Smart Fiber Amplifier Units

E3NX-FA

CSM_E3NX-FA_DS_E_16_4

A Smart Fiber Amplifier Unit with Ultra-stable Detection and Ultra-easy Setup

- Improved basic performance with 1.5 times the sensing distance and approx. 1/10th the minimum sensing object.*
- Ultra-easy setup with Smart Tuning with a light intensity adjustment range expanded 20 times to 40,000:1. Optimum stable detection achieved with light intensity adjustment even for saturated incident light.
- White on black display characters for high visibility.
- Solution Viewer that shows the passing time and difference in incident levels and Change Finder that allows you to see display values even for fast workpieces.

* Compared to the E3X-HD.

For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

Refer to the *Safety Precautions* on page 17.

Ordering Information

Fiber Amplifier Units (Dimensions ➜ pages 19 and 20)

Type	Connecting method	Appearance	Inputs/outputs	Model	
				NPN output	PNP output
Standard models	Pre-wired (2 m)		1 output	**E3NX-FA11 2M**	**E3NX-FA41 2M**
				E3NX-FA11-5 2M *1	---
	Wire-saving Connector		1 output	**E3NX-FA6**	**E3NX-FA8**
Advanced models	Pre-wired (2 m)		2 outputs + 1 input	**E3NX-FA21 2M**	**E3NX-FA51 2M**
	Wire-saving Connector		1 output + 1 input	**E3NX-FA7**	**E3NX-FA9**
			2 outputs	**E3NX-FA7TW**	**E3NX-FA9TW**
	M8 Connector		1 output + 1 input	**E3NX-FA24**	**E3NX-FA54**
			2 outputs	---	**E3NX-FA54TW**

*1. This type can prevent mutual interference for two units in the SHS2 mode.

Type	Connecting method	Appearance	Inputs/outputs	Model	
				NPN output	PNP output
Infrared models	Pre-wired (2 m)		1 output	**E3NX-FAH11 2M**	**E3NX-FAH41 2M**
	Wire-saving Connector		1 output	**E3NX-FAH6**	**E3NX-FAH8**
Analog output models	Pre-wired (2 m)		2 outputs	**E3NX-FA11AN 2M**	**E3NX-FA41AN 2M**
Model for Sensor Communications Unit ✻2	Connector for Sensor Communications Unit		---	**E3NX-FA0**	
				E3NX-FAH0	
	Connector for Sensor Communications Unit Pre-wired (2 m)		1 output	**E3NX-FA10 2M**	**E3NX-FA40 2M**

✻2. A Sensor Communications Unit is required if you want to use the Fiber Amplifier Unit on a network.

Accessories (Sold Separately)

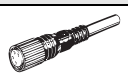
Wire-saving Connectors (Required for models for Wire-saving Connectors.) (Dimensions ➜ page 21)

Connectors are not provided with the Fiber Amplifier Unit and must be ordered separately. Note: Protective stickers are provided.

Type	Appearance	Cable length	No. of conductors	Model	Applicable Fiber Amplifier Units
Master Connector		2 m	4	**E3X-CN21**	**E3NX-FA7 E3NX-FA7TW E3NX-FA9 E3NX-FA9TW**
Slave Connector			2	**E3X-CN22**	
Master Connector			3	**E3X-CN11**	**E3NX-FA6 E3NX-FA8 E3NX-FAH6 E3NX-FAH8**
Slave Connector			1	**E3X-CN12**	

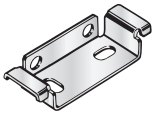
Sensor I/O Connectors (Required for models for M8 Connectors.) (Dimensions ➜ page 21)

Connectors are not provided with the Fiber Amplifier Unit and must be ordered separately.

Size	Cable	Appearance		Cable type		Model
M8	Standard cable	Straight		2m	4-wire	XS3F-M421-402-A
				5m		XS3F-M421-405-A
		L-shaped		2m		XS3F-M422-402-A
				5m		XS3F-M422-405-A

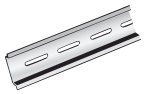
Mounting Bracket (Dimensions ➜ page 22)

A Mounting Bracket is not provided with the Fiber Amplifier Unit. It must be ordered separately as required.

Appearance	Model	Quantity
	**E39-L143**	1

DIN Track (Dimensions ➜ page 22)

A DIN Track is not provided with the Fiber Amplifier Unit. It must be ordered separately as required.

Appearance	Type	Model	Quantity
	Shallow type, total length: 1 m	**PFP-100N**	1
	Shallow type, total length: 0.5 m	**PFP-50N**	
	Deep type, total length: 1 m	**PFP-100N2**	

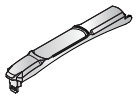
End Plate (Dimensions ➜ page 22)

Two End Plates are provided with the Sensor Communications Unit. End Plates are not provided with the Fiber Amplifier Unit. They must be ordered separately as required.

Appearance	Model	Quantity
	**PFP-M**	1

Cover

Attach these Covers to Amplifier Units.
Order a Cover when required, e.g., if you lose the covers.

Appearance	Model	Quantity
	**E39-G25 FOR E3NX-FA**	1

Related Products

Sensor Communications Units

Type	Appearance	Model
Sensor Communications Unit for EtherCAT		**E3NW-ECT**
Sensor Communications Unit for CompoNet		**E3NW-CRT ✻1**
Sensor Communications Unit for CC-Link		**E3NW-CCL**
Distributed Sensor Unit ✻2		**E3NW-DS**

Refer to your OMRON website for details.

✻1. E3NX-FAH0 can not be connected.

✻2. The Distributed Sensor Unit can be connected to any of the Sensor Communications Units.

Ratings and Specifications

Standard models/ Advanced models/ Infrared models

Item		Type	Standard models			Advanced models					Infrared models	
		NPN output	E3NX-FA11	E3NX-FA6	E3NX-FA11-5 ✻1	E3NX-FA21	E3NX-FA7	E3NX-FA7TW	E3NX-FA24	---	E3NX-FAH11	E3NX-FAH6
		PNP output	E3NX-FA41	E3NX-FA8	---	E3NX-FA51	E3NX-FA9	E3NX-FA9TW	E3NX-FA54	E3NX-FA54TW	E3NX-FAH41	E3NX-FAH8
		Connecting method	Pre-wired	Wire-saving Connector	Pre-wired	Pre-wired	Wire-saving Connector		M8 Connector		Pre-wired	Wire-saving Connector
Inputs/ outputs	Outputs		1 output			2 outputs	1 output	2 outputs	1 output	2 outputs	1 outputs	
	External inputs		---			1 input	1 input	---	1 input	---	---	
Light source (wavelength)			Red, 4-element LED (625 nm)								Infrared LED (870nm)	
Power supply voltage			10 to 30 VDC, including 10% ripple (p-p)									
Power consumption ✻2			At Power supply voltage of 24 VDC Standard Models: Normal mode : 840 mW max. (Current consumption at 35 mA max.) Eco function ON : 650 mW max. (Current consumption at 27 mA max.) Eco function LO : 750 mW max. (Current consumption at 31 mA max.) Advanced Models or Model for Sensor Communications Unit: Normal mode : 920 mW max. (Current consumption at 38 mA max.) Eco function ON : 680 mW max. (Current consumption at 28 mA max.) Eco function LO : 800 mW max. (Current consumption at 33 mA max.) Infrared models: Normal mode : 1080 mW max. (Current consumption at 45 mA max.) Eco function ON : 920 mW max. (Current consumption at 38 mA max.) Eco function LO : 1020 mW max. (Current consumption at 42 mA max.)								
Control output			Load power supply voltage: 30 VDC max., open-collector output (depends on the NPN/PNP output format) Load current: Groups of 1 to 3 Amplifier Units: 100 mA max., Groups of 4 to 30 Amplifier Units: 20 mA max. (Residual voltage: At load current of less than 10 mA: 1 V max. At load current of 10 to 100 mA: 2 V max.) OFF current: 0.1 mA max.									
External inputs			---			Refer to ✻3.		---	Refer to ✻3.	---		
Indicators			7-segment displays (Sub digital display: green, Main digital display: white) Display direction: Switchable between normal and reversed. OUT indicator (orange), L/D indicator (orange), ST indicator (blue), DPC indicator (green), and OUT selection indicator (orange, only on models with 2 outputs)									
Protection circuits			Power supply reverse polarity protection, output short-circuit protection, and output reve rse polarity protection									
Response time	Super-high-speed mode (SHS)		Operate or reset for model with 1 output: 30 µs (Super High Speed mode (SHS2) of E3NX-FA11-5 is 60 µs each), with 2 outputs: 32 µs									
	High-speed mode (HS)		Operate or reset: 250 µs									
	Standard mode (Stnd)		Operate or reset: 1 ms									
	Giga-power mode (GIGA)		Operate or reset: 16 ms									
Sensitivity adjustment			Smart Tuning (2-point tuning, full auto tuning, position tuning, maximum sensitivity tuning, power tuning, or percentage tuning (-99% to 99%)) or manual adjustment									
Maximum connectable Units			30									
No. of Units for mutual interference prevention ✻4	Super-high-speed mode (SHS)		0 **Note:** 2 units when the detection mode is set to Super High Speed mode (SHS2), and for other models, the mutual interference prevention function is disabled.									
	High-speed mode (HS)		10									
	Standard mode (Stnd)		10									
	Giga-power mode (GIGA)		10									

✻1. This type can prevent mutual interference for two units in the SHS2 mode.

✻2. At Power supply voltage of 10 to 30 VDC

Standard Models:
Normal mode : 990 mW max. (Current consumption: 33 mA max. at 30 VDC, 65 mA max. at 10 VDC)
Eco function ON : 780 mW max. (Current consumption: 26 mA max. at 30 VDC, 42 mA max. at 10 VDC)
Eco function LO : 840 mW max. (Current consumption: 28 mA max. at 30 VDC, 45 mA max. at 10 VDC)

Advanced Models:
Normal mode : 1,020 mW max. (Current consumption: 34 mA max. at 30 VDC, 67 mA max. at 10 VDC)
Eco function ON : 810 mW max. (Current consumption: 27 mA max. at 30 VDC, 44 mA max. at 10 VDC)
Eco function LO : 870 mW max. (Current consumption: 29 mA max. at 30 VDC, 48 mA max. at 10 VDC)

Infrared models:
Normal mode : 1,260 mW max. (Current consumption: 42 mA max. at 30 VDC, 80 mA max. at 10 VDC)
Eco function ON : 1,050 mW max. (Current consumption: 35 mA max. at 30 VDC, 60 mA max. at 10 VDC)
Eco function LO : 1,140 mW max. (Current consumption: 38 mA max. at 30 VDC, 70 mA max. at 10 VDC)

✻3. The following details apply to the input.

	Contact input (relay or switch)	Non-contact input (transistor)	Input time ✻3-1
NPN	ON: Shorted to 0 V (Sourcing current: 1 mA max.). OFF: Open or shorted to Vcc.	ON: 1.5 V max. (Sourcing current: 1 mA max.) OFF: Vcc – 1.5 V to Vcc (Leakage current: 0.1 mA max.)	ON: 9 ms min. OFF: 20 ms min.
PNP	ON: Shorted to Vcc (Sinking current: 3 mA max.). OFF: Open or shorted to 0 V.	ON: Vcc – 1.5 V to Vcc (Sinking current: 3 mA max.) OFF: 1.5 V max. (Leakage current: 0.1 mA max.)	

✻3-1. Input time is 25 ms (ON)/(OFF) only when (in tUnE) or (in PtUn) input is selected.

✻4. The tuning will not change the number of units. The least unit count among the mutual interference prevention units of E3NX and E3NC. Check the mutual interference prevention unit count and response speed of each model.

Item		Type	Standard models			Advanced models					Infrared models	
		NPN output	E3NX-FA11	E3NX-FA6	E3NX-FA11-5 ✻1	E3NX-FA21	E3NX-FA7	E3NX-FA7TW	E3NX-FA24	---	E3NX-FAH11	E3NX-FAH6
		PNP output	E3NX-FA41	E3NX-FA8	---	E3NX-FA51	E3NX-FA9	E3NX-FA9TW	E3NX-FA54	E3NX-FA54TW	E3NX-FAH41	E3NX-FAH8
		Connecting method	Pre-wired	Wire-saving Connector	Pre-wired	Pre-wired	Wire-saving Connector		M8 Connector		Pre-wired	Wire-saving Connector
Functions	Automatic power control (APC)		Always enabled.									
	Dynamic power control (DPC)		Provided									
	Timer		Select from timer disabled, OFF-delay, ON-delay, one-shot, or ON-delay + OFF-delay timer: 1 to 9,999 ms									
	Zero reset		Negative values can be displayed. (Threshold value is shifted.)									
	Resetting settings ✻5		Select from initial reset (factory defaults) or user reset (saved settings).									
	Eco mode ✻6		Select from OFF (digital display lit), Eco ON (digital display not lit), and Eco LO (digital display dimmed).									
	Bank switching		Select from banks 1 to 4.									
	Power tuning		Select from ON, OFF or Execution on power-up.								Select from ON or OFF.	
	Output 1		Select from normal detection mode, area detection mode or differential detection mode.								Select from normal detection mode or area detection mode.	
	Output 2		---			Select from normal detection mode, alarm output mode, error output mode or differential detection mode.	---	Select from normal detection mode, alarm output mode, error output mode or differential detection mode.	---	Select from normal detection mode, alarm output mode, error output mode or differential detection mode.	---	
	External input		---			Select from input OFF, tuning, power tuning, emission OFF, Sensor OFF, zero reset, or bank switching.		---	Select from input OFF, tuning, power tuning, emission OFF, Sensor OFF, zero reset, or bank switching.	---		
	Hysteresis width		Select from standard setting or user setting. For a user setting, the hysteresis width can be set from 0 to 9,999.									
Ambient illumination (Receiver side)			Incandescent lamp: 20,000 lx max., Sunlight: 30,000 lx max.									
Ambient temperature range ✻7			Operating: Groups of 1 or 2 Amplifier Units: −25 to 55°C, Groups of 3 to 10 Amplifier Units: −25 to 50°C, Groups of 11 to 16 Amplifier Units: −25 to 45°C, Groups of 17 to 30 Amplifier Units: −25 to 40°C Storage: −30 to 70°C (with no icing or condensation)									
Ambient humidity range			Operating and storage: 35 to 85% (with no condensation) within the surrounding air temperature range shown above									
Altitude			2,000 m max.									
Installation environment			Pollution degree 3									
Insulation resistance			20 MΩ min. (at 500 VDC)									
Dielectric strength			1,000 VAC at 50/60 Hz for 1 min									
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/s² for 3 times each in X, Y, and Z directions									
Weight (packed state/ Sensor only)			Approx. 115 g/ approx. 75 g	Approx. 60g/ approx. 20g	Approx. 115 g/ approx. 75 g	Approx. 115 g/ approx. 75 g	Approx. 60g/ approx. 20g		Approx. 65 g/ approx. 25 g		Approx. 115 g/ approx. 75 g	Approx. 60g/ approx. 20g
Materials	Case		Polycarbonate (PC)									
	Cover		Polycarbonate (PC)									
	Cable		PVC									
Accessories			Instruction Manual									

✻5. The bank is not reset by the user reset function or saved by the user save function.
✻6. Eco LO is supported for Amplifier Units manufactured in July 2014 or later.
✻7. When the number of connected units is 11 or more, the ambient temperature is less than 50°C.

Analog output models/ Model for Sensor Communications Unit

Item		Type	Analog output models	Model for Sensor Communications Unit		
		NPN output	E3NX-FA11AN	E3NX-FA10	E3NX-FA0	E3NX-FAH0
		PNP output	E3NX-FA41AN	E3NX-FA40		
		Connecting method	Pre-wired	Connector for Sensor Communications Unit Pre-wired	Connector for Sensor Communications Unit	
Inputs/ outputs	Outputs		2 outputs	1 outputs	--- ✻1	
	External inputs		---	---		
Light source (wavelength)			Red, 4-element LED (625 nm)			Infrared LED (870nm)
Power supply voltage			10 to 30 VDC, including 10% ripple (p-p)	Supplied from the connector through the communication units.		
Power consumption ✻2			At Power supply voltage of 24 VDC Normal mode : 960 mW max. (Current consumption at 40 mA max.) Eco function ON: 770 mW max. (Current consumption at 32 mA max.) Eco function LO : 870 mW max. (Current consumption at 36 mA max.)	At Power supply voltage of 24 VDC Normal mode : 920 mW max. (Current consumption at 38 mA max.) Eco function ON: 680 mW max. (Current consumption at 26 mA max.) Eco function LO : 800 mW max. (Current consumption at 33 mA max.)		At Power supply voltage of 24 VDC Normal mode : 1,080 mW max. (Current consumption at 45 mA max.) Eco function ON: 920 mW max. (Current consumption at 38 mA max.) Eco function LO : 1,020 mW max. (Current consumption at 42 mA max.)
Control output			Load power supply voltage: 30 VDC max., open-collector output (depends on the NPN/PNP output format) Load current: Groups of 1 to 3 Amplifier Units: 100 mA max., Groups of 4 to 30 Amplifier Units:20 mA max. (Residual voltage: At load current of less than 10 mA: 1 V max. At load current of 10 to 100 mA: 2 V max.) OFF current: 0.1 mA max.		---	
Analog output (reference value)			Voltage output: 1-5 VDC (10 kΩ or more connected load), temperature characteristics: 0.3% F.S. / °C	---		
Indicators			7-segment displays (Sub digital display: green, Main digital display: white) Display direction: Switchable between normal and reversed. OUT indicator (orange), L/D indicator (orange), ST indicator (blue), DPC indicator (green), and OUT selection indicator (orange, only on models with 2 outputs)			
Protection circuits			Power supply reverse polarity protection, output short-circuit protection, and output reverse polarity protection		Power supply reverse polarity protection and output short-circuit protection	
Control output Response time	Super-high-speed mode (SHS)		Operate or reset: 80 µs	Operate or reset: 32 µs		
	High-speed mode (HS)		Operate or reset: 250µs	Operate or reset: 250 µs		
	Standard mode (Stnd)		Operate or reset: 1 ms	Operate or reset: 1 ms		
	Giga-power mode (GIGA)		Operate or reset: 16 ms	Operate or reset: 16 ms		
Sensitivity adjustment			Smart Tuning (2-point tuning, full auto tuning, position tuning, maximum sensitivity tuning, power tuning, percentage tuning (–99% to 99%)) or manual adjustment			
Maximum connectable Units			30	16	With E3NW-ECT: 30 units (When connected to an OMRON NJ-series Controller.) With E3NW-CRT: 16 units (Note: E3NX-FAH0 can not be connected.) With E3NW-CCL: 16 units	
No. of Units for mutual interference prevention ✻3	Super-high-speed mode (SHS)		0 (The mutual interference prevention function is disabled if the detection mode is set to super-high-speed mode.)			
	High-speed mode (HS)		10			
	Standard mode (Stnd)		10			
	Giga-power mode (GIGA)		10			

✻1. Two sensor outputs are allocated in the programmable logic controller PLC I/O table.
PLC operation via Communications Unit enables reading detected values and changing settings.

✻2. At Power supply voltage of 10 to 30 VDC
Analog output models:
Normal mode : 1,080 mW max. (Current consumption: 36 mA max. at 30 VDC, 75 mA max. at 10 VDC)
Eco function ON : 840 mW max. (Current consumption: 28 mA max. at 30 VDC, 55 mA max. at 10 VDC)
Eco function LO : 960 mW max. (Current consumption: 32 mA max. at 30 VDC, 65 mA max. at 10 VDC)

✻3. The tuning will not change the number of units.
The least unit count among the mutual interference prevention units of E3NX and E3NC.
Check the mutual interference prevention unit count and response speed of each model.

Item		Type	Analog output models	Model for Sensor Communications Unit		
		NPN output	E3NX-FA11AN	E3NX-FA10	E3NX-FA0	E3NX-FAH0
		PNP output	E3NX-FA41AN	E3NX-FA40		
		Connecting method	Pre-wired	Connector for Sensor Communications Unit Pre-wired	Connector for Sensor Communications Unit	
Functions	Automatic power control (APC)		Always enabled.			
	Dynamic power control (DPC)		Provided			
	Timer		Select from timer disabled, OFF-delay, ON-delay, one-shot, or ON-delay + OFF-delay timer: 1 to 9,999 ms			
	Zero reset		Negative values can be displayed. (Threshold value is shifted.)			
	Resetting settings ✻4		Select from initial reset (factory defaults) or user reset (saved settings).			
	Eco mode		Select from OFF (digital display lit), Eco ON (digital display not lit), and Eco LO (digital display dimmed).			
	Bank switching		Select from banks 1 to 4.			
	Sensor OFF setting		---		Select from ON or OFF.	---
	Power tuning		Select from ON or OFF.			
	Output 1		Select from normal detection mode, area detection mode or differential detection mode (E3NX-FA10/40 only).			
	Output 2		Select from Analog scaling or Analog offset.	---	Select from normal detection mode, alarm output mode, error output mode or differential detection mode (E3NX-FA0 only).	
	Hysteresis width		Select from standard setting or user setting. For a user setting, the hysteresis width can be set from 0 to 9,999.			
Ambient illumination (Receiver side)			Incandescent lamp: 20,000 lx max., Sunlight: 30,000 lx max.			
Ambient temperature range ✻5			Operating: Groups of 1 or 2 Amplifier Units: -25 to 55°C, Groups of 3 to 10 Amplifier Units: -25 to 50°C, Groups of 11 to 16 Amplifier Units: -25 to 45°C, Groups of 17 to 30 Amplifier Units: -25 to 40°C Storage: -30 to 70°C (with no icing or condensation)	Operating: Groups of 1 or 2 Amplifier Units: 0 to 55°C, Groups of 3 to 10 Amplifier Units: 0 to 50°C, Groups of 11 to 16 Amplifier Units: 0 to 45°C Storage: -30 to 70°C (with no icing or condensation)	Operating: Groups of 1 or 2 Amplifier Units: 0 to 55°C, Groups of 3 to 10 Amplifier Units: 0 to 50°C, Groups of 11 to 16 Amplifier Units: 0 to 45°C, Groups of 17 to 30 Amplifier Units: 0 to 40°C Storage: –30 to 70°C (with no icing or condensation)	
Ambient humidity range			Operating and storage: 35 to 85% (with no condensation) within the surrounding air temperature range shown above			
Altitude			2,000 m max.			
Installation environment			Pollution degree 3			
Insulation resistance			20 MΩ min. (at 500 VDC)			
Dielectric strength			1,000 VAC at 50/60 Hz for 1 min			
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	150 m/s^2 for 3 times each in X, Y, and Z directions		
Weight (packed state/Sensor only)			Approx. 115 g/approx. 75 g	Approx. 95 g/approx. 45 g	Approx. 65 g/approx. 25 g	Approx. 65 g/approx. 25 g
Materials	Case		Polycarbonate (PC)			
	Cover		Polycarbonate (PC)			
	Cable		PVC			
Accessories			Instruction Manual			

✻4. The bank is not reset by the user reset function or saved by the user save function.
✻5. When the number of connected units is 11 or more, the ambient temperature is less than 50°C.