

Simple Fiber Amplifier

E3X-SD/-NA

The Highest Level of Power and Precision in the Industry with “GIGA RAY” Giga Power Lighting Element

- Stable detection of minute objects even when the Sensor is covered with dust and oil in severe environments.
- Quick-tuning to automatically adjust light level and set threshold value.
- Use the one-key one-function feature for quick, easy operation.
- Reasonable price.



Ordering Information

Amplifier Units

Digital Display and Direct Key Setting



Item	Appearance	Connection method	Ratings and Specifications	Model	
				NPN output	PNP output
Standard models		Pre-wired (2 m)	---	E3X-SD21 2M	E3X-SD51 2M
		Wire-saving connector		E3X-SD7	E3X-SD9

Bar Display and Adjuster Setting

Item	Appearance	Connection method	Ratings and Specifications	Model	
				NPN output	PNP output
Standard models		Pre-wired (2 m)	---	E3X-NA11 2M	E3X-NA41 2M
		Wire-saving connector		E3X-NA6	E3X-NA8
High-speed detection models		Pre-wired (2 m)	Response time: 20 μs	E3X-NA11F 2M	E3X-NA41F 2M
Water-resistant models		Pre-wired (2 m)	Degree of protection: IP66	E3X-NA11V 2M	E3X-NA41V 2M
		Connector (M8)		E3X-NA14V	E3X-NA44V



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Amplifier Unit Connectors (sold separately) Note: Stickers for Connectors are included as accessories.

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

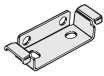
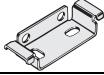
Combining Amplifier Units and Connectors <small>(Basically, Amplifier Units and Connectors are sold separately) Refer to the following tables when placing an order.</small>	Amplifier Units		+	Applicable Connectors (sold separately)	
	Type	NPN		PNP	Master Connector
	Standard models	E3X-SD7	E3X-SD9		E3X-CN11 (3-wire)
	E3X-NA6	E3X-NA8			
	When Using 5 Amplifier Units				
	5 Amplifier Units		+	1 Master Connector + 4 Slave Connectors	

Sensor I/O Connectors (sold separately)

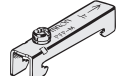
Size	Cable specifications	Appearance	Cable type	Model	
M8	Standard cable	Straight connector 	2 m	Four-conductor cable	XS3F-M421-402-A
			5 m		XS3F-M421-405-A
		L-shaped connector 	2 m		XS3F-M422-402-A
			5 m		XS3F-M422-405-A

Accessories (sold separately)

Mounting Brackets

Appearance	Applicable models	Model	Quantity
	E3X-SD□ E3X-NA□ E3X-NA□F	E39-L143	1
	E3X-NA□V	E39-L148	

End Plate

Appearance	Model	Quantity
	PFP-M	1

Ratings and Specifications

Amplifier Units

Item	Type Model	Digital display and direct key setting		Bar display and adjuster setting	
		Standard models	Standard models	High-speed detection models	Water-resistant models
		E3X-SD□	E3X-NA□	E3X-NA□F	E3X-NA□V
Light source (wavelength)		Red, 4-element LED (625 nm)			Red LED (680 nm)
Power supply voltage		12 to 24 VDC ±10%, ripple (p-p): 10% max.			
Power consumption/ Current consumption		960 mW max. (Power supply voltage: 24 V, Current consumption: 40 mA max.) (Power supply voltage: 12 V, Current consumption: 80 mA max.)	960 mW max. (Current consumption: 40 mA max.)		
Control output		Open-collector output (NPN or PNP) Load power supply: 26.4 V max., Load current: 50 mA max. (Residual voltage: 1.5 V max.) Light-ON/Dark-ON mode selector	Open-collector output (NPN or PNP) Load power supply: 26.4 V max., Load current: 50 mA max. (Residual voltage: 1 V max.) Light-ON/Dark-ON mode selector.		
Response time		Operate or reset: 200 μs max. (*1)		Operate: 20 μs max. Reset: 30 μs max.	Operate or reset: 200 μs max. (*1)
Sensitivity adjustment		UP/DOWN direct key setting, teaching with/without a workpiece, automatic teaching		8-turn sensitivity adjuster (with indicator)	
Protection circuits		Power supply reverse polarity protection, output short-circuit protection, output reverse polarity protection		Power supply reverse polarity protection, output short-circuit protection	
Timer function		---		No timer, OFF-delay timer; or Timer selector (timer time: 40 ms (fixed))	
Mutual interference prevention		Up to 5 Amplifiers (optically synchronized) (*2)		None	Up to 5 Amplifiers (optical- ly synchronized) (*2)
Ambient illumination		Receiver side Incandescent lamp: 10,000 lux max. Sunlight: 20,000 lux max.			
Number of gang-mounted Amplifiers		16 max. (The ambient temperature specification depends on the number of gang-mounted Amplifiers.)			
Ambient temperature range		Operating: Groups of 1 to 3 Amplifiers: -25°C to 55°C Groups of 4 to 11 Amplifiers: -25°C to 50°C Groups of 12 to 16 Amplifiers: -25°C to 45°C Storage: -30°C to 70°C (with no icing or condensation)			
Ambient humidity range		Operating and storage: 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 (*3)			
Vibration resistance		Destruction: 10 to 55 Hz with a 1.5-mm double amplitude for 2 hours each in X, Y and Z directions			
Shock resistance		Destruction: 500 m/s ² , for 3 times each in X, Y and Z directions			
Degree of protection		IEC 60529 IP50 (with Protective Cover attached)			IEC 60529 IP66 (with Protective Cover at- tached)
Connection method		Pre-wired (standard cable length: 2 m), or connector			
Weight (packed state) (*4)		Pre-wired model: Approx. 100 g, Model with connector: Approx. 55 g			
Material	Case	Polybutylene terephthalate (PBT)			
	Cover	Polycarbonate (PC)			Polyethersulfone (PES)
Accessories		Instruction manual			

*1. When there are 8 or more E3X-NA Amplifiers mounted side-by-side, the response time will be 350 μs max.

*2. Mutual interference prevention is effective when E3X-SD/-NA-series Amplifiers are gang-mounted without other E3X-series Amplifiers.

*3. Water-resistant models and models with connectors have a dielectric strength of 500 VAC.

*4. Add 10 g for water-resistant models.

Amplifier Unit Connectors (Wire-saving Connectors)

Item	Model	E3X-CN11	E3X-CN12
Rated current		2.5 A	
Rated voltage		50 V	
Contact resistance		20 mΩ max. (20 mVDC max., 100 mA max.) (The above figure is for connection to the Amplifier Unit and the adjacent Connector. It does not include the conductor resistance of the cable.)	
Number of insertions		Destruction: 50 times (for connection to the Amplifier Unit and the adjacent Connector)	
Material	Housing	Polybutylene terephthalate (PBT)	
	Contact	Phosphor bronze/gold-plated nickel	
Weight (packed state)		Approx. 55 g	Approx. 25 g

E3X-SD/-NA

Sensing distance

Fiber Unit				Amplifier Unit	Sensing distance (Unit: mm)		
Screw-shaped model				E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V	
Sensing method	Size	Sensing direction	Model	Standard models	High-speed detection models	Water-resistance models	
Through-beam models	M3	Straight	E32-T21R 2M	120	36	60	
	M4	Right angle	E32-T11N 2M	530	160	280	
		Straight	E32-T11R 2M	560	160	280	
			E32-TC200 2M	800	240	400	
			E32-T11L 2M	1,400	420	700	
Reflective models	M3	Right angle	E32-C31N 2M	25	7.5	13	
		Straight	E32-D21R 2M	30	10	15	
			E32-C31 2M	80	26	40	
			E32-D21R 2M	30	10	15	
	M4	Right angle	E32-D11N 2M	170	50	90	
	M6		E32-C11N 2M	170	50	85	
			E32-D11R 2M	180	60	90	
			E32-DC200 2M	300	100	150	
			E32-CC200 2M	300	100	150	
			E32-D11L 2M	400	130	200	

Fiber Unit				Amplifier Unit	Sensing distance (Unit: mm)		
Flat model				E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V	
Sensing method	Sensing direction	Size	Model	Standard models	High-speed detection models	Water-resistance models	
Through-beam models	Top view	Standard	E32-T15XR 2M	560	160	280	
		Small	E32-T25XR 2M	120	36	60	
	Side view	Standard	E32-T15YR 2M	220	66	110	
		Small	E32-T25YR 2M	60	18	30	
	Flat view	Standard	E32-T15ZR 2M	220	66	110	
		Small	E32-T25ZR 2M	60	18	30	
Reflective models	Top view	Standard	E32-D15XR 2M	180	60	90	
		Small	E32-D25XR 2M	30	10	15	
	Side view	Standard	E32-D15YR 2M	40	10	20	
		Small	E32-D25YR 2M	8	2.4	4	
	Flat view	Standard	E32-D15ZR 2M	40	10	20	
		Small	E32-D25ZR 2M	8	2.4	4	

Fiber Unit				Amplifier Unit	Sensing distance (Unit: mm)		
Cylindrical model				E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V	
Sensing method	Sensing direction	Size	Model	Standard models	High-speed detection models	Water-resistance models	
Through-beam models	Top view	φ1	E32-T223R 2M	120	36	60	
		φ3	E32-T12R 2M	560	160	280	
	Side view	φ1	E32-T24R 2M	60	18	30	
		φ3	E32-T14LR 2M	220	66	110	
Reflective models	Top view	φ1.5	E32-D22B 2M	30	10	15	
		φ2	E32-D32 2M	80	26	40	
		φ3	E32-D22R 2M	30	10	15	
			E32-D32L 2M	160	50	80	
	Side view	φ2	E32-D24R 2M	14	4.6	7	
		φ6	E32-D14LR 2M	32	10	16	

For information on Fiber Units, refer to the *Fiber Sensors Best Selection Catalog* (Cat. No. E353).

Fiber Unit				Amplifier Unit		
				Sensing distance (Unit: mm)		
Model equipped with sleeve				E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V
Sensing method	Sleeve size	Mounting size	Model	Standard models	High-speed detection models	Water-resistance models
Through-beam models	φ0.25 × 5	φ3	E32-T333-S5 1M	10	3	5
	φ0.5 × 40		E32-T33 1M	40	13.5	20
	φ0.9 × 40	M3	E32-TC200F4R 2M	120	36	60
	φ1.2 × 90	M4	E32-TC200BR 2M	560	160	280
Reflective models	φ0.5 × 15	φ2	E32-D331 2M	3	1	1.5
	φ0.8 × 15	φ3	E32-D33 2M	16	4	10
	φ1.2 × 40	M3	E32-DC200F4R 2M	30	10	15
	φ2.5 × 90	M6	E32-DC200BR 2M	180	60	90

Fiber Unit				Amplifier Unit		
				Sensing distance (Unit: mm)		
Movable section (Flexibility)				E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V
Sensing method	Shape	Size	Model	Standard models	High-speed detection models	Water-resistance models
Through-beam models	Screw-shaped model	M3	E32-T21 2M	200	60	100
		M4	E32-T11 2M	720	200	360
	Cylindrical model	φ1.5	E32-T22B 2M	200	60	100
		φ3	E32-T12B 2M	720	200	360
	Flat model	Standard	E32-T15XB 2M	720	200	360
		Small	E32-T25XB 2M	150	40	75
Reflective models	Screw-shaped model	M3	E32-D21 2M	30	10	15
		M4	E32-D21B 2M	70	20	35
		M6	E32-D11 2M	180	60	90
	Cylindrical model	φ1.5	E32-D22B 2M	30	10	15
		φ3	E32-D221B 2M	70	20	35
	Flat model	Standard	E32-D15XB 2M	180	60	90
		Small	E32-D25XB 2M	50	16	25

Fiber Unit				Amplifier Unit		
				Sensing distance (Unit: mm)		
Heat-resistance model				E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V
Sensing method	Operating temperature	Lens	Model	Standard models	High-speed detection models	Water-resistance models
Through-beam models	100°C	---	E32-T51R 2M	400	120	225
		Lens	E32-T51R 2M + E39-F1	2,000	720	1,650
		High-power lens	E32-T51R 2M + E39-F16	4,000 *	1,560	2,900
	150°C	---	E32-T51 2M	800	240	400
		Lens	E32-T51 2M + E39-F1-33	2,400	720	1,400
		High-power lens	E32-T51 2M + E39-F16	4,000 *	3,120	4,000 *
	200°C	---	E32-T54 2M	260	70	130
		Lens	E32-T81R-S 2M	360	100	180
		High-power lens	E32-T61-S 2M + E39-F1	4,000 *	1,800	3,000
	350°C	---	E32-T61-S 2M	600	180	300
		High-power lens	E32-T61-S 2M + E39-F16	4,000 *	2,340	3,900
	Reflective models	100°C	---	E32-D51R 2M	140	42
150°C		E32-D51 2M		240	80	120
200°C		E32-D81R 2M		90	27	45
350°C		E32-D61 2M		90	27	45
400°C		E32-D73 2M		60	18	30

* The fiber length is 2 m on each side, so the sensing distance is given as 4,000 mm.

For information on Fiber Units, refer to the *Fiber Sensors Best Selection Catalog* (Cat. No. E353).

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Fiber Unit			Amplifier Unit	Sensing distance (Unit: mm)		
				E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V
Chemical-resistance / Oil-resistance model						
Sensing method	Type	Model	Standard models	High-speed detection models	Water-resistance models	
Through-beam models	φ5	E32-T12F 2M	3,200	960	1,600	
	φ7.2	E32-T11F 2M	2,100	760	1,050	
	φ5 Heat-resistance	E32-T51F 2M	1,400	400	700	
	φ5 Side view	E32-T14F 2M	400	120	200	
	M4 Chemical-resistance cable	E32-T11U 2M	720	200	360	
	M4 Right angle Chemical-resistance cable	E32-T11NU 2M	400	120	210	
Reflective models	φ6	E32-D12F 2M	100	32	50	
	φ7 Side view	E32-D14F 2M	40	13	20	
	M6 Chemical-resistance cable	E32-D11U 2M	180	60	90	

Fiber Unit				Amplifier Unit	Sensing distance (Unit: mm)		
					E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V
Vacuum-resistance model							
Sensing method	Operating ambient temperature	Sensing direction	Model	Standard models	High-speed detection models	Water-resistance models	
Through-beam models	120°C	Top view	E32-T51V 1M	200	---	100	
			E32-T51V 1M + E39-F1V	1,200	---	600	
	200°C	Right angle	E32-T54V 1M	130	---	65	
			E32-T84SV 1M	500	---	250	

For information on Fiber Units, refer to the *Fiber Sensors Best Selection Catalog* (Cat. No. E353).

Fiber Unit			Amplifier Unit	Sensing distance (Unit: mm)		
Long distance/Dust resistance (High-power), Detection through gaps (Narrow vision field)				E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V
Sensing method	Type	Sensing direction/ Lens type	Model	Standard models	High-speed detection models	Water-resistance models
Through-beam models	High-power (integrated unit)	Top view	E32-T17L 10M	20,000 *1	8,400	14,000
		Side view	E32-T14 2M	3,600	1,080	1,800
	High-power (with lens unit)	High-power	E32-T11N 2M + E39-F1	3,700	1,110	2,100
		Ultrahigh-power	E32-T11N 2M + E39-F16	4,000 *2	2,000	3,600
		High-power	E32-T11R 2M + E39-F1	4,000 *2	1,260	2,100
		Ultrahigh-power	E32-T11R 2M + E39-F16	4,000 *2	2,000	3,600
		Side view	E32-T11R 2M + E39-F2	440	130	220
		High-power	E32-TC200 2M + E39-F1	4,000 *2	1,800	3,000
		Ultrahigh-power	E32-TC200 2M + E39-F16	4,000 *2	3,000	4,000 *2
		Side view	E32-TC200 2M + E39-F2	700	210	350
		High-power	E32-T11 2M + E39-F1	4,000 *2	1,200	2,000
		Ultrahigh-power	E32-T11 2M + E39-F16	4,000 *2	2,600	4,000 *2
		Side view	E32-T11 2M + E39-F2	720	200	360
		High-power	E32-T11U 2M + E39-F1	3,600	1,080	2,000
		Ultrahigh-power	E32-T11U 2M + E39-F16	4,000 *2	2,600	4,000 *2
		Side view	E32-T11U 2M + E39-F2	660	198	330
		High-power	E32-T11NU 2M + E39-F1	1,800	700	1,500
		Ultrahigh-power	E32-T11NU 2M + E39-F16	4,000 *2	1,500	2,700
		High-power	E32-T81R-S 2M + E39-F1	1,800	630	1,100
		Ultrahigh-power	E32-T81R-S 2M + E39-F16	4,000 *2	1,300	2,300
		Side view	E32-T81R-S 2M + E39-F2	280	84	140
	High-power	E32-T61-S 2M + E39-F1	4,000 *2	1,800	3,000	
	Ultrahigh-power	E32-T61-S 2M + E39-F16	4,000 *2	2,340	3,900	
Side view	E32-T61-S 2M + E39-F2	780	260	390		
Narrow vision field (aperture angle: 4°)	Top view	E32-T22S 2M	2,000	600	1,000	
	Side view	E32-T24S 2M	1,400	420	700	
Reflective models	High-power	Top view	E32-D16 2M	800	140	40 to 400

*1. The fiber length is 10 m on each side, so the sensing distance is given as 20,000 mm.

*2. The fiber length is 2 m on each side, so the sensing distance is given as 4,000 mm.

Fiber Unit			Amplifier Unit	Sensing distance (Unit: mm)		
Minute object detection (Small-spot model)				E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V
Sensing method	Spot diameter (mm)	Focal length (mm)	Model	Standard models	High-speed detection models	Water-resistance models
Reflective models	φ0.1 to 0.6 (Variable)	6 to 15	E32-C42 1M + E39-F3A	Spot diameter of 0.1 to 0.6 mm at 6 to 15 mm		
	φ0.1	5	E32-C42S 1M	Spot diameter of 0.1 mm at 5 mm		
		7	E32-C41 1M + E39-F3A-5	Spot diameter of 0.1 mm at 7 mm		
	φ0.2	17	E32-C41 1M + E39-F3B	Spot diameter of 0.2 mm at 17 mm		
	φ0.5	7	E32-C31 2M + E39-F3A-5	Spot diameter of 0.5 mm at 7 mm		
		17	E32-C31 2M + E39-F3B	Spot diameter of 0.5 mm at 17 mm		
	φ6	50	E32-L15 2M	Spot diameter of 6 mm at 50 mm		
	φ4 Parallel light	0 to 20	E32-C31 2M + E39-F3C	Spot diameter of 4 mm max. at 0 to 20 mm		
φ3	50	E32-C11N 2M + E39-F18	Spot diameter of 3 mm at 50 mm			
		E32-CC200 2M + E39-F18	Spot diameter of 3 mm at 50 mm			

For information on Fiber Units, refer to the *Fiber Sensors Best Selection Catalog* (Cat. No. E353).

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Fiber Unit				Amplifier Unit	Sensing distance (Unit: mm)		
Area-sensing (Area beam)				E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V	
Sensing method	Area range	Sensing direction	Model	Standard models	High-speed detection models	Water-resistance models	
Through-beam models	11 mm	Side view	E32-T16PR 2M	800	260	450	
		Flat view	E32-T16JR 2M	700	220	390	
Reflective models	30 mm	Side view	E32-T16WR 2M	1,380	400	690	
	11 mm		E32-D36P1 2M	150	50	75	

Fiber Unit				Amplifier Unit	Sensing distance (Unit: mm)		
Detection without background interference (Convergent-reflective)				E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V	
Sensing method	Sensing detection	Size	Model	Standard models	High-speed detection models	Water-resistance models	
Reflective models	Flat view	Standard	E32-L16-N 2M	0 to 15	0 to 12	0 to 15	
		Small	E32-L24S 2M	0 to 4			
	Top view	---	E32-L25L 2M	5.4 to 9 (Center 7.2)	5.4 to 8 (Center 7.2)	5.4 to 9 (Center 7.2)	
	Flat view		E32-L24L 2M	2 to 6 (Center 4)			

Fiber Unit				Amplifier Unit	Sensing distance (Unit: mm)		
Detection of transparent objects (Retro-reflective)				E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V	
Sensing method	Type	Model		Standard models	High-speed detection models	Water-resistance models	
Retro-reflective models *1	Square	E32-R16 5M + E39-R1 (Attached)		1,500	1,000	150 to 1,500	
	Small	E32-R21 2M + E39-R3 (Attached)		10 to 250	250	10 to 250	
	Film detection *2	E32-C31 2M + E39-F3R + E39-RP1		450	135	225	
		E32-C31 2M + E39-F3R + E39-RSP1		220	65	110	

*1. When using a highly reflective object, light reflected from the object may affect the Sensor.

*2. Film detection may not be effective for some types of film. Confirm operation in advance.

For information on Fiber Units, refer to the *Fiber Sensors Best Selection Catalog* (Cat. No. E353).

Fiber Unit				Amplifier Unit	Sensing distance (Unit: mm)				
FPD / Semiconductor / Solar battery industry				E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V			
Sensing method	Application	Operating temperature	Model	Standard models	High-speed detection models	Water-resistance models			
Reflective models	Glass substrate alignment	70°C	E32-L16-N 2M	0 to 15					
			E32-A08 2M	10 to 20					
	Glass detection	300°C	E32-A08H2 3M	10 to 20					
			E32-L16-N 2M	0 to 15					
	Glass substrate mapping	70°C	E32-A09 2M	15 to 38 (Center 25)					
			150°C	E32-A09H 2M	15 to 38 (Center 25)				
				E32-A09H2 2M	20 to 30 (Center 25)				
	WET process	60°C	E32-L11FP 5M	8 to 20 mm from end of lens (recommended: 11 mm) 19 to 31 mm from center point A of mounting hole (recommended: 22 mm)					
				70°C	E32-L12FS 5M	8 to 20 mm from end of lens (recommended: 11 mm) 32 to 44 mm from center point A of mounting hole (recommended: 35 mm)			
						85°C	E32-L11FS 5M	8 to 20 mm from end of lens (recommended: 11 mm) 32 to 44 mm from center point A of mounting hole (recommended: 35 mm)	
Through-beam models	Wafer mapping	70°C	E32-A03 2M	890	267	445			
			E32-A03-1 2M	890	267	445			
			E32-A04 2M	340	102	170			
			E32-A04-1 2M	340	102	170			

Fiber Unit				Amplifier Unit	Sensing distance (Unit: mm)		
Liquid-level detection model				E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V	
Sensing method	Sensing direction	Pipe diameter	Model	Standard models	High-speed detection models	Water-resistance models	
Reflective models	Mounted to pipe	No limit	E32-D36T 5M	Applicable pipe: Transparent (no restriction on diameter)			
		φ8 to 10 mm	E32-L25T 2M	Applicable pipe: Transparent pipe with diameter of 8 to 10 mm, recommended pipe wall thickness: 1 mm			
	Wet	---	E32-D82F1 4M	Wet model			

For information on Fiber Units, refer to the *Fiber Sensors Best Selection Catalog* (Cat. No. E353).