

E3X-DACL

Easy-Teach Colour Detection Sensor

The E3X-DACL provides reliable and easy to set up one-touch colour verification. Up to four colours can be identified. The separate amplifier allows mounting in easily accessible areas for operators while the small sensor head can be mounted in locations even when space is limited.

- Easy to set up one-touch colour verification for 1 to 4 colours
- Model for remote teaching
- Small sensor head for easy mounting even when space is tight
- White LED and multi detection modes for reliable operation even for challenging applications



Ordering Information

Type	Output	Tolerance adjustment	Connection method	Order code PNP*1
Single colour detection	Digital colour detected out	– Object teaching (good sample) with auto-tolerance – 2-point teaching (good and bad sample)	M8 4-pin pigtail (with 30 cm PVC cable)*2	E3X-DACLRX1P-M3J 0.3M
1 to 4 colour detection	Digital colour detected out (with bank switching)		2 m PVC cable	E3X-DACLRX4P 2M

*1. NPN models are available. Contact your Omron representative.

*2. Models with 2 m PVC cable or M12 pigtail connector are available. Contact your Omron representative.

Content list

All products can be ordered separately under the following order codes:

E3X-CLRX1P-M3J 0.3M

- 1 x E32-L15 Fiber sensing head
- 1 x E3X-DAC8-S Amplifier
- 1 x E3X-CN21-M3J-2 0.3M M8-4 pin amplifier connector
- 1 x AFBN0044 E3X-DACL Quick Start Guide

E3X-CLRX4P 2M

- 1 x E32-L15 Fiber sensing head
- 1 x E3X-DAC51B-S 2M Amplifier with 2m PVC cable
- 1 x AFBN0044 E3X-DACL Quick Start Guide

Ratings and Specifications

Amplifier Units

Item	Type	Single colour	1 to 4 colour
Light source (wavelength)		White LED (420 to 700 nm)	
Sensing method		C Mode: RGB ratio determination (or I Mode: Light intensity determination for red, green, or blue; Black Mode: Determination of total light intensity for red, green, and blue) *1	
	Number of registered colors	1	4 (2-color simultaneous determination × 2 banks)
Power supply voltage		12 to 24 VDC ±10%, ripple (p-p) 10% max.	
Power consumption		960 mW max. (current consumption: 40 mA max. at power supply voltage of 24 VDC)	
Control outputs		NPN or PNP open collector Load power supply voltage: 26.4 VDC max. Load current: 50 mA max. (residual voltage: 2 V max.)	
Number of control outputs		1	2
Remote control input		---	No-voltage input (contact/transistor) *2
Protection circuits		Reverse polarity for power supply connection, Output short-circuit, Reversed output polarity protection	
Response time	Super-high-speed mode *3 High-speed mode Standard mode High-resolution mode	Operate or reset: 60 μs Operate or reset: 300 μs Operate or reset: 1 ms Operate or reset: 4 ms	Operate or reset: 120 μs Operate or reset: 600 μs Operate or reset: 2 ms Operate or reset: 8 ms
Sensitivity setting (color registration, allowable range)		– Object teaching (good sample) with auto-tolerance – 2-point teaching (good and bad sample)	
Functions	Operation mode	ON for match (ON for same color as registered color) or ON for mismatch (ON for different color from registered color)	
	Timer function	Timer type: OFF delay, ON delay, or one-short, Timer time: 1 ms to 5 s (variable)	
	Control outputs	---	Output for each channel, AND output, and OR output
	Remote control	---	Bank switching (switching between banks A and B and banks C and D)
	Display switch *4	Seven patterns total: Match + Threshold, Margin + Threshold, Analog bar display, Peak + Bottom, etc.	
	Initialization	Initial reset (factory defaults) or user reset (saved settings)	Initial reset (factory defaults)
	Zero reset	Supported	Not supported
Indicators		Operation indicator (orange)/I mode display indicator (orange)	Operation indicator for each channel (orange)
Digital display		7-segment displays (Main display: Red, Sub-display: Green)	
Display direction		Switchable between normal and reversed.	
Ambient illumination (Receiver side)		Incandescent lamp: 3,000 lux Sunlight: 10,000 lux	
Ambient temperature range *5		Operating: –25°C to 55°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 50 Hz with a 1.5-mm double amplitude for 2 h each in X, Y and Z directions	
Shock resistance		Destruction: 500 m/s ² , for 3 times each in X, Y and Z directions	
Degree of protection		IEC IP50 (with Protective Cover attached)	
Connection method		Fiber connector with 30 cm PVC cable and M8 plug	Pre-wired (standard cable length: 2 m)
Weight (packed state)		Approx. 100 g	
Materials	Case	Polybutylene terephthalate (PBT)	
	Cover	Polycarbonate (PC)	

*1. When teaching with/without a workpiece, the best sensing method will be automatically selected (RGB ratio (C Mode) or light intensity determination (I Mode)). If color differences are not strong enough and RGB ratios would result in unstable detection, then light intensity determination (I Mode) will be selected. The detection mode can be set to C, I, or Black Mode.

*2. Input Specifications

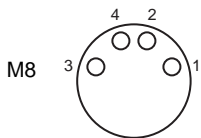
	Contact input (relay or switch)	Non-contact input (transistor)
NPN	ON: Shorted to 0 V (sourcing current: 1 mA max.). OFF: Open or shorted to Vcc.	ON: 1.5 V max. (sourcing current: 1 mA max.) OFF: Vcc - 1.5 V to Vcc (leakage current: 0.1 mA max.)
PNP	ON: Shorted to Vcc (sinking current: 3 mA max.). OFF: 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. Mutual interference prevention cannot be used in super-high-speed mode, and light intensity determination (I Mode) must be used. The response time will be 150 μs if an AND or OR is set for the control outputs.
- *4. With light intensity determination (I Mode and Black Mode), the correlation is not displayed, but rather the light intensity is displayed.
- *5. The allowable ambient operating temperature changes according to the number of Units that are linked.
2 Units: -25 to 55°C, 3 to 10 Units: -25 to 50°C, and
11 to 16 Units: -25 to 45°C

Amplifier Unit Connector

Item	Model	E3X-CN21-M3J-20.3M
Rated current		2.5 A
Rated voltage		50 V
Contact resistance		20 mΩ max. (20 mVDC max., 100 mA max.) (The figure is for connection to the Amplifier Unit and the adjacent Connector. It does not include the conductor resistance of the cable.)
No. of insertions		Destruction: 50 times (The figure for the number of insertions is for connection to the Amplifier unit and the adjacent Connector.)
Materials	Housing	Polybutylene terephthalate (PBT)
	Contacts	Phosphor bronze/gold-plated nickel
Weight (packed state)		Approx. 55 g

Pin and wire arrangement



Connector	Cable colour	
1	brown	+
2	orange/white	Output 2 or ext. input
3	blue	-
4	black	Output 1
	pink	Ext. Input

I/O Circuit Diagrams

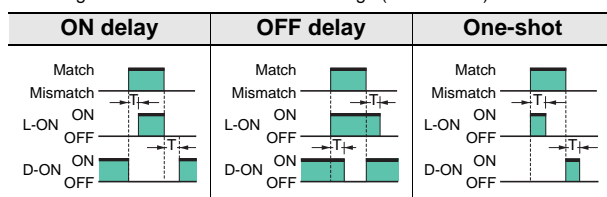
NPN Output (available on request)

Model	Operation mode	Timing charts	Operation selector switch	Output circuit
Single colour	ON for match		LIGHT ON (L-ON)	
	ON for mismatch		DARK ON (D-ON)	
1 to 4 colours	ON for match		LIGHT ON (L-ON)	
	ON for mismatch		DARK ON (D-ON)	

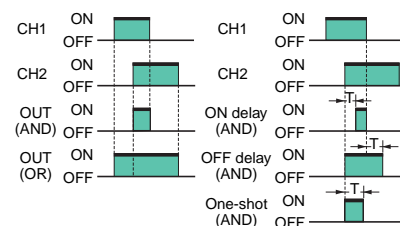
PNP Output

Model	Operation mode	Timing charts	Operation selector switch	Output circuit
Single colour	ON for match		LIGHT ON (L-ON)	
	ON for mismatch		DARK ON (D-ON)	
1 to 4 colours	ON for match		LIGHT ON (L-ON)	
	ON for mismatch		DARK ON (D-ON)	

Note 1. Timing Charts for Timer Function Settings (T: Set Time)



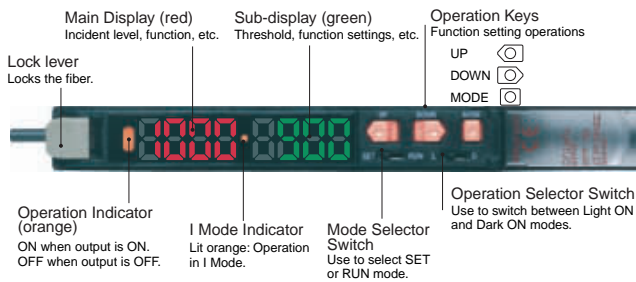
2. Control Outputs (AND, OR, Sync) and Timing Chart for Timer Settings (T: Set Time)



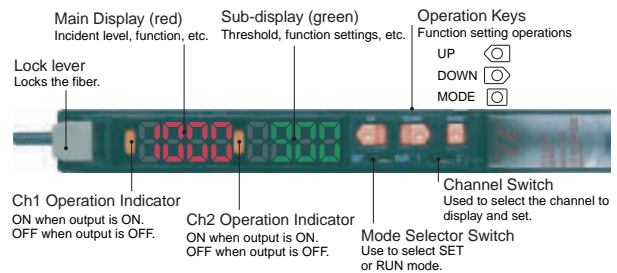
Nomenclature

Amplifier Units

Single colour



1 to 4 colour



Safety Precautions

Refer to *Warranty and Limitations of Liability*.

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 use the product with voltage in excess of the rated voltage. Excess voltage may result in malfunction or fire.



Never use the product with an AC power supply.

Otherwise, explosion may result.



High-temperature environments may result in burn injury.



Precautions for Safe Use

The following precautions must be observed to ensure safe operation of the Sensor.

1. Do not use the Sensor in an environment where explosive or flammable gas is present.
2. Do not use the Sensor in a location subject to splattering of water, oils, or chemicals.
3. Do not attempt to disassemble, repair, or modify the Sensor.
4. Do not apply voltages or currents that exceed the rated range to the Sensor.
5. Do not use the Sensor in an ambient atmosphere or environment that exceeds the ratings.
6. Wire the power supply correctly, including the polarity.
7. Connect the load correctly.
8. Do not short-circuit the load at both ends.
9. Do not use the Sensor if the case is damaged.
10. Dispose of the Sensor as industrial waste.
11. Do not use the Sensor in locations subject to direct sunlight.
12. Burn injury may occur. The Sensor surface temperature rises depending on application conditions, such as the ambient temperature and the power supply voltage. Use caution when operating or performing maintenance on the Sensor.

Precautions for Correct Use

Do not use the product in atmospheres or environments that exceed product ratings.

Amplifier Unit

● Designing

Operation after Turning Power ON

The Sensor is ready to detect within 200 ms after the power supply is turned ON. If the Sensor and load are connected to separate power supplies, be sure to turn ON the Sensor first. Time may be required for the degree of match to stabilize after the power supply is turned ON.

Operation When Turning Power OFF

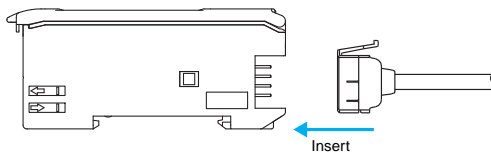
Output pulses may occur when the power is turned OFF. Turn OFF the power supply to the load and the load line before turning OFF the power supply to the Sensor.

● Mounting

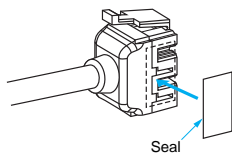
Connecting and Disconnecting Connectors

Mounting Connectors

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



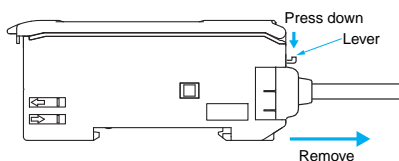
2. Attach the protector seals (provided as accessories) to the sides of master and slave connectors that are not connected.



Note: Attach the seals to the sides with grooves.

Removing Connectors

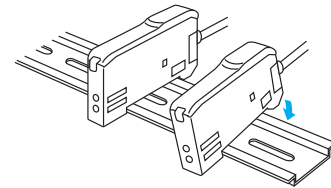
1. Slide the slave Amplifier Unit(s) for which the Connector is to be removed away from the rest of the group.
2. After the Amplifier Unit(s) has been separated, press down on the lever on the Connector and remove it. (Do not attempt to remove Connectors without separating them from other Amplifier Units first.)



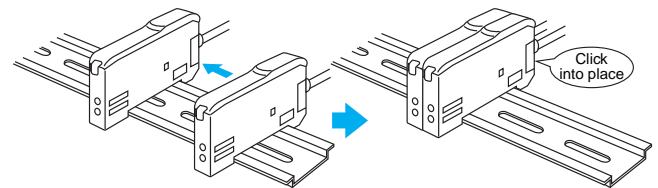
Adding and Removing Amplifier Units

Adding 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.



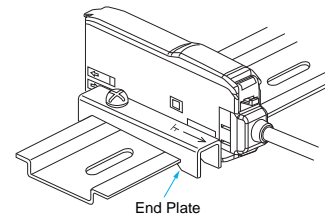
Removing Amplifier Units

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 Unit used together. For details, refer to *Ratings and Specifications*
 2. Always turn OFF the power supply before joining or separating Amplifier Units.

Mounting the End Plate (PFP-M)

An End Plate should be used if there is a possibility of the Amplifier Unit moving, e.g., due to vibration.

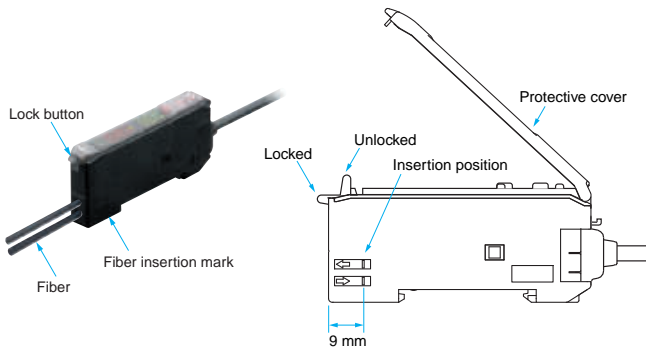


Fiber Connection

The E3X Amplifier Unit has a lock button for easy connection of the Fiber Unit. Connect or disconnect the fibers using the following procedures:

1. Connection

Open the protective cover and raise the lock lever to release the lock. Next, insert the fibers according to the fiber insertion marks on the side of the Amplifier Unit, and lower the lock lever.

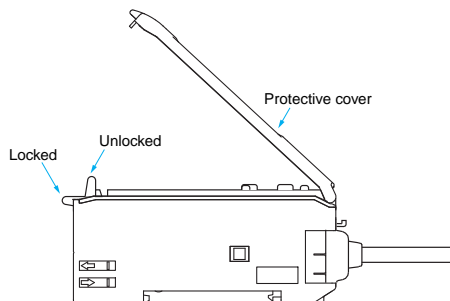


Note: Do not pull on, compress, or otherwise exert excessive force on the fibers after connecting them to the Amplifier Unit. (Do not exert more than 0.3 N·m.)

Note: If one of the fibers from the Fiber Unit has a white line, such as with a Coaxial Sensor, that fiber is for the Emitter. Insert it into the Emitter section. Refer to Dimensions for the Fiber Unit to see if there is an Emitter fiber.

2. Disconnecting Fibers

Remove the protective cover and raise the lock lever to pull out the fibers.



Note 1. To maintain the fiber properties, confirm that the lock is released before removing the fibers.
2. Be sure to lock or unlock the lock button within an ambient temperature range between -10°C and 40°C .

● Adjusting

Mutual Interference Protection Function

Light from other sensors can cause the value on the digital display to become somewhat unstable. If this occurs, reduce the threshold to create a greater margin and enable more stable detection.

Output Short-circuits Protection

OVER/CUR will flash on the display if the output short-circuit protection function operates due to a load short-circuit in a control output. If this occurs, check the load connections.

EEPROM Writing Error

If the data is not written to the EEPROM correctly due to a power failure or static-electric noise, initialize the settings with the keys on the Amplifier Unit. ERR/EEP will flash on the display when a writing error has occurred.

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.

● Others

Protective Cover

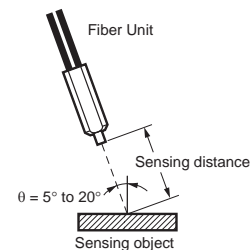
Always keep the protective cover in place when using the Amplifier Unit.

Fiber Unit

● Installation Precautions

Glossy Sensing Objects

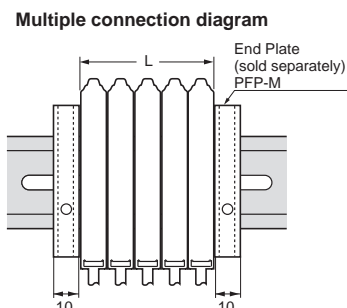
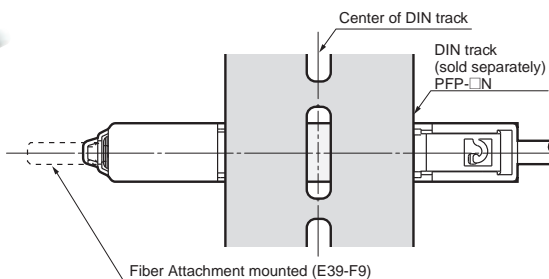
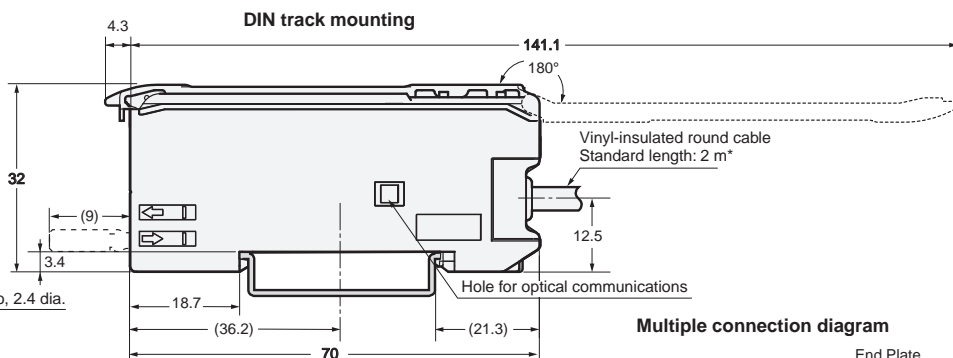
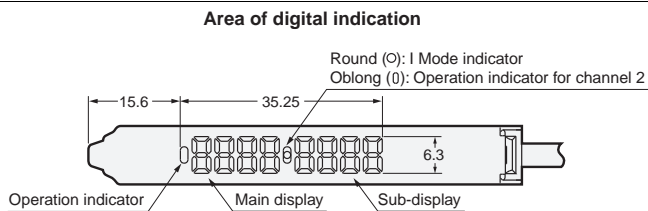
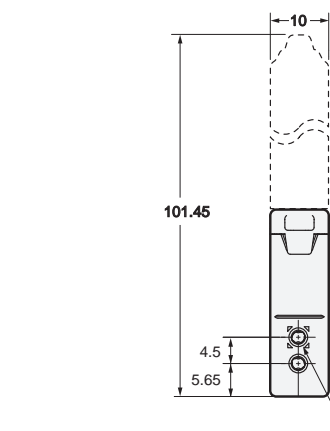
If the sensing object is glossy, detection may not be stable. If the Sensor is inclined by 5° to 20° when using a glossy sensing object, as shown below, detection capabilities can be increased and stable detection achieved.



Dimensions

Amplifier Units

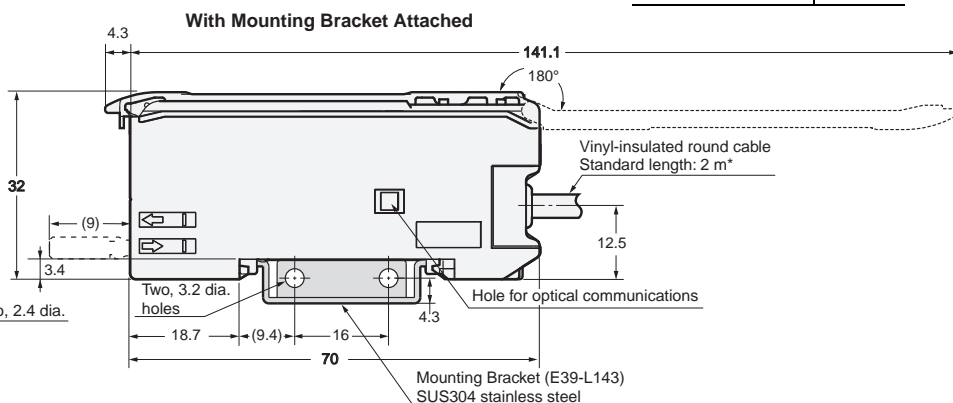
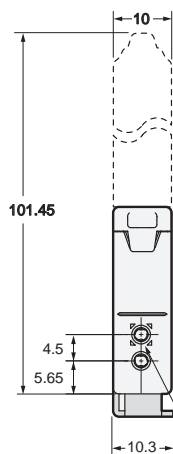
Pre-wired Amplifier Unit E3X-DACLR4P



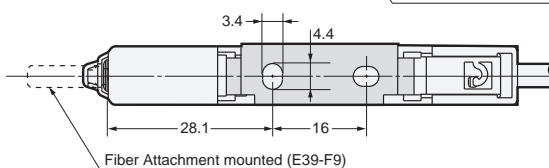
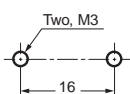
The number of expansion	L (mm)
1	10
2	20
3	30
4	40
5	50
6	60
7	70
8	80
9	90
10	100

* Cable Specifications

4-dia., 5-conductor (Conductor cross section: 0.2 mm², insulator diameter, 1.1 mm)

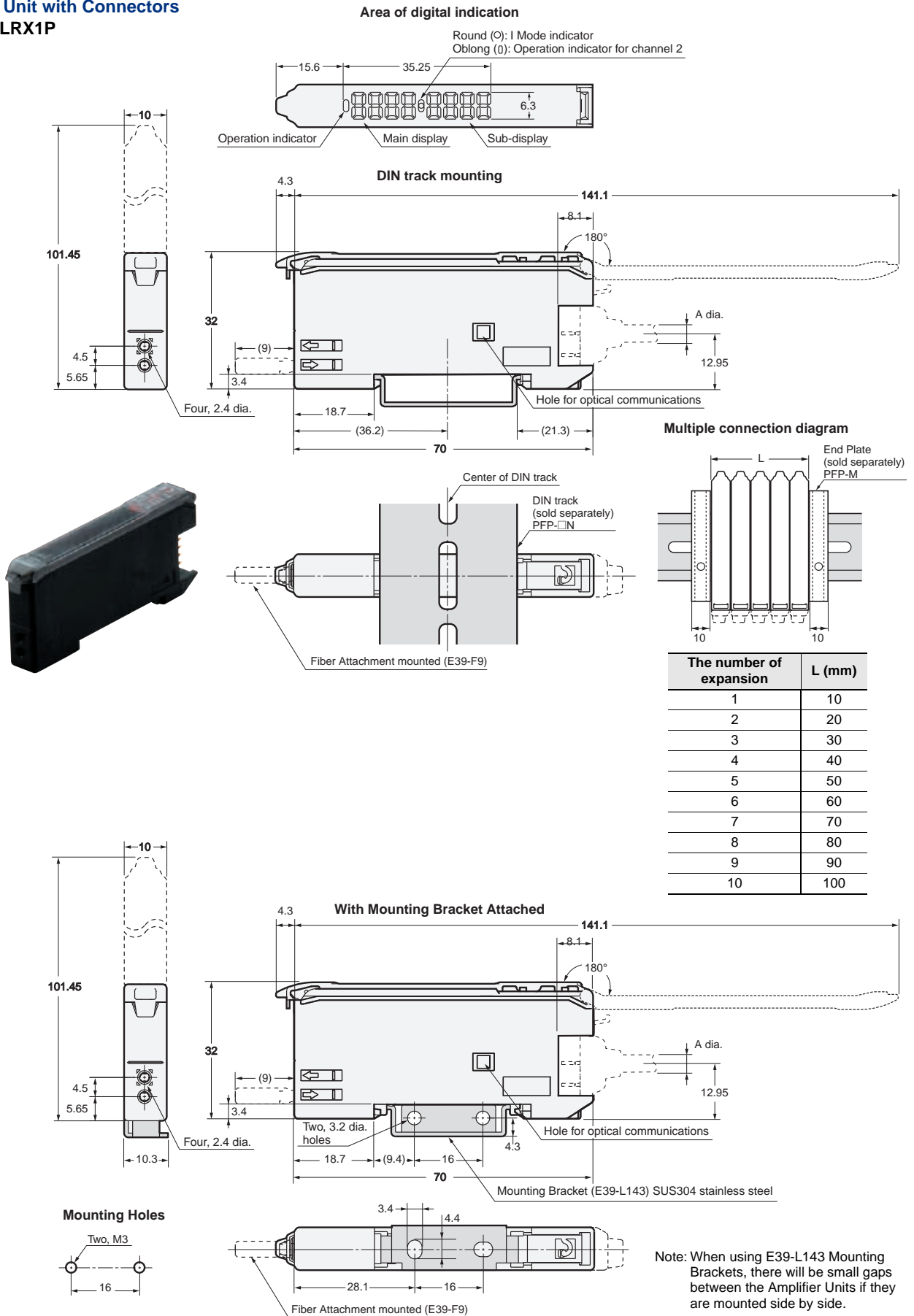


Mounting Holes

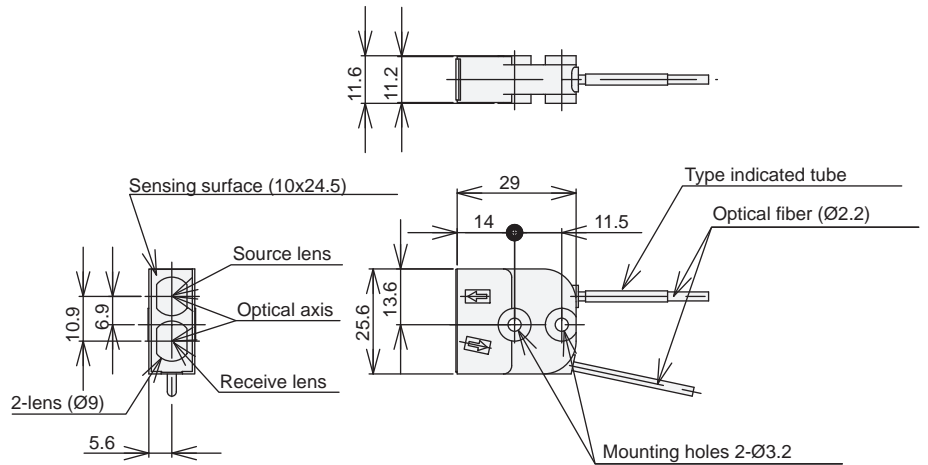


Note: When using E39-L143 Mounting Brackets, there will be small gaps between the Amplifier Units if they are mounted side by side.

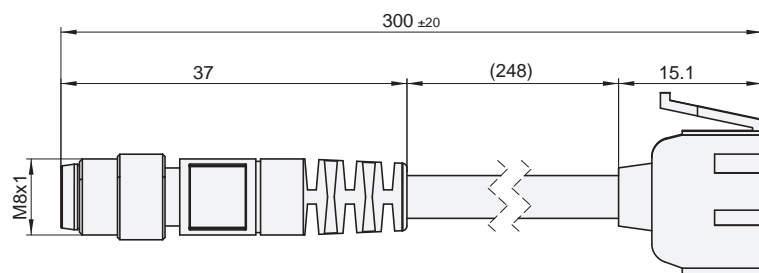
Amplifier Unit with Connectors E3X-DACLR1P



Fiber unit E32-L15



Fiber Amplifier Connector E3X-CN21-M3J-2 0.3M



Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

ERRORS AND OMISSIONS

The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

Cat. No. E75E-EN-01

In the interest of product improvement, specifications are subject to change without notice.

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