

## E3X-DA-S

Digital Fiber Sensors



**Perfection Transcended!**  
**A Wealth of Advanced Functions**  
**for Easy and Reliable Application**



***Innovation***  
***in the Solution Age***

OMRON INDUSTRIAL AUTOMATION

# Evolution and Perfection

The next-generation platform for a wide range of sensing

- point **1** The industry's first **Power Tuning Function** in a digital sensor.
- point **2** Large, **Easy-to-Read Displays** that are clear even from a distance.  
Seven convenient display formats.
- point **3** Stable long-term performance achieved with  
**OMRON's Auto Power Control (APC)** function.
- point **4** A wide array of **Advanced Functions** for even more applications.
- point **5** The same **Ease-of-Use** as the E3X-DA-N Amplifier.
- point **6** **Environmentally Friendly** design.
- point **7** Improved **Mobile Console**.

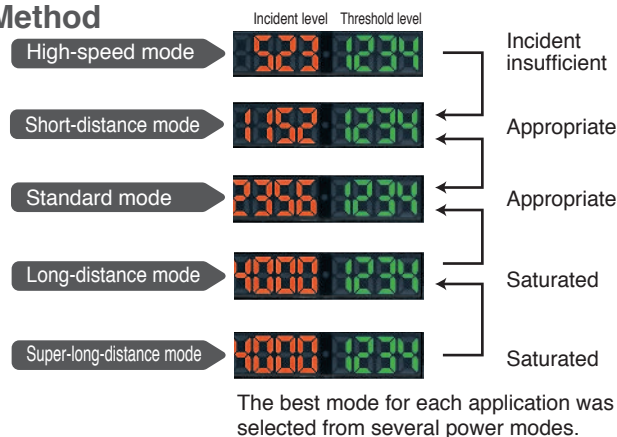


## Industry's First Power Tuning Function in a Digital Sensor.

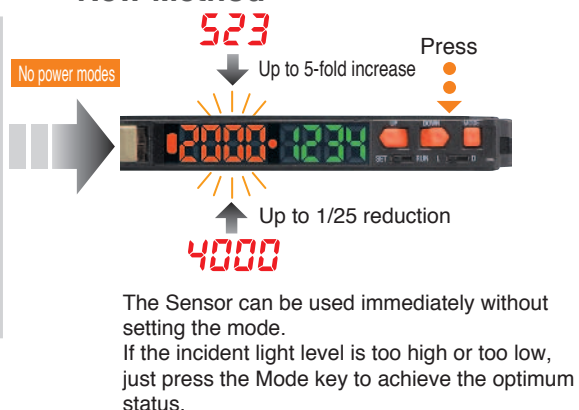
### No complicated mode settings.

Troublesome power adjustments have been eliminated, so it isn't necessary to select from power mode settings, such as long-distance mode, standard mode, and short-distance mode. When the MODE Key is pressed once, the power tuning function shifts the power level so that the present incident level is set to the ideal level (2000 on the digital display.)

#### Earlier Method



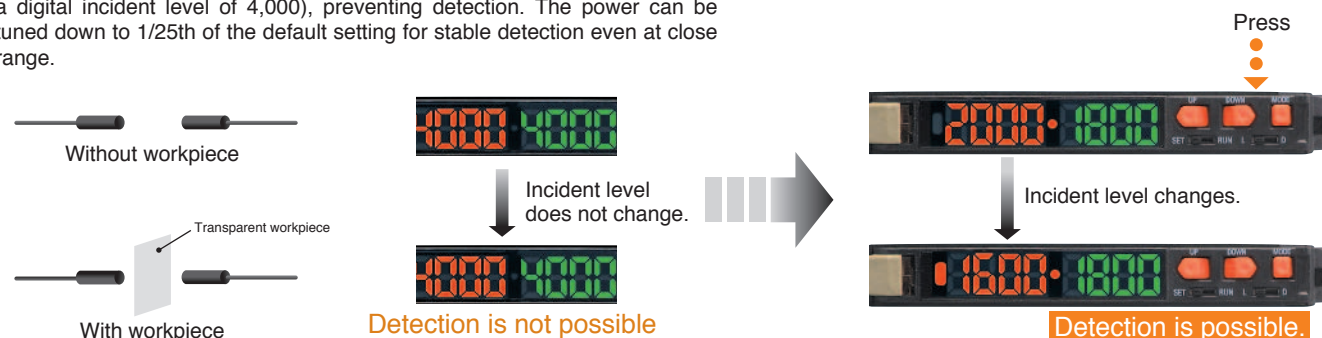
#### New Method



Patent Pending

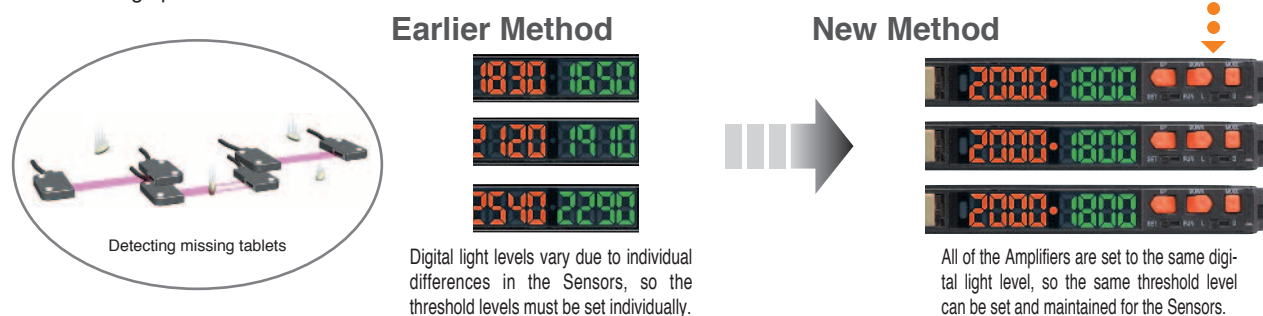
### Insufficient light or saturation at short distances can be corrected.

The power tuning range is extended to the allowable limits to eliminate problems such as insufficient light or detection failures due to saturation. If the installation distance is too short, the incident light may saturate (i.e., to a digital incident level of 4,000), preventing detection. The power can be tuned down to 1/25th of the default setting for stable detection even at close range.



### Variations between different Sensors can be eliminated.

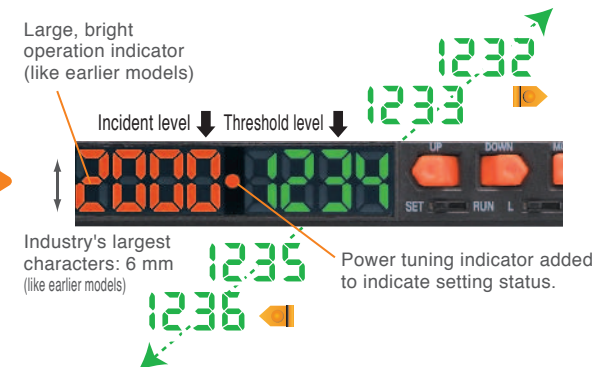
Threshold levels had to be set and maintained separately for individual Sensors due to variations in the digital light levels measured by each Sensor. With power tuning, the incident level can be fine-tuned so the same threshold level can be set for each Sensor in an application. Maintenance is also simplified because it is easier to recognize measurement levels that have shifted during operation.



## Large, Easy-to-Read Displays: Clear Even from a Distance

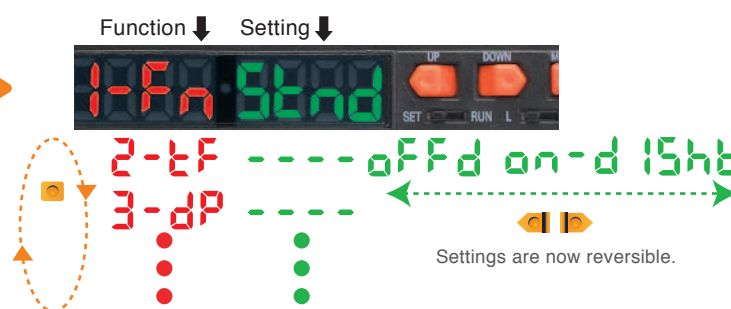
The displays are large and easy-to-read, despite the small case.

#### RUN mode



#### SET mode

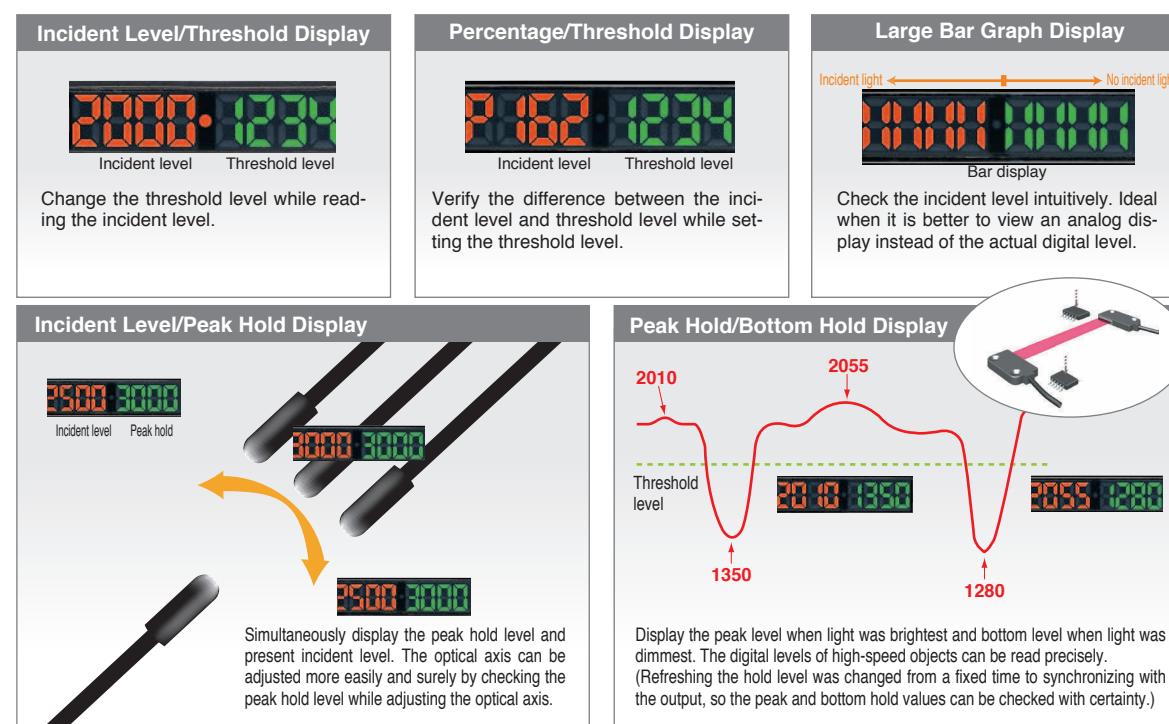
Function numbers added to function items.



## Seven Convenient Display Formats

Patent Pending

An incident level/threshold display, percentage/threshold display, and large bar graph display have been added, so you can select the best display method for the application.

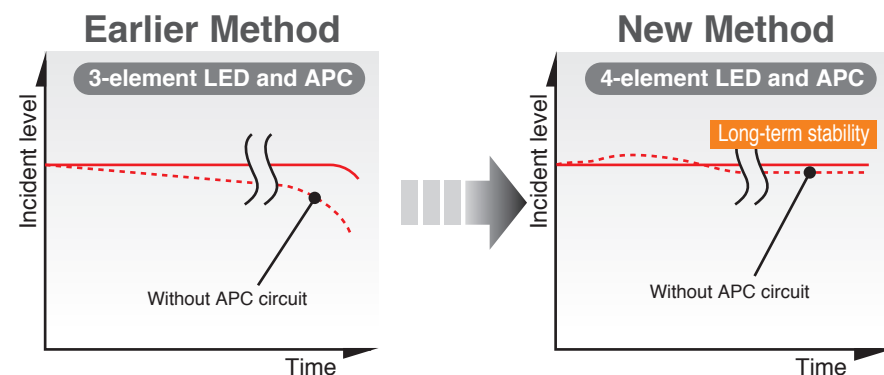


## Stable, Long-term Performance with OMRON's APC Function

**OMRON provides the industry's most stable long-term detection** Highest Level of Stability **by using new 4-element LEDs and an APC (Auto Power Control) circuit.**

In addition to our unique APC circuit used in the E3X-DA-N Amplifiers to compensate for the deterioration of the LED, the E3X-DA-S uses 4-element LEDs to counteract the deterioration of the light-emitting elements over time and achieve the industry's most stable long-term detection performance.

Furthermore, the circuit is designed with excess light capacity, so the Sensors can be used with high stability regardless of whether the APC circuit is ON or OFF.



**Compensate for the effects of contaminants and temperature variation with differential operation mode. (Advanced Models)**

This operation mode uses a special OMRON algorithm to compensate for slight light level changes due to dirt or temperature variations and detect only the light level changes due to the workpiece.

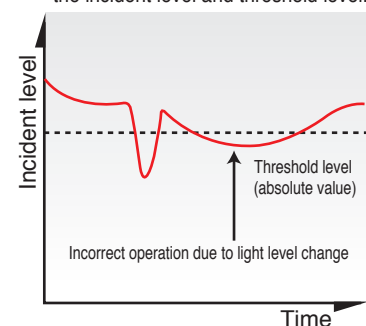
Slight light level changes can be detected with stability and precision, eliminating the need for time-consuming manual adjustments for light level changes.

With the Twin-output Amplifiers, output 2 can function as an alarm output (light level operation) to indicate when the light level has changed due to dirt or other causes.

Patent Pending

### Light Level Operation (Normal Operation)

Judges light level changes by comparing the incident level and threshold level.

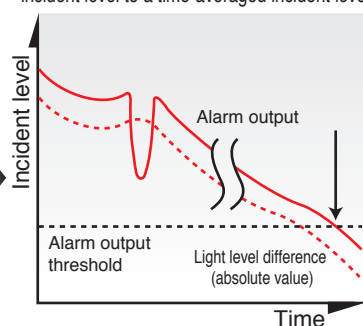


The light level varies due to dirt, temperature variations, or other environmental factors.

Incorrect operation

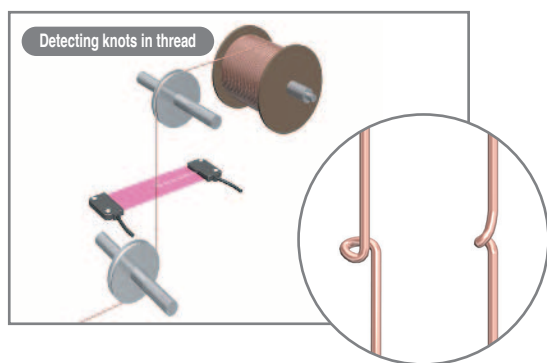
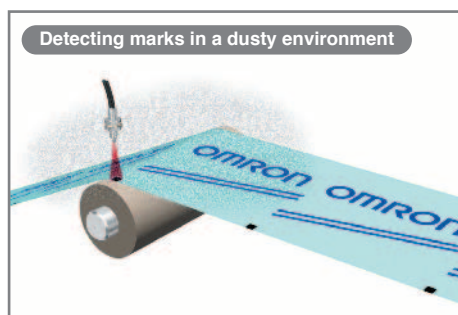
### Differential Operation

Judges light level changes by comparing the incident level to a time-averaged incident level.



Detecting differences in the light level enables setting more subtle light level differences.

Minute changes are detected reliably.



## Many Advanced Functions for Even More Applications

**In super-high-speed mode, it is the** Fastest in the Industry **fastest digital model at 48  $\mu$ s. (Standard Models)**

Provides high-speed response for miniature workpieces, such as chip parts and devices with short tact times.

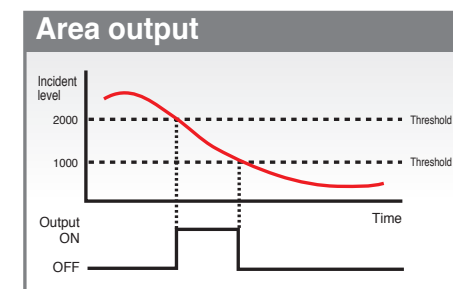
**Three kinds of timer functions are supported. The timers can be set between 1 ms and 5 s.**

A one-shot timer is supported in addition to the ON-delay and OFF-delay timers.

The Amplifier's ON time can be fixed, which is useful during high-speed workpiece detection.

**Area output function can be used for range judgement. (Advanced Twin-output Models)**

Operations that required multiple Sensors, such as height measurement, can be performed with just one Sensor. Two threshold levels can be set to easily output within-range and out-of-range outputs.

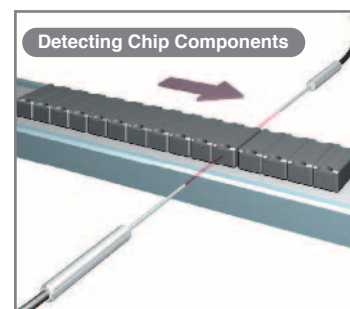
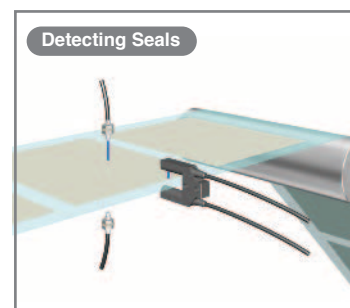
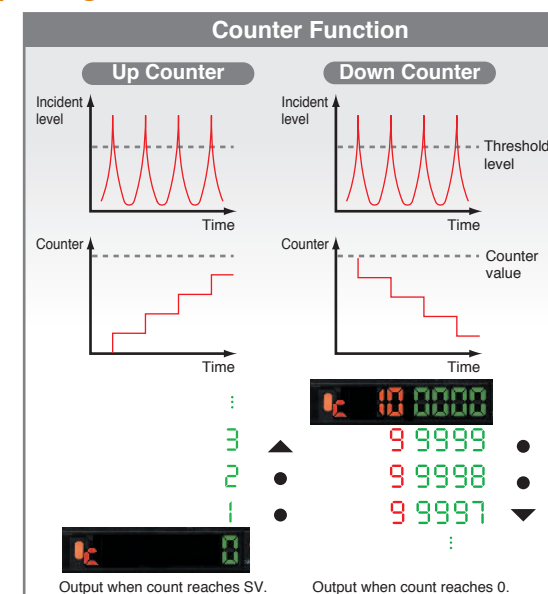


**Remote input function can control the Sensor remotely. (Advanced External-input Models)**

Input signals can make various remote settings, such as teaching operations, power tuning, and emitter OFF. This model is ideal for diverse needs, such as checking Sensor operation remotely before operation or making settings remotely because teaching has to be performed often for frequent workpiece model changes.

**The counter function can output signal after counter counts up or down.** Patent Pending **(Advanced External-input Models)**

A counter function is built-in, so the number of workpieces can be counted without a separate counter or small PLC that used to be required.



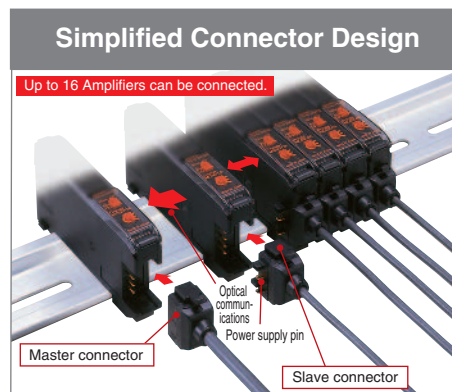
## The Same Ease-of-Use as the E3X-DA-N

The E3X-DA-S uses OMRON's own simplified wiring connectors that were introduced with the E3X-DA-N.

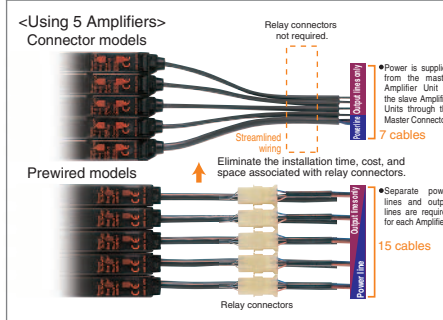
Patent Pending  
Japan patent number 3266198

In Amplifiers with Connectors, the power supply is distributed to slave connectors through a single master connector. This design has three major advantages.

1. Wiring time is significantly reduced.
2. Relay connectors are unnecessary, so wiring takes up less space.
3. Storage and maintenance are simpler because it isn't necessary to distinguish between master connector and slave connectors on the Amplifier.



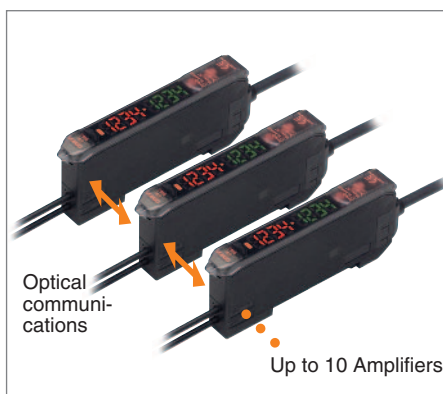
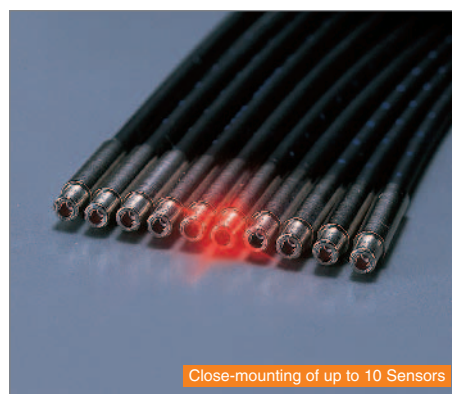
### Reduced Power Wiring Saves Space



## Optical communications prevents mutual interference.

Mutual interference is prevented with optical communications, so up to 10 Amplifiers can be mounted together.

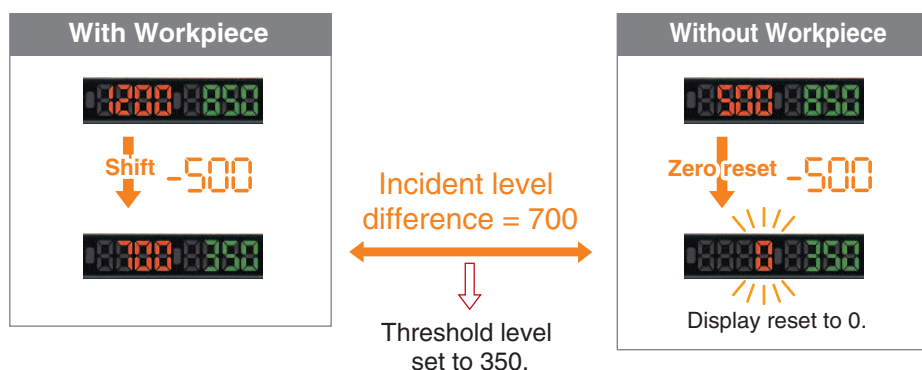
(The number of Amplifiers depends on the operating conditions.)



## Zero reset function immediately resets the digital display to 0.

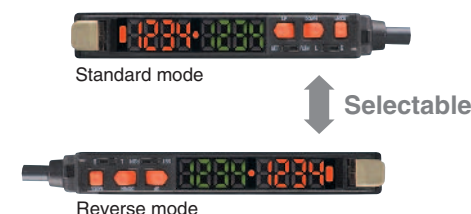
Patent Pending  
Japan patent number 3255229

The zero reset function can immediately reset the digital display to 0 at any time. By setting the reference value to 0, the threshold value can be set while monitoring differences in incident light levels. The threshold value will also shift simultaneously when the zero reset button is pressed.



## Reversible Digital Display (Reverse Mode)

The digital display can be reversed to match the Amplifier's mounting direction.

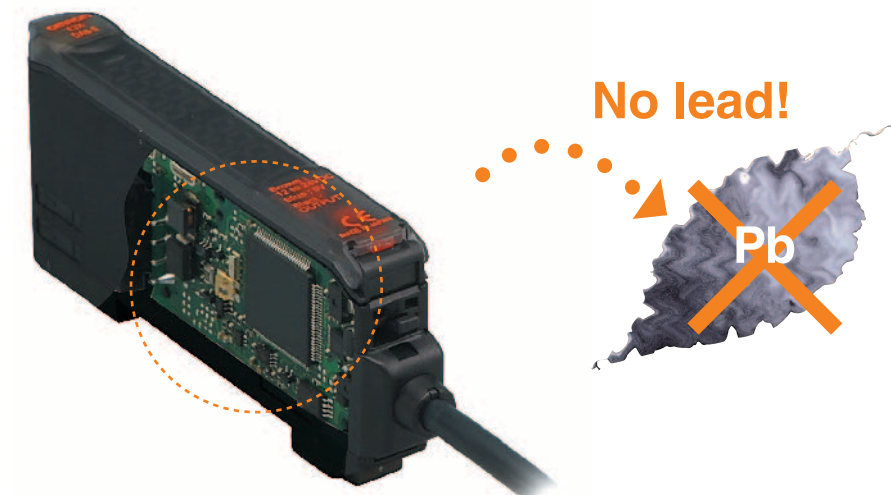


## Environmentally Friendly Design

Environmentally friendly features are essential in truly high-performance products.

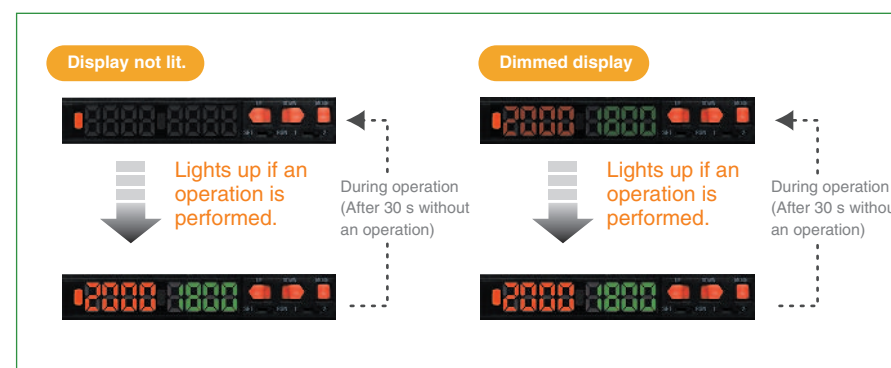
### 1 Materials containing lead have been completely eliminated. First in the industry

The Fiber Sensor is the first in the industry to use environmentally friendly lead-free solder.



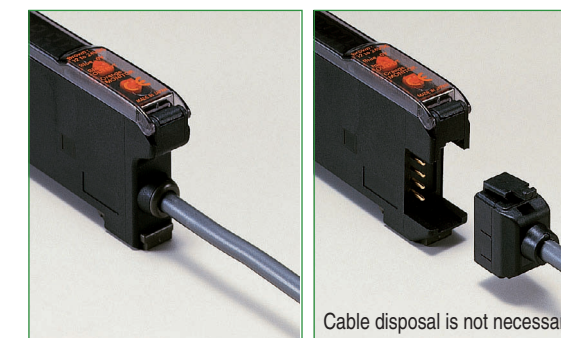
### 2 The digital display can be turned OFF or dimmed during operation. Eco-mode

When the digital display is viewed infrequently during operation, current consumption can be reduced by dimming the display or turning it OFF entirely. The display will light up again automatically when an operation key is touched. (Eco-mode can be set from the Mobile Console only.)



### 3 Cable disposal is not required during maintenance.

In addition to saving space and reducing wiring time, the new connector design eliminates the need to dispose of cables together with the Amplifiers.



## Further Improvements to the Mobile Console



Can also be used with Photoelectric Sensors with Separate Digital Amplifiers.



E3C-LDA  
Photoelectric Sensor with Separate Digital Amplifier

### Group Power Tuning

With the group power tuning function, power tuning is possible for multiple Sensors at the same time.



Group Power Tuning

*Easily set multiple Sensors.*



### Improved Mode Lock Function

Settings can be customized for different applications by locking out unnecessary function blocks within function settings.

*The Age of User-customizable Sensors.*

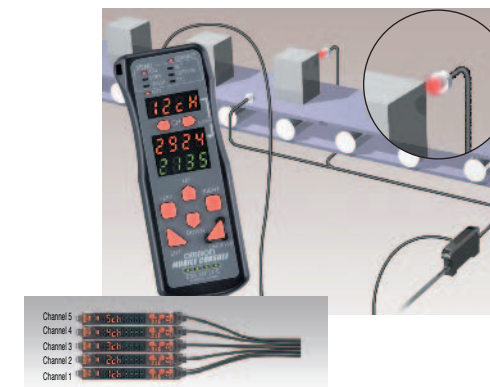
| Application        |                                      | Function Block |              |                  |
|--------------------|--------------------------------------|----------------|--------------|------------------|
|                    |                                      | Manual setting | Teaching     | Function setting |
| Manual             | Set for manual operation.            | Operation OK   | Locked       | Locked           |
| Teaching           | Set for teaching operation.          | Locked         | Operation OK | Locked           |
| Teaching +  Manual | Set for teaching + manual operation. | Operation OK   | Operation OK | Locked           |

Retains all of the Previous Advantages of the Mobile Console.

*New and Improved Fiber Sensor and Mobile Console.*

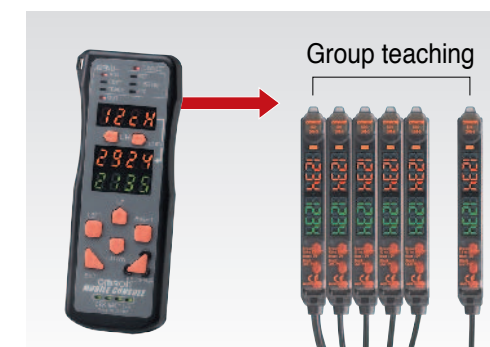
### Settings, teaching, and fine-tuning can be performed at the fiber tip.

The Mobile Console can be used for settings and teaching at the tip of the fiber. Difficult adjustments can be made while checking the workpiece position. Even if the Amplifier and Sensor head are separated during operation, it is still possible to flash the Sensor head and display the amplifier channels.



### With Group Teaching, Teach Multiple Amplifiers Simultaneously.

The tedious teaching that had to be performed separately for each Amplifier can now be performed for several Amplifiers at once using the Mobile Console.



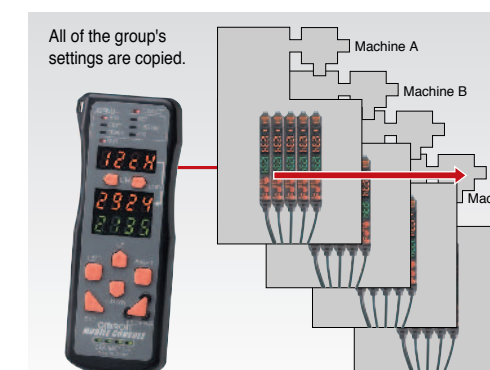
### Copying Settings within the Same Group

Settings such as mode or threshold settings in an Amplifier or bank can be copied to all of the Amplifiers in the same group.



### Copying Settings to Other Groups

The settings for a group of Amplifiers on one machine can be copied to a group of Amplifiers on another machine. (The settings can also be copied to and from banks.)



This document provides information mainly for selecting suitable models. Please read the Instruction Sheet carefully for information that the user must understand and accept before purchase, including information on warranty, limitations of liability, and precautions.

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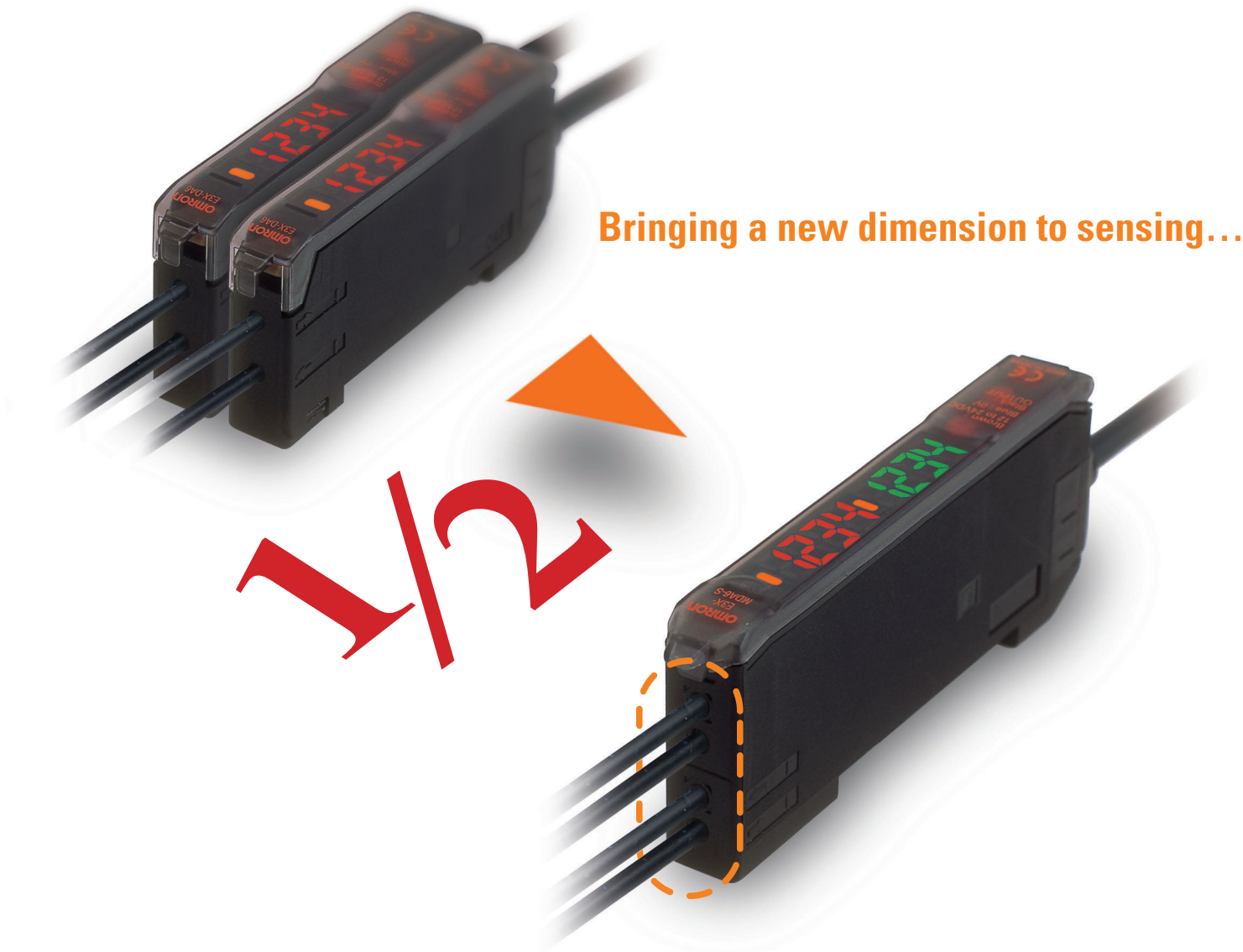
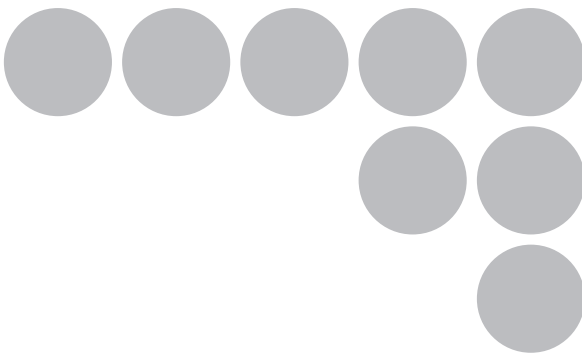
In the interest of product improvement, specifications are subject to change without notice.

**Authorized Distributor:**



# E3X-MDA

## Super Dual Fiber Sensor



Bringing a new dimension to sensing...

...the 2-channel amplifier has arrived.

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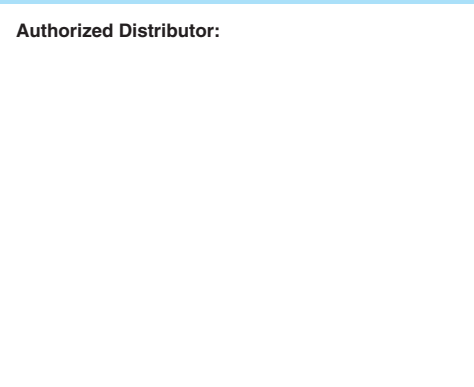
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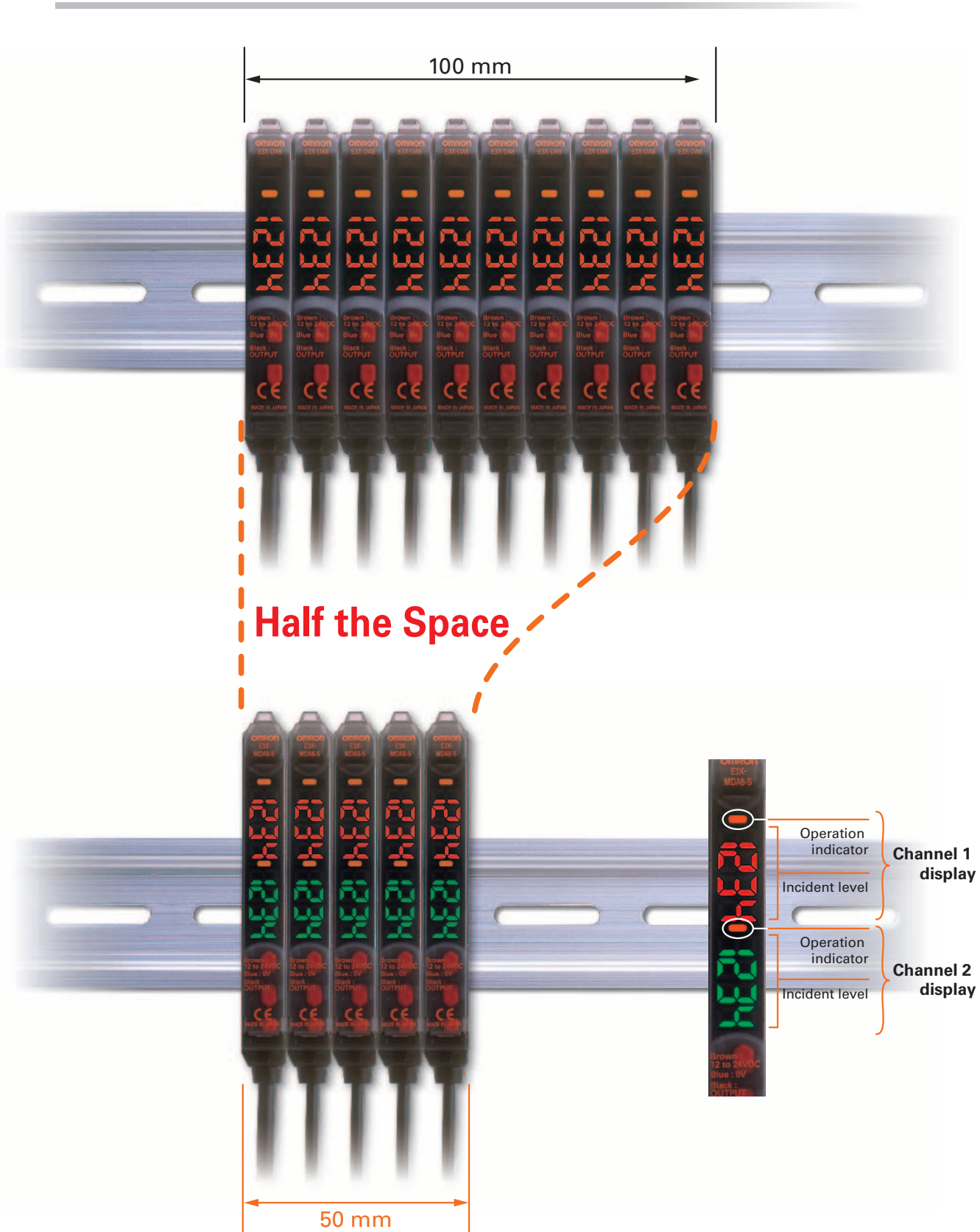
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**Authorized Distributor:**



realizing

Having problems gang-mounting Fiber Sensor Amplifier Units in tight spaces?



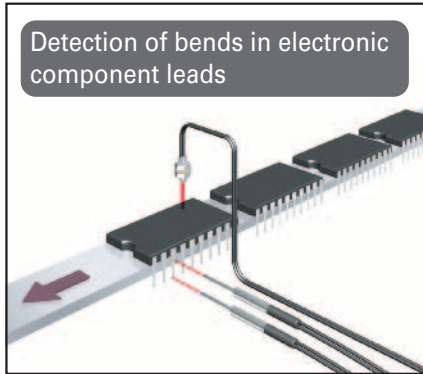
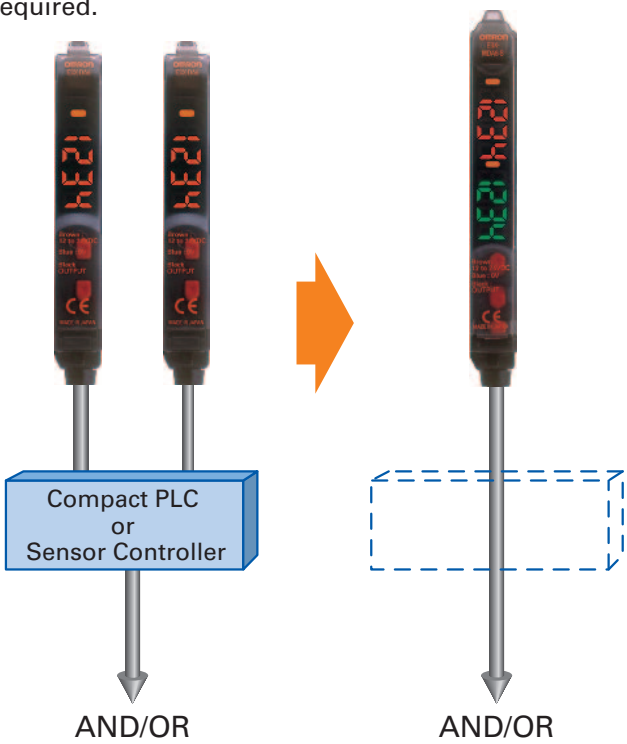
**Slimmest in the industry — 5 mm per channel. Patent pending**

Two Amplifiers squeezed into a body of width 10 mm.  
Remarkable space saving of approx. 50%.  
Power saving of approx. 40%.  
(Savings per channel compared with existing products.)



**Equipped with AND/OR control output. Patent pending**

Two types of control output possible with one Sensor (AND/OR).  
Compact PLCs and Sensor Controllers no longer required.



**Flexible control with Mobile Console.**

The Mobile Console, which can also be used with the E3X-DA-S, allows handheld operation of the Fiber Head even when it is separated from the Amplifier.



An impressive lineup of Digital Amplifiers to handle a wide variety of applications.

The Digital Amplifiers achieve a maximum response time of 48  $\mu$ s.

### Standard Models

**Models with Cables** (E3X-DA11-S)

**Models with Connectors**  
Equipped with OMRON's own easy-wiring connector. (E3X-DA6-S)

### Advanced Models

**Twin-output Models**  
Two threshold values can be set. Judgement and self-diagnosis output available. (Representative model: E3X-DA6TW-S)

**External-input Models**  
The Sensor can be controlled externally. Equipped with counting function. (Representative model: E3X-DA6RM-S)

A wide variety of color variations available. Equipped with APC circuit for more stable detection.

### Mark-detecting Models and Infrared Models

**Models with Green LED** (Representative model: E3X-DAG6-S)

**Models with Blue LED** (Representative model: E3X-DAB6-S)

**Infrared Models** Available Soon (Representative model: E3X-DAH6-S)

**NEW** Two Amplifiers squeezed into a single, compact Unit. AND/OR output available.

### 2-channel Models

(Representative model: E3X-MDA6)

Maximize Fiber Amplifier potential using remote setting, copying, and other functionality.

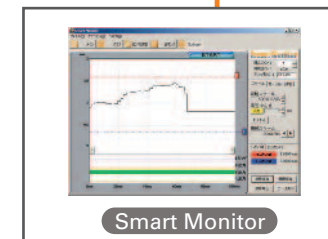
### Mobile Console

(E3X-MC11-S)

A host of remarkable functions inside a compact body.  
A complete lineup of Sensor Heads to handle an even wider range of applications.  
This is the platform for OMRON's sensing technology.

### Linear Platform

High-resolution sensing using laser and magnetic technology



### Laser-type Smart Sensors ZX-L Series



### Inductive Displacement Smart Sensors ZX-E Series



### ON/OFF Platform

A common platform for Fiber Sensors and Sensors with Separate Amplifiers



### Digital Fiber Sensors E3X-DA-S/MDA Series



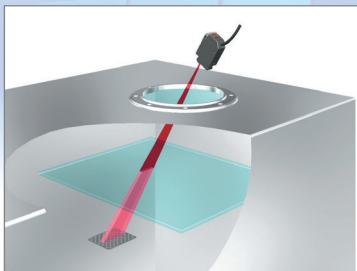
### Laser-type Photoelectric Sensors with Separate Amplifiers E3C-LDA Series



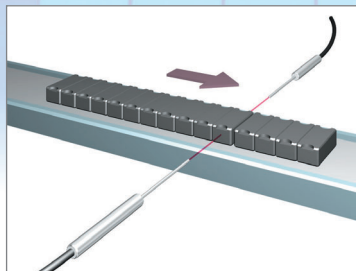
## New Models That Counteract the Decline in Operating Rates Caused by Dust and Dirt

### Advanced ATC Models

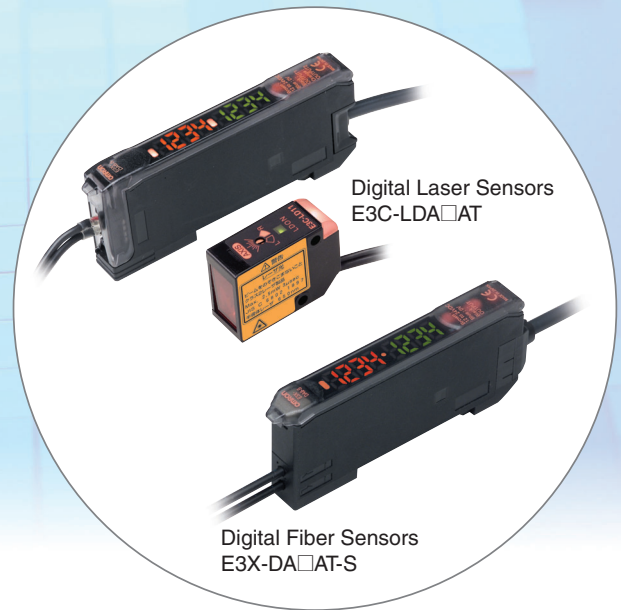
- **Active Threshold Control (ATC)**  
Automatically adjusts the threshold value.
- **ATC Error Output (Selectable Function)**  
Provides an error output when ATC does not adjust the threshold value.
- **Alarm Output (Selectable Function)**  
Provides an alarm when maintenance is required.



Glass substrate detection through view ports



Chip component detection



Digital Laser Sensors  
E3C-LDA□AT

Digital Fiber Sensors  
E3X-DA□AT-S

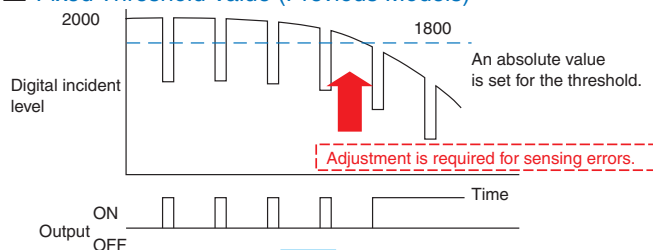
## Technology

### Intelligently Solve Problems Onsite with ATC Function

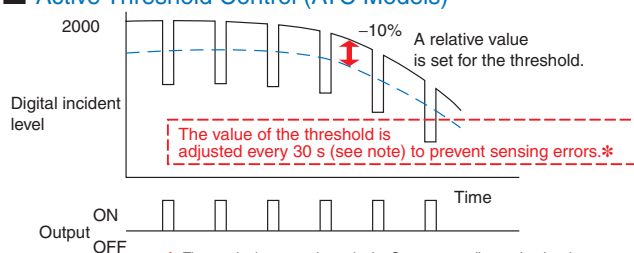
A unique OMRON algorithm has been used that can determine whether changes have been caused by dust and dirt or by differences in workpieces.

The threshold value is automatically adjusted by the Sensor according to changes to increase equipment operating rates by reducing sensing errors. This is particularly true in applications requiring high-precision detection.

#### ■ Fixed Threshold Value (Previous Models)



#### ■ Active Threshold Control (ATC Models)



\* The monitoring range is set in the Sensor according to the threshold value. The threshold value is adjusted according to changes within this range.

### The *DINC* Engine for High-performance Sensing

OMRON's many years of accumulated sensing technology and high-speed digital processing techniques merge to meet onsite needs. Our goal is high-performance sensing that provides easy, reliable application.

#### Reliable Detection of Small Workpieces

12-bit A/D converter (4,000 resolution),  
high-speed response of 48  $\mu$ s (Fiber Sensors)

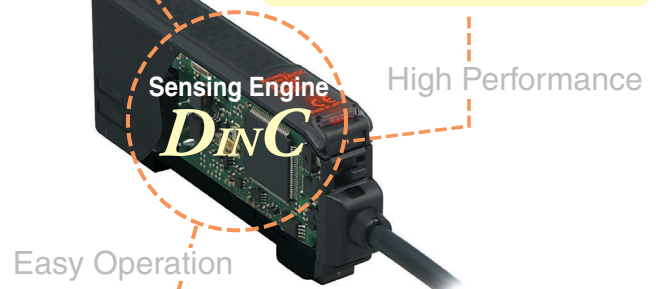
Fine Sensing

**Automatic Compensation for External Changes**

Active Threshold Control (ATC)

**Consistent Emitter Power**

Auto Power Control (APC)



Easy Operation

**Easy-to-read Displays Even at a Distance**

Intelligent Display

**Eliminates the Need for Distance Mode Settings**

Power Tuning

## Ordering Information

### Digital Fiber Sensor

| Type             | Appearance                                                                        | Functions                        | Model        |              |
|------------------|-----------------------------------------------------------------------------------|----------------------------------|--------------|--------------|
|                  |                                                                                   |                                  | NPN output   | PNP output   |
| Pre-wired Models |  | ATC                              | E3X-DA11AT-S | E3X-DA41AT-S |
| Connector Models |  | ATC error output<br>Alarm output | E3X-DA6AT-S  | E3X-DA8AT-S  |

### Separate Digital Amplifier Laser Sensors

| Type             | Appearance                                                                        | Functions                        | Model       |             |
|------------------|-----------------------------------------------------------------------------------|----------------------------------|-------------|-------------|
|                  |                                                                                   |                                  | NPN output  | PNP output  |
| Pre-wired Models |  | ATC                              | E3C-LDA11AT | E3C-LDA41AT |
| Connector Models |  | ATC error output<br>Alarm output | E3C-LDA6AT  | E3C-LDA8AT  |

## Ratings and Specifications

| Item          |                       | Type | Model                                                                                | Digital Fiber Sensors |                          | Separate Digital Amplifier Laser Sensors |            |
|---------------|-----------------------|------|--------------------------------------------------------------------------------------|-----------------------|--------------------------|------------------------------------------|------------|
|               |                       |      | NPN output                                                                           | E3X-DA11AT-S          | E3X-DA6AT-S              | E3C-LDA11AT                              | E3C-LDA6AT |
|               |                       |      | PNP output                                                                           | E3X-DA41AT-S          | E3X-DA8AT-S              | E3C-LDA41AT                              | E3C-LDA8AT |
| Response time | Super-high-speed mode |      | Operate or Reset: 80 μs                                                              |                       | Operate or Reset: 100 μs |                                          |            |
|               | High-speed mode       |      | Operate or Reset: 250 μs                                                             |                       | Operate or Reset: 250 μs |                                          |            |
|               | Standard mode         |      | Operate or Reset: 1 ms                                                               |                       |                          |                                          |            |
|               | High-resolution mode  |      | Operate or Reset: 4 ms                                                               |                       |                          |                                          |            |
| Functions     | ATC                   |      | Active threshold control (used for output 1)                                         |                       |                          |                                          |            |
|               | I/O settings          |      | The signal that is output can be selected (used for output 2): ATC error output      |                       |                          |                                          |            |
|               | Startup operation     |      | The operation when power is turned ON can be selected: No operation, PT, or PT + ATC |                       |                          |                                          |            |

Note: Basic performance is the same as the Advanced Twin-output Sensors. Refer to E3C-LDA Datasheet (E338) and E3X-DA-S Datasheet (E336) for details. Only differences from the Advanced Twin-output Sensors have been given above.

This document provides information mainly for selecting suitable models. Please read the *Instruction Sheet* carefully for information that the user must understand and accept before purchase, including information on warranty, limitations of liability, and precautions.

**Note: Do not use this document to operate the Unit.**

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### Authorized Distributor:

Note: Specifications subject to change without notice.

## New Models That Eliminate Worries about Digital Sensor Setting Mistakes

### Limited-function Models: Simple and Easy

- One-key, one-operation concept for easy operation.
- Threshold value setting with direct operation performed while monitoring the detection status.
- Lock function to prevent operating errors through unintentional operation.

### Easy and Reliable Digital Sensors with the Same Detection Performance as Previous Models



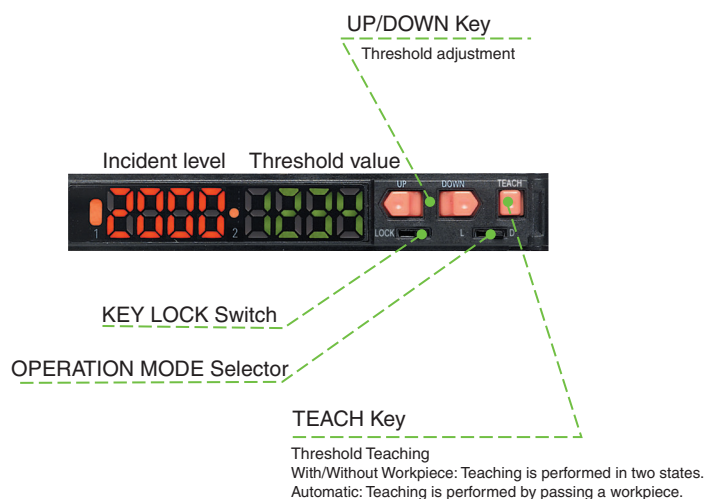
Digital Fiber Sensors  
E3X-DA□SE-S

## Technology

### The Simplest Digital Fiber Sensor

Some people think that digital sensors with their advanced performance are difficult to use, so we went back to the drawing board to rethink performance and functions.

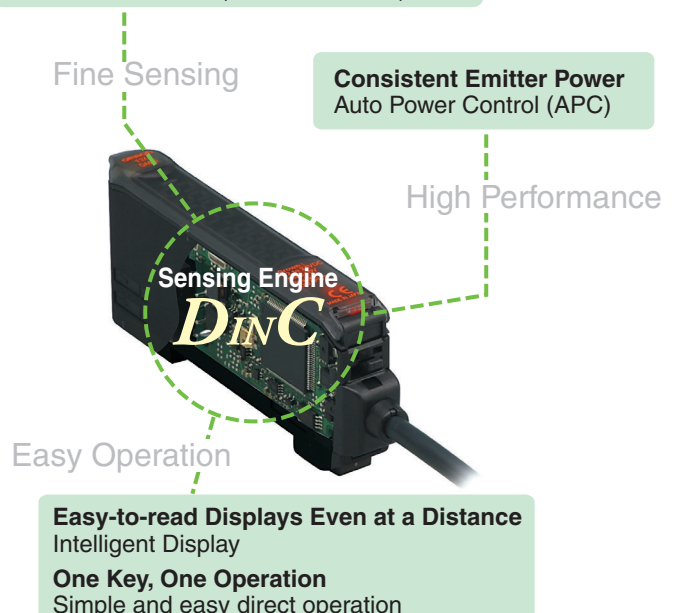
Without changing basic functions like APC and digital displays, OMRON created a Digital Fiber Sensor that can be used as easily as the familiar sensors with sensitivity adjustment knobs.



### The *D<sub>INC</sub>* Engine for High-performance Sensing

OMRON's many years of accumulated sensing technology and high-speed digital processing techniques merge to meet onsite needs. Our goal is high-performance sensing that provides easy, reliable application.

#### Reliable Detection of Small Workpieces 12-bit A/D converter (4,000 resolution)



## Ordering Information

| Type             | Appearance                                                                        | Model        |              |
|------------------|-----------------------------------------------------------------------------------|--------------|--------------|
|                  |                                                                                   | NPN output   | PNP output   |
| Pre-wired Models |  | E3X-DA11SE-S | E3X-DA41SE-S |
| Connector Models |  | E3X-DA6SE-S  | E3X-DA8SE-S  |

## Ratings and Specifications

| Item                      |                                | Model                                                                                                          | Digital Fiber Sensor |             |
|---------------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------|-------------|
|                           |                                | NPN output                                                                                                     | E3X-DA11SE-S         | E3X-DA6SE-S |
|                           |                                | PNP output                                                                                                     | E3X-DA41SE-S         | E3X-DA8SE-S |
| Light source (wavelength) |                                | Red LED (650 nm)                                                                                               |                      |             |
| Power supply voltage      |                                | 12 to 24 VDC ±10%, ripple (p-p): 10% max.                                                                      |                      |             |
| Power consumption         |                                | 960 mW max. (Power supply: 24 V, Current consumption: 40 mA max.)                                              |                      |             |
| Control output            |                                | Load power supply: 26.4 VDC max., Open-collector output, Load current: 50 mA max. (Residual voltage: 1 V max.) |                      |             |
| Protection circuits       |                                | Power supply reverse polarity protection, Output short-circuit protection                                      |                      |             |
| Response time             |                                | Operate or Reset: 1 ms                                                                                         |                      |             |
| Sensitivity setting       |                                | Teaching or manual adjustment                                                                                  |                      |             |
| Functions                 | Auto power control             | High-speed control method for emission current                                                                 |                      |             |
|                           | Mutual interference prevention | Optical communications sync, possible for up to 10 Units                                                       |                      |             |
| Indicators                |                                | Operation indicator (orange)                                                                                   |                      |             |
| Digital displays          |                                | Twin digital displays (incident level + threshold)                                                             |                      |             |

Note: Basic performance is the same as the E3X-DA-S Series. Refer to the E3X-DA-S Datasheet (E336) for details.

This document provides information mainly for selecting suitable models. Please read the *Instruction Sheet* carefully for information that the user must understand and accept before purchase, including information on warranty, limitations of liability, and precautions.

**Note: Do not use this document to operate the Unit.**

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### Authorized Distributor:

Note: Specifications subject to change without notice.

## OMRON's Next-generation Platform for a Wide Range of Detection

- Features a Power Tuning function that optimizes light reception at the press of a button.
- Combines newly developed 4-element LEDs with an APC circuit to ensure stable, long-term LED performance.
- Utilizes OMRON's innovative wire-saving connector.
- 2-channel models achieve the thinnest profile in the industry, at only 5 mm per channel.
- 2-channel models also offer AND/OR control output.



Be sure to read *Safety Precautions* on page 15.



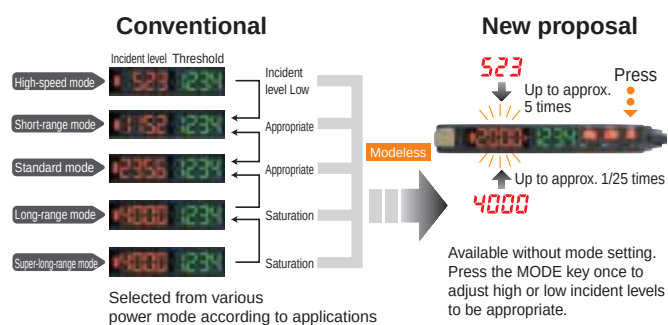
### Features

#### Equipped with an Industry's First Power Tuning (Optimum Light Setting) Function

The E3X-DA-S/MDA features a Power Tuning function that optimizes power at the press of a button.

This function easily but securely resolves saturation due to short sensing distances or insufficient incident light due to long sensing distances.

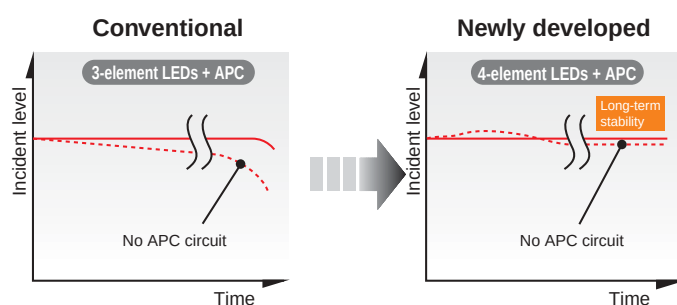
In addition, the response speed does not change as mode selection has tuned the power.



#### Adoption of Newly Developed 4-Element LEDs and an APC (Auto Power Control) Circuit Achieves Long-term Reliable Detection at the Highest Level in the Industry

The long-term reliable detection at the highest level in the industry is achieved with the innovative APC circuit whose performance is proved by E3X-DA-N series and the newly developed high-power LEDs (4-element type) to ensure super stable, long-term LED performance.

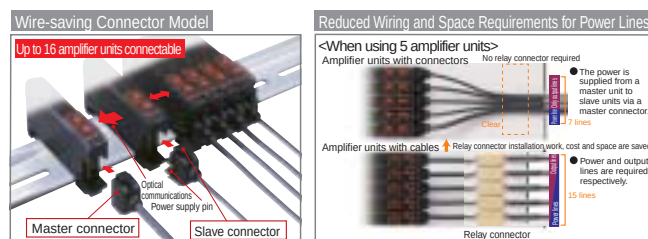
Stable performance is always available without the ON/OFF setting of an APC circuit.



#### OMRON's Innovative Wire-saving Connector Inherited from the E3X-DA-N

The amplifier units with connectors supply the power to slave connectors via a master connector. This offers three following advantages.

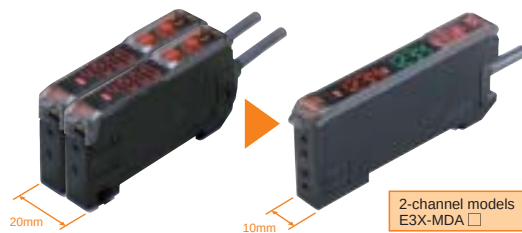
1. Greatly reduced wiring work
2. Improved space usability due to the unnecessary of relay connectors
3. Simple stock management due to the unnecessary of distinction between master and slave for amplifiers



## Models available for a wide variety of applications at manufacturing sites

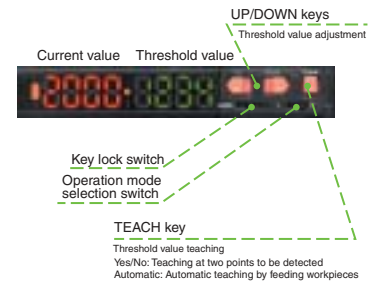
### Industry Leading Two Amplifiers Loaded in a Small Body . . . . 2-channel models

Two amplifiers are loaded in a 10 mm-wide body. Space usability can be approximately doubled. In addition, approximately 40% of the energy can be saved. (compared to the value per channel of the former model)



### Simpler Digital Fiber Sensors . . . . Simple & Easy Single-function Models

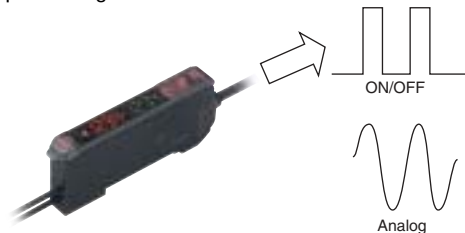
Required performance and functions have been reviewed from basic points to improve high-performance but hard-to-use digital models. Digital fiber sensors, used in the sense as if using volume type sensors, are added to the basic functions such as an APC function and digital display.



### High-speed and High-resolution Analog Output Supports Wide Variety of Applications . . . .Advanced Analog Output Models

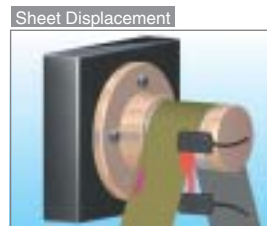
#### Analog Control Output

The voltage in the range of 1 to 5 V is output according to the incident level (digital display). Wide variety of applications is possible including positioning control or difference detection with multiple levels.



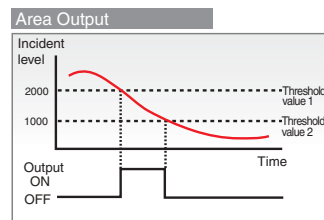
#### High-speed and High Resolution

Detection modes can be switched in accordance with applications. High-speed response of 80  $\mu$ s (super-high-speed mode) supports the positioning controls that require high-speed control.



### Area Output Function Area Judgment Is Possible . . . .Advanced, Twin-output Models

Only one sensor is enough for area judgment for height or others that has required multiple sensors. Setting two threshold values allows easy output inside and outside range.



### Remote Input Function Sensors Controlled from Outside . . . .Advanced, External-input Models

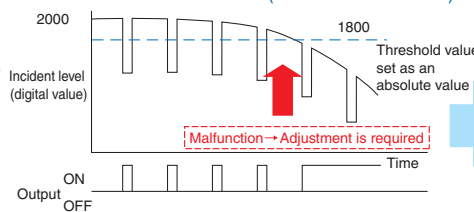
Remote settings for teaching/power tuning/light OFF are possible with input signals. The remote input function meets the diversifying demands such as remote settings made for frequent teaching due to level change corresponding to workpiece change or remote operation check of sensors before operation.



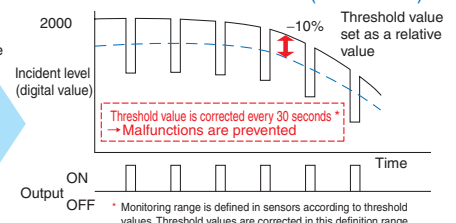
### Equipped with an Industry's First ATC Function that Resolves Problems at Manufacturing Sites . . . .Advanced ATC Models

OMRON's unique algorithm is equipped to distinguish dust or dirt and the change of workpieces. Automatic correction of threshold values by sensors in accordance with changes prevents malfunctions and improves the operating rates of machines. The ATC function is especially effective for the applications that require high-resolution detection.

#### Fixed Threshold Value Method (Conventional Models)



#### Corrected Threshold Value Method (ATC Models)



\* Monitoring range is defined in sensors according to threshold values. Threshold values are corrected in this definition range.

## Ordering Information

### Amplifier Units

Amplifier Units with Cables (2 m) [Refer to *Dimensions* on page 17.]

| Item                                                    |                       | Appearance                                                                        | Functions                                           | Model           |                 |
|---------------------------------------------------------|-----------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------|-----------------|-----------------|
|                                                         |                       |                                                                                   |                                                     | NPN output      | PNP output      |
| Single-function models                                  |                       |  | ---                                                 | E3X-DA11SE-S 2M | E3X-DA41SE-S 2M |
| Standard models                                         |                       |                                                                                   | Timer, Response speed change                        | E3X-DA11-S 2M   | E3X-DA41-S 2M   |
| Mark-detecting models<br>(multiple color light sources) | Green LED             |                                                                                   |                                                     | E3X-DAG11-S 2M  | E3X-DAG41-S 2M  |
|                                                         | Blue LED              |                                                                                   |                                                     | E3X-DAB11-S 2M  | E3X-DAB41-S 2M  |
|                                                         | Infrared LED          |                                                                                   |                                                     | E3X-DAH11-S 2M  | E3X-DAH41-S 2M  |
| Advanced models                                         | External-input models |                                                                                   | Remote setting, counter, differential operation     | E3X-DA11RM-S 2M | E3X-DA41RM-S 2M |
|                                                         | Twin-output models    |                                                                                   | Area output, self-diagnosis, differential operation | E3X-DA11TW-S 2M | E3X-DA41TW-S 2M |
|                                                         | ATC function models   |                                                                                   | ATC (Threshold value automatic correction)          | E3X-DA11AT-S 2M | E3X-DA41AT-S 2M |
|                                                         | Analog output models  |                                                                                   | Analog output models                                | E3X-DA11AN-S 2M | E3X-DA41AN-S 2M |
| 2-channel models                                        |                       |  | AND/OR output                                       | E3X-MDA11 2M    | E3X-MDA41 2M    |

### Amplifier Units with Connectors

| Item                                                    |                       | Appearance                                                                          | Functions                                           | Model       |             |
|---------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------|-------------|-------------|
|                                                         |                       |                                                                                     |                                                     | NPN output  | PNP output  |
| Single-function models                                  |                       |   | ---                                                 | E3X-DA6SE-S | E3X-DA8SE-S |
| Standard models                                         |                       |                                                                                     | Timer, Response speed change                        | E3X-DA6-S   | E3X-DA8-S   |
| Mark-detecting models<br>(multiple color light sources) | Green LED             |                                                                                     |                                                     | E3X-DAG6-S  | E3X-DAG8-S  |
|                                                         | Blue LED              |                                                                                     |                                                     | E3X-DAB6-S  | E3X-DAB8-S  |
|                                                         | Infrared LED          |                                                                                     |                                                     | E3X-DAH6-S  | E3X-DAH8-S  |
| Advanced models                                         | External-input models |                                                                                     | Remote setting, counter, differential operation     | E3X-DA6RM-S | E3X-DA8RM-S |
|                                                         | Twin-output models    |                                                                                     | Area output, self-diagnosis, differential operation | E3X-DA6TW-S | E3X-DA8TW-S |
|                                                         | ATC function models   |                                                                                     | ATC (Threshold value automatic correction)          | E3X-DA6AT-S | E3X-DA8AT-S |
| 2-channel models                                        |                       |  | AND/OR output                                       | E3X-MDA6    | E3X-MDA8    |

## Ratings and Specifications

|                        |                       | Light source | Response time  | Control output/input                 |               |               | Functions    |       |                         |                        |         |               |
|------------------------|-----------------------|--------------|----------------|--------------------------------------|---------------|---------------|--------------|-------|-------------------------|------------------------|---------|---------------|
|                        |                       |              |                | ON/OFF output                        | Input         | Analog output | Power tuning | Timer | Interference prevention | Differential detection | counter | ATC           |
| Single-function models |                       | Red LED      | 1 ms           | Only main                            | ---           | ---           | ---          | ---   | ○                       | ---                    | ---     | ---           |
| Standard models        |                       |              | 50 μs to 4 ms  |                                      |               |               | ○            | ○     |                         |                        |         |               |
| Mark-detecting models  | E3X-DA□G-S            | Green LED    | 50 μs to 4 ms  | Only main                            | ---           | ---           | ○            | ○     | ○                       | ---                    | ---     | ---           |
|                        | 3X-DA□B-S             | Blue LED     |                |                                      |               |               |              |       |                         |                        |         |               |
|                        | E3X-DA□H-S            | Infrared LED |                |                                      |               |               |              |       |                         |                        |         |               |
| Ad-<br>vanced models   | Twin-output models    | Red LED      | 50 μs to 4 ms  | Only main                            | ○<br>(1 line) | ---           | ○            | ○     | ○                       | ○                      | ○       | ---           |
|                        | External-input models |              | 80 μs to 4 ms  | Main + sub<br>(2 lines)              |               |               |              |       |                         |                        | ---     |               |
|                        | ATC function models   |              | 130 μs to 4 ms |                                      | Only main     |               |              |       |                         |                        |         | ○<br>(1 line) |
|                        | Analog output         |              | 80 μs to 4 ms  |                                      |               |               |              |       |                         |                        |         |               |
| 2-channel models       |                       | Red LED      | 130 μs to 4 ms | Main + main<br>(2 independent lines) | ---           | ---           | ○            | ○     | ○                       | ---                    | ---     | ---           |

## Amplifier Unit Connectors (Order Separately)

Note: Protector seals are provided as accessories. [\[Refer to Dimensions on page 19.\]](#)

| Item             | Appearance                                                                        | Cable length | No. of conductors | Model    |
|------------------|-----------------------------------------------------------------------------------|--------------|-------------------|----------|
| Master Connector |  | 2 m          | 3                 | E3X-CN11 |
|                  |                                                                                   |              | 4                 | E3X-CN21 |
| Slave Connector  |  |              | 1                 | E3X-CN12 |
|                  |                                                                                   |              | 2                 | E3X-CN22 |

### Combining Amplifier Units and Connectors

Amplifier Units and Connectors are sold separately. Refer to the following tables when placing an order.

| Amplifier Unit                                          |             |             | Applicable Connector (Order Separately) |                 |
|---------------------------------------------------------|-------------|-------------|-----------------------------------------|-----------------|
| Model                                                   | NPN output  | PNP output  | Master Connector                        | Slave Connector |
| Single-function models                                  | E3X-DA6SE-S | E3X-DA8SE-S | E3X-CN11                                | E3X-CN12        |
| Standard models                                         | E3X-DA6-S   | E3X-DA8-S   |                                         |                 |
| Mark-detecting models<br>(multiple color light sources) | E3X-DAG6-S  | E3X-DAG8-S  |                                         |                 |
|                                                         | E3X-DAB6-S  | E3X-DAB8-S  |                                         |                 |
|                                                         | E3X-DAH6-S  | E3X-DAH8-S  | E3X-CN21                                | E3X-CN22        |
| Advanced models                                         | E3X-DA6TW-S | E3X-DA8TW-S |                                         |                 |
|                                                         | E3X-DA6RM-S | E3X-DA8RM-S |                                         |                 |
|                                                         | E3X-DA6AT-S | E3X-DA8AT-S |                                         |                 |
| 2-channel models                                        | E3X-MDA6    | E3X-MDA8    |                                         |                 |

### When Using 5 Amplifier Units

|                           |   |                                         |
|---------------------------|---|-----------------------------------------|
| Amplifier Units (5 Units) | + | 1 Master Connector + 4 Slave Connectors |
|---------------------------|---|-----------------------------------------|

## Mobile Console (Order Separately) [\[Refer to Dimensions on page 20.\]](#)

| Appearance                                                                          | Model                                 | Remarks                                                                 |
|-------------------------------------------------------------------------------------|---------------------------------------|-------------------------------------------------------------------------|
|  | E3X-MC11-SV2<br>(model number of set) | Mobile Console with Head, Cable, and AC adapter provided as accessories |
|  | E3X-MC11-C1-SV2                       | Mobile Console                                                          |
|  | E3X-MC11-H1                           | Head                                                                    |
|  | E39-Z12-1                             | Cable (1.5 m)                                                           |

Note: Use the E3X-MC11-SV2 Mobile Console for the E3X-DA-S/MDA-series Amplifier Units.

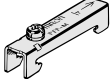
The E3X-MC11-SV2 is an upgraded version of the E3X-MC11-S that is fully interchangeable with the older model.

## Accessories (Order Separately)

### Mounting Bracket [\[Refer to E39-L/F39-L/E39-S/E39-R.\]](#)

| Appearance                                                                          | Model    | Quantity |
|-------------------------------------------------------------------------------------|----------|----------|
|  | E39-L143 | 1        |

### End Plate [\[Refer to PFP-□.\]](#)

| Appearance                                                                          | Model | Quantity |
|-------------------------------------------------------------------------------------|-------|----------|
|  | PFP-M | 1        |

## Ratings and Specifications

Refer to pages 17 to 20 for dimensions.

## Amplifier Units

| Type                                 |                                | Single-function models                                                                                                                                                                                         | Standard models                                                                                                                                                                                                          | Mark-detecting models (multiple color light sources)          |                   |                      |
|--------------------------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------|----------------------|
|                                      |                                |                                                                                                                                                                                                                |                                                                                                                                                                                                                          | Green LED                                                     | Blue LED          | Infrared LED         |
| Item                                 | Model                          | E3X-DA□SE-S                                                                                                                                                                                                    | E3X-DA□-S                                                                                                                                                                                                                | E3X-DAG□-S                                                    | E3X-DAB□-S        | E3X-DAH□-S           |
| Light source (wavelength)            |                                | Red LED (635 nm)                                                                                                                                                                                               |                                                                                                                                                                                                                          | Green LED (525 nm)                                            | Blue LED (470 nm) | Infrared LED (870nm) |
| 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 output                       |                                | Load power supply voltage: 26.4 VDC; NPN/PNP open collector; load current: 50 mA max.; residual voltage: 1 V max.                                                                                              |                                                                                                                                                                                                                          |                                                               |                   |                      |
| Protection circuits                  |                                | Reverse polarity for power supply connection, output short-circuit                                                                                                                                             |                                                                                                                                                                                                                          |                                                               |                   |                      |
| Re-sponse time                       | Super-high-speed mode          | ---                                                                                                                                                                                                            | Operate: 48 μs, reset: 50 μs *1, *2                                                                                                                                                                                      |                                                               |                   |                      |
|                                      | High-speed mode                | ---                                                                                                                                                                                                            | Operate/reset: 250 μs                                                                                                                                                                                                    |                                                               |                   |                      |
|                                      | Standard mode                  | Operate or reset: 1 ms                                                                                                                                                                                         |                                                                                                                                                                                                                          |                                                               |                   |                      |
|                                      | High-resolution mode           | ---                                                                                                                                                                                                            | Operate or reset: 4 ms                                                                                                                                                                                                   |                                                               |                   |                      |
| Sensitivity setting                  |                                | Teaching or manual method                                                                                                                                                                                      |                                                                                                                                                                                                                          |                                                               |                   |                      |
| Func-tions                           | Power tuning                   | ---                                                                                                                                                                                                            | Light emission power and reception gain, digital control method                                                                                                                                                          |                                                               |                   |                      |
|                                      | Timer function                 | ---                                                                                                                                                                                                            | Select from OFF-delay, ON-delay, or one-shot timer.<br>1 ms to 5 s (1 to 20 ms set in 1-ms increments, 20 to 200 ms set in 10-ms increments, 200 ms to 1 s set in 100-ms increments, and 1 to 5 s set in 1 s-increments) |                                                               |                   |                      |
|                                      | Automatic power control (APC)  | High-speed control method for emission current                                                                                                                                                                 |                                                                                                                                                                                                                          |                                                               |                   |                      |
|                                      | Zero-reset                     | ---                                                                                                                                                                                                            | Negative values can be displayed. (Threshold value is shifted.)                                                                                                                                                          |                                                               |                   |                      |
|                                      | Initial reset                  | Settings can be returned to defaults as required.                                                                                                                                                              |                                                                                                                                                                                                                          |                                                               |                   |                      |
|                                      | Mutual interference prevention | Possible for up to 10 Units *3                                                                                                                                                                                 |                                                                                                                                                                                                                          |                                                               |                   |                      |
| Display                              |                                | Operation indicator (orange)                                                                                                                                                                                   |                                                                                                                                                                                                                          | Operation indicator (orange), Power Tuning indicator (orange) |                   |                      |
| Digital display                      |                                | incident level + threshold                                                                                                                                                                                     |                                                                                                                                                                                                                          | Select from incident level + threshold or other 6 patterns    |                   |                      |
| Display orientation                  |                                | ---                                                                                                                                                                                                            |                                                                                                                                                                                                                          | Switching between normal/reversed display is possible.        |                   |                      |
| Ambient illumination (Receiver side) |                                | Incandescent lamp: 10,000 lux max.<br>Sunlight: 20,000 lux max.                                                                                                                                                |                                                                                                                                                                                                                          |                                                               |                   |                      |
| Ambient temperature range            |                                | Operating: Groups of 1 to 2 Amplifiers: -25°C to 55°C<br>Groups of 3 to 10 Amplifiers: -25°C to 50°C<br>Groups of 11 to 16 Amplifiers: -25°C to 45°C<br>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 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                                                                                                                                  |                                                                                                                                                                                                                          |                                                               |                   |                      |
| Degree of protection                 |                                | IEC 60529 IP50 (with Protective Cover attached)                                                                                                                                                                |                                                                                                                                                                                                                          |                                                               |                   |                      |
| Connection method                    |                                | Pre-wired or amplifier unit connector                                                                                                                                                                          |                                                                                                                                                                                                                          |                                                               |                   |                      |
| Weight (packed state)                |                                | Pre-wired model: Approx. 100 g, Amplifier unit connector model: Approx. 55 g                                                                                                                                   |                                                                                                                                                                                                                          |                                                               |                   |                      |
| Materials                            | Case                           | Polybutylene terephthalate (PBT)                                                                                                                                                                               |                                                                                                                                                                                                                          |                                                               |                   |                      |
|                                      | Cover                          | Polycarbonate (PC)                                                                                                                                                                                             |                                                                                                                                                                                                                          |                                                               |                   |                      |
| Accessories                          |                                | Instruction manual                                                                                                                                                                                             |                                                                                                                                                                                                                          |                                                               |                   |                      |

\*1. Communications are disabled if the detection mode is selected during super-high-speed mode, and the communications functions for mutual interference prevention and the Mobile Console will not function.

\*2. PNP output is as follows: Operate: 53 μs, reset: 55 μs.

\*3. Mutual interference prevention can be used for only up to 6 Units if power tuning is enabled.

| Type<br><br>Model         |                                | Advanced models                                                                                                                                                                                                          |                            |                             |                                                                                                                                                                                                                                                                                                                             | 2-channel models                            |
|---------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
|                           |                                | External input mod-els                                                                                                                                                                                                   | Twin output mod-els        | ATC function mod-els        | Analog output mod-els                                                                                                                                                                                                                                                                                                       |                                             |
| Item                      | Model                          | E3X-DA□RM-S                                                                                                                                                                                                              | E3X-DA□TW-S                | E3X-DA□AT-S                 | E3X-DA□AN-S                                                                                                                                                                                                                                                                                                                 | E3X-MDA□                                    |
| Light source (wavelength) |                                | Red LED (635 nm)                                                                                                                                                                                                         |                            |                             |                                                                                                                                                                                                                                                                                                                             |                                             |
| Power supply voltage      |                                | 12 to 24 VDC ±10%, ripple (p-p) 10% max.                                                                                                                                                                                 |                            |                             |                                                                                                                                                                                                                                                                                                                             |                                             |
| Power consumption         |                                | 1,080 mW max. (current consumption: 45 mA max. at power supply voltage of 24 VDC)                                                                                                                                        |                            |                             |                                                                                                                                                                                                                                                                                                                             |                                             |
| Control output            | ON/OFF output                  | Load power supply voltage: 26.4 VDC; NPN/PNP open collector; load current: 50 mA max.; residual voltage: 1 V max.                                                                                                        |                            |                             |                                                                                                                                                                                                                                                                                                                             |                                             |
|                           | Analog output                  | ---                                                                                                                                                                                                                      |                            |                             | Control output<br>Voltage output: 1 to 5 VDC<br>(Connection load 10 kΩ min.)<br>Temperature characteristics<br>0.3%F.S./°C<br>Response speed/repeat accuracy<br>Super-high-speed mode:<br>80 μs/1.5%F.S.<br>High-speed mode:<br>250 μs/1.5%F.S.<br>Standard mode:<br>1 ms/1%F.S.<br>High-resolution mode:<br>4 ms/0.75%F.S. | ---                                         |
| Remote control input      |                                | No-voltage input (contact/non-contact) *1                                                                                                                                                                                |                            |                             |                                                                                                                                                                                                                                                                                                                             |                                             |
| Protection circuits       |                                | Reverse polarity for power supply connection, output short-circuit                                                                                                                                                       |                            |                             |                                                                                                                                                                                                                                                                                                                             |                                             |
| Re-sponse time            | Super-high-speed mode          | Operate: 48 μs, reset: 50 μs *2, *3, *4                                                                                                                                                                                  | Operate or reset: 80 μs *2 | Operate or reset: 130 μs *2 | Operate or reset: 80 μs *2                                                                                                                                                                                                                                                                                                  | Operate or reset: 130 μs *2, *5             |
|                           | High-speed mode                | Operate or reset: 250 μs                                                                                                                                                                                                 |                            |                             |                                                                                                                                                                                                                                                                                                                             | Operate or reset: 450 μs                    |
|                           | Standard mode                  | Operate or reset: 1ms                                                                                                                                                                                                    |                            |                             |                                                                                                                                                                                                                                                                                                                             |                                             |
|                           | High-resolution mode           | Operate or reset: 4ms                                                                                                                                                                                                    |                            |                             |                                                                                                                                                                                                                                                                                                                             |                                             |
| Sensitivity setting       |                                | Teaching or manual method                                                                                                                                                                                                |                            |                             |                                                                                                                                                                                                                                                                                                                             |                                             |
| Functions                 | Power tuning                   | Light emission power and reception gain, digital control method                                                                                                                                                          |                            |                             |                                                                                                                                                                                                                                                                                                                             |                                             |
|                           | Differential de-tection        | Switchable between single edge and double edge detection mode<br>Single edge: Can be set to 250 μs, 500 μs, 1 ms, 10 ms, or 100 ms.<br>Double edge: Can be set to 500 μs, 1 ms, 2 ms, 20 ms, or 200 ms.                  |                            |                             | ---                                                                                                                                                                                                                                                                                                                         |                                             |
|                           | Timer function                 | Select from OFF-delay, ON-delay, or one-shot timer.<br>1 ms to 5 s (1 to 20 ms set in 1-ms increments, 20 to 200 ms set in 10-ms increments, 200 ms to 1 s set in 100-ms increments, and 1 to 5 s set in 1 s-increments) |                            |                             |                                                                                                                                                                                                                                                                                                                             |                                             |
|                           | Automatic power control (APC)  | High-speed control method for emission current                                                                                                                                                                           |                            |                             |                                                                                                                                                                                                                                                                                                                             |                                             |
|                           | Zero-reset                     | Negative values can be displayed. (Threshold value is shifted.)                                                                                                                                                          |                            |                             |                                                                                                                                                                                                                                                                                                                             |                                             |
|                           | Initial reset                  | Settings can be returned to defaults as required.                                                                                                                                                                        |                            |                             |                                                                                                                                                                                                                                                                                                                             |                                             |
|                           | Mutual interference prevention | Possible for up to 10 Units *6                                                                                                                                                                                           |                            |                             |                                                                                                                                                                                                                                                                                                                             | Possible for up to 9 Units (18 channels) *7 |
|                           | Counter                        | Switchable between up counter and down counter.<br>Set count:<br>0 to 9,999,999                                                                                                                                          | ---                        |                             |                                                                                                                                                                                                                                                                                                                             |                                             |

\*1. Input Specifications

|     | Contact input (relay or switch)                                                   | Non-contact input (transistor)                                                                          |
|-----|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| NPN | ON: Shorted to 0 V (sourcing current: 1 mA max.).<br>OFF: Open or shorted to Vcc. | ON: 1.5 V max. (sourcing current: 1 mA max.).<br>OFF: Vcc - 1.5 V to Vcc (leakage current: 0.1 mA max.) |
| PNP | ON: Shorted to Vcc (sinking current: 3 mA max.).<br>OFF: Open or shorted to 0 V.  | ON: Vcc - 1.5 V to Vcc (sinking current: 3 mA max.).<br>OFF: 1.5 V max. (leakage current: 0.1 mA max.)  |

\*2. Communications are disabled if the detection mode is selected during super-high-speed mode, and the communications functions for mutual interference prevention and the Mobile Console will not function.

\*3. PNP output is as follows: Operate: 53 μs, reset: 55 μs.

\*4. When counter is enabled: 80 μs for operate and reset respectively.

\*5. When differential output is selected for the output setting, the second channel output is 200 μs for operation and reset respectively.

\*6. Mutual interference prevention can be used for only up to 6 Units if power tuning is enabled.

\*7. Mutual interference prevention can be used for up to 5 Units (10 channels) if power tuning is enabled.

| Type                                 |             | Advanced models                                                                                                                                                                                                |                                                                                        |                                                                                                        |                                                               | 2-channel models                                                                                                     |
|--------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
|                                      |             | External input models                                                                                                                                                                                          | Twin-output models                                                                     | ATC function models                                                                                    | Analog output models                                          |                                                                                                                      |
| Item                                 | Model       | E3X-DA□RM-S                                                                                                                                                                                                    | E3X-DA□TW-S                                                                            | E3X-DA□AT-S                                                                                            | E3X-DA□AN-S                                                   | E3X-MDA□                                                                                                             |
| Functions                            | I/O setting | External input setting (Select from teaching, power tuning, zero reset, light OFF, or counter reset.)                                                                                                          | Output setting (Select from channel 2 output, area output, or self-diagnosis.)         | Output setting (Select from channel 2 output, area output, self-diagnosis output, or ATC error output) | Analog output setting (offset voltage adjustable)             | Output setting (Select from channel 2 output, AND, OR, leading edge sync, falling edge sync, or differential output) |
| Display                              |             | Operation indicator (orange), Power Tuning indicator (orange)                                                                                                                                                  | Operation indicator for channel 1 (orange), Operation indicator for channel 2 (orange) |                                                                                                        | Operation indicator (orange), Power Tuning indicator (orange) | Operation indicator for channel 1 (orange), Operation indicator for channel 2 (orange)                               |
| Digital display                      |             | Select from incident level + threshold or other 7 patterns                                                                                                                                                     | Select from incident level + threshold or other 6 patterns                             |                                                                                                        |                                                               | Select from incident level for channel 1 + incident level for channel 2 or other 7 patterns                          |
| Display orientation                  |             | Switching between normal/reversed display is possible.                                                                                                                                                         |                                                                                        |                                                                                                        |                                                               |                                                                                                                      |
| Ambient illumination (Receiver side) |             | Incandescent lamp: 10,000 lux max.<br>Sunlight: 20,000 lux max.                                                                                                                                                |                                                                                        |                                                                                                        |                                                               |                                                                                                                      |
| Ambient temperature range            |             | Operating: Groups of 1 to 2 Amplifiers: -25°C to 55°C<br>Groups of 3 to 10 Amplifiers: -25°C to 50°C<br>Groups of 11 to 16 Amplifiers: -25°C to 45°C<br>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 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                                                                                                                                  |                                                                                        |                                                                                                        |                                                               |                                                                                                                      |
| Degree of protection                 |             | IEC 60529 IP50 (with Protective Cover attached)                                                                                                                                                                |                                                                                        |                                                                                                        |                                                               |                                                                                                                      |
| Connection method                    |             | Pre-wired or amplifier unit connector                                                                                                                                                                          |                                                                                        |                                                                                                        |                                                               |                                                                                                                      |
| Weight (packed state)                |             | Pre-wired model: Approx. 100 g, Amplifier unit connector model: Approx. 55 g                                                                                                                                   |                                                                                        |                                                                                                        |                                                               |                                                                                                                      |
| Materials                            | Case        | Polybutylene terephthalate (PBT)                                                                                                                                                                               |                                                                                        |                                                                                                        |                                                               |                                                                                                                      |
|                                      | Cover       | Polycarbonate (PC)                                                                                                                                                                                             |                                                                                        |                                                                                                        |                                                               |                                                                                                                      |
| Accessories                          |             | Instruction manual                                                                                                                                                                                             |                                                                                        |                                                                                                        |                                                               |                                                                                                                      |

### Amplifier Unit Connectors

| Item                  | Model    | E3X-CN11/21/22                                                                                                                                                                        | E3X-CN12     |
|-----------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Rated current         |          | 2.5 A                                                                                                                                                                                 |              |
| Rated voltage         |          | 50 V                                                                                                                                                                                  |              |
| Contact resistance    |          | 20 mΩ max. (20 mVDC max., 100 mA max.)<br>(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<br>(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                                                                                                                                                                          | Approx. 25 g |

### Mobile Console

| Item                                                                             | Model | E3X-MC11-SV2                              |
|----------------------------------------------------------------------------------|-------|-------------------------------------------|
| Applicable Sensors                                                               |       | E3X-DA-S<br>E3X-MDA<br>E3C-LDA<br>E2C-EDA |
| Power supply voltage                                                             |       | Charged with AC adapter                   |
| Connection method                                                                |       | Connected via adapter                     |
| Weight (packed state)                                                            |       | Approx. 580 g (Console only: 120 g)       |
| Refer to <i>Instruction Manual</i> provided with the Mobile Console for details. |       |                                           |

# Sensing Distance Through-beam Models

(Unit: mm)

| Type                |                                |                                                        | Model | E3X-DA□-S            |               |                 |                       | E3X-MDA□             |               |                 |                       |
|---------------------|--------------------------------|--------------------------------------------------------|-------|----------------------|---------------|-----------------|-----------------------|----------------------|---------------|-----------------|-----------------------|
|                     |                                |                                                        |       | High-resolution mode | Standard mode | High-speed mode | Super-high-speed mode | High-resolution mode | Standard mode | High-speed mode | Super-high-speed mode |
| Standard models     | Flexible (new standard)        | E32-T11R/E32-T12R/E32-T15XR/E32-TC200BR(B4R)           |       | 700                  | 530           | 350             | 140                   | 450                  | 350           | 230             | 140                   |
|                     |                                | E32-T14LR/E32-T15YR/E32-T15ZR                          |       | 270                  | 210           | 130             | 50                    | 170                  | 130           | 85              | 50                    |
|                     |                                | E32-T21R/E32-T22R/E32-T222R/E32-T25XR/E32-TC200FR(F4R) |       | 160                  | 130           | 75              | 30                    | 100                  | 75            | 50              | 30                    |
|                     |                                | E32-T24R/E32-T25YR/E32-T25ZR                           |       | 60                   | 50            | 25              | 10                    | 35                   | 27            | 18              | 10                    |
|                     | Standard                       | E32-TC200/E32-T12/E32-T15X/E32-TC200B(B4)              |       | 1,000                | 760           | 500             | 200                   | 650                  | 500           | 330             | 200                   |
|                     |                                | E32-T14L/E32-T15Y/E32-T15Z                             |       | 600                  | 460           | 300             | 120                   | 390                  | 300           | 200             | 120                   |
|                     |                                | E32-TC200A                                             |       | 900                  | 680           | 450             | 180                   | 580                  | 450           | 300             | 180                   |
|                     |                                | E32-TC200E/E32-T22/E32-T222/E32-T25X/E32-TC200F(F4)    |       | 270                  | 220           | 125             | 50                    | 170                  | 130           | 85              | 50                    |
|                     | Break-resistant                | E32-T24/E32-T25Y/E32-T25Z                              |       | 160                  | 130           | 75              | 30                    | 100                  | 70            | 45              | 30                    |
|                     |                                | E32-T11/E32-T12B/E32-T15XB                             |       | 900                  | 680           | 450             | 180                   | 580                  | 450           | 300             | 180                   |
|                     |                                | E32-T21/E32-T221B/E32-T22B                             |       | 240                  | 200           | 110             | 45                    | 150                  | 110           | 70              | 45                    |
|                     | Fluorine coating               | E32-T25XB                                              |       | 180                  | 150           | 85              | 35                    | 125                  | 95            | 60              | 35                    |
|                     |                                | E32-T11U                                               |       | 900                  | 680           | 450             | 180                   | 580                  | 450           | 300             | 180                   |
| Special-beam models | Long-distance, high power      | E32-T17L                                               |       | 20,000*1             | 20,000*1      | 10,000          | 4,000                 | 13,000               | 10,000        | 6,500           | 4,000                 |
|                     |                                | E32-TC200 + E39-F1                                     |       | 4,000*2              | 4,000*2       | 2,600           | 1,500                 | 4,000                | 3,700         | 2,400           | 1,500                 |
|                     |                                | E32-T11R + E39-F1                                      |       | 4,000*2              | 3,700         | 2,400           | 970                   | 3,100                | 2,400         | 1,600           | 970                   |
|                     |                                | E32-T11 + E39-F1                                       |       | 4,000*2              | 3,600         | 2,300           | 930                   | 3,000                | 2,300         | 1,500           | 930                   |
|                     |                                | E32-T14                                                |       | 4,000*2              | 3,400         | 2,250           | 900                   | 2,900                | 2,200         | 1,450           | 900                   |
|                     |                                | E32-T11L/E32-T12L                                      |       | 1,700                | 1,330         | 870             | 350                   | 1,100                | 870           | 580             | 350                   |
|                     |                                | E32-T11L + E39-F2                                      |       | 910                  | 800           | 500             | 180                   | 600                  | 520           | 340             | 180                   |
|                     |                                | E32-T11R + E39-F2                                      |       | 520                  | 400           | 250             | 100                   | 330                  | 260           | 170             | 100                   |
|                     |                                | E32-T11 + E39-F2                                       |       | 820                  | 660           | 430             | 160                   | 530                  | 430           | 280             | 160                   |
|                     | Ultracompact, ultrafine sleeve | E32-T21L/E32-T22L                                      |       | 540                  | 440           | 250             | 100                   | 340                  | 260           | 170             | 100                   |
|                     |                                | E32-T223R                                              |       | 160                  | 130           | 75              | 30                    | 110                  | 85            | 55              | 30                    |
|                     |                                | E32-T33-S5                                             |       | 53                   | 44            | 25              | 10                    | 35                   | 28            | 18              | 10                    |
|                     |                                | E32-T333-S5                                            |       | 12                   | 10            | 6               | 4                     | 8                    | 6             | 5               | 4                     |
|                     | Fine beam                      | E32-T334-S5                                            |       | 6                    | 5             | 3               | 2                     | 4                    | 3             | 2               | 2                     |
|                     |                                | E32-T22S                                               |       | 2,500                | 1,900         | 1,250           | 500                   | 1,600                | 1,250         | 830             | 500                   |
|                     | Area sensing                   | E32-T24S                                               |       | 1,750                | 1,300         | 870             | 350                   | 1,100                | 870           | 580             | 350                   |
|                     |                                | E32-T16PR                                              |       | 1,100                | 840           | 560             | 220                   | 730                  | 560           | 370             | 220                   |
|                     |                                | E32-T16P                                               |       | 1,500                | 1,100         | 750             | 300                   | 970                  | 750           | 500             | 300                   |
|                     |                                | E32-T16JR                                              |       | 980                  | 750           | 480             | 190                   | 600                  | 480           | 320             | 190                   |
|                     |                                | E32-T16J                                               |       | 1,300                | 1,000         | 650             | 260                   | 800                  | 650           | 430             | 260                   |
|                     |                                | E32-T16WR                                              |       | 1,700                | 1,300         | 850             | 340                   | 1,100                | 860           | 570             | 340                   |
|                     |                                | E32-T16W                                               |       | 2,300                | 1,800         | 1,150           | 450                   | 1,400                | 1,100         | 730             | 450                   |
|                     |                                | E32-T16                                                |       | 3,700                | 2,800         | 1,850           | 740                   | 2,400                | 1,800         | 1,200           | 740                   |
|                     |                                | E32-M21                                                |       | 750                  | 610           | 350             | 140                   | 470                  | 360           | 240             | 140                   |

\*1. The optical fiber for the E32-T17L is 10 m long on each side, so the value is 20,000 mm

\*2. The optical fiber is 2 m long on each side, so the sensing distance is 4,000 mm.

| Type                         |                    |                    | Model | E3X-DA□-S            |               |                 |                       | E3X-MDA□             |               |                 |                       |
|------------------------------|--------------------|--------------------|-------|----------------------|---------------|-----------------|-----------------------|----------------------|---------------|-----------------|-----------------------|
|                              |                    |                    |       | High-resolution mode | Standard mode | High-speed mode | Super-high-speed mode | High-resolution mode | Standard mode | High-speed mode | Super-high-speed mode |
| Environment resistant models | Heat-resistant     | E32-T51            |       | 1,000                | 760           | 500             | 200                   | 650                  | 500           | 330             | 200                   |
|                              |                    | E32-T54            |       | 300                  | 230           | 150             | 60                    | 190                  | 150           | 100             | 60                    |
|                              |                    | E32-T81R-S         |       | 360                  | 280           | 180             | 70                    | 230                  | 180           | 120             | 70                    |
|                              |                    | E32-T61-S + E39-F2 |       | 600                  | 450           | 300             | 120                   | 390                  | 300           | 200             | 120                   |
|                              |                    | E32-T61-S + E39-F1 |       | 4,000                | 3,400         | 2,200           | 900                   | 3,000                | 2,200         | 1,450           | 900                   |
|                              |                    | E32-T84S-S         |       | 1,750                | 1,300         | 870             | 350                   | 1,100                | 870           | 570             | 350                   |
|                              |                    | E32-T61-S          |       | 600                  | 450           | 300             | 120                   | 390                  | 300           | 200             | 120                   |
|                              | Chemical resistant | E32-T11F           |       | 2,500                | 2,000         | 1,300           | 520                   | 1,600                | 1,300         | 850             | 520                   |
|                              |                    | E32-T12F           |       | 4,000*               | 3,000         | 2,000           | 800                   | 2,600                | 2,000         | 1,300           | 800                   |
|                              |                    | E32-T14F           |       | 500                  | 400           | 250             | 100                   | 320                  | 250           | 160             | 100                   |
|                              |                    | E32-T51F           |       | 1,800                | 1,400         | 900             | 350                   | 1,190                | 920           | 600             | 350                   |
|                              |                    | E32-T81F-S         |       | 920                  | 700           | 460             | 190                   | 600                  | 460           | 300             | 190                   |
|                              | Vacuum resistant   | E32-T51V           |       | 260                  | 200           | 130             | 50                    | 170                  | 130           | 85              | 50                    |
|                              |                    | E32-T51V + E39-F1V |       | 1,350                | 1,000         | 680             | 260                   | 850                  | 650           | 430             | 260                   |
|                              |                    | E32-T54V           |       | 210                  | 130           | 100             | 35                    | 110                  | 85            | 55              | 35                    |
|                              |                    | E32-T54V + E39-F1V |       | 660                  | 500           | 330             | 180                   | 420                  | 320           | 210             | 180                   |
|                              |                    | E32-T84SV          |       | 630                  | 480           | 320             | 130                   | 410                  | 310           | 200             | 130                   |

\* The optical fiber for the E32-T12F is 2 m long on each side, so the sensing distance is 4,000 mm.

## Reflective Models

(Unit: mm)

| Type            |                         |                                                        | Model | E3X-DA□-S            |               |                 |                       | E3X-MDA□             |               |                 |                       |
|-----------------|-------------------------|--------------------------------------------------------|-------|----------------------|---------------|-----------------|-----------------------|----------------------|---------------|-----------------|-----------------------|
|                 |                         |                                                        |       | High-resolution mode | Standard mode | High-speed mode | Super-high-speed mode | High-resolution mode | Standard mode | High-speed mode | Super-high-speed mode |
| Standard models | Flexible (new standard) | E32-D11R/E32-D12R/E32-D15XR/E32-DC200BR(B4R)           |       | 300                  | 170           | 120             | 50                    | 170                  | 120           | 80              | 50                    |
|                 |                         | E32-D14LR                                              |       | 80                   | 45            | 30              | 14                    | 45                   | 33            | 22              | 14                    |
|                 |                         | E32-D15YR/E32-D15ZR                                    |       | 70                   | 40            | 26              | 12                    | 40                   | 29            | 19              | 12                    |
|                 |                         | E32-D211R/E32-D21R/E32-D22R/E32-D25XR/E32-DC200FR(F4R) |       | 50                   | 30            | 20              | 8                     | 30                   | 22            | 14              | 8                     |
|                 |                         | E32-D24R                                               |       | 26                   | 15            | 10              | 4                     | 15                   | 10            | 6               | 4                     |
|                 |                         | E32-D25YR/E32-D25ZR                                    |       | 14                   | 8             | 5               | 2                     | 8                    | 5             | 3.3             | 2                     |
|                 | Standard                | E32-DC200/E32-D15X/E32-DC200B(B4)                      |       | 500                  | 300           | 200             | 90                    | 300                  | 210           | 130             | 90                    |
|                 |                         | E32-D12                                                |       | 400                  | 230           | 160             | 70                    | 230                  | 160           | 100             | 70                    |
|                 |                         | E32-D14L                                               |       | 200                  | 110           | 80              | 36                    | 110                  | 80            | 50              | 36                    |
|                 |                         | E32-D15Y/E32-D15Z                                      |       | 170                  | 100           | 65              | 30                    | 100                  | 70            | 45              | 30                    |
|                 |                         | E32-D211/E32-DC200E/E32-D22/E32-D25X/E32-DC200F(F4)    |       | 130                  | 80            | 50              | 22                    | 80                   | 55            | 35              | 22                    |
|                 |                         | E32-D24                                                |       | 50                   | 30            | 20              | 8                     | 30                   | 22            | 14              | 8                     |
|                 |                         | E32-D25Y/E32-D25Z                                      |       | 35                   | 20            | 12              | 6                     | 20                   | 14            | 9               | 6                     |
|                 | Break-resistant         | E32-D11/E32-D15XB                                      |       | 300                  | 170           | 120             | 50                    | 170                  | 125           | 80              | 50                    |
|                 |                         | E32-D21B/E32-D221B                                     |       | 110                  | 70            | 45              | 20                    | 70                   | 50            | 30              | 20                    |
|                 |                         | E32-D21/E32-D22B                                       |       | 50                   | 30            | 20              | 8                     | 30                   | 22            | 14              | 8                     |
|                 |                         | E32-D25XB                                              |       | 85                   | 50            | 30              | 15                    | 50                   | 35            | 23              | 15                    |
|                 | Fluorine coating        | E32-D11U                                               |       | 300                  | 170           | 120             | 50                    | 170                  | 125           | 80              | 50                    |

| Type                         |                                |                             | Model | E3X-DA□-S                                                                               |               |                 |                       | E3X-MDA□             |               |                 |                       |
|------------------------------|--------------------------------|-----------------------------|-------|-----------------------------------------------------------------------------------------|---------------|-----------------|-----------------------|----------------------|---------------|-----------------|-----------------------|
|                              |                                |                             |       | High-resolution mode                                                                    | Standard mode | High-speed mode | Super-high-speed mode | High-resolution mode | Standard mode | High-speed mode | Super-high-speed mode |
| Special-beam models          | Long distance, high power      | E32-D16                     |       | 40 to 1,000                                                                             | 40 to 700     | 40 to 450       | 40 to 240             | 40 to 600            | 40 to 490     | 40 to 300       | 40 to 240             |
|                              |                                | E32-D11L                    |       | 650                                                                                     | 400           | 260             | 110                   | 400                  | 270           | 180             | 110                   |
|                              |                                | E32-D21L/E32-D22L           |       | 210                                                                                     | 130           | 80              | 35                    | 130                  | 85            | 55              | 35                    |
|                              | Ultracompact, ultrafine sleeve | E32-D33                     |       | 25                                                                                      | 16            | 10              | 4                     | 16                   | 10            | 6               | 4                     |
|                              |                                | E32-D331                    |       | 5                                                                                       | 3             | 2               | 0.8                   | 3                    | 2             | 1.3             | 0.8                   |
|                              | Coaxial/small spot             | E32-CC200R                  |       | 250                                                                                     | 150           | 100             | 45                    | 150                  | 105           | 65              | 45                    |
|                              |                                | E32-CC200                   |       | 500                                                                                     | 300           | 200             | 90                    | 300                  | 210           | 140             | 90                    |
|                              |                                | E32-D32L                    |       | 250                                                                                     | 150           | 100             | 45                    | 150                  | 100           | 65              | 45                    |
|                              |                                | E32-C31/E32-D32             |       | 120                                                                                     | 75            | 50              | 22                    | 75                   | 50            | 30              | 22                    |
|                              |                                | E32-C42 + E39-F3A           |       | Spot diameter variable in the range 0.1 to 0.6 mm at distances in the range 6 to 15 mm. |               |                 |                       |                      |               |                 |                       |
|                              |                                | E32-D32 + E39-F3A           |       | Spot diameter variable in the range 0.5 to 1mm at distances in the range 6 to 15 mm.    |               |                 |                       |                      |               |                 |                       |
|                              |                                | E32-C41 + E39-F3A-5         |       | 0.1-mm dia. spot at a distance of 7 mm.                                                 |               |                 |                       |                      |               |                 |                       |
|                              |                                | E32-C31 + E39-F3A-5         |       | 0.5-mm dia. spot at a distance of 7 mm.                                                 |               |                 |                       |                      |               |                 |                       |
|                              |                                | E32-C41 + E39-F3B           |       | 0.2-mm dia. spot at a distance of 17 mm.                                                |               |                 |                       |                      |               |                 |                       |
|                              |                                | E32-C31 + E39-F3B           |       | 0.5-mm dia. spot at a distance of 17 mm.                                                |               |                 |                       |                      |               |                 |                       |
|                              |                                | E32-C31 + E39-F3C           |       | Spot diameter of 4 mm max. at distances in the range 0 to 20 mm.                        |               |                 |                       |                      |               |                 |                       |
|                              | Area sensing                   | E32-D36P1                   |       | 250                                                                                     | 150           | 100             | 45                    | 150                  | 100           | 65              | 45                    |
|                              | Retroreflective                | E32-R21 + E39-R3 (provided) |       | 10 to 250                                                                               |               |                 |                       |                      |               |                 |                       |
|                              |                                | E32-R16 + E39-R1 (provided) |       | 150 to 1,500                                                                            |               |                 |                       |                      |               |                 |                       |
|                              | Convergent-reflective          | E32-L25/E32-L25A            |       | 3.3                                                                                     |               |                 |                       |                      |               |                 |                       |
|                              |                                | E32-L24S                    |       | 0 to 4                                                                                  |               |                 |                       |                      |               |                 |                       |
|                              |                                | E32-L24L                    |       | 2 to 6 (center 4)                                                                       |               |                 |                       |                      |               |                 |                       |
|                              |                                | E32-L25L                    |       | 5.4 to 9 (center 7.2)                                                                   |               |                 |                       |                      |               |                 |                       |
|                              |                                | E32-L86                     |       | 4 to 10                                                                                 |               |                 |                       |                      |               |                 |                       |
| Environment-resistant models | Heat-resistant                 | E32-D51                     |       | 400                                                                                     | 230           | 160             | 72                    | 230                  | 165           | 110             | 72                    |
|                              |                                | E32-D81R-S                  |       | 150                                                                                     | 90            | 60              | 27                    | 90                   | 63            | 40              | 27                    |
|                              |                                | E32-D61-S                   |       |                                                                                         |               |                 |                       |                      |               |                 |                       |
|                              |                                | E32-D73-S                   |       | 100                                                                                     | 60            | 40              | 18                    | 60                   | 40            | 25              | 18                    |
|                              | Chemical-resistant             | E32-D12F                    |       | 160                                                                                     | 95            | 65              | 30                    | 95                   | 70            | 45              | 30                    |
|                              |                                | E32-D14F                    |       | 70                                                                                      | 40            | 30              | 10                    | 40                   | 28            | 18              | 10                    |

## Application-specific Models

(Unit: mm)

| Type                        |                           |                   | E3X-DA□-S                                                                                                          |               |                 |                       | E3X-MDA□             |               |                 |                       |
|-----------------------------|---------------------------|-------------------|--------------------------------------------------------------------------------------------------------------------|---------------|-----------------|-----------------------|----------------------|---------------|-----------------|-----------------------|
|                             |                           |                   | High-resolution mode                                                                                               | Standard mode | High-speed mode | Super-high-speed mode | High-resolution mode | Standard mode | High-speed mode | Super-high-speed mode |
| Application-specific models | Label detection           | E32-G14           | 10                                                                                                                 |               |                 |                       |                      |               |                 |                       |
|                             |                           | E32-T14           | 4,000*                                                                                                             | 3,400         | 2,250           | 900                   | 2,900                | 2,200         | 1,450           | 900                   |
|                             | Liquid-level detection    | E32-L25T          | Applicable tube: Transparent tube with a diameter in the range 8 to 10 mm and a recommended wall thickness of 1 mm |               |                 |                       |                      |               |                 |                       |
|                             |                           | E32-D36T          | Applicable tube: Transparent tube (no restriction on diameter)                                                     |               |                 |                       |                      |               |                 |                       |
|                             |                           | E32-A01           | Applicable tube: Transparent tube with a diameter of 3.2, 6.4, or 9.5 mm and a recommended wall thickness of 1 mm  |               |                 |                       |                      |               |                 |                       |
|                             |                           | E32-A02           | Applicable tube: Transparent tube with a diameter in the range 6 to 13 mm and a recommended wall thickness of 1 mm |               |                 |                       |                      |               |                 |                       |
|                             |                           | E32-D82F1(F2)     | Liquid-contact model                                                                                               |               |                 |                       |                      |               |                 |                       |
|                             | Glass-substrate alignment | E32-L16-N         | 0 to 15                                                                                                            |               |                 | 0 to 12               | 0 to 15              |               |                 | 0 to 12               |
|                             |                           | E32-A08           | 10 to 20                                                                                                           |               |                 | ---                   | 10 to 20             |               |                 | ---                   |
|                             |                           | E32-A07E1(E2)     | 15 to 25                                                                                                           |               |                 | ---                   | 15 to 25             |               |                 | ---                   |
|                             |                           | E32-L66           | 5 to 18                                                                                                            |               | 5 to 16         | ---                   | 5 to 18              |               | 5 to 14         | ---                   |
|                             | Glass-substrate Mapping   | E32-A09/E32-A09H  | 15 to 38                                                                                                           |               |                 | ---                   | 15 to 38             |               |                 | ---                   |
|                             |                           | E32-A09H2         | 20 to 30                                                                                                           |               |                 | ---                   | 20 to 30             |               |                 | ---                   |
|                             | Wafer mapping             | E32-A03/E32-A03-1 | 1,150                                                                                                              | 890           | 600             | 250                   | 750                  | 580           | 380             | 250                   |
|                             |                           | E32-T24S          | 1,750                                                                                                              | 1,300         | 870             | 350                   | 1,100                | 870           | 580             | 350                   |
|                             |                           | E32-A04/E32-A04-1 | 460                                                                                                                | 340           | 225             | 100                   | 300                  | 220           | 145             | 100                   |

\* The optical fiber for the E32-T14 is 2 m long on each side, so the sensing distance is 4,000 mm.

## Green, Blue, and Infrared Light Sources

(Unit: mm)

| Type                        |                 |                                              | E3X-DAG□-S/DAB□-S    |               |                 |                       | E3X-DAH□-S           |               |                 |                       |
|-----------------------------|-----------------|----------------------------------------------|----------------------|---------------|-----------------|-----------------------|----------------------|---------------|-----------------|-----------------------|
|                             |                 |                                              | High-resolution mode | Standard mode | High-speed mode | Super-high-speed mode | High-resolution mode | Standard mode | High-speed mode | Super-high-speed mode |
| Through-beam models         | Standard        | E32-T11R/E32-T12R/E32-T15XR/E32-TC200BR(B4R) | 65                   | 50            | 35              | 30                    | 280                  | 190           | 130             | 55                    |
|                             |                 | E32-T14LR/E32-T15YR/E32-T15ZR                | 25                   | 20            | 22              | 12                    | 100                  | 75            | 80              | 21                    |
|                             |                 | E32-TC200/E32-T12/E32-T15X/E32-TC200B(B4)    | 100                  | 75            | 50              | 45                    | 400                  | 280           | 180             | 80                    |
|                             |                 | E32-T14L/E32-T15Y/E32-T15Z                   | 50                   | 40            | 30              | 25                    | 240                  | 160           | 110             | 45                    |
|                             | Special beam    | E32-T11L/E32-T12L                            | 150                  | 120           | 85              | 75                    | 700                  | 490           | 320             | 140                   |
| Reflective models           | Standard        | E32-D11R/E32-D12R/E32-D15XR/E32-DC200BR(B4R) | 17                   | 14            | 10              | 8                     | 120                  | 90            | 60              | 21                    |
|                             |                 | E32-D14LR                                    | 4.4                  | 3.5           | 2.5             | 2.2                   | 32                   | 24            | 16              | 5.5                   |
|                             |                 | E32-D15YR/E32-D15ZR                          | 4.2                  | 3.3           | 2.2             | 2.1                   | 28                   | 20            | 13              | 5                     |
|                             |                 | E32-DC200/E32-D15X/E32-DC200B(B4)            | 32                   | 25            | 16              | 16                    | 200                  | 150           | 100             | 35                    |
|                             |                 | E32-D14L                                     | 11                   | 9             | 6               | 5.5                   | 80                   | 60            | 40              | 14                    |
|                             |                 | E32-D15Y/E32-D15Z                            | 10                   | 8             | 5.5             | 5                     | 65                   | 50            | 33              | 11                    |
|                             | Special beam    | E32-D11L                                     | 44                   | 35            | 22              | 22                    | 260                  | 190           | 130             | 45                    |
|                             |                 | E32-CC200R                                   | 15                   | 12            | 8               | 7.5                   | 100                  | 75            | 50              | 17                    |
|                             |                 | E32-CC200                                    | 32                   | 25            | 16              | 16                    | 200                  | 150           | 100             | 35                    |
|                             |                 | E32-D32L                                     | 15                   | 12            | 8               | 7.5                   | 100                  | 75            | 50              | 17                    |
|                             |                 | E32-C31/E32-D32                              | 7.5                  | 6             | 4               | 3.5                   | 50                   | 37            | 25              | 8.5                   |
| Application-specific models | Label detection | E32-T14                                      | 320                  | 260           | 220             | 160                   | 1,800                | 1,200         | 820             | 360                   |
|                             |                 | E32-G14                                      | 10                   |               |                 |                       | 10                   |               |                 |                       |

Refer to E32 Series for details on Fiber Units.

## Output Circuit Diagrams

## NPN Output

| Model                                                                                                            | Operation mode | Timing charts | Operation selector | Output circuit |
|------------------------------------------------------------------------------------------------------------------|----------------|---------------|--------------------|----------------|
| E3X-DA11-S<br>E3X-DA6-S<br>E3X-DAG11-S<br>E3X-DAG6-S<br>E3X-DAB11-S<br>E3X-DAB6-S<br>E3X-DA11SE-S<br>E3X-DA6SE-S | Light-ON       |               | LIGHT ON (L-ON)    |                |
|                                                                                                                  | Dark-ON        |               | DARK ON (D-ON)     |                |
| E3X-DA11TW-S<br>E3X-DA6TW-S<br>E3X-MDA11<br>E3X-MDA6<br>E3X-DA11AT-S<br>E3X-DA6AT-S                              | Light-ON       |               | LIGHT ON (L-ON)    |                |
|                                                                                                                  | Dark-ON        |               | DARK ON (D-ON)     |                |
| E3X-DA11RM-S<br>E3X-DA6RM-S                                                                                      | Light-ON       |               | LIGHT ON (L-ON)    |                |
|                                                                                                                  | Dark-ON        |               | DARK ON (D-ON)     |                |
| E3X-DA11AN-S                                                                                                     | Light-ON       |               | LIGHT ON (L-ON)    |                |
|                                                                                                                  | Dark-ON        |               | DARK ON (D-ON)     |                |

Note: 1. The ON/OFF regions when areas settings are used with the E3X-DA□TW-S are as follows:  
 LIGHT ON: ON when the incident level is between the thresholds for channels 1 and 2.  
 DARK ON: OFF when the incident level is between the thresholds for channels 1 and 2.

## 2. Timing Charts for Timer Function Settings (T: Set Time)

| ON delay | OFF delay | One-shot |
|----------|-----------|----------|
|          |           |          |

## 3. Control Output (AND, OR, Sync) and Timing Chart for Timer Settings (T: Set Time)

|                |                     |
|----------------|---------------------|
| CH1 ON         | CH1 ON              |
| CH1 OFF        | CH1 OFF             |
| CH2 ON         | CH2 ON              |
| CH2 OFF        | CH2 OFF             |
| OUT (AND) ON   | ON delay (AND) ON   |
| OUT (AND) OFF  | OFF delay (AND) OFF |
| OUT (OR) ON    | One-shot (AND) ON   |
| OUT (OR) OFF   | One-shot (AND) OFF  |
| OUT (sync) ON  |                     |
| OUT (sync) OFF |                     |

## PNP Output

| Model                                                                                                            | Operation mode | Timing chart | Operation selector | Output circuit |
|------------------------------------------------------------------------------------------------------------------|----------------|--------------|--------------------|----------------|
| E3X-DA41-S<br>E3X-DA8-S<br>E3X-DAG41-S<br>E3X-DAG8-S<br>E3X-DAB41-S<br>E3X-DAB8-S<br>E3X-DA41SE-S<br>E3X-DA8SE-S | Light-ON       |              | LIGHT ON (L-ON)    |                |
|                                                                                                                  | Dark-ON        |              | DARK ON (D-ON)     |                |
| E3X-DA41TW-S<br>E3X-DA8TW-S<br>E3X-MDA41<br>E3X-DA41AT-S<br>E3X-DA8AT-S                                          | Light-ON       |              | LIGHT ON (L-ON)    |                |
|                                                                                                                  | Dark-ON        |              | DARK ON (D-ON)     |                |
| E3X-DA41RM-S<br>E3X-DA8RM-S                                                                                      | Light-ON       |              | LIGHT ON (L-ON)    |                |
|                                                                                                                  | Dark-ON        |              | DARK ON (D-ON)     |                |
| E3X-DA41AN-S                                                                                                     | Light-ON       |              | LIGHT ON (L-ON)    |                |
|                                                                                                                  | Dark-ON        |              | DARK ON (D-ON)     |                |

Note: The ON/OFF regions when areas settings are used with the E3X-DA□TW-S are as follows:  
 LIGHT ON: ON when the incident level is between the thresholds for channels 1 and 2.  
 DARK ON: OFF when the incident level is between the thresholds for channels 1 and 2.

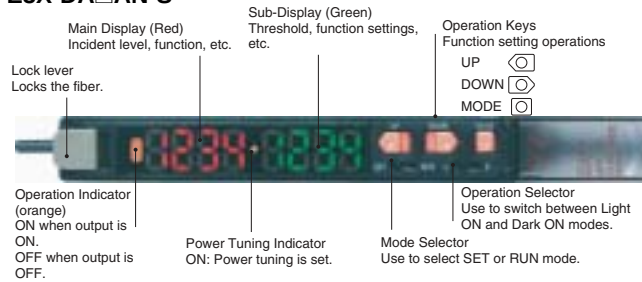
## Nomenclature

### Amplifier Units

E3X-DA□-S

E3X-DA□RM-S

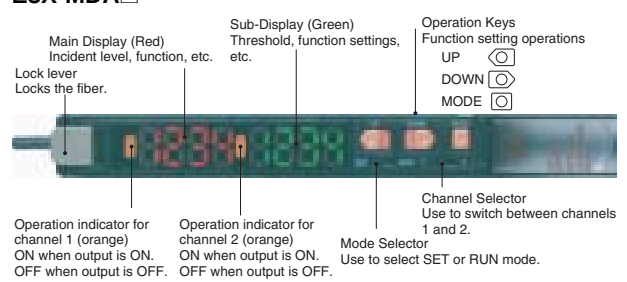
E3X-DA□AN-S



E3X-DA□TW-S

E3X-DA□AT-S

E3X-MDA□



## 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.



### 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

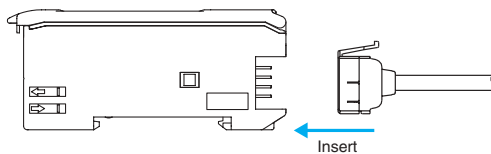
The Sensor is ready to detect within 200 ms after the power supply is turned ON. If the Sensor and load are connected to separate power supplies, be sure to turn ON the Sensor first.

#### ● Mounting

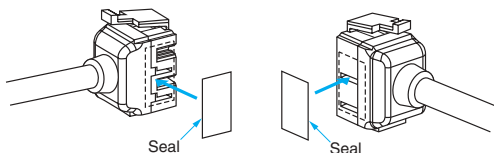
#### Connecting and Disconnecting Connectors

##### Mounting Connectors

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



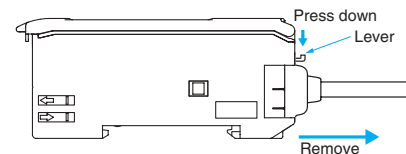
2. Attach the protector seals (provided as accessories) to the sides of master and slave connectors that are not connected.



Note: Attach the seals to the sides with grooves.

### Removing Connectors

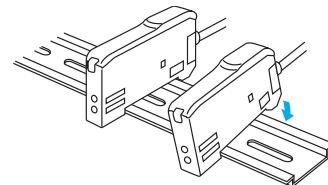
1. Slide the slave Amplifier Unit(s) for which the Connector is to be removed away from the rest of the group.
2. After the Amplifier Unit(s) has been separated, press down on the lever on the Connector and remove it. (Do not attempt to remove Connectors without separating them from other Amplifier Units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



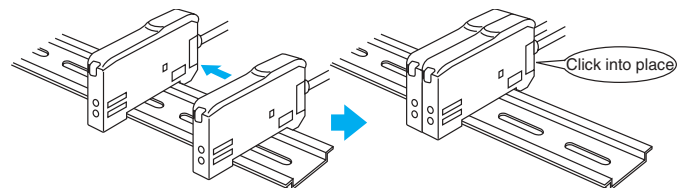
### Adding and Removing Amplifier Units

#### 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.



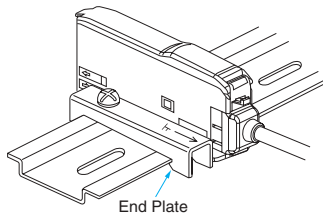
#### Removing Amplifier Units

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

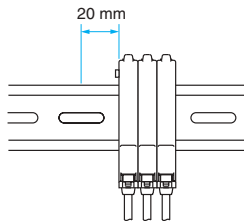
## Mounting the End Plate (PFP-M)

An End Plate should be used if there is a possibility of the Amplifier Unit moving, e.g., due to vibration. If a Mobile Console is going to be mounted, connect the End Plate in the direction shown in the following diagram.



## Mounting the Mobile Console Head

Leave a gap of at least 20 mm between the nearest Amplifier Unit and the Mobile Console head.

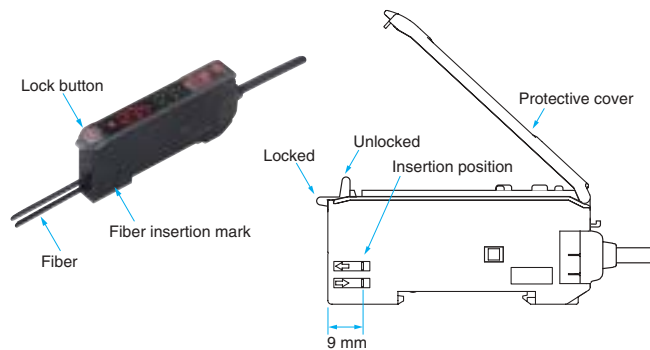


## Fiber Connection

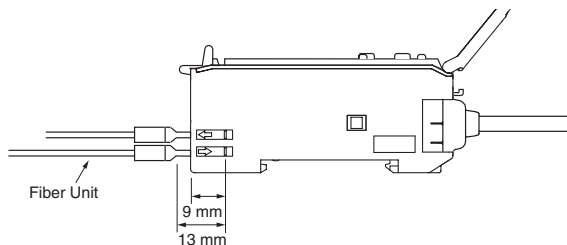
The E3X Amplifier Unit has a lock button for easy connection of the Fiber Unit. Connect or disconnect the fibers using the following procedures:

### 1. Connection

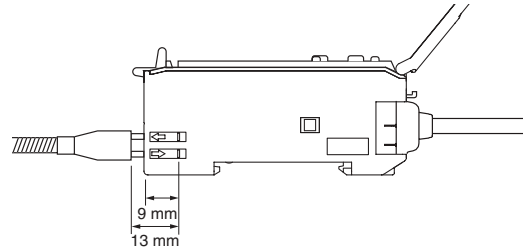
Open the protective cover, insert the fibers according to the fiber insertion marks on the side of the Amplifier Unit, and lower the lock lever.



### Fibers with E39-F9 Attachment

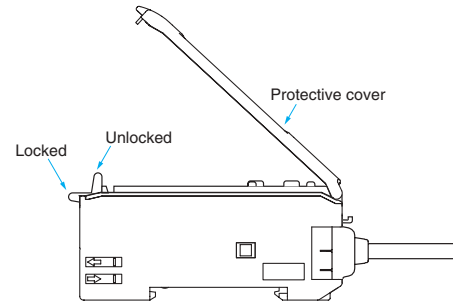


## Fibers That Cannot Be Free-Cut (with Sleeves)



### 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  $-10^{\circ}\text{C}$  and  $40^{\circ}\text{C}$ .

## ● Adjusting

### Mutual Interference Protection Function

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

### 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.

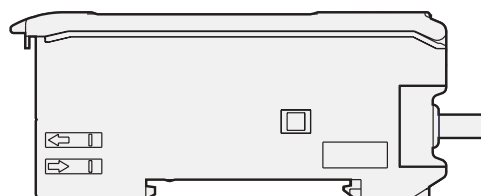
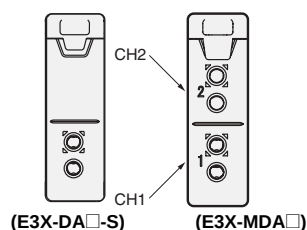
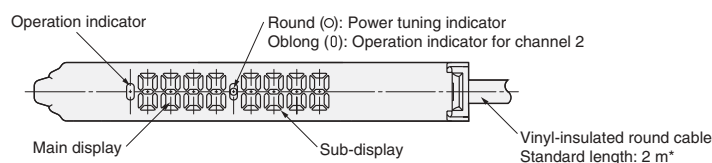
### Mobile Console

Use the E3X-MC11-SV2 Mobile Console for the E3X-DA-S-series Amplifier Units.

Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

### Amplifier Units with Cables

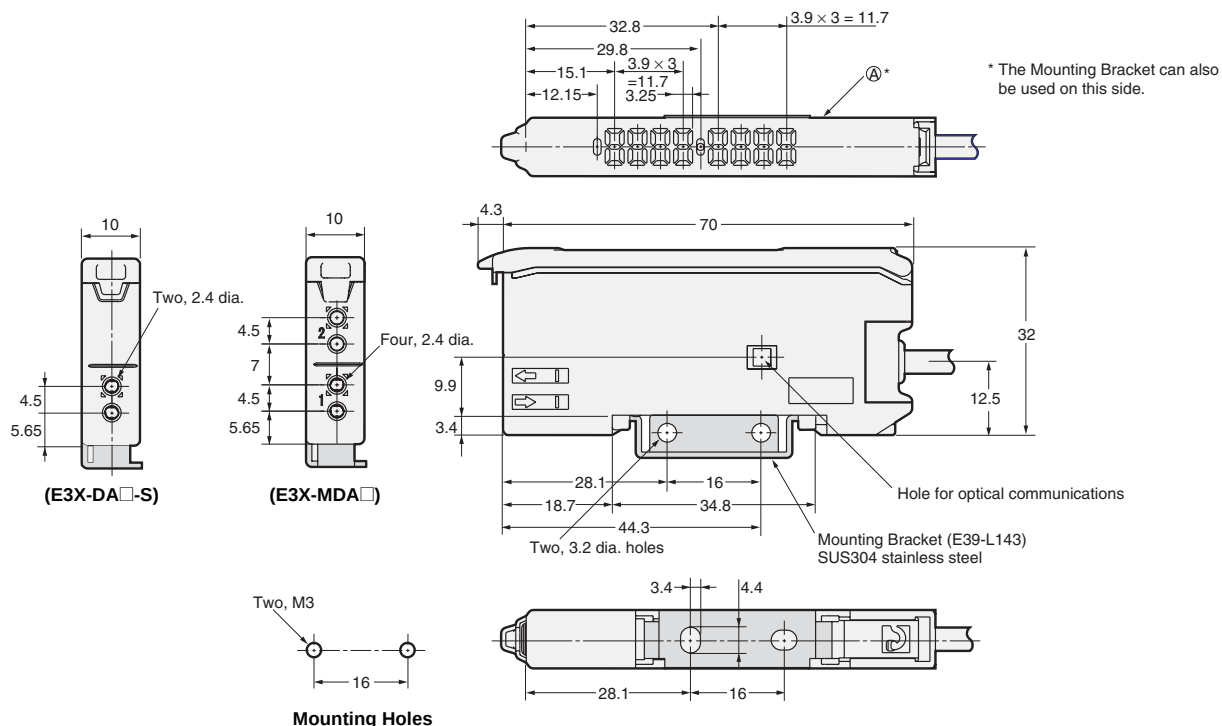
**E3X-MDA41**



\*Cable Specifications

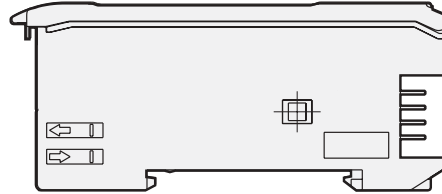
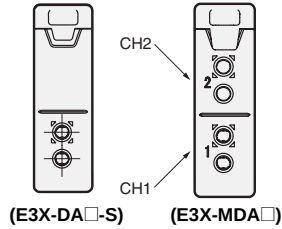
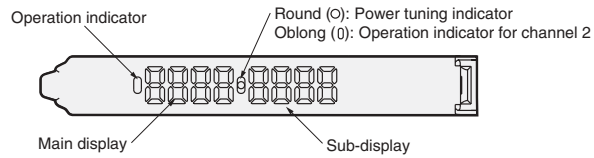
|                                                                                                                 |                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| <b>E3X-DA11-S</b><br><b>-DA41-S</b><br><b>-DAG11-S</b><br><b>-DAG41-S</b><br><b>-DAB11-S</b><br><b>-DAB41-S</b> | 4-dia., 3-conductor (Conductor cross section: 0.2 mm <sup>2</sup> , insulator diameter: 1.1 mm) |
| <b>E3X-DA11TW-S</b><br><b>-DA41TW-S</b><br><b>-DA11RM-S</b><br><b>-DA41RM-S</b>                                 | 4-dia., 4-conductor (Conductor cross section: 0.2 mm <sup>2</sup> , insulator diameter, 1.1 mm) |
| <b>E3X-MDA11</b><br><b>-MDA41</b>                                                                               | 4-dia., 2-conductor (Conductor cross section: 0.2 mm <sup>2</sup> , insulator diameter: 1.1 mm) |

### With Mounting Bracket Attached



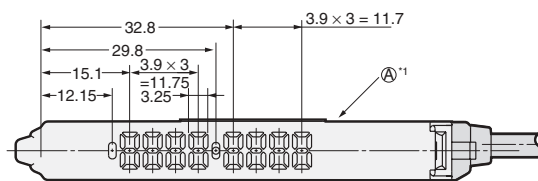
## Amplifier Units with Connectors

**E3X-DA6-S**  
**E3X-DA8-S**  
**E3X-DAG6-S**  
**E3X-DAG8-S**  
**E3X-DAB6-S**  
**E3X-DAB8-S**  
**E3X-DA6RM-S**  
**E3X-DA8RM-S**  
**E3X-DA6TW-S**  
**E3X-DA8TW-S**  
**E3X-DA6SE-S**  
**E3X-DA8SE-S**  
**E3X-DA6AT-S**  
**E3X-DA8AT-S**  
**E3X-MDA6**  
**E3X-MDA8**

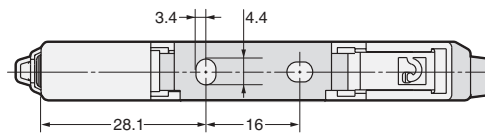
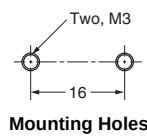
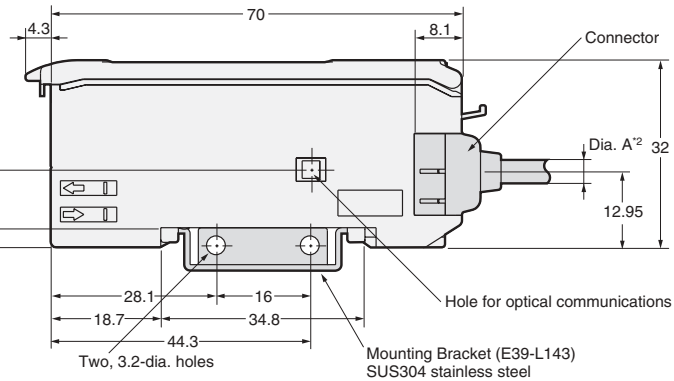
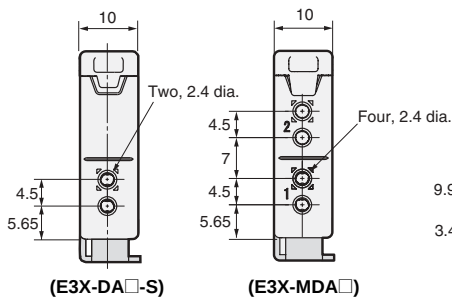


### With Mounting Bracket Attached

\*1 The Mounting Bracket can also be used on this side.  
\*2 Cable Diameters



|                                   |                |
|-----------------------------------|----------------|
| <b>E3X-CN22</b><br>(2 conductors) | 4.0-mm<br>dia. |
| <b>E3X-CN21</b><br>(4 conductors) |                |
| <b>E3X-CN11</b><br>(3 conductors) |                |
| <b>E3X-CN12</b><br>(1 conductor)  | 2.6-mm<br>dia. |

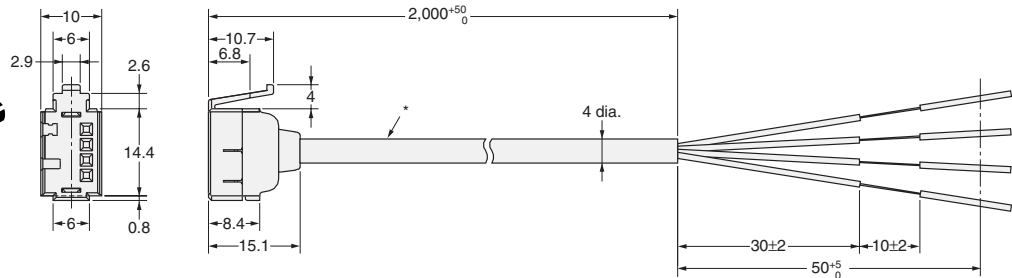
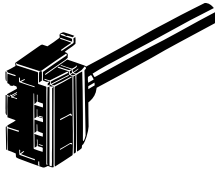


## Amplifier Unit Connectors

### Master Connectors

E3X-CN11

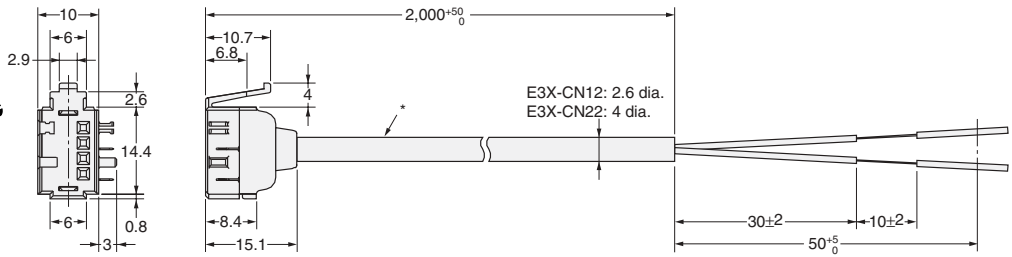
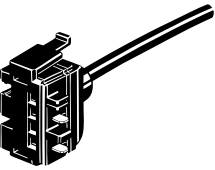
E3X-CN21



### Slave Connectors

E3X-CN12

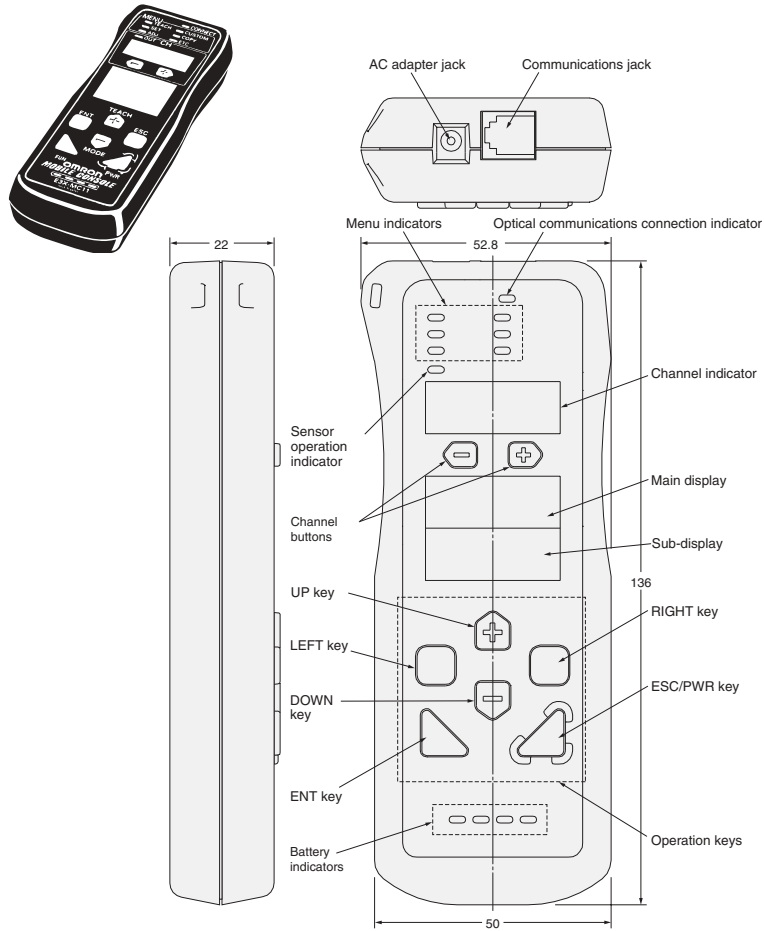
E3X-CN22



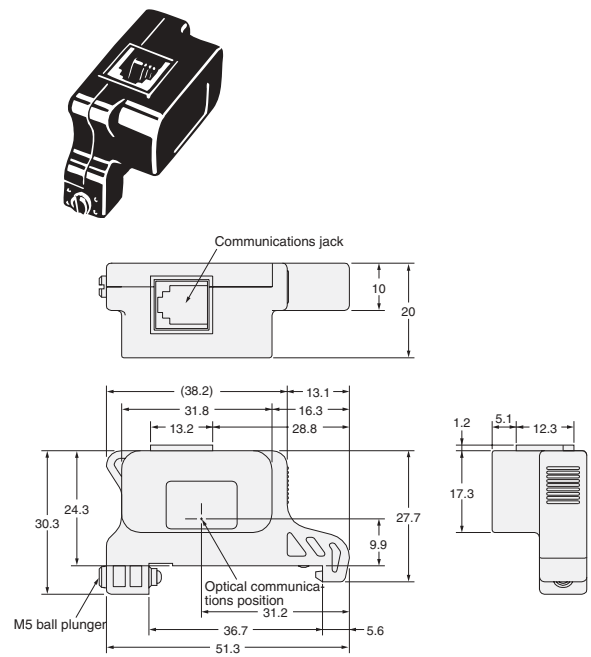
## Mobile Console

E3X-MC11-SV2

### Mobile Console



### Mobile Console Head



Refer to E32 Series for details on Fiber Units.

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2008.11

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