

### Amplifiers With Digital Display Offer Remote Teaching and Easy-to-Repeat Settings

- Large, easy-to-read digital display enables easy setting and real-time monitoring
- Three “Fiber Network Communications Units” enable some E3X-DA models to be used in industrial network communications such as the DeviceNet, CompoBus/S and RS-422
- Wire-saving models have a unique connector design that allows up to 16 amplifiers to be connected
- Hand-held programmer offers “copy and paste” function for easy setting
- Auto Power Control circuit enhances stable detection by maintaining the LED’s light intensity level throughout the sensor’s life
- Dual analog-digital output models and models with two independent digital outputs increase application flexibility
- Available with red, green, blue or infrared light source

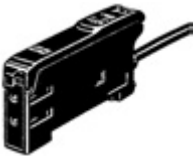
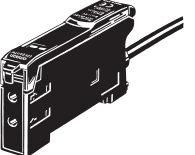
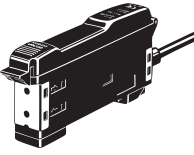


### Ordering Information:




#### Important note for ordering:

Choose normally stocked products whenever possible to ensure availability that matches your schedule. Normally stocked items are shown as shaded in the Ordering Information tables. Non-stocked items are available but are subject to longer lead times. For the most up-to-date information on stock status, contact your Omron representative.


#### ■ Amplifier Units With 2 Meter Cables

Item	Appearance	Output	Part Number		
			NPN output	PNP output	
Standard models		ON/OFF	<b>E3X-DA11-N</b>	<b>E3X-DA41-N</b>	
Dual analog/digital output models		ON/OFF, Analog	<b>E3X-DA21-N</b>	<b>E3X-DA51-N</b>	
Mark-detecting models		Blue LED	ON/OFF	<b>E3X-DAB11-N</b>	<b>E3X-DAB41-N</b>
		Green LED		<b>E3X-DAG11-N</b>	<b>E3X-DAG41-N</b>
Infrared models		<b>E3X-DAH11-N</b>	<b>E3X-DAH41-N</b>		
Two independent output models			<b>E3X-DA11TW</b>	<b>E3X-DA41TW</b>	
Water-resistant models			<b>E3X-DA11V</b>	<b>E3X-DA41V</b>	

## ■ Wire-saving Amplifier Units

Item		Appearance	Output	Part number				
				NPN output	PNP output	Applicable Connector (order separately)		
Standard models			ON/OFF	E3X-DA6	E3X-DA8	Master	E3X-CN11	
						Slave	E3X-CN12	
						Cordless	E3X-CN02	
Dual analog/digital output models				ON/OFF, Analog	E3X-DA7	E3X-DA9	Master	E3X-CN21
							Slave	E3X-CN22
Mark-detecting models	Blue LED			ON/OFF	E3X-DAB6	E3X-DAB8	Master	E3X-CN11
							Slave	E3X-CN12
							Cordless	E3X-CN02
	Green LED			ON/OFF	E3X-DAG6	E3X-DAG8	Master	E3X-CN11
							Slave	E3X-CN12
		Cordless					E3X-CN02	
Infrared models				ON/OFF	E3X-DAH6	E3X-DAH8	Master	E3X-CN11
			Slave				E3X-CN12	
Two independent output models			ON/OFF	E3X-DA6TW	E3X-DA8TW	Master	E3X-CN21	
						Slave	E3X-CN22	
						Cordless	E3X-CN02	
Incident light level monitoring model			ON/OFF	E3X-DA6-P	—	Master	E3X-CN11	
						Slave	E3X-CN12	
						Cordless	E3X-CN02	

## ■ Amplifier Units with M8 Connectors


Item	Appearance	Output	Part number		
			NPN output	PNP output	Applicable connector (order separately)
Standard models		ON/OFF	E3X-DA14V	E3X-DA44V	XS3F-M421-40□-A
					XS3F-M422-40□-A
					XS3W-M421-402-R

## ■ Fiber Amplifiers for DeviceNet, CompoBus/S, and RS-422 Network Communications

Type	Appearance	Output	Applicable network communications	Fiber Network Communication Unit (Order Separately) (See note 2)	Slave Connector for Fiber Amplifier Unit (See note 3)	Part number	
						NPN	PNP
Wire-saving standard models		ON/OFF	DeviceNet	E3X-DRT21	E3X-CN02	E3X-DA6 (See note 1)	E3X-DA8 (See note 1)
CompoBus/S			E3X-SRT21				
RS-422			E3X-CIF11				
Wire-saving Blue LED models			DeviceNet	E3X-DRT21	E3X-CN02	E3X-DAB6	E3X-DAB8
CompoBus/S			E3X-SRT21				
RS-422			E3X-CIF11				
Wire-saving Green LED models			DeviceNet	E3X-DRT21	E3X-CN02	E3X-DAG6	E3X-DAG8
CompoBus/S			E3X-SRT21				
RS-422			E3X-CIF11				
Light incident level monitoring model	DeviceNet	E3X-DRT21	E3X-CN02	E3X-DA6-P	—		
CompoBus/S	E3X-SRT21						
RS-422	E3X-CIF11						
Two independent output models			DeviceNet	E3X-DRT21	E3X-CN02	E3X-DA6TW	E3X-DA8TW
CompoBus/S			E3X-SRT21				
RS-422			E3X-CIF11				



- Note:**
1. Amplifiers that were manufactured before June 18, 2001 cannot be implemented on DeviceNet, CompoBus/S, and RS-422 network communications.
  2. The E3X-DAN must be attached to the corresponding communication unit, according to the table above, in order for it to be used in DeviceNet, CompoBus/S or RS-422 network communications. Refer to Fiber Network Communications Units data sheet (Cat no. E323-E1-1) for details.
  3. Fiber Amplifier units for Network Communications must be used with slave connectors.

## ■ Terminal Block Amplifier for DeviceNet, CompoBus/S, and RS-422 Network Communications

Type	Appearance	Applicable network communications	Communication Unit (order separately)	Slave Connector for Fiber Amplifier Unit	Part number
Terminal block (See note)		DeviceNet	E3X-DRT21	E3X-CN02	E39-TM1
CompoBus/S		E3X-SRT21			
RS-422		E3X-CIF11			




- Note:** This unit allows one input from a micro-switch, limit switch or other type of sensor. Connect this unit as far from the Fiber Network Communication Unit as possible.

### ■ Connectors (Order Separately)






Item	Appearance	Cable length	No. of conductors	Part number	
Master Connector for wire-saving amplifier units		2 m	3	E3X-CN11	
			4	E3X-CN21	
Slave Connector for wire-saving amplifier units		2 m	1	E3X-CN12	
			2	E3X-CN22	
Slave Connector for fiber network communications amplifiers	1-wire cord	—	2 m	1	E3X-CN12
	Cordless	—	—	—	E3X-CN02

**Note:** Stickers for Connectors are included as accessories.

### ■ M8 Connectors (Order Separately)

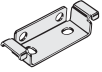
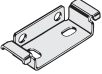
Size	Appearance	Number of conductors	Cable length	Part number
Straight connector, single ended		4	2 m (6.56 ft.)	XS3F-M421-402-A
			5 m (16.41 ft.)	XS3F-M421-405-A
Right angle, single headed connector		4	2 m (6.56 ft.)	XS3F-M422-402-A
			5 m (16.41 ft.)	XS3F-M422-405-A
Straight connector, double ended		4	2 m (6.56 ft.)	XS3W-M421-402-R

### ■ Remote Control Programmer (Order Separately)


Type	Appearance	Part number
Optical communication head, programmer, cable, AC adapter  Power supply method: Chargeable battery		E3X-MC11
Programmer		E3X-MC11-C1
Optical communication head		E3X-MC11-H1
Cable (1.5 m)		E39-Z12-1
Cable (5.0 m)		E39-Z12-2

## ■ Accessories (Order Separately)

### Mounting Brackets

Appearance	Applicable model	Part number	Quantity
	E3X-DA□-N E3X-DA□	E39-L143	1
	E3X-DA□V	E39-L148	1

### End Plate

Appearance	Part number	Quantity
	PFP-M	1

### Operating Instructions Sticker

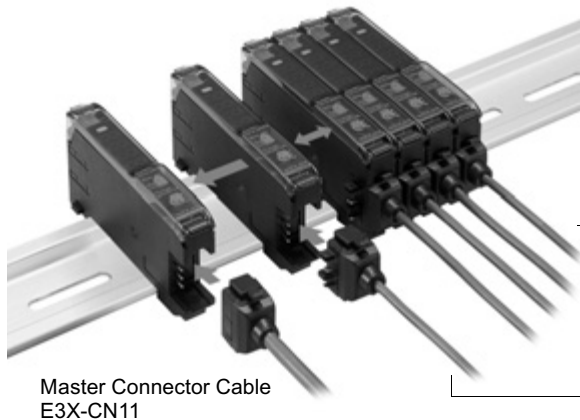
Part number	Remarks
E39-Y1	Attach near the sensor.

## ■ Combining Multiple Wire-saving Amplifiers and Connector Cables

When combining wire-saving amplifiers, the amplifiers that are connected together must all have the same part number. Only one master connector is required. The master connector cable distributes power to all the “ganged” wire-saving amplifiers. The rest of the wire-saving amplifiers require slave connector cables; slave connector cables handle output signal transmission only.

Example: Requirements for combining 6 E3X-DA6 amplifiers together:

- 1 master connector cable
- 5 slave connector cables
- 6 E3X-DA6 amplifiers



Slave Connector Cable  
E3X-CN12

Master Connector Cable  
E3X-CN11

# Specifications: Amplifier Units

## ■ Amplifier Units with Cables

Item		Standard models	Analog-output models	Mark-detecting models		Infrared models	Water-resistant models	Two independent output models	
Output type	NPN	E3X-DA11-N	E3X-DA21-N	E3X-DAB11-N	E3X-DAG11-N	E3X-DAH11-N	E3X-DA11V	E3X-DA11TW	
	PNP	E3X-DA41-N	E3X-DA51-N	E3X-DAB41-N	E3X-DAG41-N	E3X-DAH41-N	E3X-DA41V	E3X-DA41TW	
Light source (wavelength)		Red LED (660 nm)		Blue LED (470 nm)	Green LED (525 nm)	Infrared LED (870 nm)	Red LED (660 nm)		
Supply voltage		12 to 24 VDC $\pm$ 10%, ripple (p-p) 10% max.							
Power consumption	Normal	960 mW max. (current consumption: 40 mA max. at power supply voltage of 24 VDC)							
	Economy	720 mW max. (current consumption: 30 mA max. at power supply voltage of 24 VDC)							
	Digital display not lit	600 mW max. (current consumption: 25 mA max. at power supply voltage of 24 VDC)							
Control output	ON/OFF	NPN/PNP (depends on model) open collector; load current: 50 mA max.; residual voltage: 1 V max.; Light ON/Dark ON mode selector							
	Analog	---	Load 1 to 5 VDC, 10 k $\Omega$ min.	---					
Circuit protection		Reverse polarity, output short-circuit, mutual interference prevention (supported for up to 10 Units)							
Response time	High speed	250 $\mu$ s for operation and reset						0.5 ms for operation and reset	
	Standard	1 ms for operation and reset						2 ms for operation and reset	
	Long distance	4 ms for operation and reset						7 ms for operation and reset	
Sensitivity setting		Teaching or manual method							
Functions	Timer function	OFF-delay timer: 0 to 200 ms, 1 to 20 ms (set in 1 ms increments); 20 to 200 ms (set in 5 ms increments)							
	Automatic power control (APC)	Fiber-optic current digital control				---			Fiber-optic current digital control
	Zero-reset	Display can be reset to zero when required (negative values can be displayed).							
	Initial reset	Settings can be returned to defaults as required.							
	Monitor focus	---	Upper and lower limits can be set as required for every 100 digital values.		---				
Display		Operation indicator (orange), 7-segment digital incident level display (red), 7-segment digital incident level percentage display (red), threshold and excess gain 2-color indication bar (green and red), 7-segment digital threshold display (red)							
Display timing		Normal/peak-hold/bottom-hold program selectable							
Display orientation		Normal/reverse program selectable							
Optical axis adjustment		Optical axis adjustment possible (flashing function)							
Ambient illumination (receiver side)		Incandescent lamp: 10,000 lux max. Sunlight: 20,000 lux max.							
Ambient temperature	Operating	1 to 3 Amplifiers: $-25^{\circ}\text{C}$ to $55^{\circ}\text{C}$ ( $-13^{\circ}\text{F}$ to $131^{\circ}\text{F}$ ) 4 to 11 Amplifiers: $-25^{\circ}\text{C}$ to $50^{\circ}\text{C}$ ( $-13^{\circ}\text{F}$ to $122^{\circ}\text{F}$ ) 12 to 16 Amplifiers: $-25^{\circ}\text{C}$ to $45^{\circ}\text{C}$ ( $-13^{\circ}\text{F}$ to $113^{\circ}\text{F}$ ) (with no icing or condensation)							
	Storage	$-30^{\circ}\text{C}$ to $70^{\circ}\text{C}$ ( $-22^{\circ}\text{F}$ to $158^{\circ}\text{F}$ ) with no icing or condensation							
Ambient humidity		Operating and storage: 35% to 85% (with no condensation)							
Insulation resistance		20 M $\Omega$ min. (at 500 VDC)							
Dielectric strength (destruction)		1,000 VAC at 50/60 Hz for 1 minute							

Item		Standard models	Analog-output models	Mark-detecting models		Infrared models	Water-resistant models	Two independent output models	
Output type	NPN	E3X-DA11-N	E3X-DA21-N	E3X-DAB11-N	E3X-DAG11-N	E3X-DAH11-N	E3X-DA11V	E3X-DA11TW	
	PNP	E3X-DA41-N	E3X-DA51-N	E3X-DAB41-N	E3X-DAG41-N	E3X-DAH41-N	E3X-DA41V	E3X-DA41TW	
Vibration resistance (destruction)		10 to 55 Hz with a 1.5-mm double amplitude for 2 hrs 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							
Enclosure rating		IEC 60529 IP50 (with Protective Cover attached)					IEC 60529 IP66 (with Protective Cover attached)	IEC 60529 IP50 (with Protective Cover attached)	
Connection method		Pre-wired standard cable length: 2 m (6.56 ft.)							
Weight (packed)		Approx. 100 g					Approx. 110 g	Approx. 100 g	
Material	Case	Polybutylene terephthalate (PBT)							
	Cover	Polycarbonate					Polyethersulfone	Polycarbonate	

### ■ Amplifier Units with Connectors

Specifications for Amplifier Units with Connectors are similar to those for the amplifiers units with 2 meter cables

Item		Standard models	Analog output models	Mark-detecting models		Infrared models	Water-resistant models (See note.)	Two independent output models	
Output type	NPN	E3X-DA6(P)	E3X-DA7	E3X-DAB6	E3X-DAG6	E3X-DAH6	E3X-DA14V	E3X-DA6TW	
	PNP	E3X-DA8	E3X-DA9	E3X-DAB8	E3X-DAG8	E3X-DAH8	E3X-DA44V	E3X-DA8TW	
Connection method		Standard connector cable					M8 connector	Standard connector cable	
Weight (packed)		Approx. 55 g					Approx. 65 g	Approx. 55 g	

**Note:** The dielectric strength for water-resistant models is 500 VAC at 50/60 Hz for 1 minute.

### ■ E39-TM1 Specifications

Item		E39-TM1
Supply voltage (See note 1)		12 to 24 VDC ±10%, ripple (p-p) 10% max.
Sensor power supply		11 to 23 VDC (supply voltage -1 VDC)
Current consumption		40 mA max. + sensor current consumption (total: 100 mA max.)
Response time		1.2 ms max.
Number of inputs		1 point
Input signals		NPN/PNP, no voltage input (Contact and non-contact), Switch selectable
Input operating configuration		N.O./N.C., switch selectable
Indicators		Input signal display (orange)
Ambient Temperature (See note 2)	Operating	1 to 3 units: -25°C to 55°C (-13°F to 131°F) 4 to 8 units: -25°C to 45°C (-13°F to 113°F) 9 to 16 units: -25°C to 40°C (-13°F to 104°F) No icing or condensation
	Storage	-30°C to 70°C (-22°F to 158°F)

## ■ Connectors for Wiring-saving Amplifier Units

Item	E3X-CN11/21/22	E3X-CN12	E3X-CN02
Rated current	2.5 A		
Rated voltage	50 V		
Contact resistance	20 mΩ max. (20 mVDC max., 100 mA max.) (See note 1.)		
No. of insertions	50 times (See note 2.)		
Material	Housing	Polybutylene terephthalate (PBT)	
	Contacts	Phosphor bronze/gold-plated nickel	
Weight (packed)	Approx. 55 g	Approx. 25 g	

- Note:**
1. The specified value for the contact resistance pertains to the contact resistance between the connector and the amplifier unit, and the Connector and other neighboring connectors. It does not include the conductor resistance of the cable.
  2. The specified value represents the number of insertions into the amplifier unit, and the adjacent connector.

## ■ M8 Connectors

Item	XS3F-M4□□-□□□-A
Current rating	1A
Voltage rating	125 VDC
Contact resistance	40 mΩ max. 20 mVDC max., 100 mA max.
Insulation resistance	1000 mΩ max. 500 mVDC
Dielectric strength	1000 VAC for 1 minute, Leakage current: 1 mA max.
Enclosure rating	IEC IP67
Insertion tolerance	200 times minimum
Tensile strength	50 N (5.1 kgf/15 sec.)
Ambient operating temperature	-25°C to 70°C (-13°F to 158°F)

## ■ Mobile Console

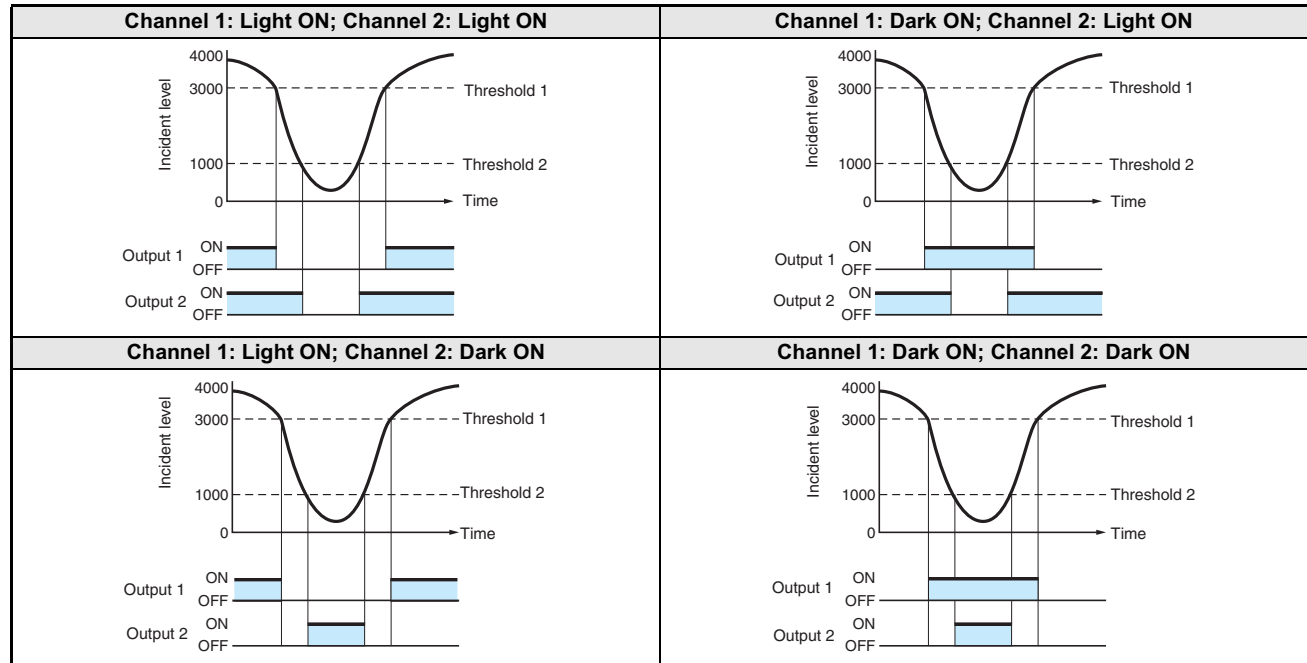
Item	E3X-MC11
Supply voltage	Charged with AC adapter
Connection method	Connected via adapter
Weight (packed)	Approx. 580 g (Console only: 120 g)



# Technical Reference (for E3X-DA-TW With Two Independent Outputs)

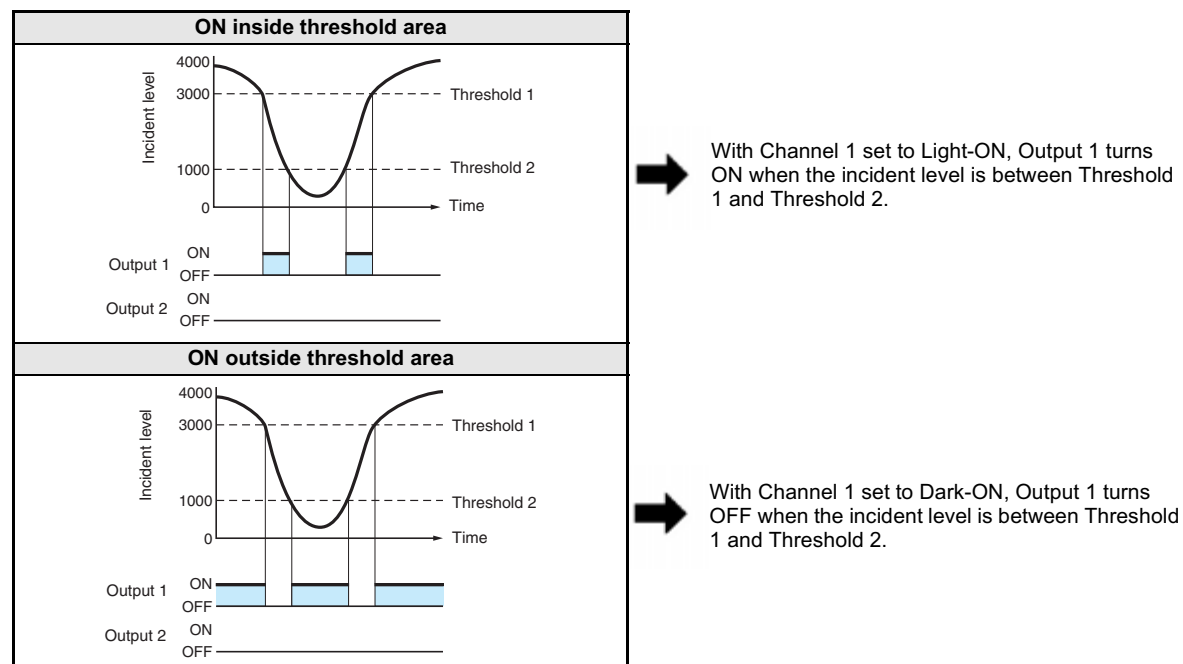
## Output Patterns for Normal Operation

The E3X-DA-TW's two independently configurable outputs enable customers to solve applications that historically required two sensors with just one sensor. In addition to being able to independently configure the two outputs, customers can also separately select either Light-ON or Dark-ON mode in channels 1 and 2, bringing the possible output patterns to four. With the four output patterns, customers are able to further increase their application's flexibility. The following examples illustrate some of the output patterns that can be attained with the E3X-DA-TW models. Threshold 1 is set to 3,000 and threshold 2 is set to 1,000.



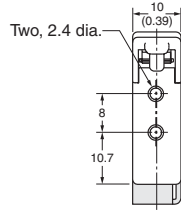
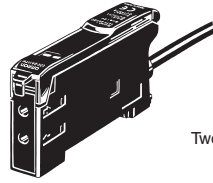
## Output Patterns for Area Sensing

The multiple output patterns can also be used to set a "sensing area". With the multiple output patterns, users are able to monitor whether the incident level is inside or outside the threshold area. The output patterns below illustrate how a "sensing area" can be established.

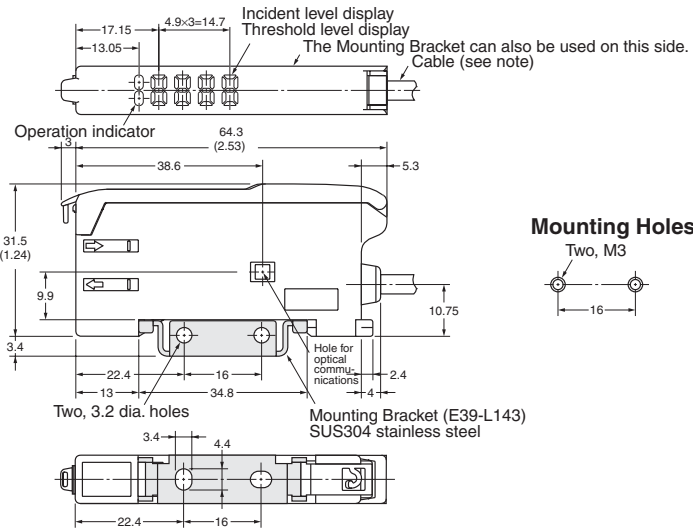


**Note:** Output 2 is always OFF.

## Amplifier Units with Cables, Twin-output Models

E3X-DA11TW  
E3X-DA41TW

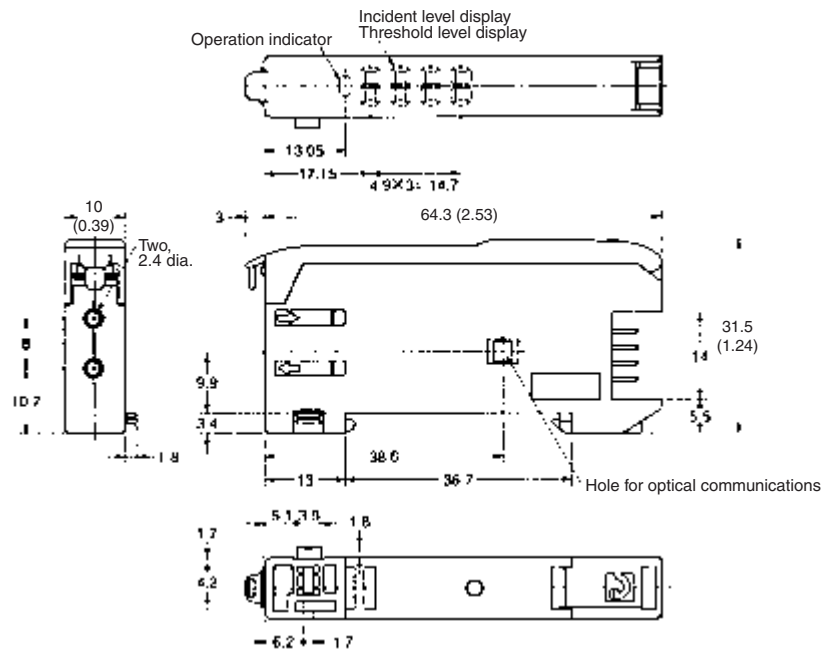
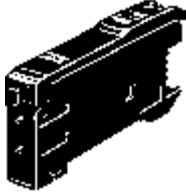
## With Mounting Bracket Attached



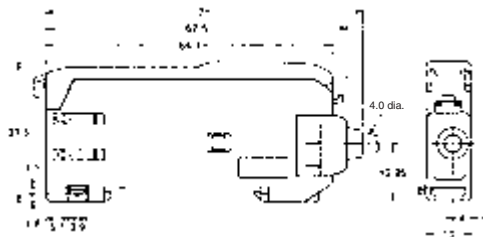
Note: A 4-dia., 4-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.2 mm<sup>2</sup>; insulation diameter: 1.1 mm) is used.

## Amplifier Units with Standard Connectors

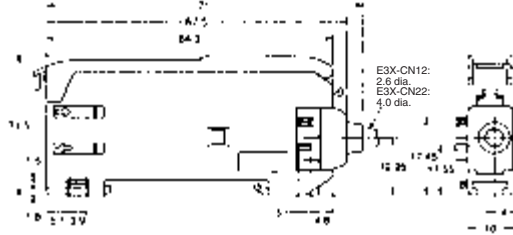
E3X-DA6	E3X-DAG6
E3X-DA6P	E3X-DAH6
E3X-DA7	E3X-DA8
E3X-DAB8	E3X-DAG8
E3X-DA9	E3X-DAH8
E3X-DAB6	



## Dimensions with Master Connector Connected



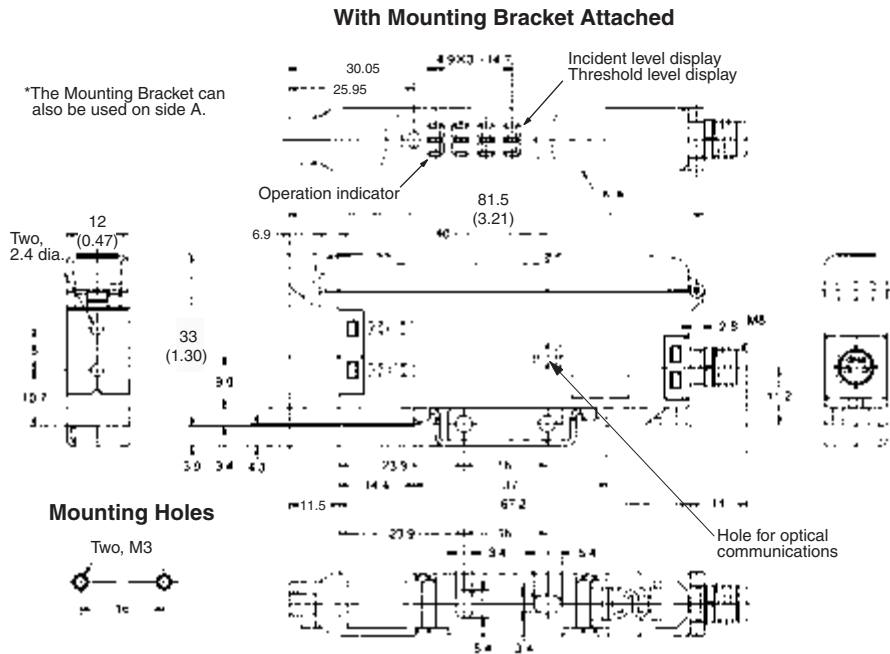
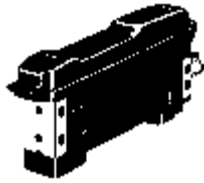
## Dimensions with Slave Connector Connected



Unit: mm (inch)

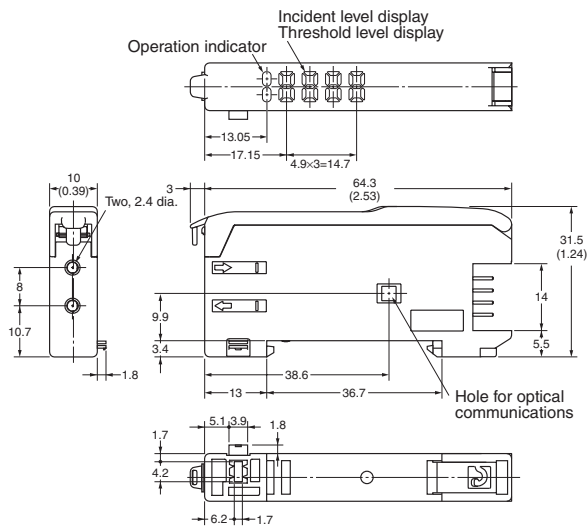
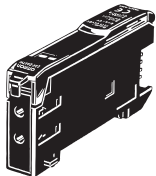
**Amplifier Units with M8 Connectors, Water-resistant Models**

**E3X-DA14V  
E3X-DA44V**

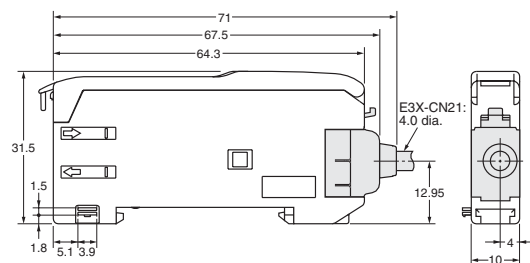


**Amplifier Units with Standard Connectors, Twin-output Models**

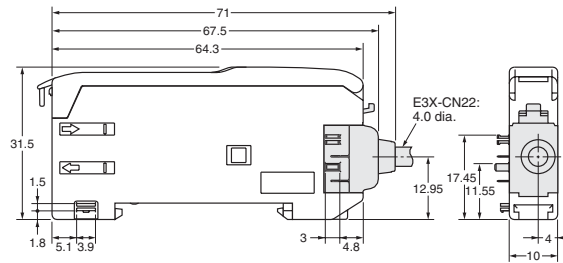
**E3X-DA6TW  
E3X-DA8TW**



**Dimensions with Master Connector Connected**

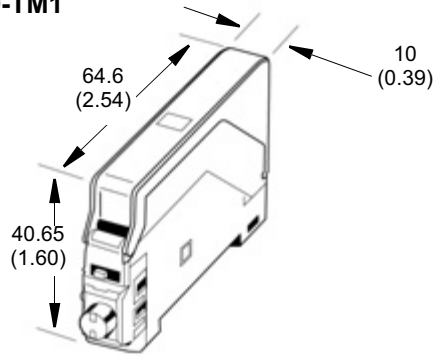


**Dimensions with Slave Connector Connected**



## ■ Terminal Block

### E39-TM1

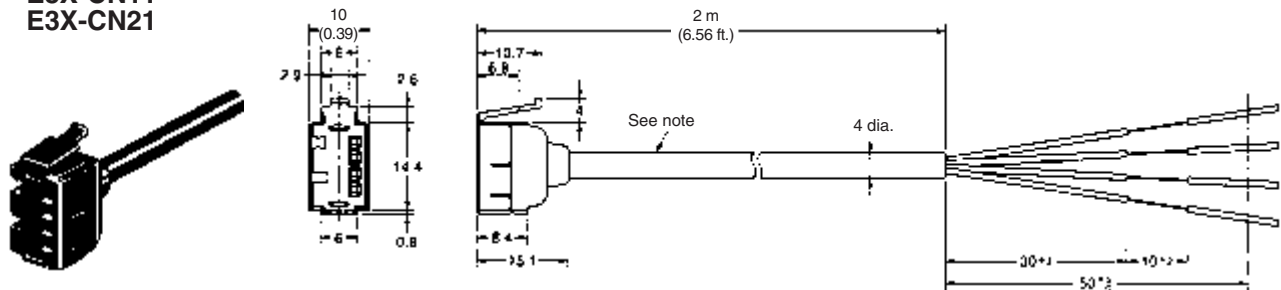


## ■ Wire-Saving Connector Cord Sets

### Master Connectors

#### E3X-CN11

#### E3X-CN21



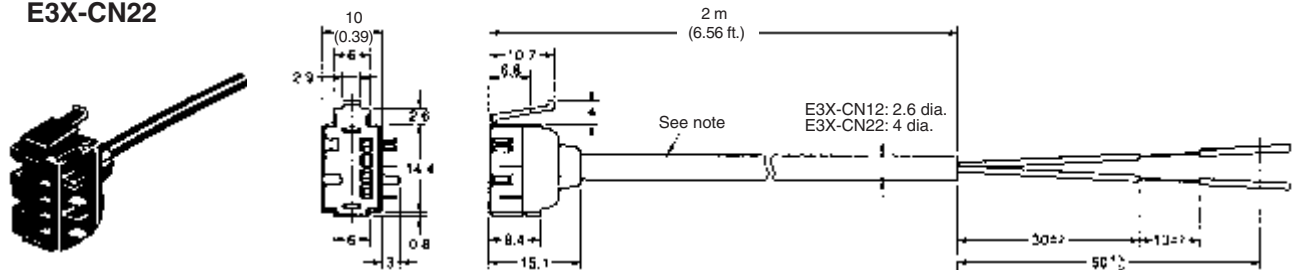
**Note:** E3X-CN11: A 4-dia., 3-conductor, vinyl-insulated round cable (conductor cross-sectional area:  $0.2 \text{ mm}^2$ ; insulation diameter: 1.1 mm) is used.

E3X-CN21: A 4-dia., 4-conductor, vinyl-insulated round cable (conductor cross-sectional area:  $0.2 \text{ mm}^2$ ; insulation diameter: 1.1 mm) is used.

### Slave Connectors

#### E3X-CN12

#### E3X-CN22

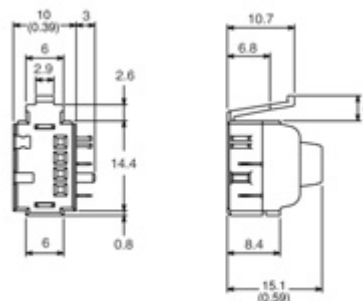


**Note:** E3X-CN12: A 2.6-dia., single-conductor, vinyl-insulated round cable (conductor cross-sectional area:  $0.2 \text{ mm}^2$ ; insulation diameter: 1.1 mm) is used.

E3X-CN22: A 4-dia., 2-conductor, vinyl-insulated round cable (conductor cross-sectional area:  $0.2 \text{ mm}^2$ ; insulation diameter: 1.1 mm) is used.

### Cordless Slave Connector

#### E3X-CN02



**Note:** For information on use of the E3X-CN02, refer to the Fiber Amplifiers for DeviceNet, CompuBus/S and RS-422 Network Communications table on page 3 of this data sheet.

# Precautions

## ■ Avoid damage to the E3X-DA-N

- Voltage must not exceed the rated voltage of the E3X-DA-N.
- When supplying power to the E3X-DA-N, make sure that the polarity of the power is correct.
- Do not short-circuit the load connected to the E3X-DA-N.
- Do not impose 100 VAC or more on models that operate with DC.
- Do not use the E3X-DA-N in environments where flammable or explosive gas exists.
- Do not disassemble, repair or modify the E3X-DA-N.
- The E3X-DA-N has an enclosure rating of IP50; do not immerse in water.
- Load must be connected to the E3X-DA-N.

## ■ Installation

### Power Reset Time

- The E3X-DA-N is ready to sense objects 200 ms after the power supply is turned on.
- If power is supplied to the E3X-DA-N and the load independently, make sure to turn ON the E3X-DA-N first.
- When the E3X-DA-N is turned ON or OFF, the operation indicator will be illuminated for an instant, but no control output will be turned ON.

### Power Supply

- Do not connect the E3X-DA-N to a full-wave or half-wave rectified power supply.
- When a standard switching power supply is used, the frame ground (FG) and the ground (G) terminal must be grounded. Otherwise, the E3X-DA-N may experience noise problem.

## ■ Wiring

### Cable

- The cable can be extended up to 100 m provided the wire thickness is at least 0.3 mm<sup>2</sup>.
- Do not pull cables with pulling force exceeding 50N.

### Avoid Damage or Malfunction Due to Induction Noise

- Never run the E3X-DA-N cables in the same conduit with power lines or high tension cables.

## ■ Adjustment

### Mutual Interference Protection Function

There may be some instability in the digital display values due to light from other sensors. If this occurs, increase the sensitivity (i.e., decrease the threshold) to perform stable detection.

### EEPROM Writing Error

If the data is not written to the EEPROM correctly due to a power failure during teaching or static-electric noise, repeat the whole teaching procedure.

### Optical Communications

Several Amplifier Units can be slid together and used in groups. Do not, however, slide the Amplifier Units or attempt to remove any of the Amplifier Units during operation.

### Hysteresis Adjustment

The hysteresis setting can be adjusted using the Remote Control Programmer. Do not, however, set the hysteresis to a value lower than the factory setting. Using a setting less than the factory setting may result in incorrect operation.

## ■ Typical Values

Minimum sensing object and characteristic data values are typical values checked on actual products selected at random. None of these values represent a guaranteed rating or performance value.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters into inches, divide by 25.4

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