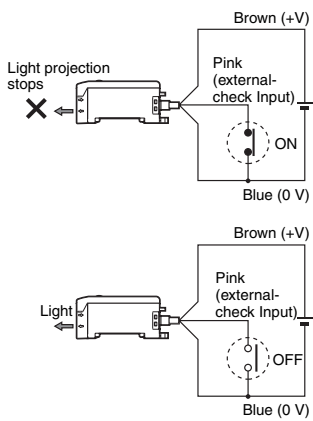
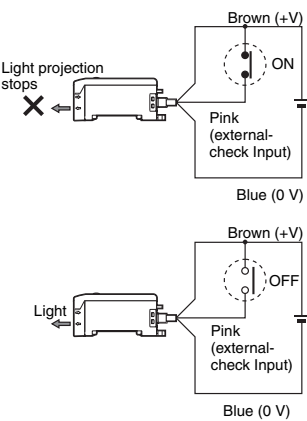
With this function, light projection can be stopped when desired. The operation of the Sensor can be checked with this function before the E3X is placed into actual operation.

E3X-A□1

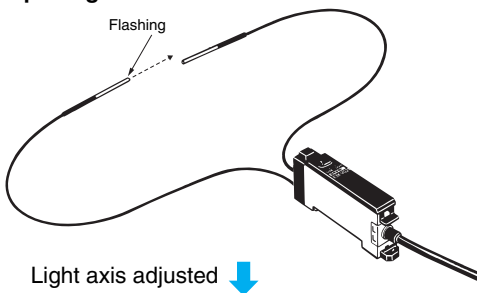
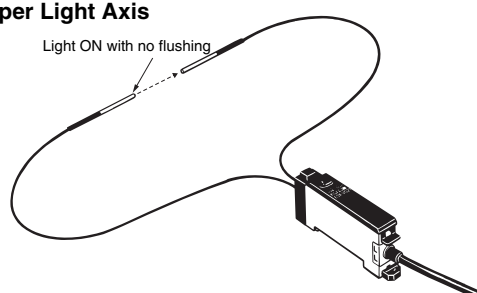
- Light is emitted from the projection fiber head when the external check input is ON. The Sensor, however, will not operate. The light required to operate the Sensor is stopped.

E3X-F□1/VG21

- No light is emitted from the projection fiber head when external check input is ON.

NPN Type	PNP Type
 Light projection stops Brown (+V) Pink (external-check Input) Blue (0 V) ON Light Brown (+V) Pink (external-check Input) Blue (0 V) OFF External-check input Short (between blue and pink) Open ON OFF Indicator (red) ON OFF By short-circuiting the pink and blue cords, light projection can be stopped* (with a short-circuit current of 0.2 mA max.). * Only the E3X-A□1 emits light from the light-emitting diode during external-check input.	 Light projection stops Brown (+V) Pink (external-check Input) Blue (0 V) ON Light Brown (+V) Pink (external-check Input) Blue (0 V) OFF External-check input Short (between brown and pink) Open ON OFF Indicator (red) ON OFF By short-circuiting the brown and pink cords, light projection can be stopped* (with a short-circuit current of 0.2 mA max.). * Only the E3X-A□1 emits light from the light-emitting diode during external-check input.

Light Axis Adjustment with Flashing Function

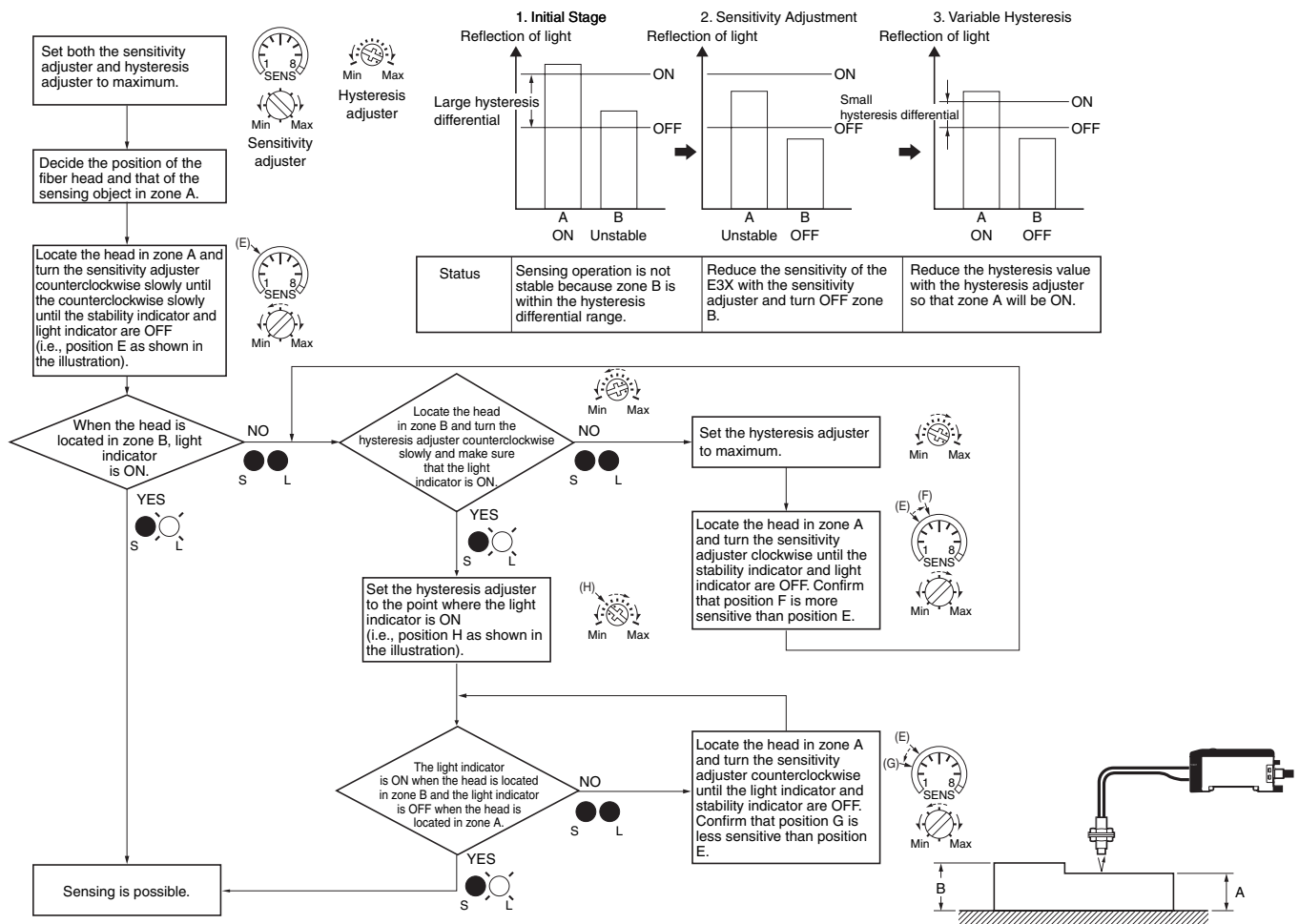
Procedure	Operation
1	Set the mode selector switch to SET.  Mode Selector switch SET L-ON D-ON MADE IN JAPAN
2	Adjust the light axis by moving the fiber with the light flashing. Improper Light Axis  Flashing Light axis adjusted Proper Light Axis  Light ON with no flashing
3	Set the mode selector switch to L-ON or D-ON after the light axis is adjusted.

●Adjusting

Variable Hysteresis Function (E3X-H11)

Sensing of Plate Level Differences (If sensing is impossible with the hysteresis value set to maximum)

Refer to the following when using the hysteresis adjuster.



(Unit: mm)

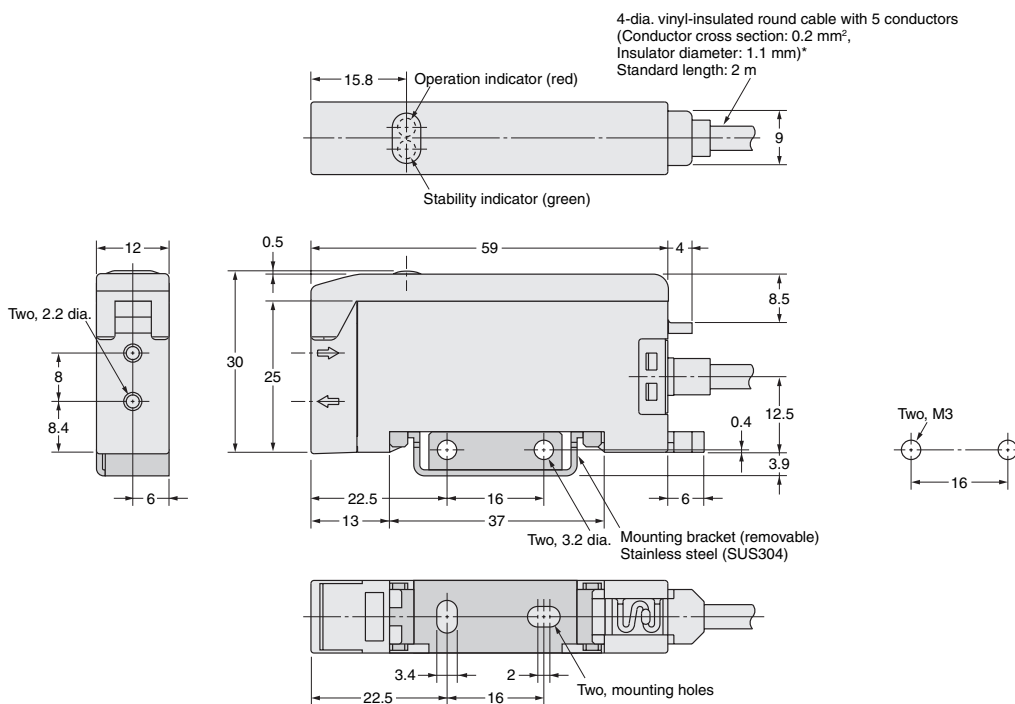
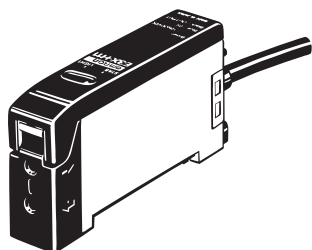
Dimensions

Unless otherwise specified, the tolerance class IT16 is used for dimensions in this data sheet.

Amplifiers

Amplifiers

E3X-A□1
E3X-H11
E3X-F□1
E3X-VG□1

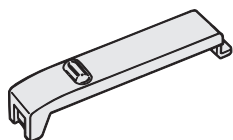


*The cable for the E3X-A11/-A41/-H11/-VG11 has 3 conductors.

Accessories (Order Separately)

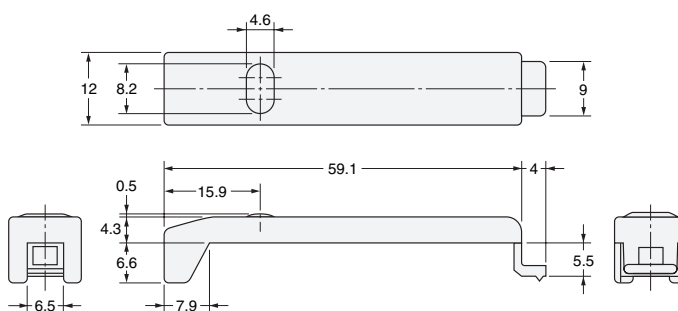
Protective Cover

E39-G4



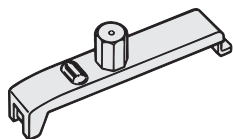
Material: Polycarbonate

Attached to the E3X-A/H/F/VG.

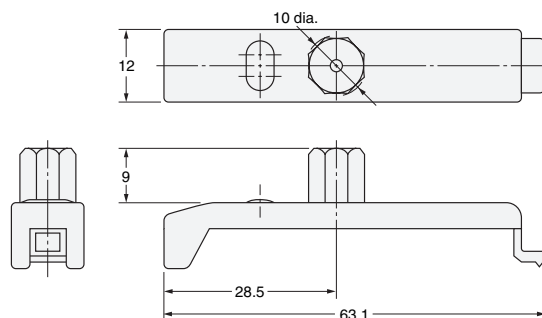


Manual Sensitivity Adjuster Knob

E39-G3



Materials:
Manual Sensitivity Adjuster Knob: Polyacetal
Cover: Polycarbonate



In the interest of product improvement, specifications are subject to change without notice.