

## High-Precision Fiber-optic Amplifier

## E3X-NH

The E3X-NH Employs a 16-Bit Processor as *An Industry First*

- An Automatic Sensitivity Adjustment feature allows stable detection of objects in frequently changing environments
- Three teach modes for optimal sensing
- 8-point scaled sensitivity meter is ideal for high precision sensing and through-beam applications at long distances (and clearly displays a target's reflectivity level)
- A manual fine tuning sensitivity feature allows 13 threshold adjustments using an easy-to-read digital scale
- Ideal for detecting small objects or fine wires
- NPN/PNP types available



## Ordering Information

### ■ AMPLIFIER UNITS

Description		General-purpose models		Timer-function models	
Output		NPN	PNP	NPN	PNP
<b>Part number</b>		<b>E3X-NH11</b>	<b>E3X-NH41</b>	<b>E3X-NH21</b>	<b>E3X-NH51</b>
Appearance					
Light source (Wave length)		Red LED (680 nm)			
Power supply voltage		12 to 24 VDC ±10%, ripple (p-p) 10% max.			
Current consumption		75 mA max.			
Output	Control output	NPN open collector, load current: 50 mA max., residual voltage: 1 V max.	PNP open collector, load current: 50 mA max., residual voltage: 1 V max.	NPN open collector, load current: 50 mA max., residual voltage: 1 V max.	PNP open collector, load current: 50 mA max., residual voltage: 1 V max.
	Alarm output	1 V max.	1 V max.	1 V max.	1 V max.
Response time		1 ms max. for turn-on and turn-off, respectively			
Sensitivity setting		Teaching method			
Fine sensitivity adjustment		Automatic or manual fine threshold adjustment (13 levels)			

# Specifications

Description		General-purpose models	Timer-function models		
Part number		E3X-NH11	E3X-NH41	E3X-NH21	E3X-NH51
Light source		Red (680 nm)			
Supply voltage		12-24 VDC +10% ripple (p-p) 10 % max.			
Output		NPN	PNP	NPN	PNP
Timing		—			40 ms off delay
Indicator		Operation indicator (orange LED), 8-level incident level indicator (green LED), 13-level threshold indicator (red LED)			
Circuit protection		Output short-circuit protection, reverse polarity on supply			
Operation mode		Light ON and Dark ON, switch-selectable			
Ambient light immunity	Incandescent lamp	3,000 lx max.			
	Sunlight	10,000 lx max.			
Ambient temperature	Operating	-25°C to 55°C (-13°F to 131°F) with no icing			
	Storage	-40°C to 70°C (-40°F to 158°F) with no icing			
Ambient humidity	Operating	35% to 85% (with no condensation)			
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute			
Vibration resistance		10 to 55 Hz, 1.5-mm double amplitude or 300 m/s <sup>2</sup> (approx. 30G) for 2 hrs each in X, Y, and Z directions			
Insulation resistance		20 MΩ min. (at 500 VDC)			
Shock resistance		500 m/s <sup>2</sup> (approx. 50G) for 3 times each in X, Y, and Z axis			
Enclosure rating		IEC IP50			
Connection method		2m cable			
Material	Case	PBT			
	Cover	Polycarbonate			
Weight (with 2 m cable)		Approx. 100 g			
Accessory		Mounting brackets (included)			

## Installation

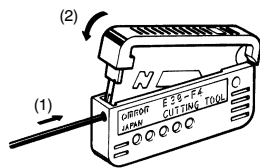
### ■ CUTTING FIBER

Insert a fiber into the Fiber Cutter and determine the length of the fiber to be cut.

Press down the Fiber Cutter in a single stroke to cut the fiber.

An insertion mark can be placed on the fiber to serve as a reference when inserting the fiber into the Amplifier. Use the following procedure.

Confirm through the Cutter hole that the fiber is inserted beyond the insertion mark hole so that the insertion mark is properly indicated, and then press firmly down on the Cutter.



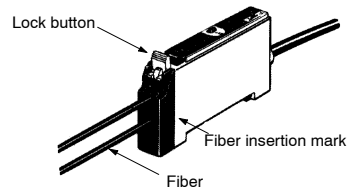
Insert the fiber into the Amplifier up to the insertion mark. Proper fiber performance will not be achieved unless the fiber is inserted all the way to the insertion mark. (This method is applicable to standard, 2.2-mm-diameter fibers only.)

### ■ FIBER CONNECTION OR DISCONNECTION PROCEDURES

The E3X-NH Amplifier has a lock button. Follow these steps to connect or disconnect the fibers to (or from) the E3X-NH Amplifier:

**Note:** The fiber must be locked or released in a temperature range of  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $104^{\circ}\text{F}$ ).

#### Connection



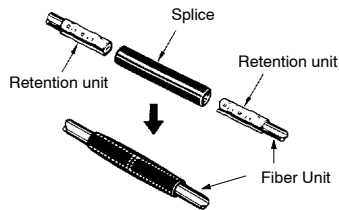
1. After cutting the fibers (using the E39-F4 Fiber Cutter), place an insertion mark on the fiber so that it can be correctly inserted into the Amplifier.
2. Insert the fiber into the Amplifier up to this insertion mark.
3. Press the lock button to lock the fiber in that position.

## ■ ATTACHMENT UNITS

### Applications

#### E39-F10 Fiber Connector

Use the following procedure (refer to the figure) to connect fibers via the Fiber Connector.



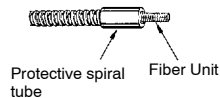
Each Fiber Unit should be as close as possible before they are connected.

Sensing distance will be reduced by approximately 25% when fibers are connected.

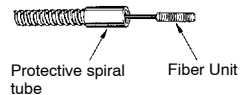
Only fibers with a 2.2-mm dia. can be connected. (Refer to page NO TAG for applicable Fiber Units.)

#### Protective Spiral Tube

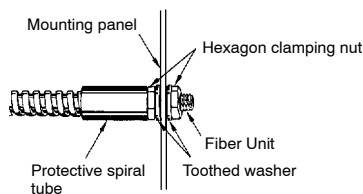
Insert a fiber to the Protective Spiral Tube from the head connector side (threaded) of the tube.



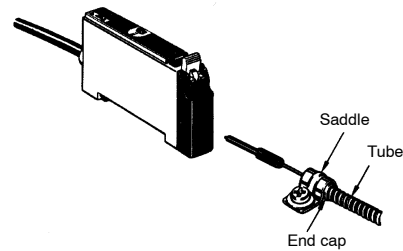
Push the fiber into the Protective Spiral Tube. The tube should be straight so that the fiber is not twisted when inserted. Then turn the end cap of the spiral tube.



Secure the Protective Spiral Tube on a suitable place with the attached nut.



Use the attached saddle to secure the end cap of the Protective Spiral Tube. To secure the Protective Spiral Tube at a position other than the end cap, apply tape to the tube so that the portion becomes thicker in diameter.

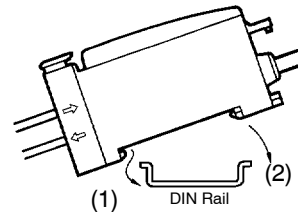


## ■ AMPLIFIER UNITS

### Mounting

1. Mount the *front part* (see #1) to the mounting bracket (attachment) or on a DIN rail.
2. Press the *back part* (see #2) onto the mounting bracket or onto the DIN rail.

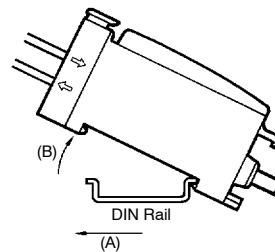
Note: *DO NOT* mount the back part on the mounting bracket or the DIN rail first and then mount the front part on the mounting bracket on the DIN rail. This could decrease the mounting strength of the Amplifier Unit.



### Removal

You can remove the Amplifier in one easy step:

1. Press the Amplifier Unit in direction (A) and lift the fiber insertion part in direction (B) as shown here



## Precautions



### WARNING

The E3X-NH is not a safety component for ensuring the safety of people as defined in EC Directive 91/368/EEC, or as covered by separate European standards or by any other regulations or standards.

### ■ AVOID DAMAGE TO THE E3X-NH SENSOR

- Do not impose any voltage exceeding the rated voltage on the E3X-NH.
- Do not impose 100 VAC or more on models that operate with DC.
- When supplying power to the E3X-NH, make sure that the polarity of the power is correct.
- Do not short-circuit the load connected to the E3X-NH.
- The load must be connected to the E3X-NH in operation.

### ■ REFLECTOR

#### Precautions for Using the E39-R3 Reflector

Use detergent, etc., to remove any dust or oil from the surfaces where tape is applied. Adhesive tape will not be attached properly if oil or dust remains on the surface.

The E39-R3 cannot be used in places where it is exposed to oil or chemicals.

### ■ MUTUAL INTERFERENCE PROTECTION

Perform two-point teaching if two to three Fiber Units are closely mounted together. The mutual interference feature will guard against false triggering.

### ■ EEPROM WRITING ERROR

Write errors may result at the time of teaching due to power failure or static noise. If any of these occur, re-teach the amplifier.

### ■ SENSING A MINUTE OBJECT

This data sheet shows typical examples for detecting minute objects. These typical examples are for reference use only, because these example operations were tested on Units sampled at random from a lot and the values described are average values. Do not assume that all Units ensure such operations.

### ■ WHEN THE POWER IS OFF

The moment power is turned off, the E3X-NH may output a pulse signal which could affect the operation of the devices connected to it. This will occur more often if power is supplied to the E3X-NH from an external power supply, thus affecting the connected timer or counter. We recommend using a separate power supply to avoid a false signal.

For extending the cable, use wire with 0.3 mm<sup>2</sup> min. The total length of the cable should be a maximum of 100 m.

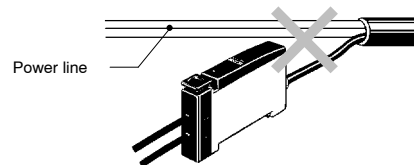
### ■ POWER SUPPLY

If a standard switching regulator is used as a power supply, the frame ground (FG) terminal and the ground (G) terminal must be grounded, or the Amplifier can malfunction due to the switching noise of the power supply.

The supplied voltage must be within the rated voltage range. Unregulated full- or half-wave rectifiers must not be used as power supplies.

### ■ WIRING

Never wire the Amplifier within the same conduit with power lines. Doing so will cause induction between the lines, possibly resulting in faulty operation or damage. Always wire the Amplifier in a separate, dedicated conduit.



**NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches divide by 25.4.**

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