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.**

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Ordering Information

Amplifier Units [Refer to *Dimensions* on page *13*.]

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**

*An Amplifier Unit Connector (sold separately) is required.

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 *1		**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) *2		**E3X-NA14V**	**E3X-NA44V**

*1. An Amplifier Unit Connector (sold separately) is required.
*2. A Sensor I/O Connector (sold separately) is required.

Amplifier Unit Connectors (sold separately)

Note: Protective seals provided. [Refer to *Dimensions* on page *17*.]

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

Ordering Precautions for Amplifier Units Connectors

A Connector is not provided with the Amplifier Unit. Refer to the tables at the right when placing an order.

Amplifier Units		
Type	**NPN**	**PNP**
Standard models	E3X-SD7	E3X-SD9
	E3X-NA6	E3X-NA8

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Applicable Connectors (sold separately)	
Master Connector	**Slave Connector**
E3X-CN11 (3-wire)	E3X-CN12 (1-wire)

When Using 5 Amplifier Units

5 Amplifier Units	+	1 Master Connector + 4 Slave Connectors

Sensor I/O Connectors (Models for Connectors: A Connector is not provided with the Amplifier Unit. Be sure to order a Connector separately.)

[Refer to *Dimensions* on *XS3*.]

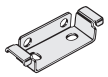
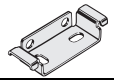
Size	Cable specifications	Appearance	Cable type		Model
M8	Standard cable	Straight connector	2 m	Four-conductor cable	**XS3F-M421-402-A**
			5 m		**XS3F-M421-405-A**
		L-shaped connector	2 m		**XS3F-M422-402-A**
			5 m		**XS3F-M422-405-A**

Accessories (sold separately)

Mounting Brackets

A Mounting Bracket is not provided with the Amplifier Unit. Order a Mounting Bracket separately if required.

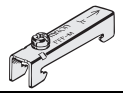
[Refer to *Dimensions* on page *17*.]

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

End Plate

End Plates are not provided with the Amplifier Unit. Order End Plates separately if required.

[Refer to *Dimensions* on page *17*.]

Appearance	Model	Quantity
	**PFP-M**	1

Ratings and Specifications

Amplifier Units

Item \ Type	Digital display and direct key setting	Bar display and adjuster setting		
	Standard models	Standard models	High-speed detection models	Water-resistant models
Model	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 (optically 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 attached)
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)			
Material 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)	
Material Contact	Phosphor bronze/gold-plated nickel	
Weight (packed state)	Approx. 55 g	Approx. 25 g

Sensing distance

Fiber Unit / Screw-shaped model				Amplifier Unit: E3X-SD□ E3X-NA□	Amplifier Unit: E3X-NA□F	Amplifier Unit: E3X-NA□V
Sensing method	Size	Sensing direction	Model	Sensing distance (Unit: mm) Standard models	Sensing distance (Unit: mm) High-speed detection models	Sensing distance (Unit: mm) 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
	M4		E32-D211R 2M	30	10	15
	M6	Right angle	E32-D11N 2M	170	50	90
			E32-C11N 2M	170	50	85
		Straight	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 / Flat model				Amplifier Unit: E3X-SD□ E3X-NA□	Amplifier Unit: E3X-NA□F	Amplifier Unit: E3X-NA□V
Sensing method	Sensing direction	Size	Model	Sensing distance (Unit: mm) Standard models	Sensing distance (Unit: mm) High-speed detection models	Sensing distance (Unit: mm) 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 / Cylindrical model				Amplifier Unit: E3X-SD□ E3X-NA□	Amplifier Unit: E3X-NA□F	Amplifier Unit: E3X-NA□V
Sensing method	Sensing direction	Size	Model	Sensing distance (Unit: mm) Standard models	Sensing distance (Unit: mm) High-speed detection models	Sensing distance (Unit: mm) 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 / Model equipped with sleeve			Amplifier Unit	Sensing distance (Unit: mm)		
				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 / Movable section (Flexibility)			Amplifier Unit	Sensing distance (Unit: mm)		
				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 / Heat-resistance model			Amplifier Unit	Sensing distance (Unit: mm)		
				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 ✻
		---	E32-T54 2M	260	70	130
	200°C		E32-T81R-S 2M	360	100	180
		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	70
	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).

Fiber Unit / Chemical-resistance / Oil-resistance model			Amplifier Unit	Sensing distance (Unit: mm)	
			E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V
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 / Vacuum-resistance model				Amplifier Unit	Sensing distance (Unit: mm)	
				E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V
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
		Right angle	E32-T54V 1M	130	---	65
	200°C		E32-T84SV 1M	500	---	250

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

Fiber Unit / Long distance/Dust resistance (High-power), Detection through gaps (Narrow vision field)			Amplifier Unit	Sensing distance (Unit: mm)		
				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 / Minute object detection (Small-spot model)			Amplifier Unit	Sensing distance (Unit: mm)		
				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).

Fiber Unit / Area-sensing (Area beam)			Amplifier Unit	Sensing distance (Unit: mm)		
				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
	30 mm	Side view	E32-T16WR 2M	1,380	400	690
Reflective models	11 mm		E32-D36P1 2M	150	50	75

Fiber Unit / Detection without background interference (Convergent-reflective)			Amplifier Unit	Sensing distance (Unit: mm)		
				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 / Detection of transparent objects (Retro-reflective)		Amplifier Unit	Sensing distance (Unit: mm)		
			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 / FPD / Semiconductor / Solar battery industry			Amplifier Unit	Sensing distance (Unit: mm)		
				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		
		300°C	E32-A08H2 3M	10 to 20		
	Glass detection	70°C	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)		
		300°C	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

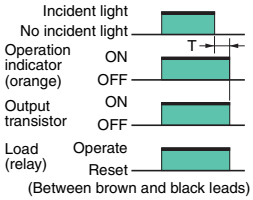
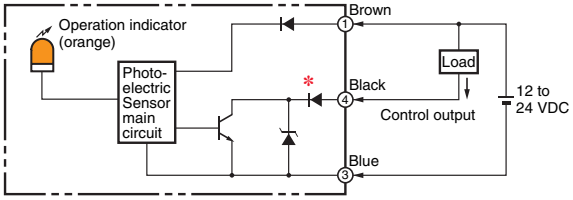
Fiber Unit / Liquid-level detection model			Amplifier Unit	Sensing distance (Unit: mm)		
				E3X-SD□ E3X-NA□	E3X-NA□F	E3X-NA□V
Sensing method	Sensing direction	Pipe diameter	Model	Standard models	High-speed detection models	Water-resistance models
Reflective models	Mounted to pipe	No limit	E32-D36T 5M	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).

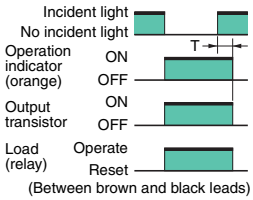
E3X-SD/-NA

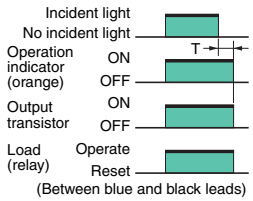
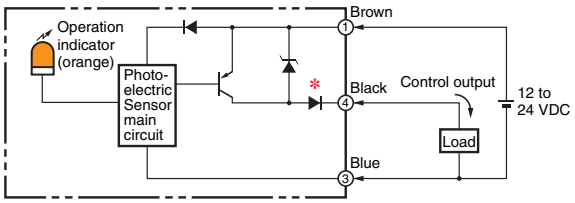
I/O Circuit Diagrams

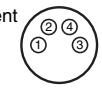
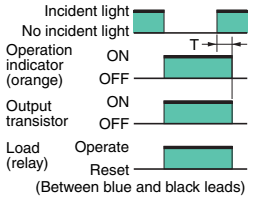
<table>
<tr><th>Output form</th><th>Model</th><th>Output transistor operation mode</th><th>Timing charts</th><th>Operation selector</th><th>Output circuit</th></tr>
<tr><td rowspan="2">NPN Output</td><td rowspan="2">E3X-SD21
E3X-SD7

E3X-NA11
E3X-NA6
E3X-NA11F
E3X-NA11V
E3X-NA14V</td><td>Light-ON</td><td> 
</td><td>LIGHT ON (L-ON)</td><td rowspan="2"> 

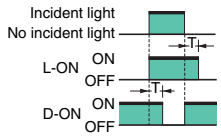
• M8 Connector Pin Arrangement

Note: Pin 2 is not used.
✻ Not present on the E3X-NA.</td></tr>
<tr><td>Dark-ON</td><td> 
</td><td>DARK ON (D-ON)</td></tr>
<tr><td rowspan="2">PNP Output</td><td rowspan="2">E3X-SD51
E3X-SD9

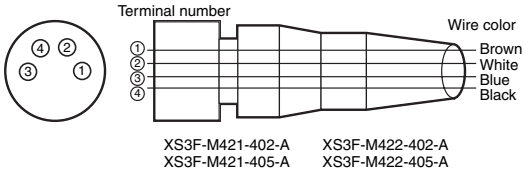
E3X-NA41
E3X-NA8
E3X-NA41F
E3X-NA41V
E3X-NA44V</td><td>Light-ON</td><td> 
</td><td>LIGHT ON (L-ON)</td><td rowspan="2"> 

• M8 Connector Pin Arrangement

Note: Pin 2 is not used.
✻ Not present on the E3X-NA.</td></tr>
<tr><td>Dark-ON</td><td> 
</td><td>DARK ON (D-ON)</td></tr>
</table>

Note: Timing Charts for Timer Settings (T: Set Time)

OFF delay


Plug (Sensor I/O Connector)



Classification	Wire color	Connection pin	Application
DC	Brown	1	Power supply (+V)
	White	2	---
	Blue	3	Power supply (0 V)
	Black	4	Output

Note: Pin 2 is not used.

Safety Precautions

⚠ WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly.
Do not use it for such purposes.

⚠ Caution

Do not exceed the rated voltage.
Excess voltage may result in malfunction or fire.

Do not use an AC power supply.
Using an AC power supply may result in rupturing.

High-temperature environments may result in burn injury.

Precautions for Safe Use

The following precautions must be observed to ensure safety.

1. Do not use the product in locations where flammable or explosive gas is present.
2. Do not use the product in locations subject to splashing water, oil, or chemicals, or in locations subject to steam.
3. Do not attempt to disassemble, repair, or modify the product.
4. Do not apply voltage or current in excess of the rated ranges.
5. Do not use the product in atmospheres or environments that exceed product ratings.
6. Do not wire the product incorrectly, such as using incorrect power supply polarity.
7. Connect the load properly.
8. Do not short-circuit both ends of the load.
9. Do not use the product if the case is damaged.
10. When disposing of the product, dispose of it as industrial waste.
11. Do not use the product in locations subject to direct sunlight.
12. The surface temperature of the product may rise as a result of the ambient temperature, power supply, or other usage conditions. Use caution when performing maintenance and washing. Failure to do so may result in burn injury.

Precautions for Correct Use

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

Amplifier Units

● Designing

Communications Hole

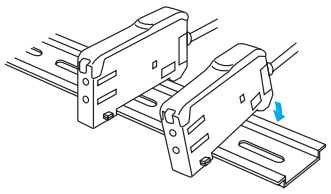
The hole on the side of the Amplifier Unit is a communications hole for preventing mutual interference when Amplifier Units are mounted side-by-side. The E3X-MC11 Mobile Console (sold separately) cannot be used.
If an excessive amount of light is received via the Sensor, the mutual interference prevention function may not work. In this case, make the appropriate adjustments using the sensitivity adjuster.
Mutual interference prevention is effective when E3X-SD/-NA-series Amplifiers are gang-mounted without other E3X-series Amplifiers.

● Mounting

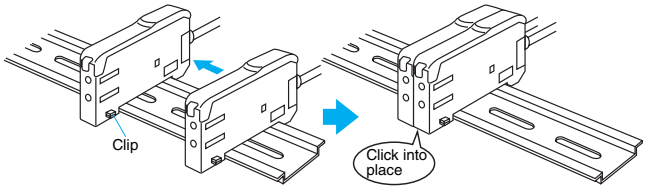
DIN Track Mounting/Removal

Mounting Amplifier Units

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



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



Removing Amplifier Units

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

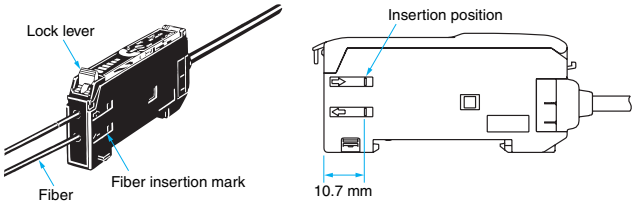
Note 1. The specifications for ambient temperature will vary according to the number of Amplifier Units used together. For details, refer to *Ratings and Specifications*.
2. Always turn OFF the power supply before mounting or removing Amplifier Units.

Fiber Connection and Disconnection

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

1. Connection

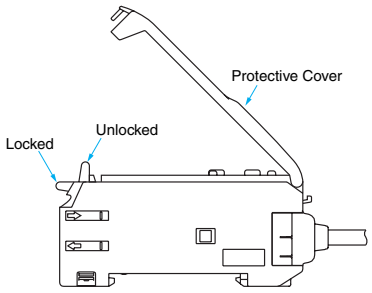
Open the Protective Cover, insert the fibers according to the fiber insertion marks on the side of the Amplifier Unit, and lower the lock lever.



Note: If one of the fibers from the Fiber Unit has a white line, such as with a Coaxial Sensor, that fiber is for the Emitter. Insert it into the Emitter section. Refer to Dimensions for the Fiber Unit to see if there is an Emitter fiber.

2. Disconnection

Remove the Protective Cover and raise the lock lever to pull out the fiber.



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

3. Precautions for Fiber Connection/Disconnection

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

● **Operating Environment**

Ambient Conditions

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

● **Other**

Protective Cover

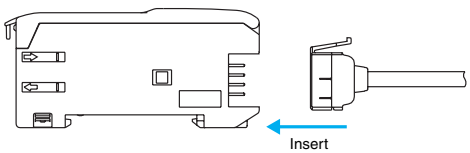
Be sure to mount the Protective Cover before use.

Amplifier Units with Connectors

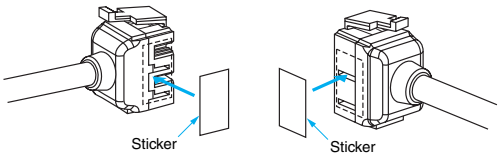
● **Mounting**

Mounting Connectors

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



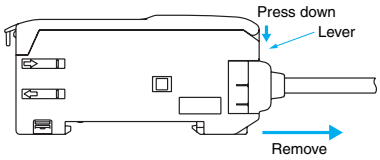
2. Join Amplifier Units together as required after all the Master and Slave Connectors have been inserted.
3. Attach the stickers (provided as accessories) to the sides of Master and Slave Connectors that are not connected to other Connectors.



Note: Attach the stickers to the sides with grooves.

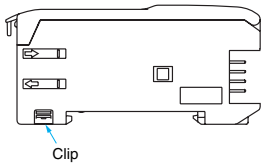
Removing Connectors

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



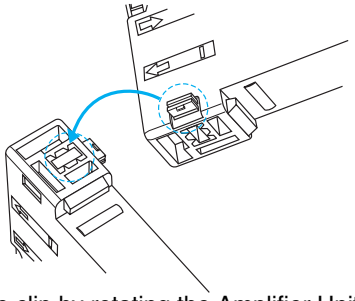
Mounting End Plate (PFP-M)

Depending on how it is mounted, an Amplifier Unit may move during operation. In this case, use an End Plate.
Before mounting an End Plate, remove the clip from the master Amplifier Unit using a nipper or similar tool.

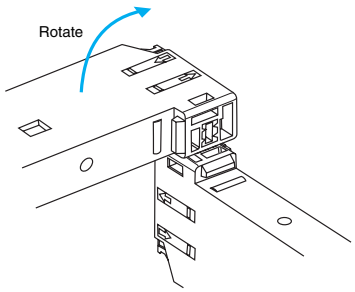


The clip can also be removed using the following mechanism, which is incorporated in the construction of the section underneath the clip.

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



2. Remove the clip by rotating the Amplifier Unit.



Pull Strengths for Connectors (Including Cables)

E3X-CN11: 30 N max.
E3X-CN12: 12 N max.

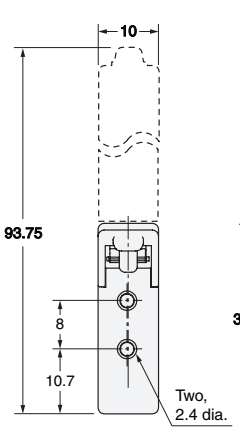
Dimensions

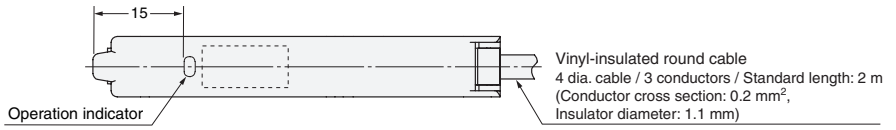
(Unit: mm)
Tolerance class IT16 applies to dimensions in this sheet unless otherwise specified.

Amplifier Units

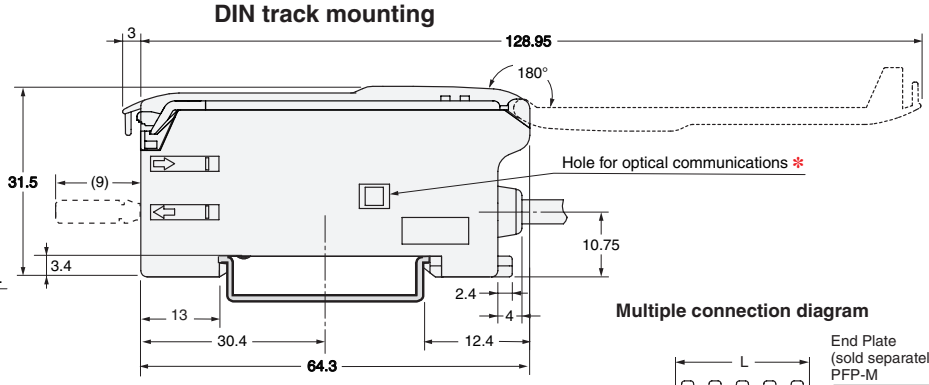
Amplifier Units with Cables

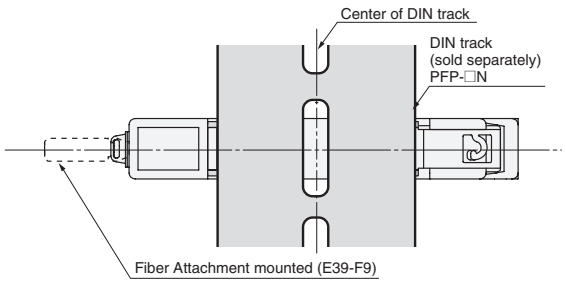
E3X-SD21
E3X-SD51
E3X-NA11
E3X-NA11F
E3X-NA41
E3X-NA41F



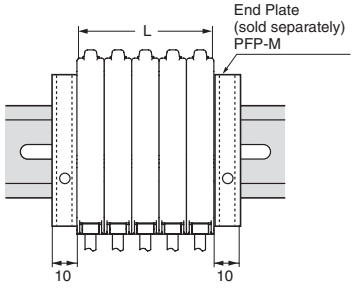


DIN track mounting



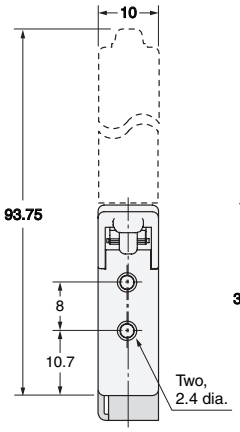


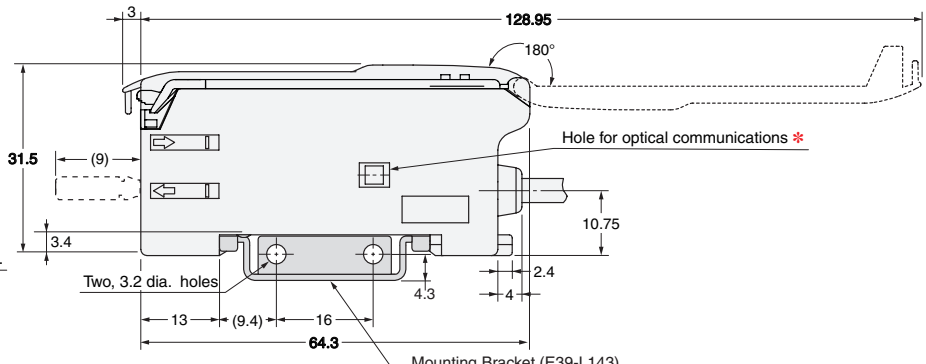
Multiple connection diagram



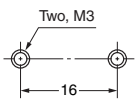
The number of expansion	L (mm)
1	10
2	20
3	30
4	40
5	50
6	60
7	70
8	80
9	90
10	100

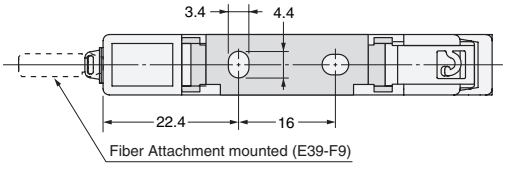
With Mounting Bracket Attached





Mounting Holes



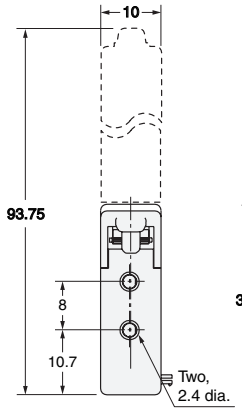


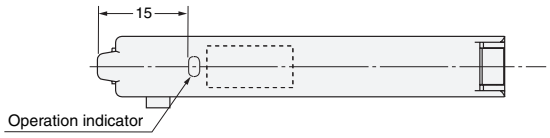
✻ There is no hole for E3X-NA□F models.

Note: When using E39-L143 Mounting Brackets, there will be small gaps between the Amplifier Units if they are mounted side by side.

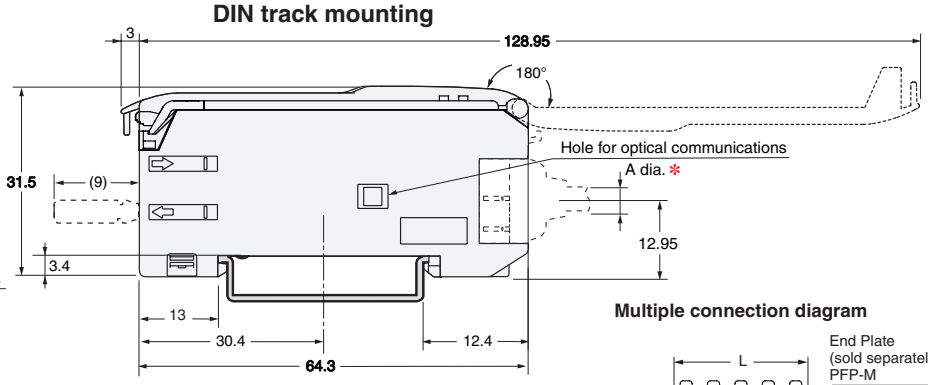
Amplifier Units with Connectors

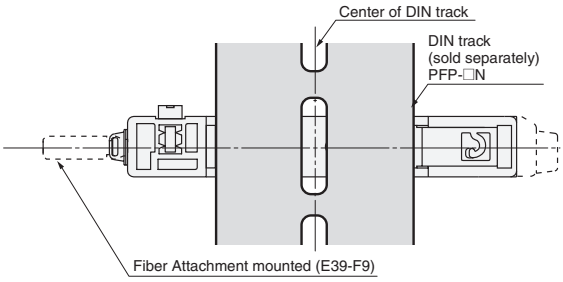
E3X-SD7
E3X-SD9
E3X-NA6
E3X-NA8



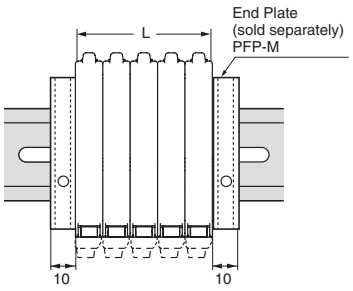


DIN track mounting



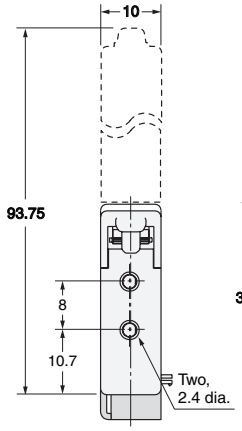


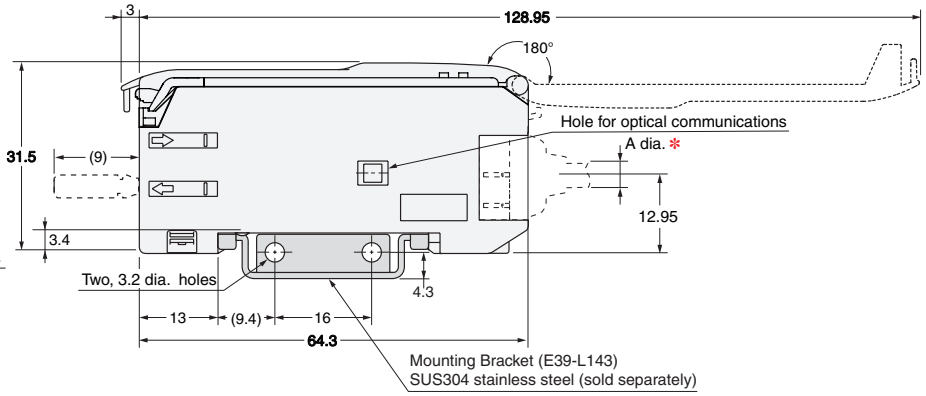
Multiple connection diagram



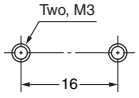
The number of expansion	L (mm)
1	10
2	20
3	30
4	40
5	50
6	60
7	70
8	80
9	90
10	100

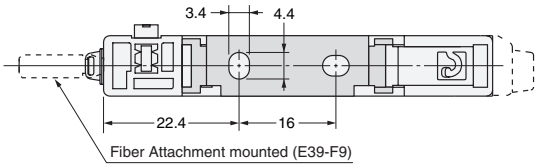
With Mounting Bracket Attached





Mounting Holes





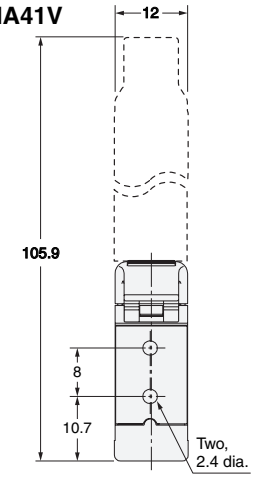
✻ Cable Diameters

E3X-CN11 (3 conductors)	4.0 dia.
E3X-CN12 (1 conductor)	2.6 dia.

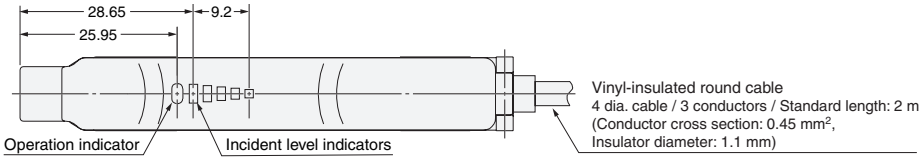
Note: When using E39-L143 Mounting Brackets, there will be small gaps between the Amplifier Units if they are mounted side by side.

Amplifier Units with Cables, Water-resistant Models

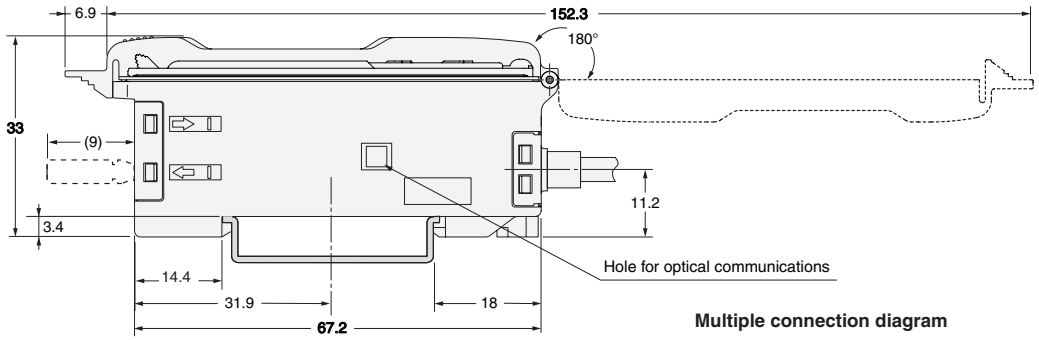
E3X-NA11V
E3X-NA41V

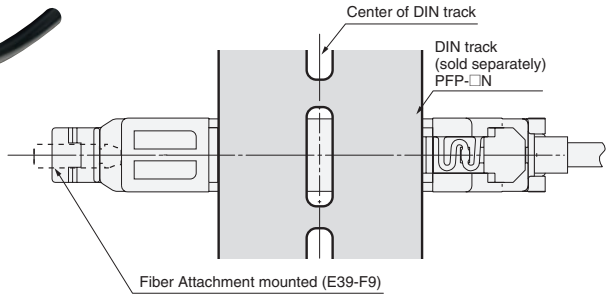


Area of digital indication

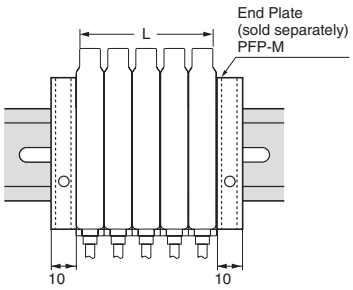


DIN track mounting

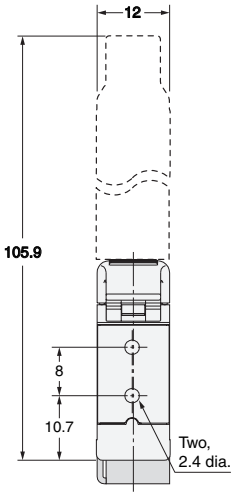




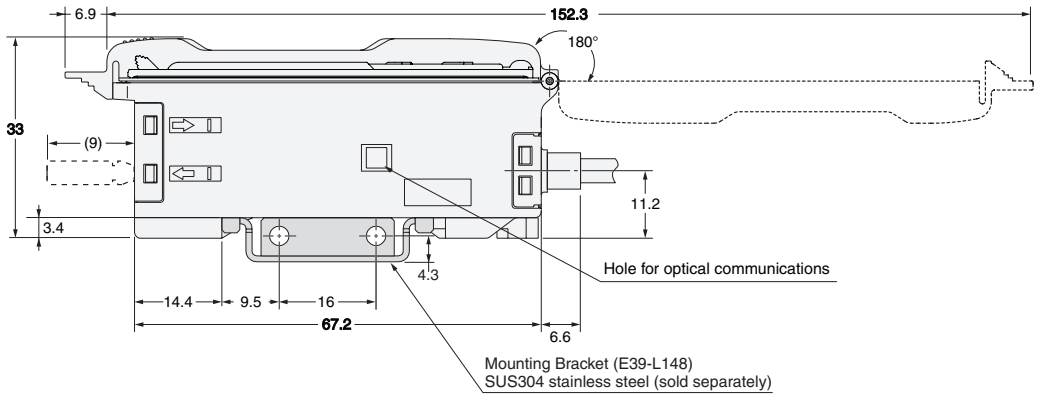
Multiple connection diagram



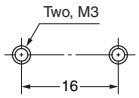
The number of expansion	L (mm)
1	12
2	24
3	36
4	48
5	60
6	72
7	84
8	96
9	108
10	120

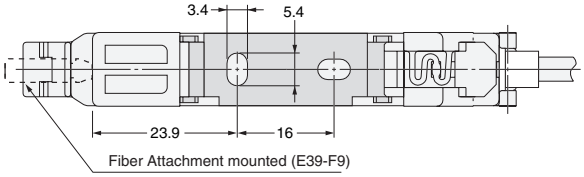


With Mounting Bracket Attached



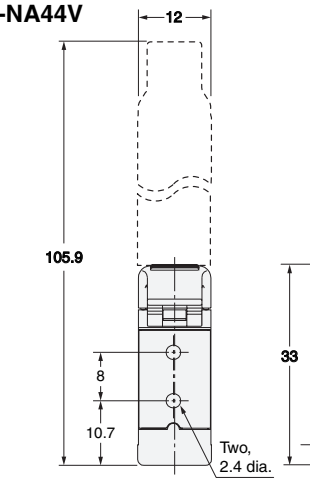
Mounting Holes



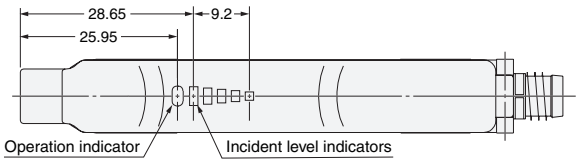


Amplifier Units with Connectors, Water-resistant Models

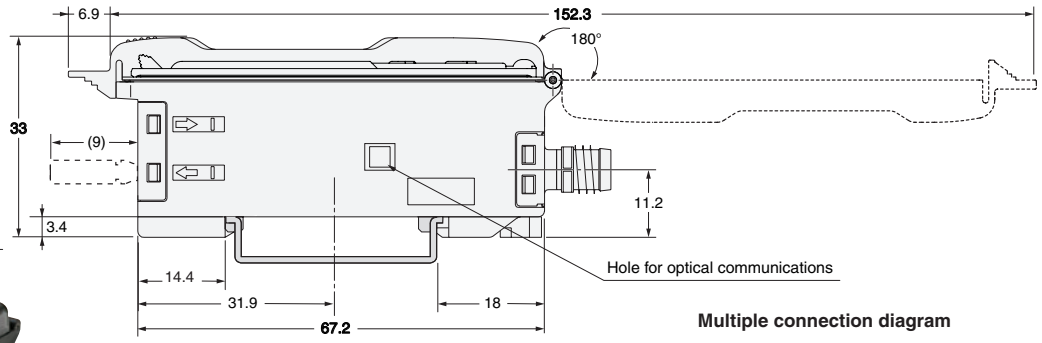
E3X-NA14V
E3X-NA44V

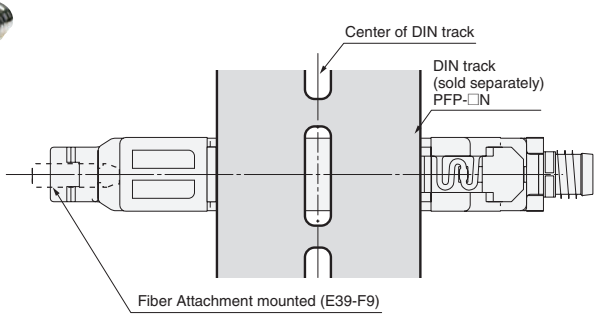


Area of digital indication

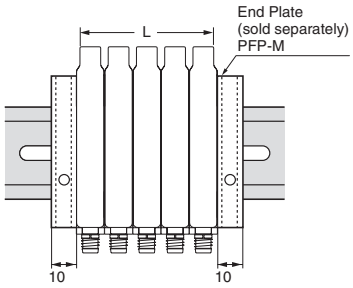


DIN track mounting





Multiple connection diagram



The number of expansion	L (mm)
1	12
2	24
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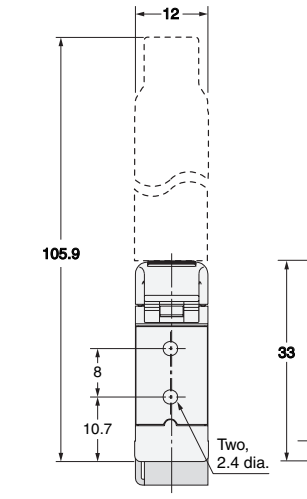
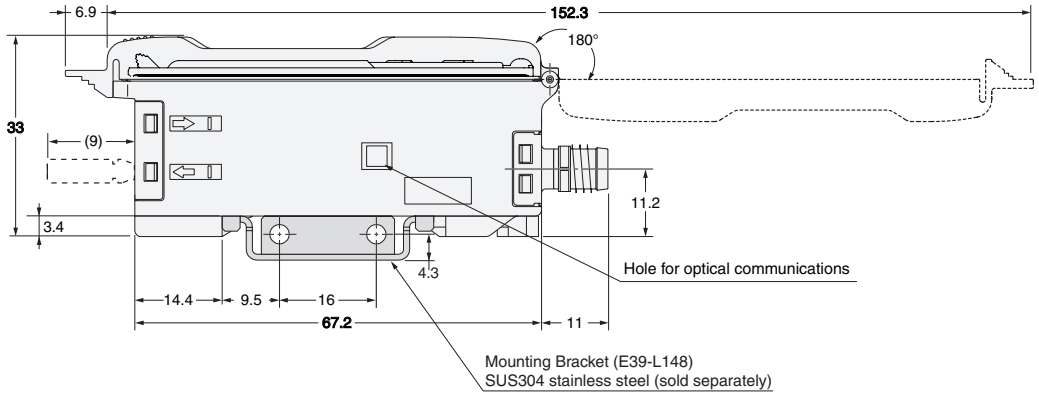
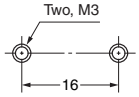
4	48
5	60
6	72
7	84
8	96
9	108
10	120

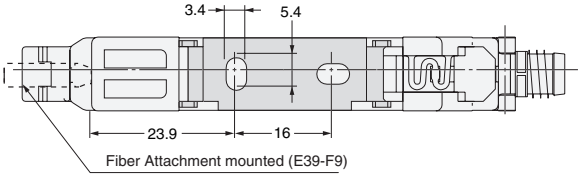


With Mounting Bracket Attached



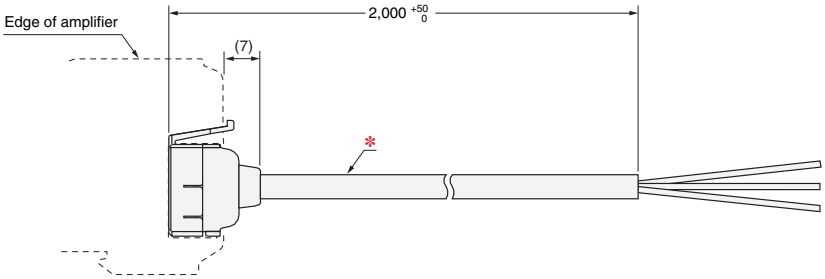
Mounting Holes





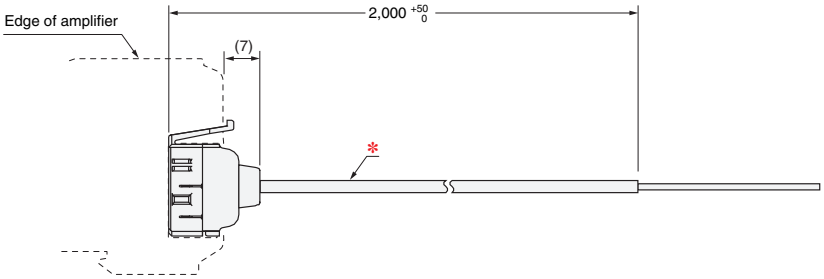
Amplifier Unit Connectors (Wire-saving Connectors)

Master Connector
E3X-CN11



* E3X-CN11: **4 dia.** cable / **3 conductors** / Standard length: 2 m (Conductor cross section: 0.2 mm^2 (AWG24), Insulator diameter: 1.1 mm)

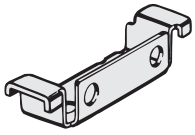
Slave Connector
E3X-CN12



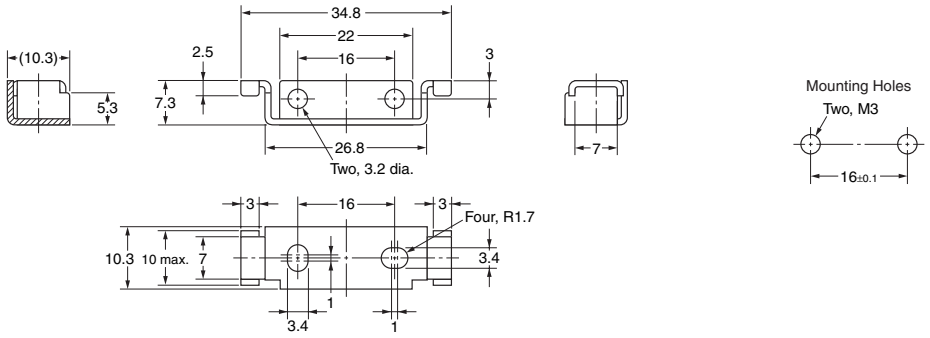
* E3X-CN12: **2.6 dia.** cable / **1 conductor** / Standard length: 2 m (Conductor cross section: 0.2 mm^2 (AWG24), Insulator diameter: 1.1 mm)

Accessories (sold separately)

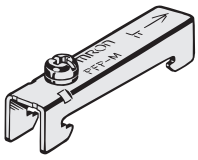
Mounting Brackets
E39-L143

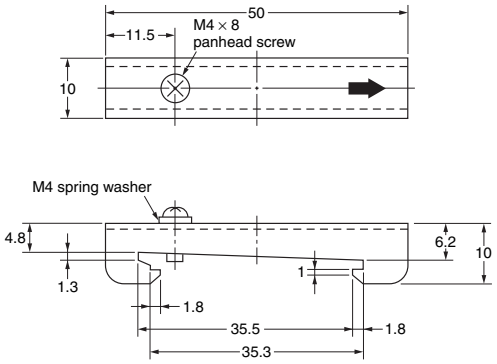


Material: Stainless steel (SUS304)



End Plates
PFP-M



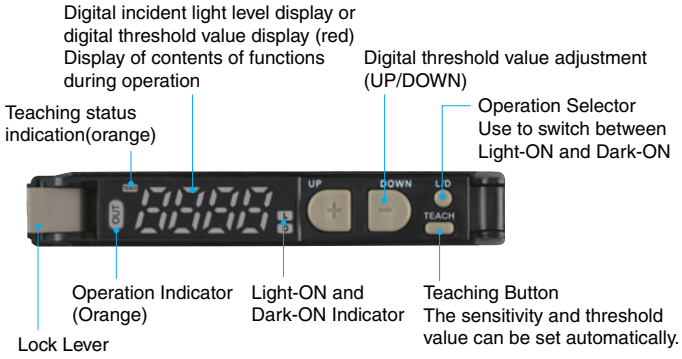


E3X-SD/-NA

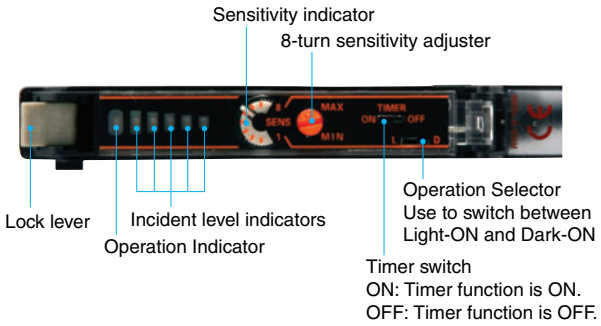
Nomenclature

Amplifier Units

E3X-SD



E3X-NA



Operating Procedure

E3X-SD

1 Sensitivity Setting

The sensitivity can be set with the UP and DOWN Keys similar to using an adjuster knob. The sensitivity can also be easily set by using the following two teaching functions.

2-1. Teaching with/without a Workpiece

Two points (one with the workpiece and the other without) are detected, and the operating level is set to the midpoint. Light level is also automatically set to the optimal value.

Operation description	Button/Key
Press the TEACH button with the workpiece.	TEACH
Press the TEACH button without the workpiece.	TEACH

2-2. Automatic Teaching

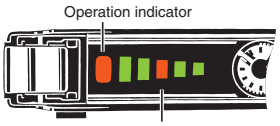
Changes within a time are detected, and the operating level is set to the midpoint between the maximum and the minimum values of the changes. This setting is optimal for when the workpieces cannot be stopped. Execute automatic teaching again if the incident light level is not automatically set to the optimal value.

Operation description	Button/Key
Press the TEACH button for 3 s min. Let the workpiece pass while the button is pressed.	TEACH

E3X-NA

1 Displays

A bar display (with four green and one red) showing excess gain is provided in addition to the orange operation indicator. Use these when adjusting the light axis and setting the sensitivity at setup.

Display/indicator status (for L/ON)	Excess gain level	Description
	Approx. 120% min.	Stable incident light
	Approx. 110% to 120%	
	Approx. 90% to 110%	Unstable incident light or Unstable interrupted light
	Approx. 80% to 90%	Stable interrupted light
	Approx. 80% max.	

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