

## Easy-teach digital fiber amplifier



# E3X-SD

The E3X-SD easy-teach fiber amplifier is the ideal solution for all standard fiber applications. The one-button teaching and/or the simple threshold adjustment with up/down keys and the easy to read display allow an intuitive usage and fast set up.

- easy one-button teaching
- easy to read display and simple threshold adjustment with up/ down keys for intuitive usage
- GIGA RAY LED for high performance and precision





### Ordering Information

Shape	Item	Order code	
		NPN output	PNP output
	Pre-wired	E3X-SD21 2M	E3X-SD51 2M
	Fiber amplifier connector* <sup>1</sup>	E3X-SD7	E3X-SD9

\*<sup>1</sup>: Order connector separately. For M8 connector models see E3X-DA-S.

### Amplifier Unit Connectors (sold separately)

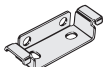
Shape	Type	Comment	Order code
	Fiber amplifier connector	2 m PVC cable	E3X-CN21* <sup>1</sup>
		30 cm PVC cable with M12 plug connector (4 pin)	E3X-CN21-M1J 0.3M
		30 cm PVC cable with M8 plug connector (4 pin)	E3X-CN21-M3J-2 0.3M

\*<sup>1</sup>: 4-wire version. For 3-wire version order E3X-CN11.

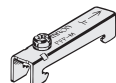
Note: Stickers for Connectors are included as accessories.

### Accessories (sold separately)

#### Mounting Brackets

Appearance	Model	Quantity
	E39-L143	1

#### End Plate

Appearance	Model	Quantity
	PFP-M	1

## Ratings and Specifications

## Amplifier Units

Item	E3X-SD□	
Light source (wavelength)	Red, 4-element LED (625 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.)	
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	
Response time	Operate or reset: 200 μs max.	
Sensitivity adjustment	UP/DOWN direct key setting, teaching with/without a workpiece, automatic teaching	
Protection circuits	Power supply reverse polarity protection, output short-circuit protection, output reverse polarity protection	
Mutual interference prevention	Up to 5 Amplifiers (optically synchronized) <sup>*1</sup>	
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	
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 <sup>2</sup> , for 3 times each in X, Y and Z directions	
Degree of protection	IEC 60529 IP50 (with Protective Cover attached)	
Connection method	Pre-wired (standard cable length: 2 m), or connector	
Weight (packed state)	Pre-wired model: Approx. 100 g, Model with connector: Approx. 55 g	
Material	Case	Polybutylene terephthalate (PBT)
	Cover	Polycarbonate (PC)
Accessories	Instruction manual	

<sup>\*1</sup>. Mutual interference prevention is effective when E3X-SD-series Amplifiers are gang-mounted without other E3X-series Amplifiers.

Output Circuit Diagrams

Output form	Model	Output transistor operation mode	Timing charts	Operation selector	Output circuit
NPN Output	E3X-SD21 E3X-SD7	Light-ON		LIGHT ON (L-ON)	
		Dark-ON		DARK ON (D-ON)	
PNP Output	E3X-SD51 E3X-SD9	Light-ON		LIGHT ON (L-ON)	
		Dark-ON		DARK ON (D-ON)	

## 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.

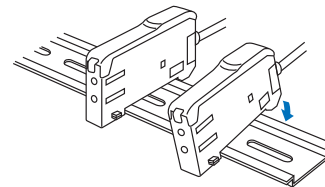
If an excessive amount of light is received via the Sensor, the mutual interference prevention function may not work. In this case, make the appropriate adjustments using the sensitivity adjuster. Mutual interference prevention is effective when E3X-SD-series Amplifiers are gang-mounted without other E3X-series Amplifiers.

##### Mounting

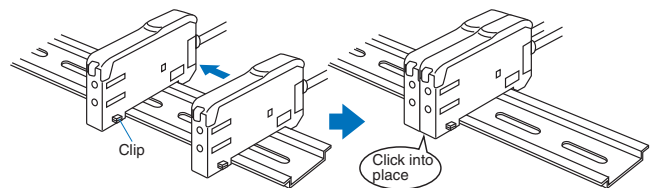
##### DIN Track Mounting/Removal

##### 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.)

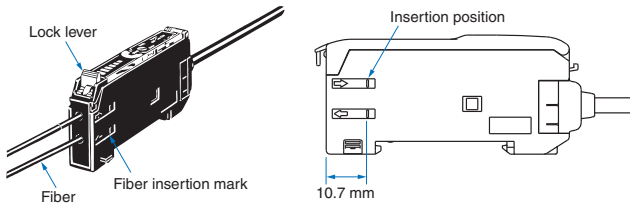
- Note**
1. The specifications for ambient temperature will vary according to the number of Amplifier Units used together. For details, refer to *Ratings and Specifications*.
  2. Always turn OFF the power supply before mounting or removing Amplifier Units.

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:

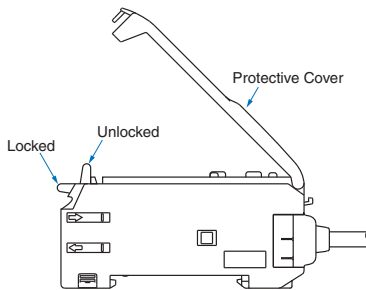
**1. Connection**

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.



**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**

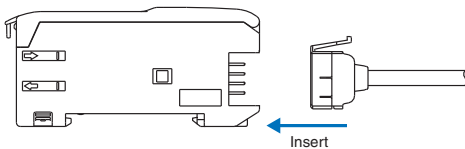
Be sure to mount the Protective Cover before use.

**Amplifier Units with Connectors**

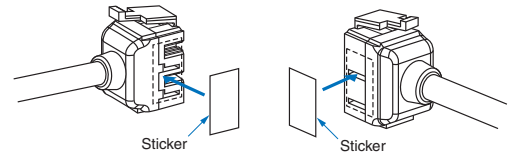
**Mounting**

**Mounting Connectors**

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



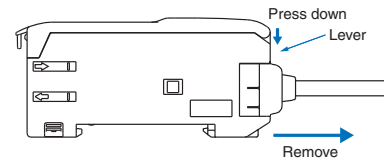
2. Join Amplifier Units together as required after all the Master and Slave Connectors have been inserted.
3. Attach the stickers (provided as accessories) to the sides of Master and Slave Connectors that are not connected to other Connectors.



Note: Attach the stickers to the sides with grooves.

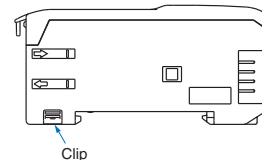
**Removing Connectors**

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.)



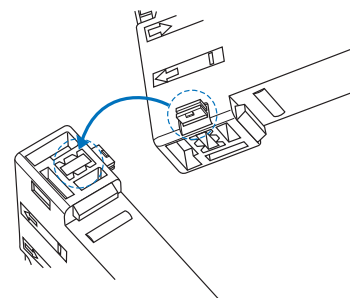
**Mounting End Plate (PFP-M)**

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.

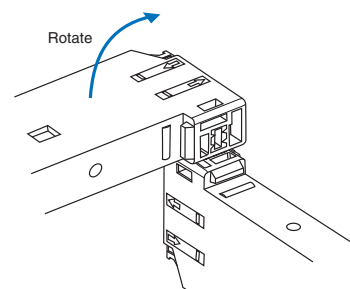


The clip can also be removed using the following mechanism, which is incorporated in the construction of the section underneath the clip.

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.

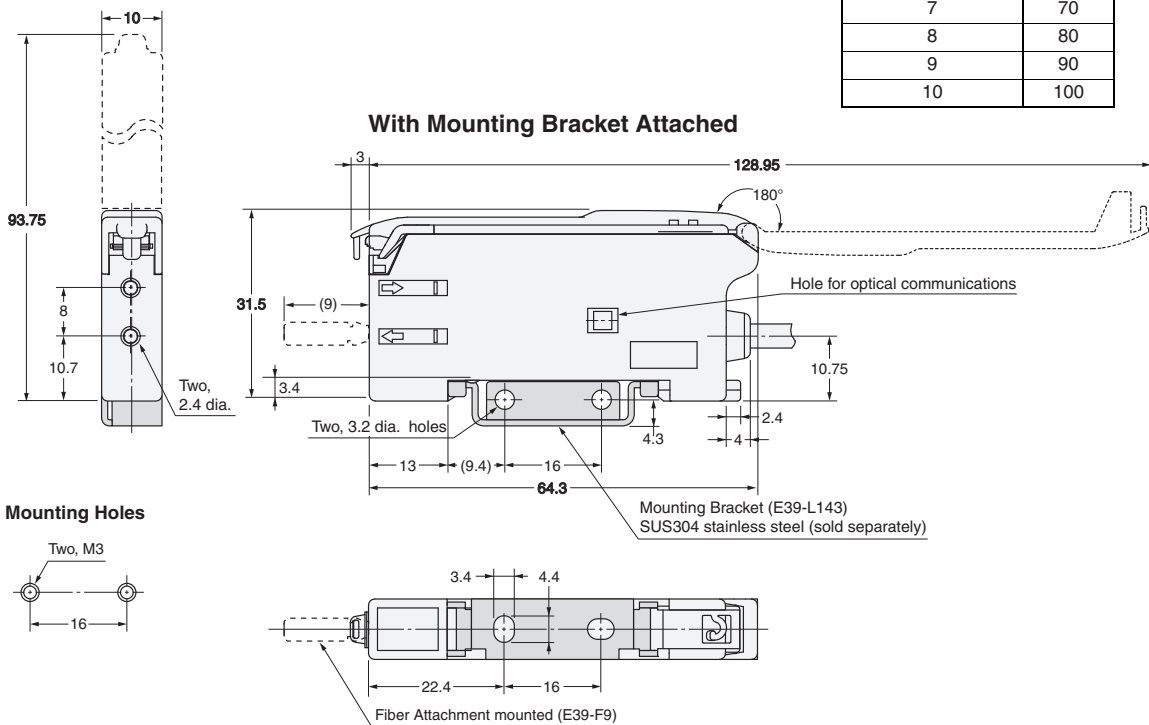
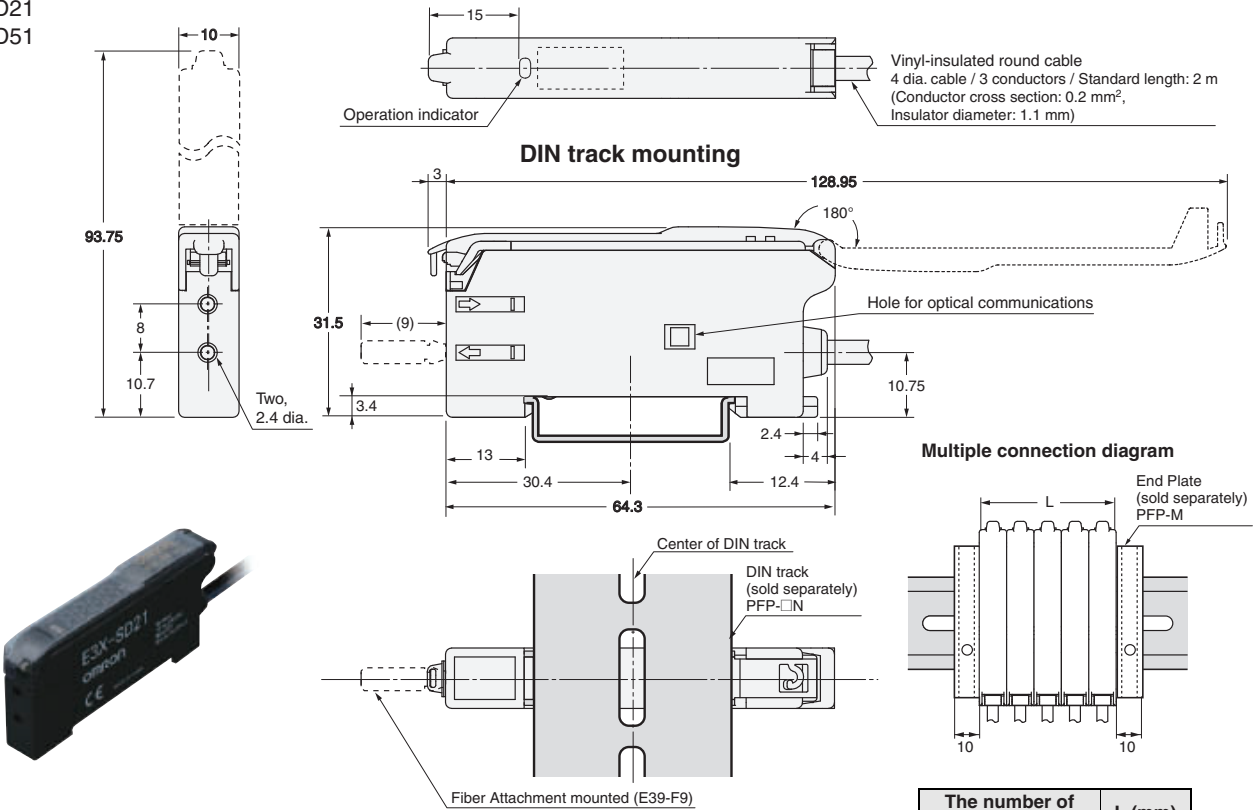
E3X-CN12: 12 N max.

Dimensions

Amplifier Units

Amplifier Units with Cables

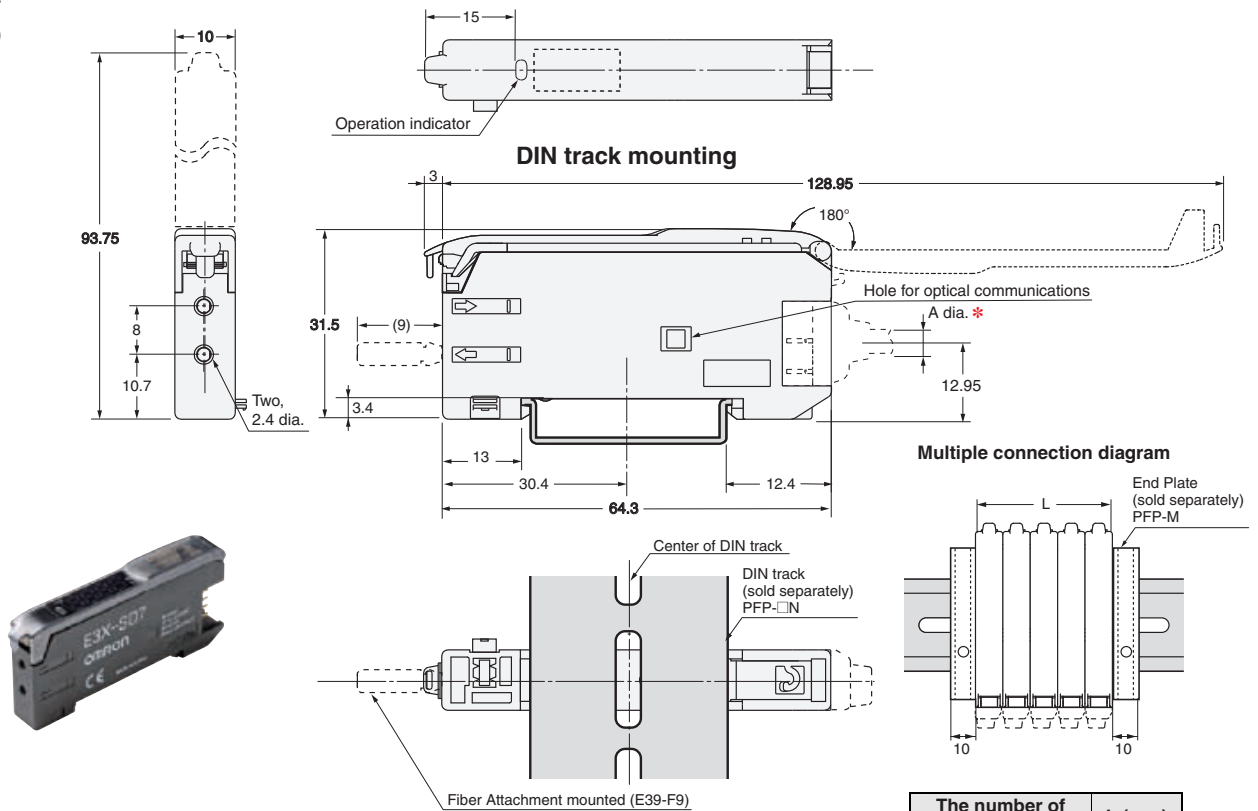
E3X-SD21  
E3X-SD51



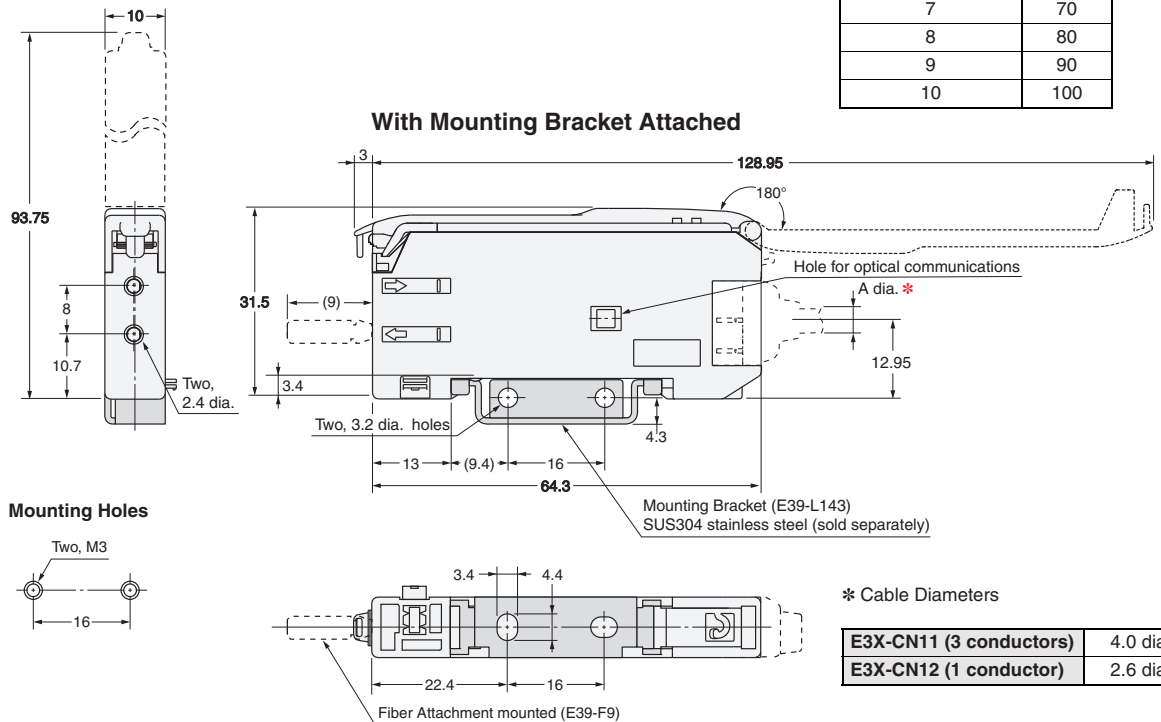
Note: When using E39-L143 Mounting Brackets, there will be small gaps between the Amplifier Units if they are mounted side by side.

Amplifier Units with Connectors

E3X-SD7  
E3X-SD9



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



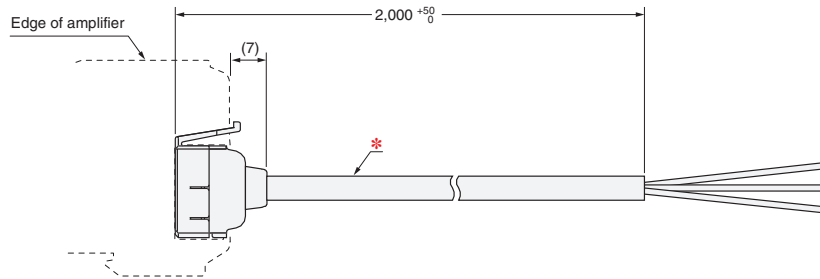
\* Cable Diameters

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.

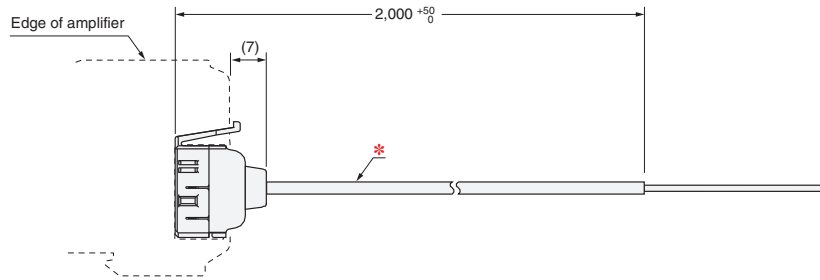
Amplifier Unit Connectors (Wire-saving Connectors)

Master Connector  
E3X-CN11



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

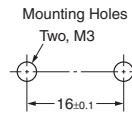
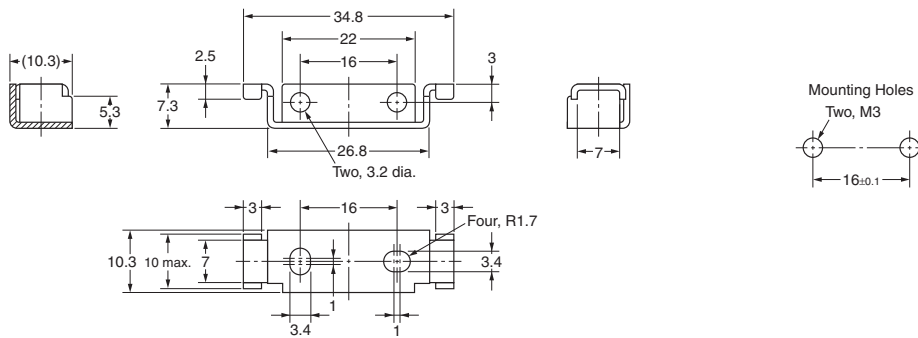
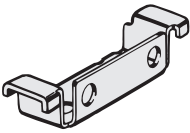
Slave Connector  
E3X-CN12



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

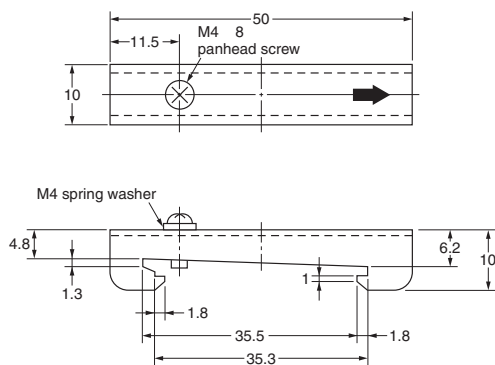
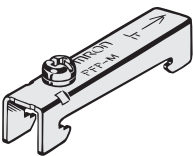
Accessories (sold separately)

Mounting Brackets  
E39-L143



Material: Stainless steel (SUS304)

End Plates  
PFP-M

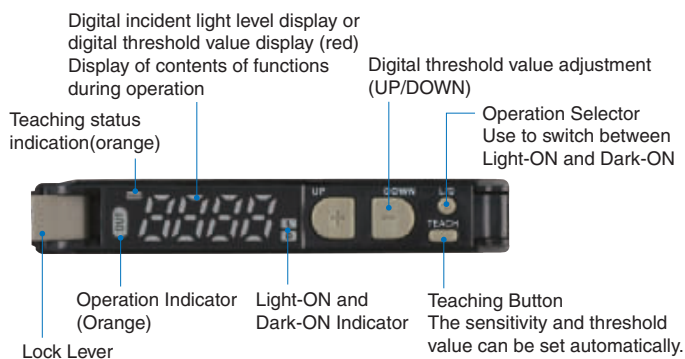




## Nomenclature

### Amplifier Units

#### E3X-SD



## Operating Procedure



### 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.

#### 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 

### 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 

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