

Digital Fiber Amplifier

E3X-DA-N

*Truly ultimate fiber amplifier
in pursuit of "user friendliness"
and "high performance"*



* UL-listed including UL991 tests/evaluations for applications: UL991, SEMI S2-0200 Applicable standard: UL3121-1 Standards for additional tests/evaluations

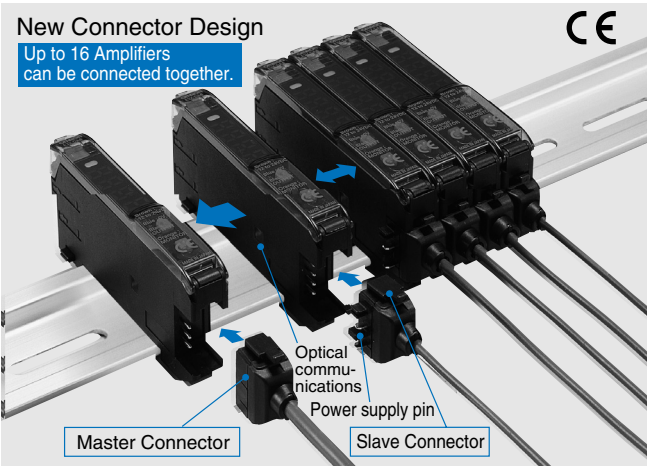
Features

Reducing power line wiring meaning space is saved. New design for easier maintenance.

Industry First Patent pending

The connector type that uses the wire-saving connector supplies power to the single-conductor slave connectors via the three-conductor master connector. Hence, the following three has been made possible.

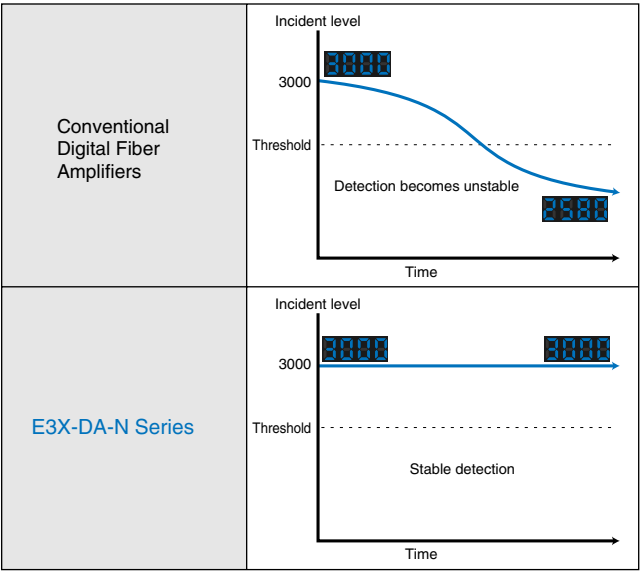
- 1. Wiring is much simpler.
- 2. Relay connectors are not required meaning that space is used more efficiently and costs are reduced.
- 3. Simple inventory control because of no differentiation between master and slave in the amplifier section.



Super digital display by use of the Auto Power Control (APC) circuit

Industry First

The incident level of LEDs used in sensors is prone to deteriorate with time and as a result, detection becomes unstable. Using the APC (auto power control) circuit for the first time as the fiber sensor, the E3X-DA-N series has no digital value variations, realizing severe detection. This makes the E3X-DA-N ideal for applications where a high degree of sensitivity is required, such as detecting crystal glass.



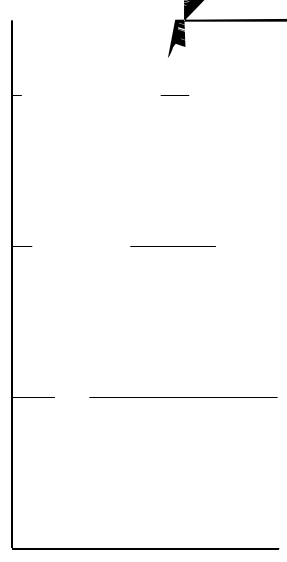
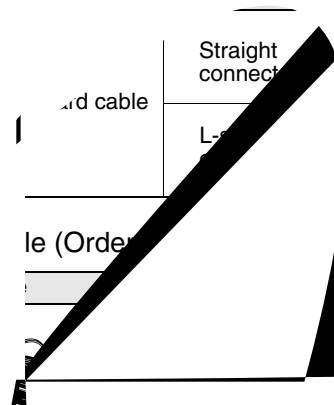
If the amplifier being operated is away from the sensor head, the sensor head can be flashed or the amplifier channel can be displayed.

JA41TW

	Model	
	NPN output	PNP output
Output type	E3X-DA6	E3X-DA8
	E3X-DA7	E3X-DA9
	E3X-DAB6	E3X-DAB8
	E3X-DAG6	E3X-DAG8

Infrared models	Master	E3'
	Slave	
Differential output type	Master	
	S'	
XS3F-M421-40#-A XS3F-M422-40#-A		
	Master	E3X-CN21
	Slave	E3X-CN22

E3X-DA14V	E3X-DA44V
E3X-DA6TW	E3X-DA8TW



Rating/Performance

Amplifier units

Prewired

Type		Standard models	Monitor-out-put models	Mark-detecting models		Infrared models	Water-resis- tant models	Twin-output models
Model	NPN output	E3X-DA11-N	E3X-DA21-N	E3X-DAB11-N	E3X-DAG11-N	E3X-DAH11-N	E3X-DA11V	E3X-DA11TW
	PNP output	E3X-DA41-N	E3X-DA51-N	E3X-DAB41-N	E3X-DAG41-N	E3X-DAH41-N	E3X-DA41V	E3X-DA41TW
Item								
Light source (wave length)		Red LED (660 nm)		Blue LED (470 nm)	Green LED (525 nm)	Infrared LED (870 nm)	Red LED (660 nm)	
Power supply voltage		12 to 24 VDC ±10%, ripple (p-p) : 10% max.						
Power consumption		Normal: Power consumption 960 mW max. (power consumption 40 mA max. at supply voltage 24 V) Eco mode: Power consumption 720 mW max. (power consumption 30 mA max. at supply voltage 24 V) Digital display OFF: Power consumption 600 mW max. (power consumption 25 mA max. at supply voltage 24 V)						
Con- trol output	ON/OFF output	Load current 50 mA (residual voltage NPN/PNP: 1 V max. each) Open collector output type (depends on the NPN/PNP output format) Light-ON/Dark-ON, switch selectable						
	Monitor output	---	1 to 5 VDC, load 10 k min.	---				
Protective circuits		Reverse polarity protection, output short-circuit protection, mutual interference prevention (possible for up to 10 amplifiers)						
Re- spons e time	Super-high-speed mode:	0.25 ms for operation and reset respectively						0.5 ms for operation and reset respectively
	Standard mode:	Operation/reset: 1 ms each						2 ms for operation and reset respectively
	Super-long-dis- tance mode:	4 ms for operation and reset respectively						7 ms for operation and reset respectively
Sensitivity setting		Teaching or manual method						
Func- tions	Timer functions	OFF delay 0 to 200 ms (1 to 20: 1 ms increments, 20 to 200 ms: 5 ms increments), when the Mobile Control is used, select either OFF delay, ON delay or one shot.						
	Automatic pow- er control (APC)	Fiber-optic current digital con- trol		---			Fiber-optic current digital control	
	Zero reset	Yes (negative indication possible)						
	Initial reset	Yes (setting conditions initialized)						
	Monitor focus	---	Upper and lower limit val- ues of output range can be set per digital value of 100	---				
Indicator lamp		Operation indicator (orange), 7-segment digital incident level display (red), 7-segment digital incident level percent display (red), incident level & threshold value double-bar display (green, red), 7-segment digital threshold value display (red)						
Display timing		Normal/peak hold/bottom hold selectable						
Display direction		Normal/reverse selectable						
Optical axis adjustment function		Yes (hyper flashing emission function)						
Ambient lighting		Incandescent lamp: 10,000 lux max. Sunlight 20,000 lux max.						
Ambient temperature		Operating: Groups of 1 to 3 amplifiers: -25 to +55°C, Groups of 4 to 11 amplifiers: -25 to +50°C, Groups of 12 to 16 amplifiers: -25 to +45°C Storage: -30 to +70°C (with no icing and condensation)						
Ambient humidity		Operating/Storage: 35% to 85% RH (with no condensation)						

Item	Model	Type	Standard models	Monitor-out-put models	Mark-detecting models		Infrared models	Water-resis- tant models	Twin-output models
		NPN output	E3X-DA11-N	E3X-DA21-N	E3X-DAB11-N	E3X-DAG11-N	E3X-DAH11-N	E3X-DA11V	E3X-DA11TW
		PNP output	E3X-DA41-N	E3X-DA51-N	E3X-DAB41-N	E3X-DAG41-N	E3X-DAH41-N	E3X-DA41V	E3X-DA41TW
Insulation resistance			20 M min. at 500 VDC						
Dielectric strength			1,000 VAC at 50/60 Hz for 1 minute						
Vibration resistance			10 to 55 Hz, 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						
Protective structure			IEC 60529 IP50 (with Protective Cover attached)					IEC 60529 IP66 (with protective cover at- tached)	IEC 60529 IP50 (with protective cover attached)
Connection method			Prewired models (standard length: 2 m)						
Weight (Packed state)			Approx. 100 g					Approx. 110 g	Approx. 100 g
Mate- rial	Case		PBT (polybutylene terephthalate)						
	Cover		Polycarbonate						Polyethersul- fone
Accessories			Instruction manual						

Connector type

Specifications that differ from those of the prewired type

Item	Type		Standard models	Monitor-out-put models	Mark-detecting models		Infrared models	Water-resis- tant models (See note.)	Twin-out-put models
	Model	NPN output	E3X-DA6	E3X-DA7	E3X-DAB6	E3X-DAG6	E3X-DAH6	E3X-DA14V	E3X-DA6TW
		PNP output	E3X-DA8	E3X-DA9	E3X-DAB8	E3X-DAG8	E3X-DAH8	E3X-DA44V	E3X-DA8TW
Connection method			Connector type					M8 connector	Connector
Weight (Packed state)			Approx. 55 g					65 g	Approx. 55 g

* For waterproof type only, voltage resistance is 500 VAC 50/60 Hz 1 min

Amplifier unit Connectors

Item	Model	E3X-CN11/21/22	E3X-CN12
Rated current		2.5 A	
Rated voltage		50 V	
Contact resistance		20 m Ω max. (20 mVDC max., 100 mA max.) [By connection with amplifier unit and connection with adjacent connector (except conductor resistance of cable)]	
No. of insertions		50 times (By connection with amplifier unit and connection with adjacent connector)	
Material	Housing	PBT (polybutylene terephthalate)	
	Contacts	Phosphor bronze/gold-plated nickel	
Weight (Packed state)		Approx. 55 g	Approx. 25 g

Mobile Console

Item	Model	E3X-MC11
Supply volt- age		Charged with AC adapter
Connection method		Connected via adapter
Weight (packed state)		Approx. 580 g (Console only: 120 g)
For details of the Mobile Console, refer to the instruction manual attached to the product.		

Digital Fiber Amplifier

* Differential output digital fiber amplifier (E3X-DA11D/E3X-DA6D)

Applicable fiber unit characteristic

(Through-beam model)

Sensitivity switching 11 steps can be set Fiber type	Sensing distance (mm) (Values in parentheses: When using the E39-F1 lens unit)						Standard object (mm) *1 Minimum sensing object *2 (Opaque object) default
	HIGH			LOW			
	1	2	3-11	1	2	3-11	
	270 or 570 s	0.5 or 1 ms	1 to 200 ms or 2 to 400 ms	270 or 570 s	0.5 or 1 ms	1 to 200 ms or 2 to 400 ms	
E32-ET11R	240 (1680)	280 (1960)	370 (2590)	140(980)	180(1260)	240 (1680)	1 mm dia. (0.01 mm dia.) (0.3 mm dia.)*3 (0.2 mm dia.)
E32-ET21R	50	60	80	30	40	50	
E32-T16WR	580	690	910	350	450	580	
E32-T16PR	380	450	600	230	290	380	

*1. The sensing object is operating.

*2. Value applied when the response time is set to 3-11. The value can be detected if the temperature varies within the operating ambient temperature. (Value when the sensing object is operating)

*3. The digital value is 1000 and the value can be detected in each detection area.

Refer to the E3X-DA-N for the note of the fiber unit.

(Reflective model)

Sensitivity switching 11 steps can be set Fiber type	Sensing distance (mm)*1						Standard object (mm) *2 Minimum sensing object *3 (Opaque object) de- fault
	HIGH			LOW			
	1	2	3-11	1	2	3-11	
	Re- sponse time	270 or 570 s	0.5 or 1 ms	1 to 200 ms or 2 to 400 ms	270 or 570 s	0.5 or 1 ms	
E32-ED11R	80	90	120	45	60	80	150 x 150 (0.01 mm dia.)
E32-ED21R	13	15	20	7	10	13	25 x 25 (0.01 mm dia.)

*1. Sensing distance indicates values for white paper.

*2. The sensing object is operating.

*3. Value applied when the response time is set to 3-11. The value can be detected if the temperature varies within the operating ambient temperature. (Value when the sensing object is operating)

Note: Refer to E3X-DA-N for the note of the fiber unit.

Differences from E3X-DA-N amplifier unit

Item		Differential output type (edge detection type)	
		Prewiring type	amplifier units with Connectors
		E3X-DA11D	E3X-DA6D
Power consumption		Power consumption 960 mW max. (at power supply voltage 24 V, power consumption 40 mA max.)	
Control output	ON/OFF output	Load current 50 mA (residual voltage NPN/PNP: 1 V max. each) Open collector output type L.ON (ON at edge detection)/D.ON (OFF at edge detection) switch selectable	
Detection mode		One-side edge detection mode/both-side edge detection mode	
Response time		One-side edge detection mode: 270/500 s/1/2/4/10/20/30/50/100/200 ms selectable Both-side edge detection mode: 570 s/1/2/4/10/20/30/50/100/200/400 ms selectable	
Functions	Timer function	OFF delay timer for L.ON ON delay timer for D.ON 0 to 5 s (1 to 20 ms: 1 ms increments, 20 to 20 ms: 5 ms increments, 200 ms to 1 s: 100 ms, 1 to 5 s: 1 s increments)	
	APC	Yes	
	Zero reset	Yes (negative indication)	
	Initial reset	Yes (setting conditions initialized)	
	Sensitivity switching	Yes (HIGH/LOW)	
	Teaching level	One-point teaching level 1 to 50% variable (1% increments)	
Indicator lamp		Operation indicator (orange), 7-segment incident level display (red), 7-segment digital edge detection level display (red)	

For the outline drawings and other details, refer to the instruction manuals attached to the products.

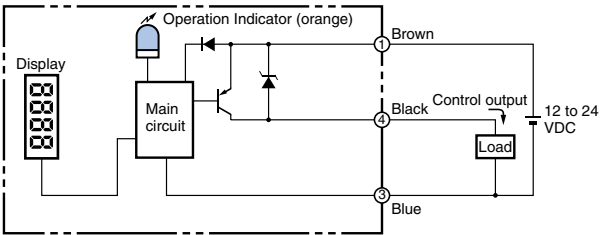
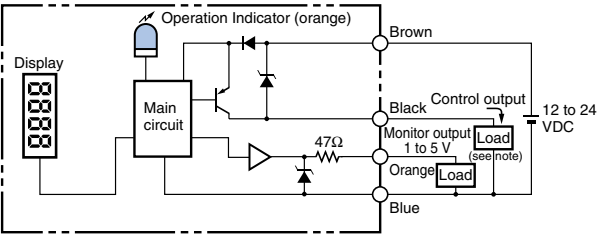
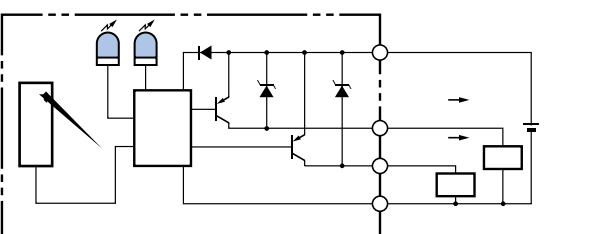
Output Circuit Diagram

NPN output

Model	Output transistor Status	Timing chart	Mode selection switch	Output circuit
E3X-DA11-N E3X-DAB11-N E3X-DAG11-N E3X-DAH11-N E3X-DA11V E3X-DA6 E3X-DAB6 E3X-DAG6 E3X-DAH6 E3X-DA14V	Light ON	Incident light	L ON (LIGHT ON)	Connector Pin Arrangement Note: Pin 2 is not used.
	Dark ON	Incident light	D ON (DARK ON)	
E3X-DA21-N E3X-DA7	Light ON	Incident light	L ON (LIGHT ON)	Note: Load resistance: 10Ωmin.
	Dark ON	Incident light	D ON (DARK ON)	
E3X-DA11TW E3X-DA6TW	Light ON	CH1/ Incident light	L ON (LIGHT ON)	
	Dark ON	CH1/ Incident light	D ON (DARK ON)	

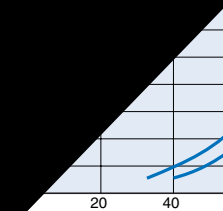
Note: With E3X-DA#TW models, only channel 1 is output when set for area sensing operation.
 L ON The range between the CH1 and CH2 thresholds turns ON
 D ON The range between the CH1 and CH2 thresholds turns OFF (CH2 is always OFF)

PNP output

Model	Output transistor Status	Timing chart	Mode selection switch	Output circuit
E3X-DA41-N E3X-DAB41-N E3X-DAG41-N E3X-DAH41-N E3X-DA41V E3X-DA8 E3X-DAB8 E3X-DAG8 E3X-DAH8 E3X-DA44V	Light ON	Incident light No incident light Operation Indicator (orange) OFF Output transistor ON Load (relay) Operate Release (Between blue and black)	L ON (LIGHT ON)	 Connector Pin Arrangement Note: Pin 2 is not used.
	Dark ON	Incident light No incident light Operation Indicator (orange) ON Output transistor OFF Load (relay) Operate Release (Between blue and black)	D ON (DARK ON)	
E3X-DA51-N E3X-DA9	Light ON	Incident light No incident light Operation Indicator (orange) OFF Output transistor ON Load (relay) Operate Release (Between blue and black)	L ON (LIGHT ON)	 Note: Load resistance: 10kΩmin.
	Dark ON	Incident light No incident light Operation Indicator (orange) ON Output transistor OFF Load (relay) Operate Release (Between blue and black)	D ON (DARK ON)	
E3X-DA41TW E3X-DA8TW	Light ON	CH1/ Incident light CH2/ Main incident light Operation Indicator (orange) OFF Output transistor ON Load (relay) Operate Release (Between blue and black)	L ON (LIGHT ON)	
	Dark ON		D ON (DARK ON)	

Note: With E3X-DA#TW models, only channel 1 is output when set for area sensing operation.
 L ON The range between the CH1 and CH2 thresholds turns ON
 D ON The range between the CH1 and CH2 thresholds turns OFF (CH2 is always OFF)

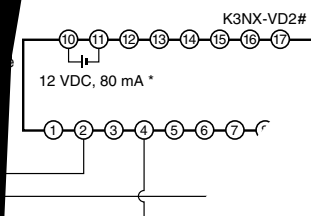
Connectors (Sensor I/O Connectors)



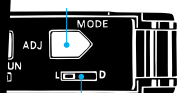
reflective mode
K3NX-VD200



K3NX-VD2#



Setting,



Operation Mode Selector
Use to switch between
Light ON and Dark ON modes.

SET,
mode.

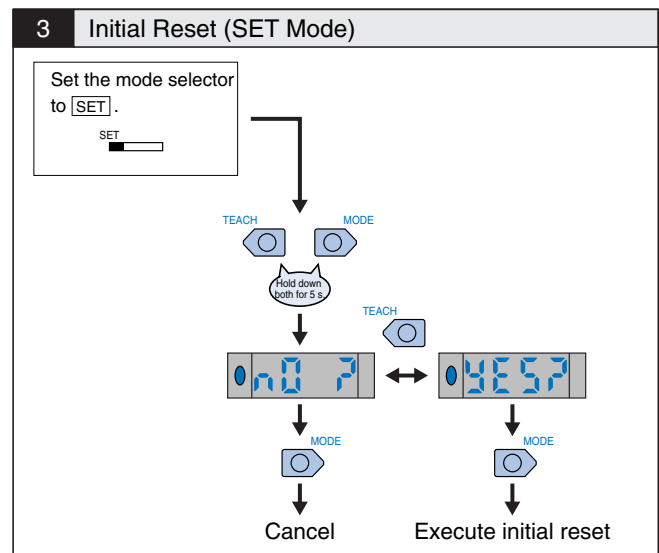
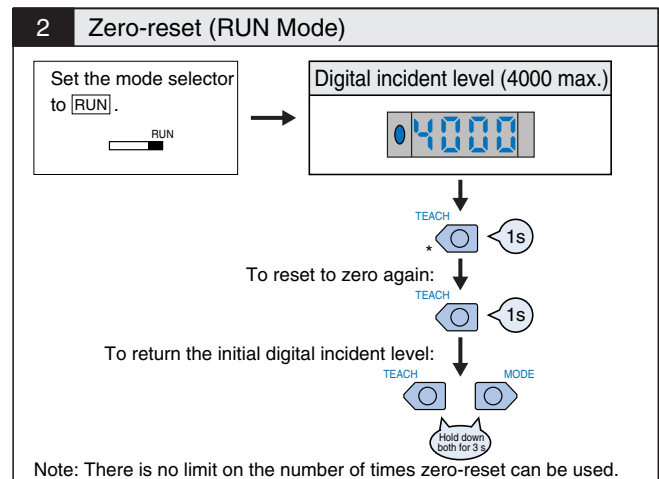
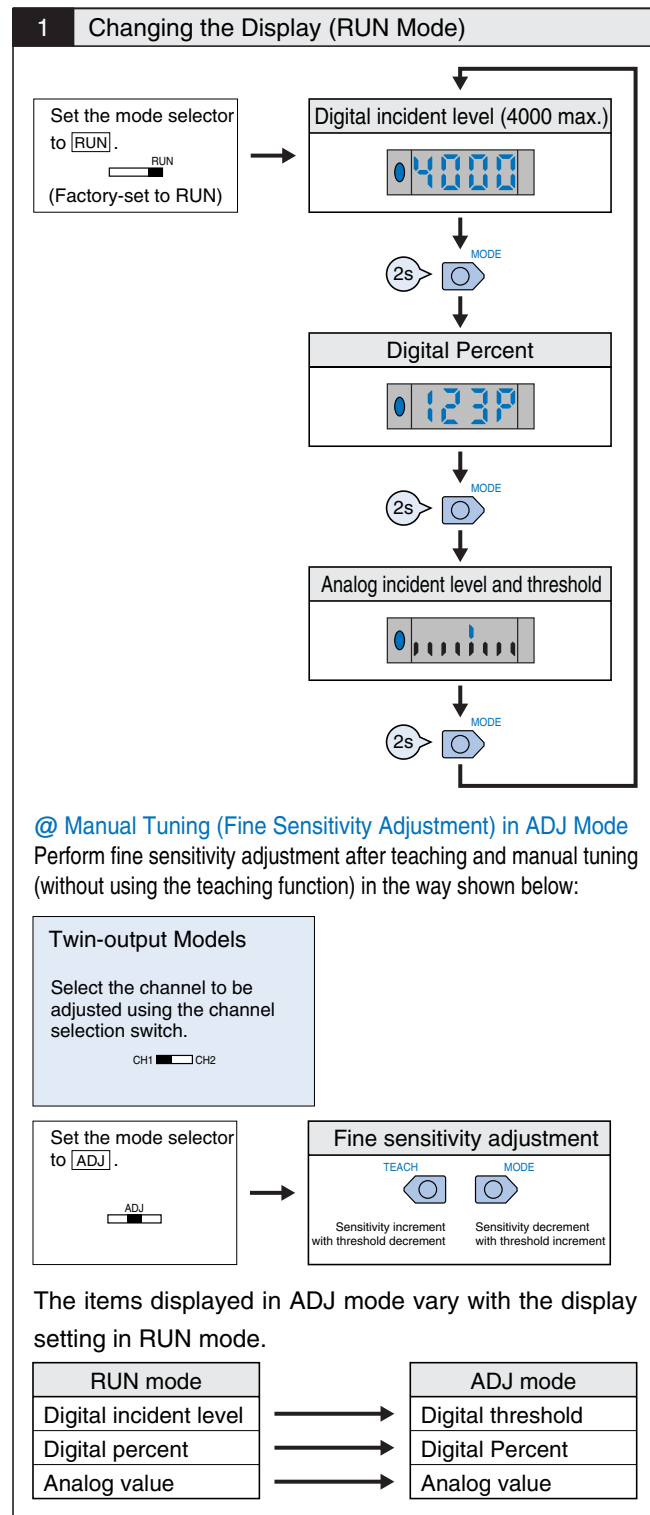
reference to

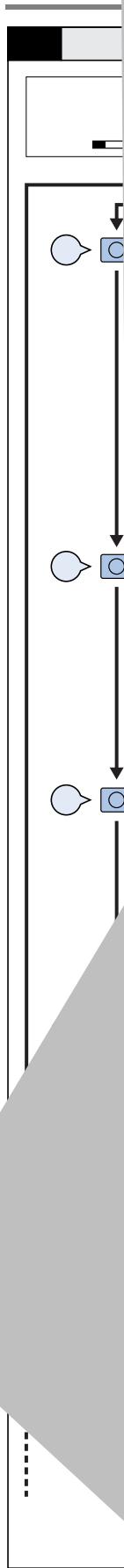
- 1. Select an application.
- 2. Refer to the K3NX Datasheet (N90).
- 3. DC power supply
- 4. (Analog) Sensor with DC
- 5. Check respective power
- 6. Check wiring them.



Operation

General





Set the mode selector to **SET**.

ent sensitivity settings. Refer to

TEACH

TEACH

TEACH

MODE

TEACH

MODE

TEACH

TEACH

TEACH

MODE

Display orientation setting

TEACH

TEACH

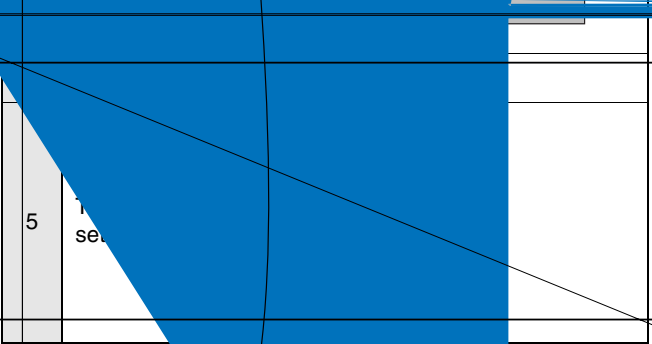
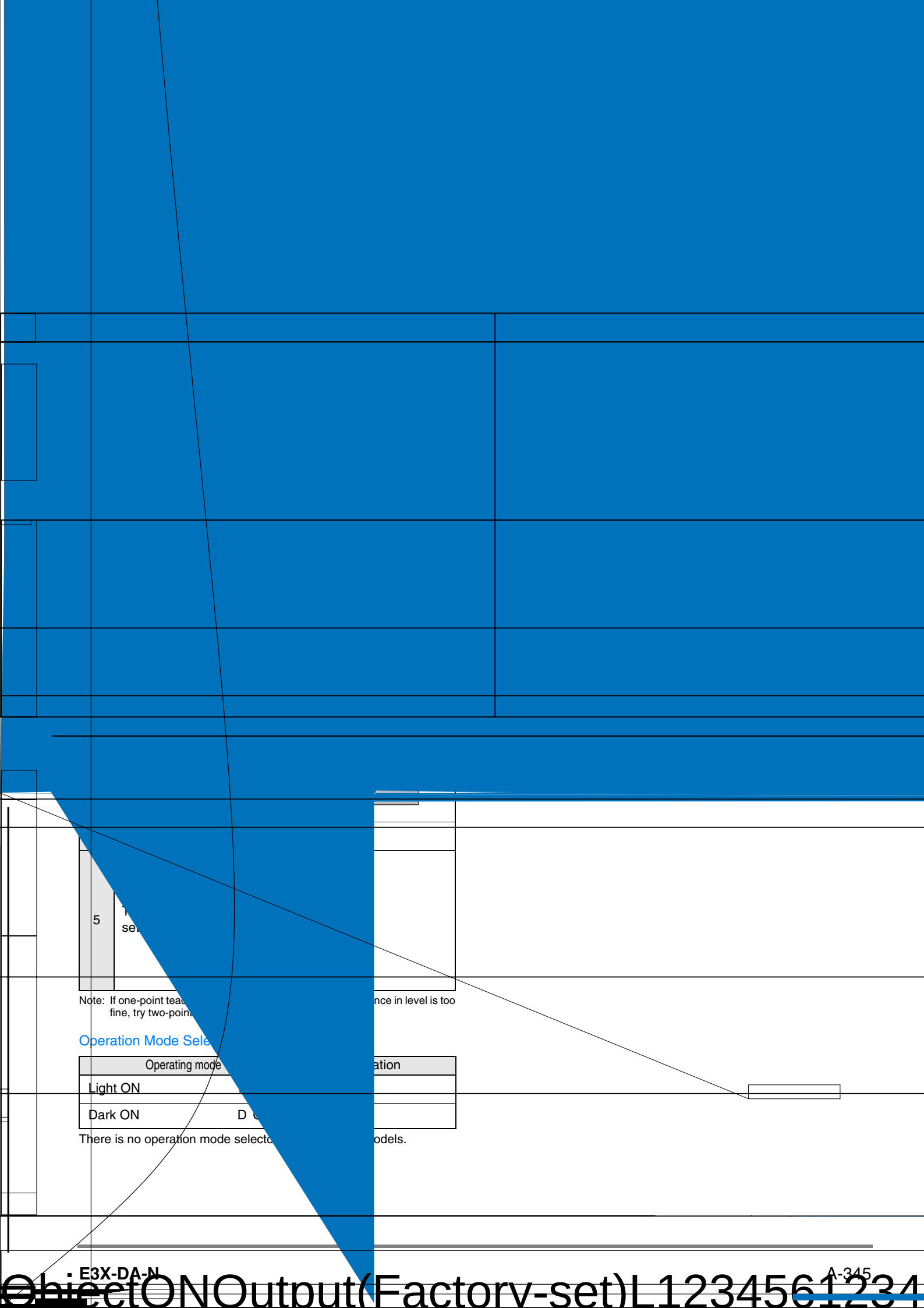
MODE

@ Area Sensing

Area sensing is possible using the threshold values for channels 1 and 2.

- If channel 1 is set to L/ON, output turns ON when the incident level is between the thresholds.
- If channel 1 is set to D/ON, output turns OFF when the incident level is between the thresholds.

The result is output to control output 1.

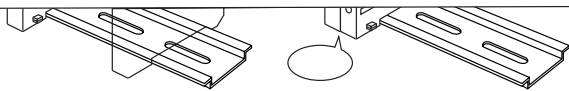


Note: If one-point teaching is not successful, the distance in level is too fine, try two-point teaching.

Operation Mode Selection

Operating mode	Operation
Light ON	
Dark ON	D

There is no operation mode selection for the following models.



(Removing)

Slide one unit away from the other and remove them one by one. (Do not remove the connected units together from the DIN rail.)

Note: 1. When the amplifier units are connected to each other, the operable ambient temperature changes depending on the number of connected amplifier units. Check "Ratings/Performance".
2. Before connecting or removing the units, always switch power off.

Fitting of Mobile Console head

When fitting the Mobile Console head, a 20 mm or more clearance is needed on the left side.

Use of Mobile Console

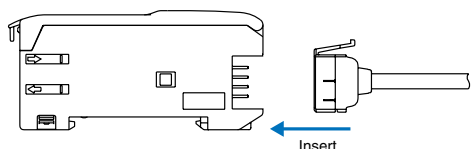
For the twin output type (E3X-DA##TW), up to 16 channels (eight E3X-DA##TW units) can be set from the Mobile Console E3X-MC11. (Note that the operation mode and area detection cannot be set.)

Amplifier Unit Connectors

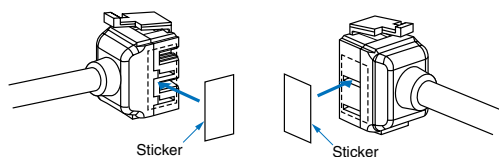
Installation

Connector installation

1. Insert the Master or Slave Connector into the amplifier unit until it clicks into place.



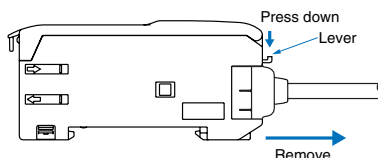
2. Link amplifier units to each other after the master and slave Connectors have been inserted.
3. Apply the supplied seal to the non-connecting surface of the master/slave connector.



Note: Apply seal to the grooved side.

Removing Connectors

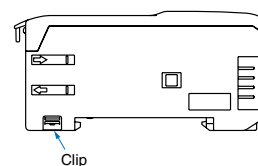
1. Slide the slave amplifier unit (s) on which the connector must be removed from the rest of the group.
2. After the amplifier unit (s) has been separated, press down the lever on the connector and remove it. (Do not attempt to remove connectors without separating them from other amplifier units first.)



Mounting End Plate (PFP-M)

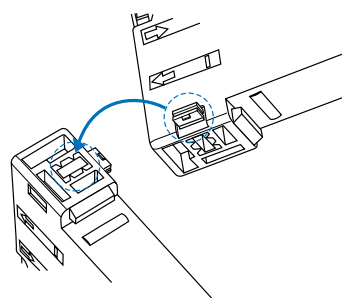
Depending on the installation, an amplifier unit may move during operation. In this case, use an end plate.

Before installing an end plate, remove the clip from the master amplifier unit using a nipper or similar tool.

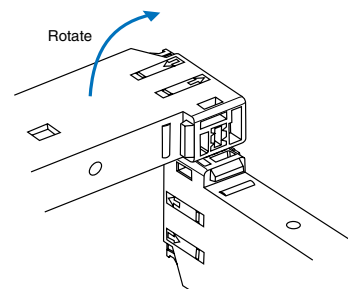


The sensor bottom is also equipped with a clip removing mechanism.

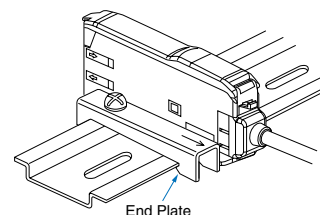
1. Insert the clip to be removed into the slit underneath the clip on another amplifier unit.



2. Remove the clip by rotating the amplifier unit.



When fitting the Mobile Console, set the end plate in the guide as shown in the following figure.



Tensile stress for connectors (including cables)

E3X-CN11, E3X-CN21, E3X-CN22: 30 N max.

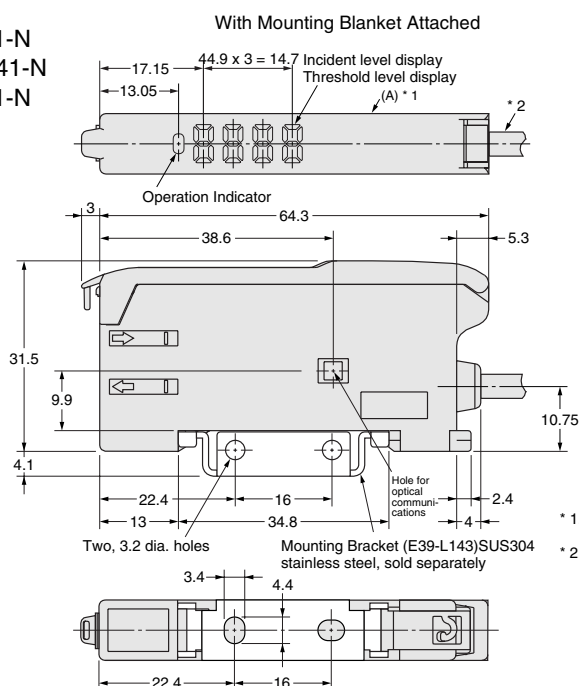
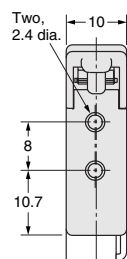
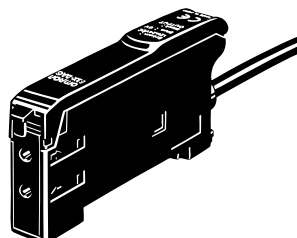
E3X-CN12: 12N max.

Dimensions (Unit: mm)

Amplifier Units

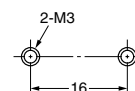
prewired

E3X-DA11-N E3X-DAG11-N E3X-DA21-N
E3X-DAH11-N E3X-DAB11-N E3X-DAB41-N
E3X-DA41-N E3X-DAG41-N E3X-DA51-N
E3X-DAH41-N E3X-DA11D



CAD file E3X_05

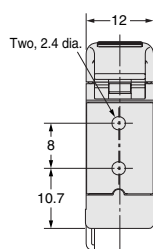
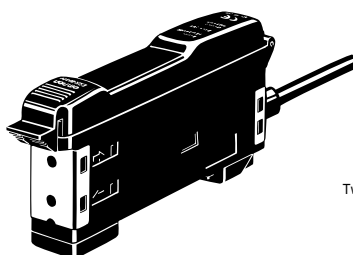
Mounting Holes



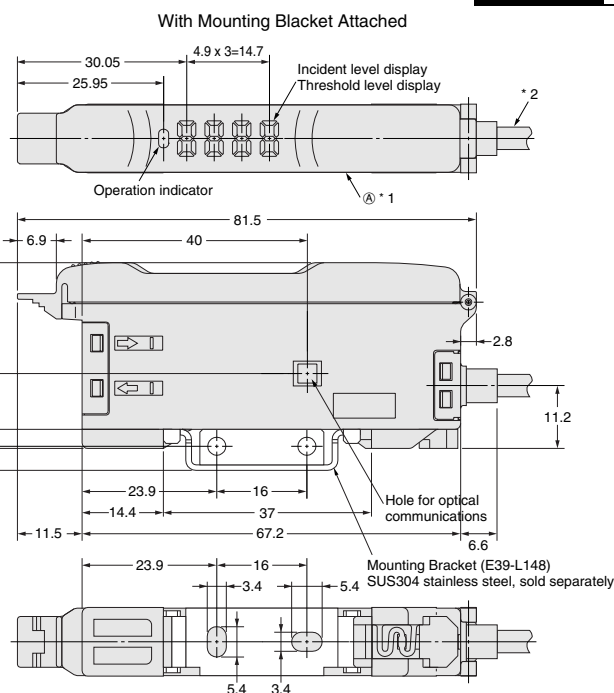
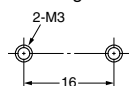
- * 1. The Mounting Bracket can also be used on side A.
- * 2. E3X-DA11-N/DA41-N/DAB11-N:
A 4-dia., 3-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.45 mm²; insulation diameter: 1.1 mm) is used.
E3X-DA21-N/DA51-N: A 4-dia., 4-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.2 mm²; insulation diameter: 1.1 mm) is used.

Amplifier units with Cables, Water-resistant Models

E3X-DA11V
E3X-DA41V



Mounting Holes

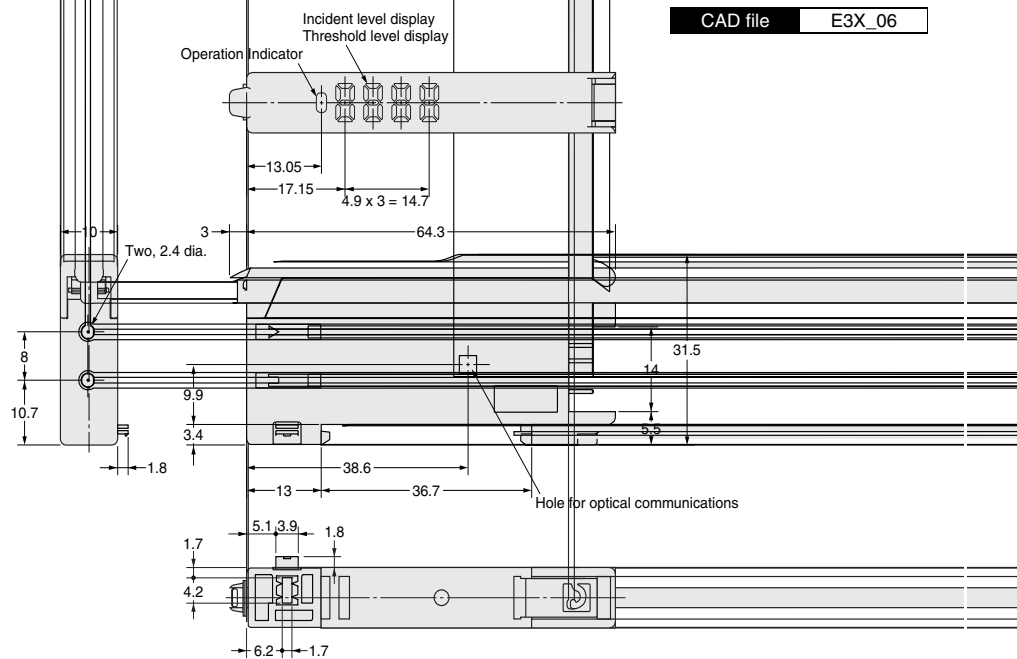


CAD file E3X_10

- * 1. The mounting Bracket can also be used on side A.
- * 2. 4-dia., 3-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.2 mm²; insulation diameter: 1.1 mm) is used.

Connector type

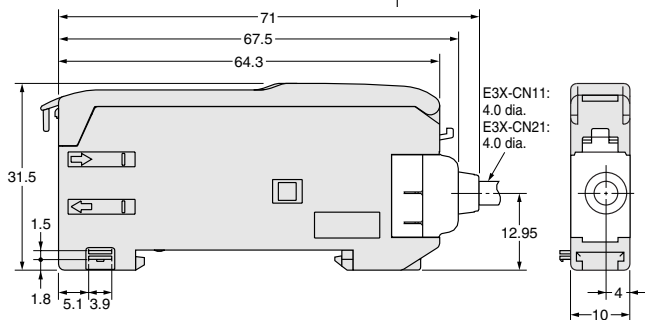
E3X-DA6E3X-DAG6
E3X-DA7E3X-DAH6
E3X-DA8E3X-DAB8
E3X-DA9E3X-DAG8
E3X-DAB6E3X-DAH8
E3X-DA6D



CAD file E3X_06

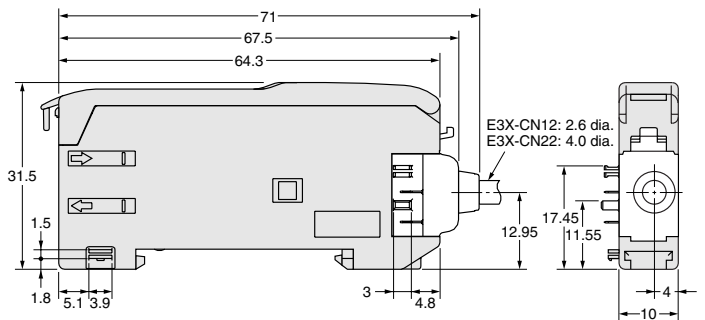
CAD file E3X_07

Dimensions with Master Connector Connected



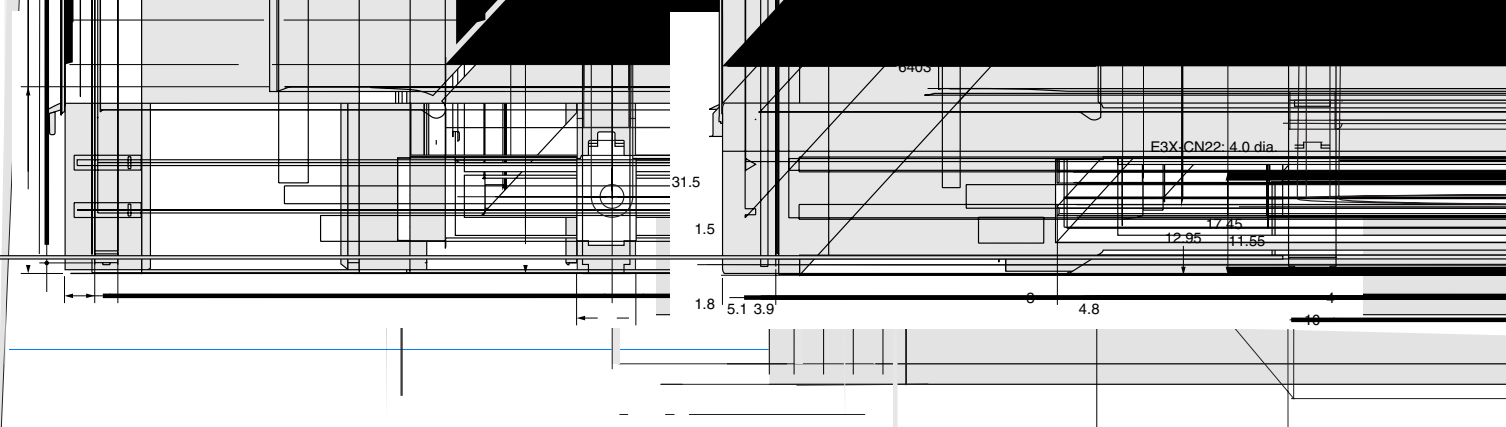
CAD file E3X_08

Dimensions with Slave Connector Connected



A
W
E
E

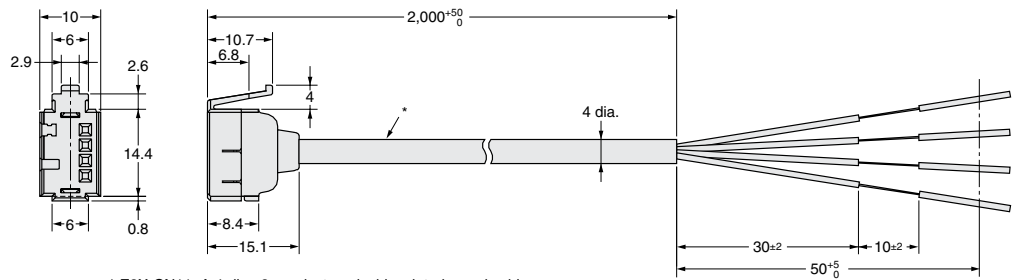
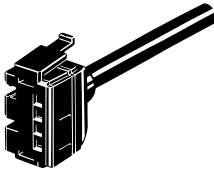
Amplifier unit
Twin output
E3X-DA6TW
E3X-DA8TW



Amplifier Unit Connectors

Master connector

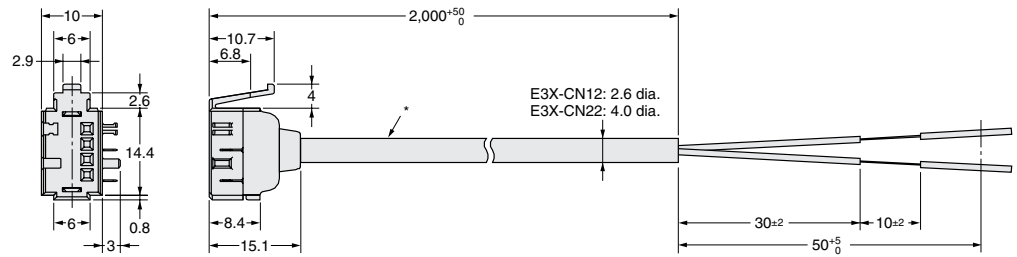
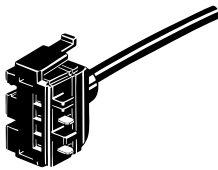
E3X-CN11
E3X-CN21



* E3X-CN11: A 4-dia., 3-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.2 mm²; insulation diameter: 1.1 mm) is used.
E3X-CN21: A 4-dia., 4-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.2 mm²; insulation diameter: 1.1 mm) is used.

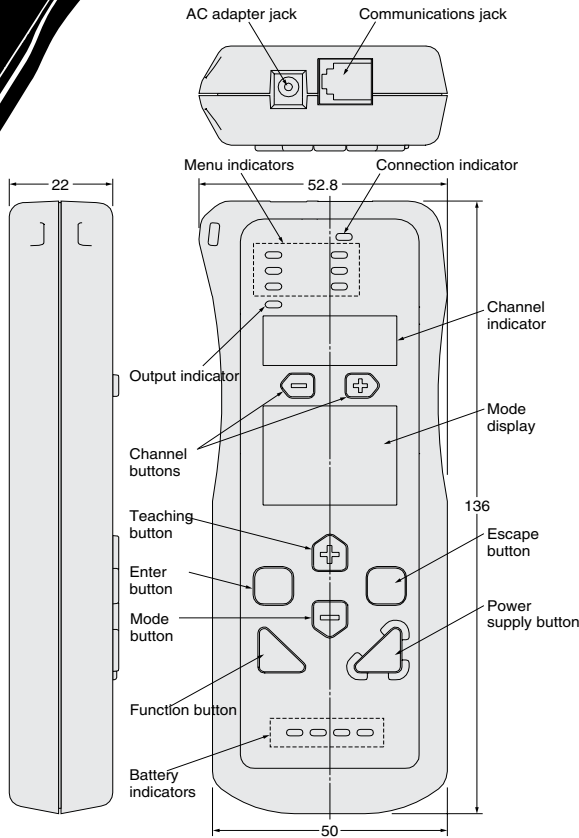
Slave connector

E3X-CN12
E3X-CN22



* E3X-CN12: A 2.6-dia., single-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.2 mm²; insulation diameter: 1.1 mm) is used.
E3X-CN22: A 4-dia., 2-conductor, vinyl-insulated round cable (conductor cross-sectional area: 0.2 mm²; insulation diameter: 1.1 mm) is used.

Mobile Console



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E22E-EN-Cat04-01 In the interest of product improvement, specifications are subject to change without notice.
