OMRON

Color Mark Sensors

E3S-DC/E3NX-CA Series

Food/ Beverage/ Personal Care Industries

Packaging Comes in a Variety of Designs and Materials

Recently, packaging materials and designs have grown much more diverse, such as aluminum vapor deposition material to prevent oxidation, or very colorful packages to attract the attention of consumers.

Highly-reflective glossy packaging, such as aluminum vapor deposition material

Colorful packaging where there is little difference in color between the mark and background

Low-reflection packaging, such as film with fine asperities

Business Challenge

If we respond to packaging trends, the number of false detection with color mark sensors will increase, reducing productivity...

More and more people working with color mark detection in the field are calling for the following:

"I want stable detection of aluminum vapor deposition material and other glossy packaging."

"I want stable detection of colorful packaging with little color difference."

"I want stable detection of packaging even if the lot changes."

NEW

Color Mark Photoelectric Sensor
E3S-DC

IO-Link

OMRON's New Color Mark Sensors

Offer Stable Detection of Both Glossy and Colorful Packaging.

It therefore does not reduce the operation rates of production facilities.

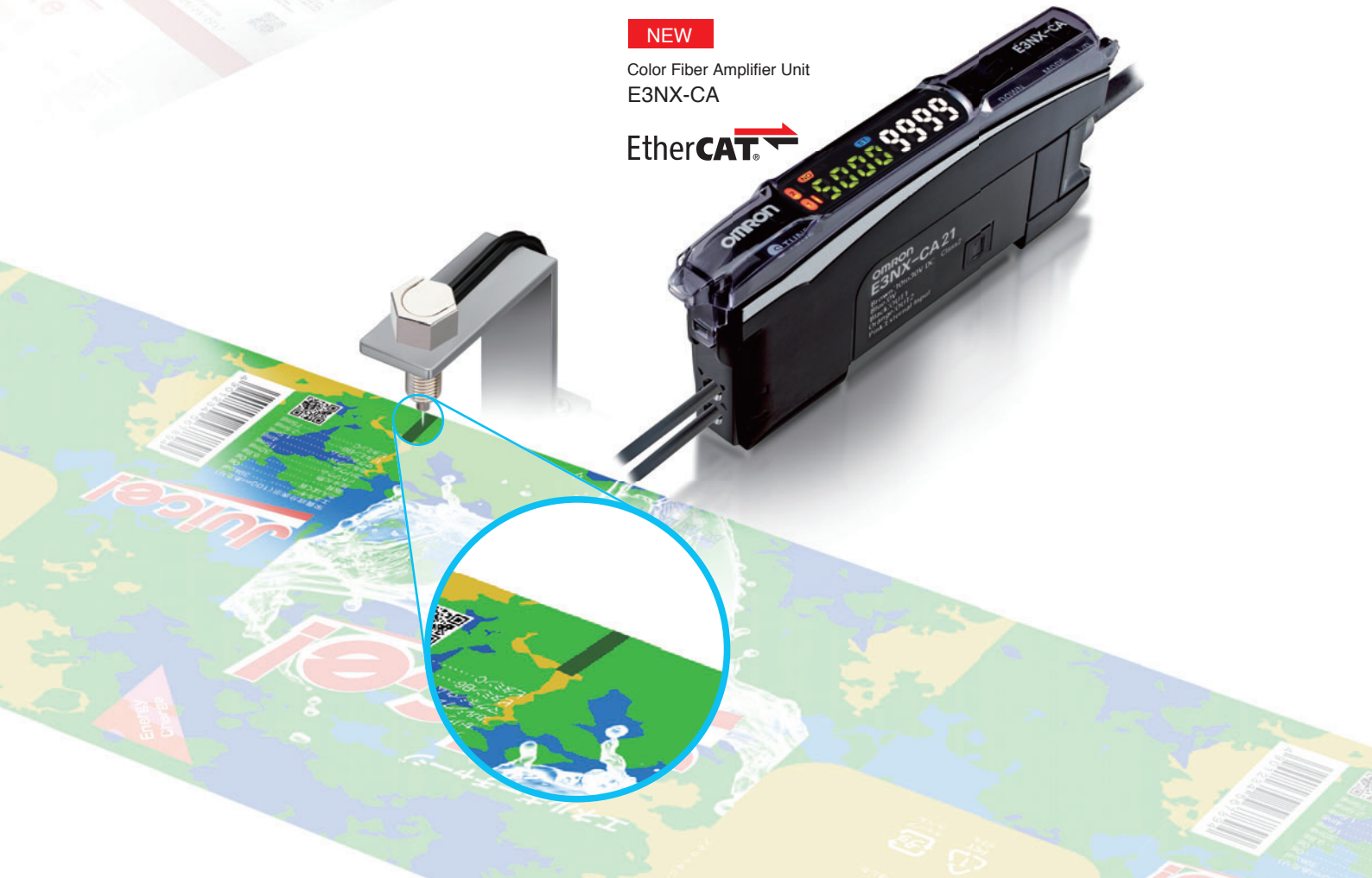
The Sensors can accurately detect color marks on glossy and colorful packaging, which have been troublesome for conventional systems.

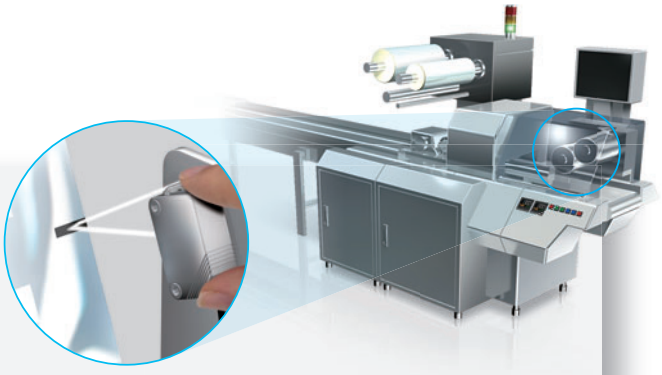
They also help reduce the number of troubleshooting requests made to packaging machine manufacturers—without any decrease in the operation rate due to equipment stoppages caused by false detection.

NEW

Color Fiber Amplifier Unit
E3NX-CA

EtherCAT





"I want stable detection of aluminum vapor deposition material and other glossy packaging."

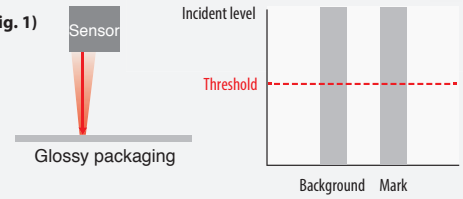
Existing challenges

The intensity of the light received by the sensor from highly-reflective glossy packaging is too strong, so there is not enough difference in incident levels to perform color mark detection (i.e. saturation, Fig. 1).

The angle needs to be finely adjusted to avoid saturation and allow the sensor to detect the mark. However, if the sensor is tilted too much, detection will become unstable as the incident level decreases (Fig. 2).

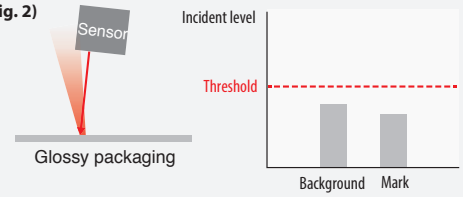
Saturated; unable to detect

(Fig. 1)



Insufficient; unstable to detect
(Fine adjustment of light intensity (tilt) required)

(Fig. 2)



E3S-DC/E3NX-CA

Light Is Received over a Wide Range: Enough Even for Glossy Packaging

This allows for the stable detection of glossy aluminum vapor deposition packaging—simply install the Sensor directly above

Follow along to see how the technology works.

No Saturation Even with 99% Reflective Optical Mirrors

High Dynamic Range (Wide Incident Light Range)

Color Mark Photoelectric Sensor (E3S-DC):

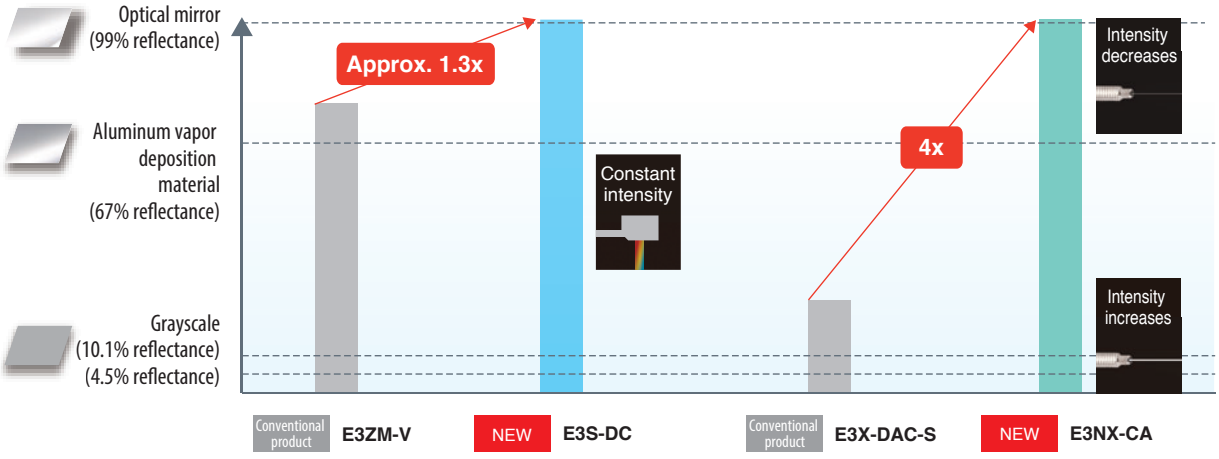
The incident light range in which no saturation occurs—no adjustment required

The included high luminance RGB three-color LED light emitting element drastically improves the light intensity. Meanwhile, Smart Noise Reduction technology in the Fiber Sensor is applied to reduce the amount of noise, resulting in a high dynamic range where the Sensor is not saturated even when detecting a mirror surface—without having to make any light intensity adjustments.

Color Fiber Amplifier Unit (E3NX-CA):

The optimal light intensity—with just two button presses

The high luminance white LED and Smart Noise Reduction technology work together to increase the light intensity and reduce the amount of noise. These have made it possible to expand the light intensity adjustment range for the emitter and receiver to 1/100x and 1/3x respectively, resulting in a high dynamic range four times that of conventional products. You can automatically adjust the optimal intensity by just pressing a button once with a mark and once without it.



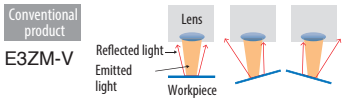
* Optical mirror and aluminum vapor deposition material measured at the distance with maximum incident level (13 mm); grayscale measured at the distance with minimum incident level (7 mm or 13 mm).

Further Information

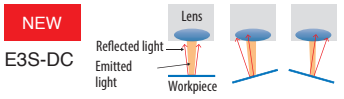
Stable Detection Even of Tilted Workpieces

Thin and soft wrapping paper tends to be difficult to detect stably due to shifting angles. E3S-DC that has OMRON's original narrow beam and large optical system and E3NX-CA used with the coaxial Fiber Unit make stable detection possible.

■ Color Mark Photoelectric Sensor:

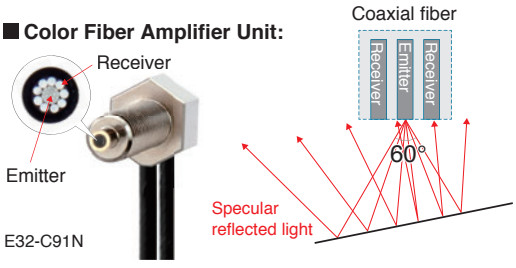


Reflected light tends to go outside the lens due to the angle of the workpiece, which reduces an incident level.



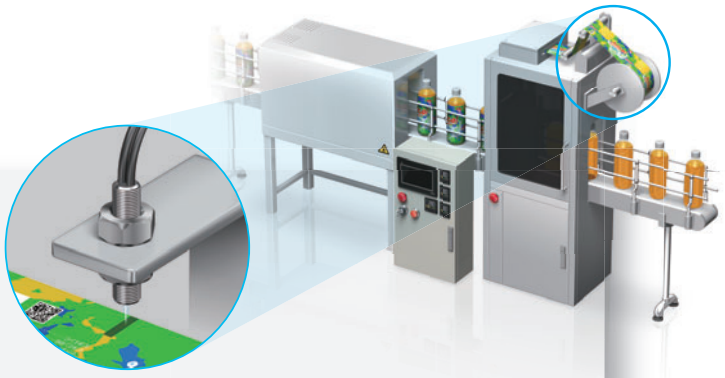
The large lens easily gathers reflected light of the narrow beam even if the workpiece is tilted, resulting in no incident level fluctuation.

■ Color Fiber Amplifier Unit:



The coaxial Fiber Unit E32-C91N has an emission beam that covers a 60° area. Even if the workpiece is tilted, the Fiber Unit does not receive much of the specular reflected light and mainly receives diffusion light that carries color information. Therefore it stably detects color information even if the workpiece has a glossy surface.

"I want stable detection of colorful packaging with little color difference."

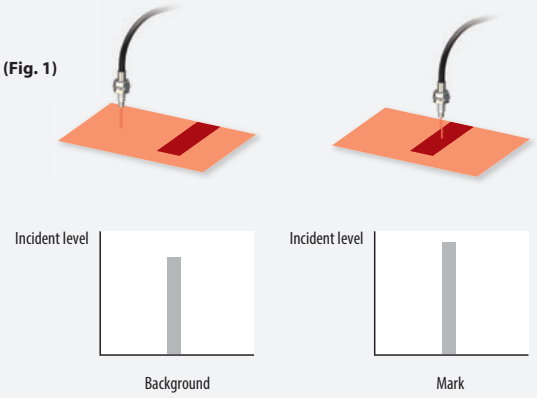


Existing challenges

With designs becoming more colorful, there are times where there is little difference in color between the color mark and the design elements (background). When color differences are subtle, the S/N ratio*1 required for detection cannot be obtained, and the color mark cannot be detected (Fig. 1).

*1 The ratio of incident levels at which a workpiece is and is not detected. For example, if this is 1,000 when detecting the workpiece and 100 when not detecting the workpiece, the S/N ratio is 10:1. The higher the S/N ratio is, the more stable the detection becomes.

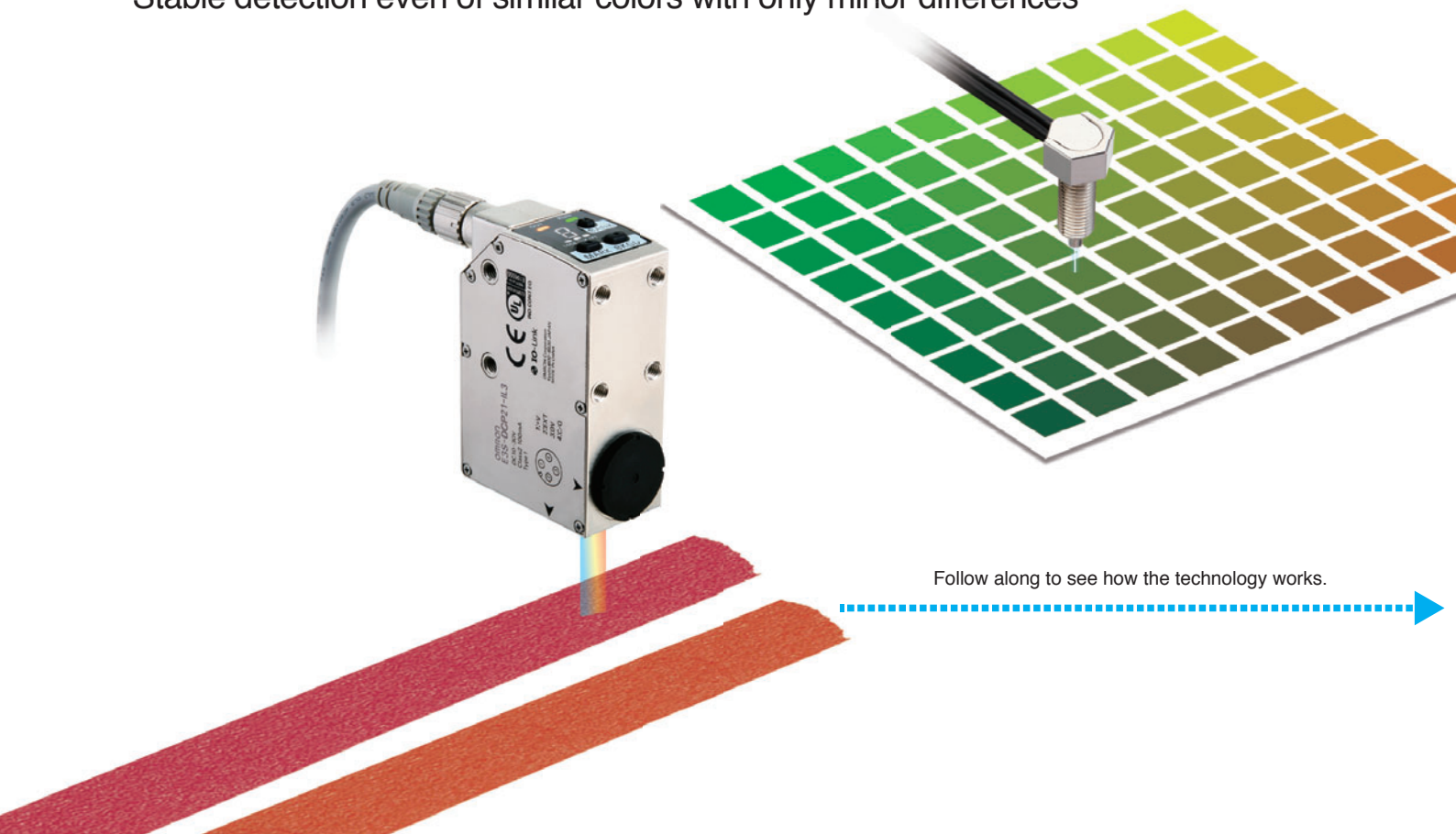
(Fig. 1)



E3S-DC/E3NX-CA

Provides a High S/N Ratio to Detect Subtle Color Differences

Stable detection even of similar colors with only minor differences



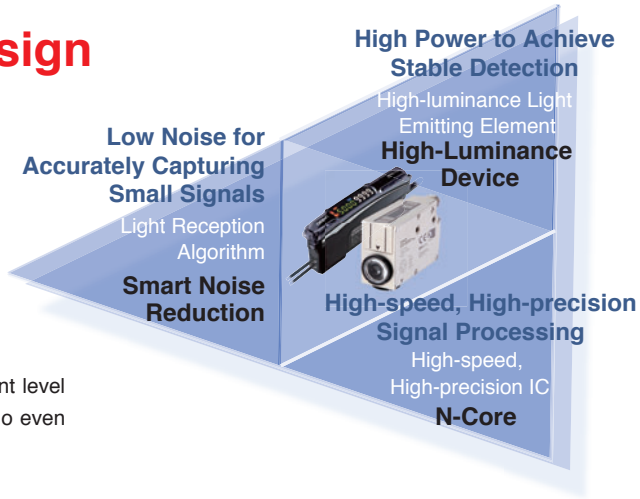
Follow along to see how the technology works.

Identifies Even Minor Color Differences

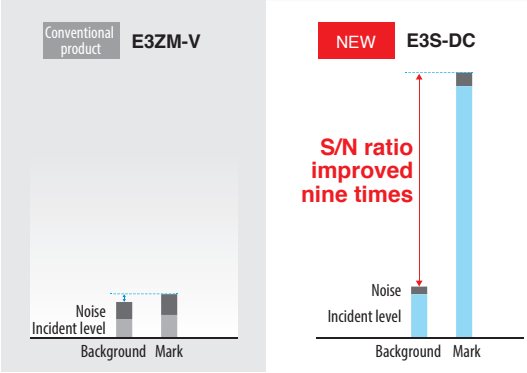
High S/N Ratio System Design

Three N-Smart Technologies Work Together to Obtain a High S/N Ratio

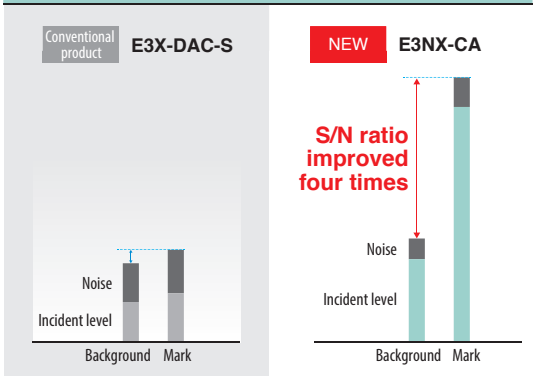
The high luminance white LED of the Fiber Amplifier Unit, and the high luminance RGB three-color LEDs and high efficiency optical system design of the Photoelectric Sensor deliver high power. "Smart Noise Reduction" (a light reception algorithm) and "N-Core" (a high-speed, high-precision IC) work together to dramatically reduce the effect of noise. Increasing the incident level and decreasing noise make it possible to obtain a high S/N ratio even when color differences are subtle.



Color Mark Photoelectric Sensor (E3S-DC):



Color Fiber Amplifier Unit (E3NX-CA):

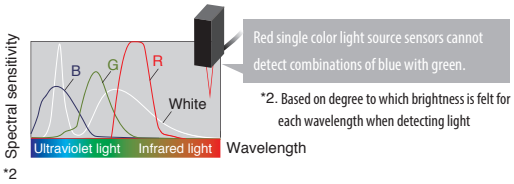


Further Information

From Single Wavelengths to Color Sensing

The wavelength ranges for red, green, and blue are narrow, and combinations with other colors cannot be detected with RGB single-color light source sensors (Fig. 2). For the new Color Mark Sensors, the Photoelectric Sensor uses RGB three-color LEDs as the light source, and the Fiber Sensor uses a white LED that has a broad wavelength range. Color sensing makes stable detection possible—even for those color combinations that would be difficult using single wavelengths.

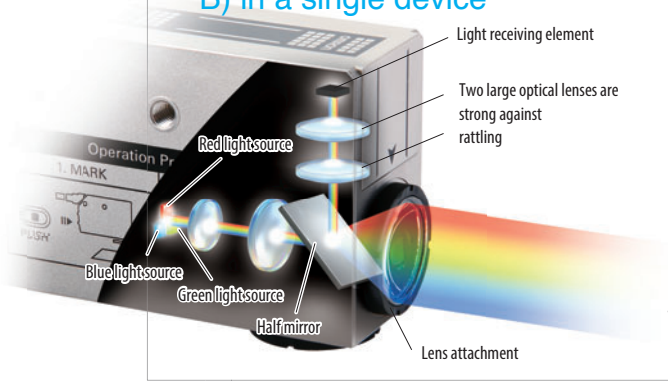
(Fig. 2)
Spectral Sensitivity Characteristics for Red, Green, Blue and White



*2. Based on degree to which brightness is felt for each wavelength when detecting light

Color Mark Photoelectric Sensor (E3S-DC):

Three light sources (R, G, and B) in a single device

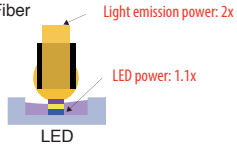


Color Fiber Amplifier Unit (E3NX-CA):

White LED light emitting element & RGB matrix light receiving element

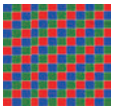
High luminance white LED light emitting element

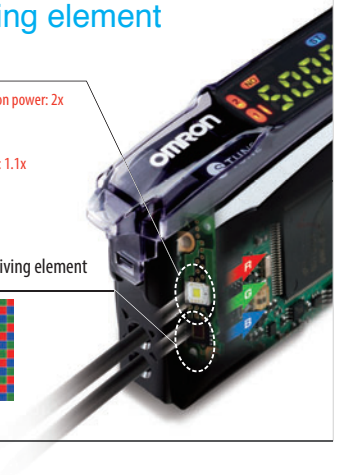
LEDs with narrow light emitting regions improve the efficiency of optical coupling with fiber.



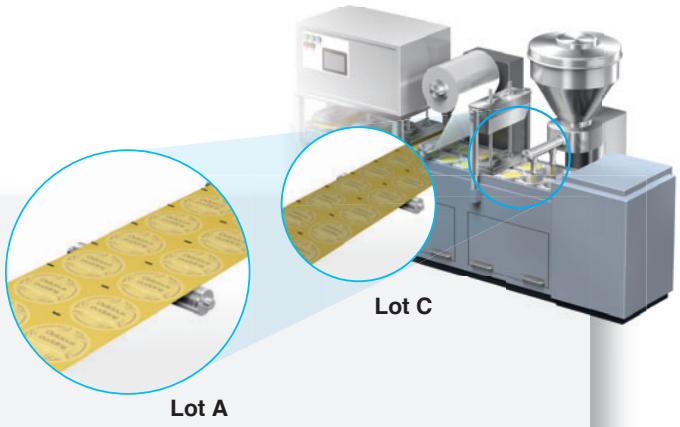
Patented Highly sensitive RGB matrix light receiving element

Detects all RGB wavelengths included in light reflected from the workpiece.



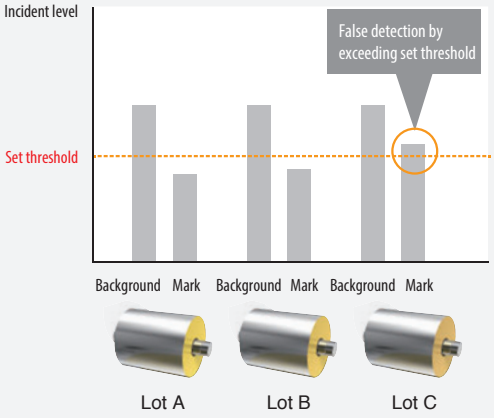


"I want stable detection of packaging even if the lot changes."



Existing challenges

There are cases where colors of packaging materials vary from lot to lot. If the parameters are not changed, this could result in equipment stoppage caused by false detection. In such a case it can be difficult to determine the cause of the problem—resulting in time lost due to troubleshooting and a notable decrease in productivity.



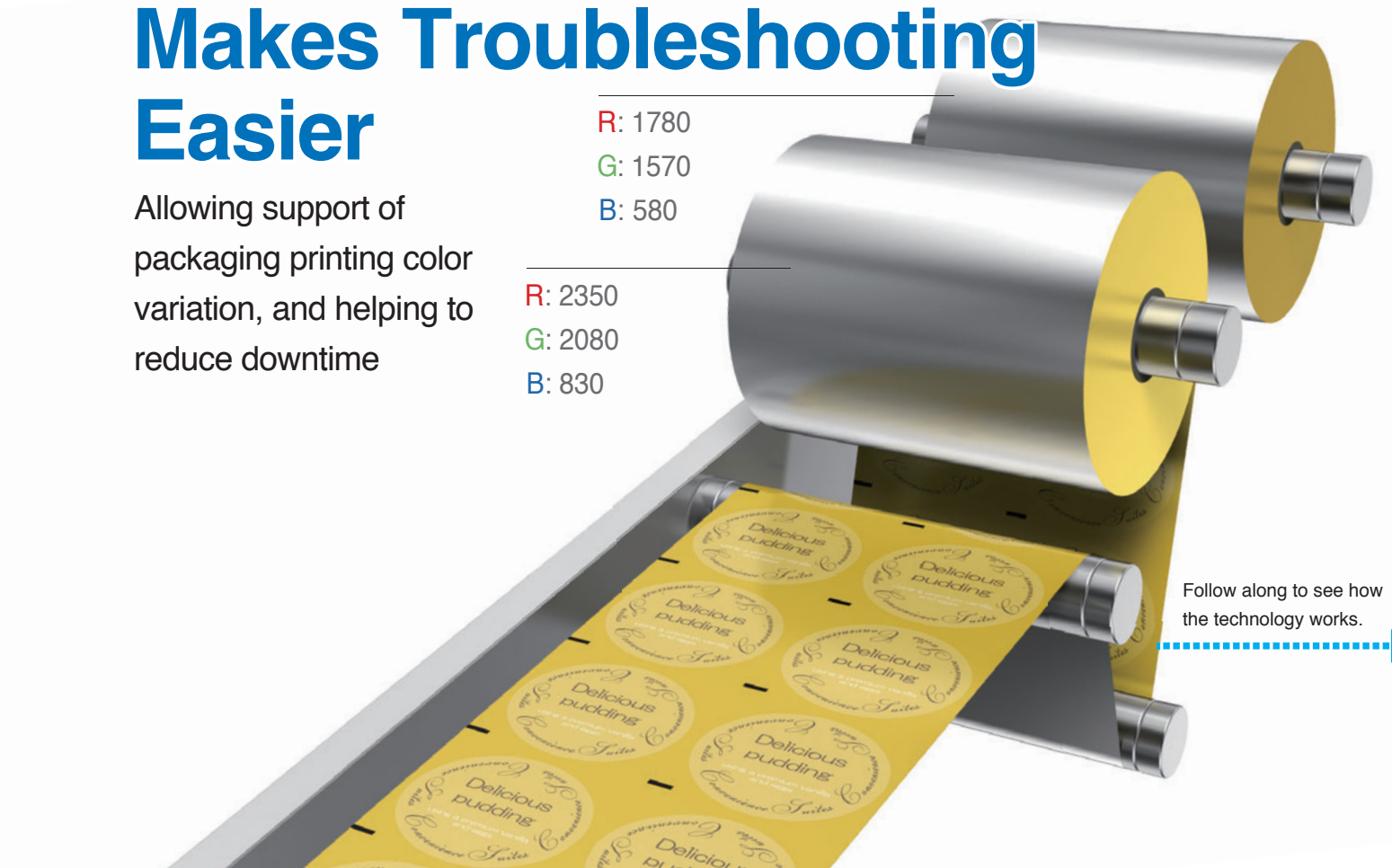
E3S-DC/E3NX-CA

Visualization of Variation in Colors Printed on Packaging Makes Troubleshooting Easier

Allowing support of packaging printing color variation, and helping to reduce downtime

R: 1780
G: 1570
B: 580

R: 2350
G: 2080
B: 830



Follow along to see how the technology works.

Visualization of Color Variation

RGB Data Transmission Function

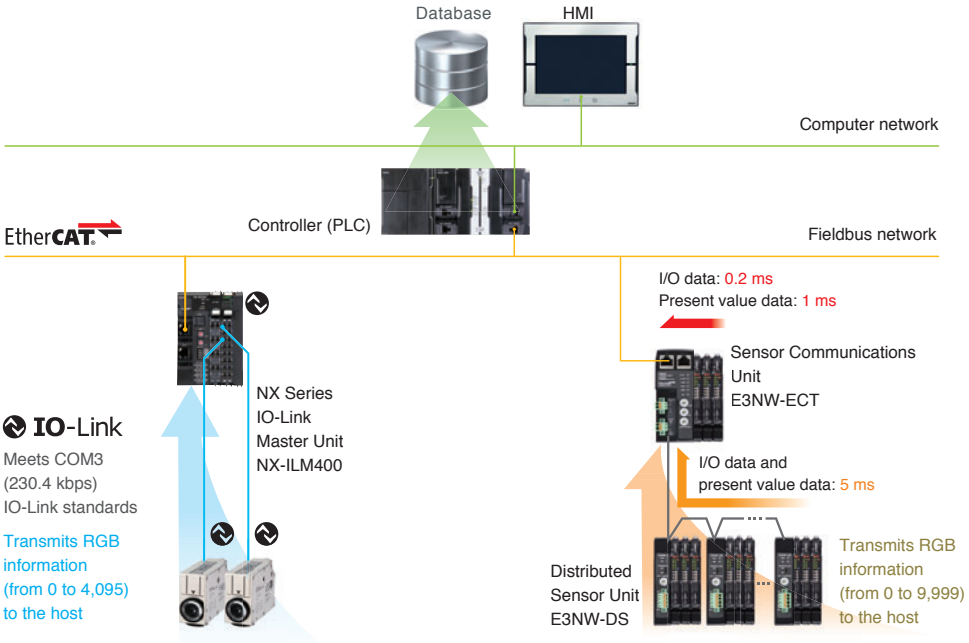
RGB information for color marks and backgrounds for each lot is transmitted to a host and quantified. This information is then managed in a database, making it possible to set optimal thresholds and identify causes quickly if a problem occurs.

During commissioning

Until now, setting the threshold during commissioning required the knowledge of an expert. Now it is possible to get the optimal setting just by registering the RGB ratio of the packaging.

During maintenance

When the Sensor makes false detection, values can be checked to determine whether color variation from lot to lot in packaging material has occurred, making it easy to identify what has caused a problem and to then resolve it.



Color Mark Photoelectric Sensor E3S-DC

Color Fiber Amplifier Unit E3NX-CA

Color Mark Photoelectric Sensor (E3S-DC):

Data transmission via IO-Link

To be supported in July 2016

Color Fiber Amplifier Unit (E3NX-CA):

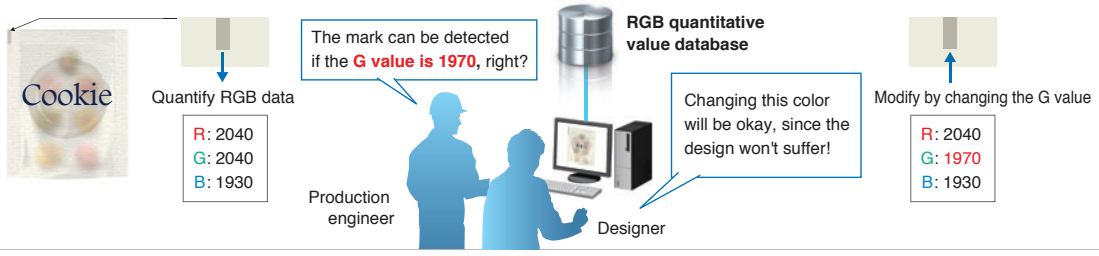
Data transmission via EtherCAT

Further Information

Test Parameter Support Function *1

The test parameter support function allows users to determine whether or not detection is possible for designs in the prototyping stage. Package designers and production engineers use quantified RGB digital data to discuss the designs, which allows them to reach a quick decision on which design to use—and helps shorten lead times from design to production line commissioning.

Examine values that can be detected based on RGB data, then provide feedback on the design.



*1 Made possible through using a function that transmits RGB data via IO-Link (for E3S-DS) or EtherCAT (for E3NX-CA) to build a system that covers everything from Sensors to the computer network.

MEMO

Color Mark Photoelectric Sensor

E3S-DC

Color Mark Detection on Any Type of Packaging.
Narrow Beam and Large Lens for Stable Detection of Workpieces Tilted at Various Angles.

- Detects subtle color differences.
  High luminance, three-element (RGB) LED light source for greater light intensity. Highly efficient optics technology provides high power and enables stable detection even of subtle color differences.
- Handles glossy workpieces.
  Thorough noise reduction.
  High dynamic range covers everything from black to mirror surfaces.
- IoT compatible.
  Models that support IO-Link also available.
  Sends RGB information to host with high-speed IO-Link communications.
  Optimum threshold set to reduce false detection.

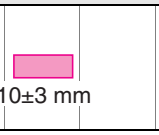
For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

⚠ Refer to *Safety Precautions* on page 17.

Ordering Information

Sensors (Refer to *Dimensions* on page 18.)

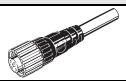
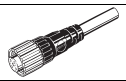
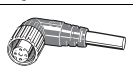
Red light, Green light, Blue light

Sensing method	Appearance	Connection method	Sensing distance	Output	Model	Baud rate ✻
Diffuse-reflective (mark detection)		M12 connector	 10±3 mm	Push-pull	**E3S-DCP21-IL2**	COM2
					E3S-DCP21-IL3	COM3
				NPN	**E3S-DCN21**	---

Note: Download the IO-Link setup file (IODD file) from your OMRON website.
✻ Refer to *Ratings and Specifications* on page 13 for the baud rate.

Accessories (Sold Separately)

Sensor I/O Connectors (Required for a Sensor with a connector.)
Connectors are not provided with the Sensors. Be sure to order a Connector separately.

Size	Type	Appearance	Cable length	Model
M12	Socket on one cable end	Straight 	2 m	**XS2F-D421-D80-F**
			5 m	**XS2F-D421-G80-F**
		L-shape ✻2	2 m	**XS2F-D422-D80-F**
			5 m	**XS2F-D422-G80-F**
	Socket and plug on cable ends ✻1	Smartclick connector Straight/straight 	2 m	**XS5W-D421-D81-F**
			5 m	**XS5W-D421-G81-F**
		Smartclick connector L-shape/L-shape  ✻2	2 m	**XS5W-D422-D81-F**
			5 m	**XS5W-D422-G81-F**

Note: 1. Refer to *Sensor I/O Connectors/Sensor Controllers* on your OMRON website for details.
The XS2W (Socket and Plug on Cable Ends) and XS5F (Socket on One Cable End) are also available.
2. The connectors will not rotate after they are connected.

✻**1.** There are also straight type/L-shape type combinations available.

Ratings and Specifications

Item	Model			
Sensing method		Diffuse-reflective (mark detection)		
Output		Push-pull		NPN
		E3S-DCP21-IL2	E3S-DCP21-IL3	E3S-DCN21
Sensing distance		10 ±3 mm (White paper 10 ×10 mm)		
Spot size (reference value)		1 × 4 mm		
Light source (wavelength)		Red LED (635 nm), Green LED (525 nm), Blue LED (465 nm)		
Power supply voltage		10 to 30 VDC±10% (Ripple (p-p) 10% max.)		
Power consumption		960 mW max. (Reference: Power supply voltage 24 V, Current consumption 40 mA max.)		
Control output		Load current: 100 mA max. (30 VDC max.)		
Indications		Operation indicator (orange), RUN indicator (green), 7-segment indicator (white), Key lock indicator (white), Timer indicator (white), 1-point teaching mode indicator (white)		
Operation mode		High when mark is detected.		ON when mark is detected.
Protection circuits		Power supply reverse polarity protection, output short-circuit protection and output incorrect connection protection		
Response time		Operate or reset: 50 μs max. for each (2-point teaching mode) Operate or reset: 150 μs max. for each (1-point teaching mode)		
Sensitivity adjustment		Teaching method		
Ambient illumination		Incandescent lamp: 3,000 lx max.		
Ambient temperature range		Operating: −10 to 55°C; Storage: −25 to 70°C (with no icing or condensation)		
Ambient humidity range		Operation: 35% to 85%, Storage: 35% to 95% (with no condensation)		
Insulation resistance		20 MΩ min. (at 500 VDC)		
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min		
Vibration resistance		Destruction: 10 to 55 Hz with double amplitude of 1.5 mm for 2 hours each in X, Y, and Z directions		
Shock resistance		Destruction: 500 m/s^2 3 times each in X, Y, and Z directions		
Degree of protection		IEC 60529 IP67		
Connection method		M12, 4-pin connector		
Weight (packed state/Sensor only)	Model with connector	Approx. 370 g/approx. 320 g		
Materials	Case	Diecast zinc (nickel-plated brass)		
	Lens	Methacrylic resin (PMMA)		
	Indicators	ABS		
	Buttons	Elastomers		
	Connector	Diecast zinc (nickel-plated brass)		
Main IO-Link functions		• Operation mode switching between NO and NC • Timer function of the control output and timer time selecting function (Select a function from disabled, ON delay, OFF delay, one-shot or ON/OFF delay.) (Select a timer time of 1-5000 ms.) • Selecting function of ON delay timer time for instability (0 (disabled)-1000 ms) • Monitor output function (PD output indicating a relative detection quantity) • Energizing time read-out function (unit: h) • Initialize the settings function “Restore the factory settings”		---
Communication specifications	IO-Link specification	Version 1.1		---
	Baud rate	E3S-DCP21-IL3: COM3 (230.4 kbps), E3S-DCP21-IL2: COM2 (38.4 kbps)		---
	Data length	PD size: 8 bytes, OD size: 1 byte (M-sequence type: TYPE_2_2)		---
	Minimum cycle time	E3S-DCP21-IL3 (COM3): 1.5 ms, E3S-DCP21-IL2 (COM2): 4.8 ms		---
Accessories		Instruction manual		---

✻ Standard Sensing Object for the Mark Sensor

Color	Munsell code
White	N9.5
Red	4R 4.5/12.0
Yellow-red	4YR 6.0/11.5
Yellow	5Y 8.5/11.0
Yellow-green	3GY 6.5/10.0
Green	3G 6.5/9.0
Blue-green	5BG 4.5/10.0
Blue	3PB 5.0/10.0
Blue-purple	9PB 5.0/10.0
Purple	7P 5.0/10.0
Red-purple	6RP 4.5/12.5
(Black)	(N2.0)

Engineering Data (Reference Value)

Color vs. Detection Capability

E3S-DC

Teaching Capabilities

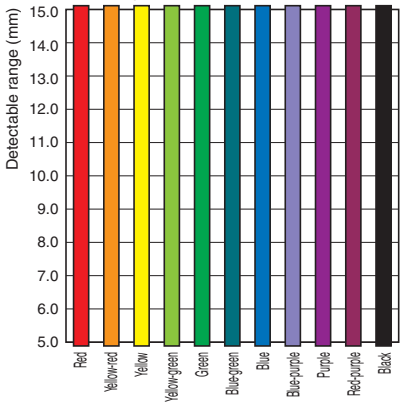
	White	Red	Yellow -red	Yellow	Yellow -green	Green	Blue -green	Blue	Blue -purple	Purple	Red -purple	Black
White		○	○	○	○	○	○	○	○	○	○	○
Red	○		○	○	○	○	○	○	○	○	○	○
Yellow -red	○	○		○	○	○	○	○	○	○	○	○
Yellow	○	○	○		○	○	○	○	○	○	○	○
Yellow -green	○	○	○	○		○	○	○	○	○	○	○
Green	○	○	○	○	○		○	○	○	○	○	○
Blue -green	○	○	○	○	○	○		○	○	○	○	○
Blue	○	○	○	○	○	○	○		○	○	○	○
Blue -purple	○	○	○	○	○	○	○	○		○	○	○
Purple	○	○	○	○	○	○	○	○	○		○	○
Red -purple	○	○	○	○	○	○	○	○	○	○		○
Black	○	○	○	○	○	○	○	○	○	○	○	

Note: The above chart shows the combinations of colors for which teaching is possible at a sensing distance of 10 mm.

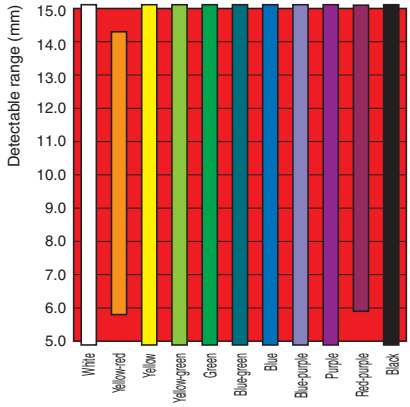
Detectable Ranges

E3S-DC

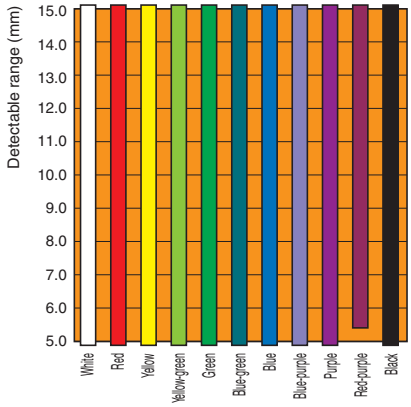
Background color: White
Teaching distance: 10 mm



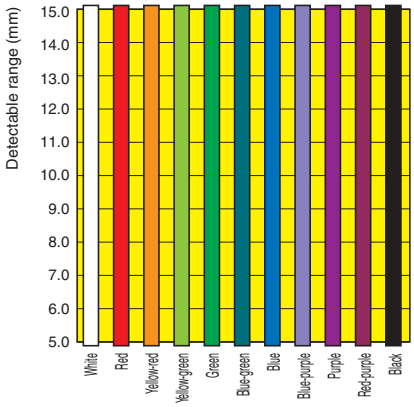
Background color: Red
Teaching distance: 10 mm



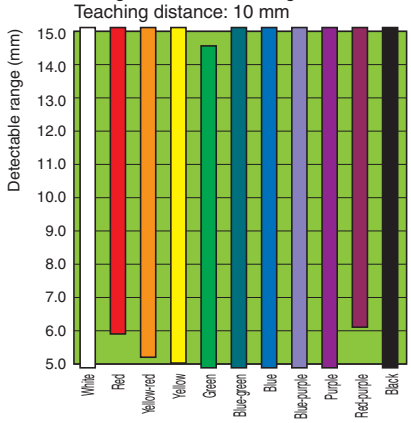
Background color: Yellow-red
Teaching distance: 10 mm



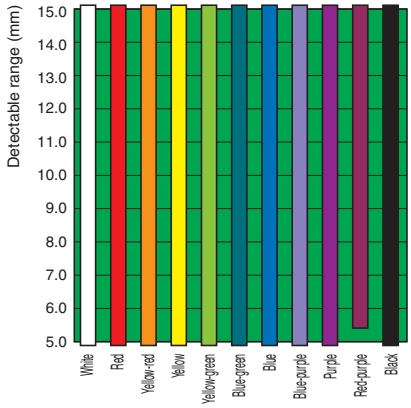
Background color: Yellow
Teaching distance: 10 mm



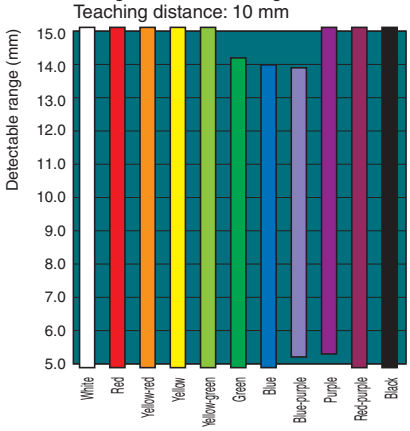
Background color: Yellow-green
Teaching distance: 10 mm



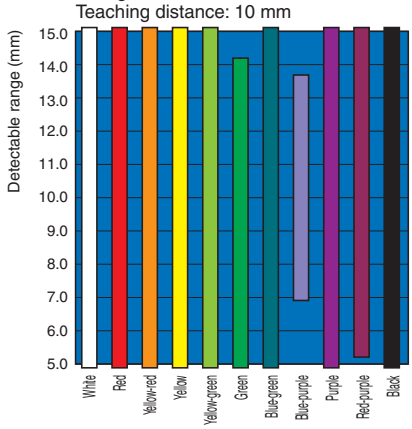
Background color: Green
Teaching distance: 10 mm



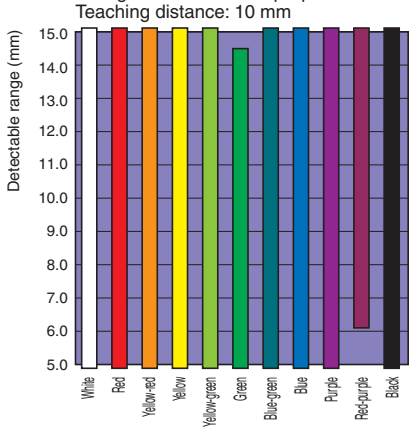
Background color: Blue-green
Teaching distance: 10 mm

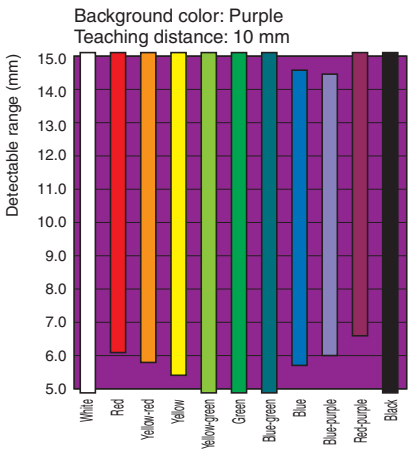


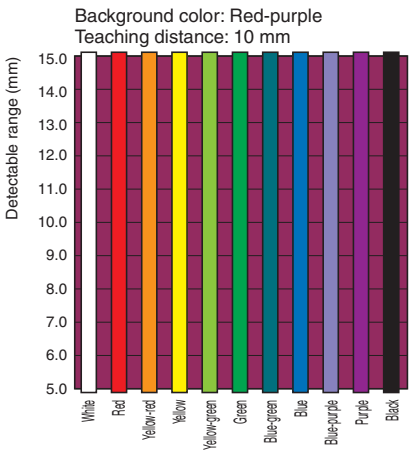
Background color: Blue
Teaching distance: 10 mm

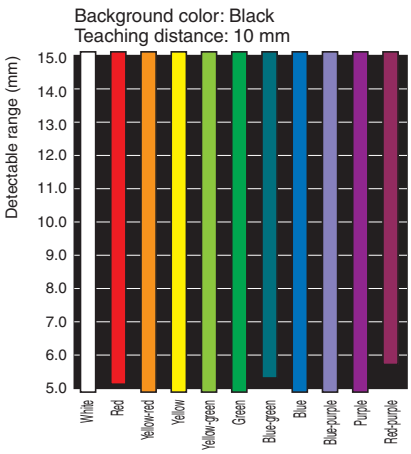


Background color: Blue-purple
Teaching distance: 10 mm



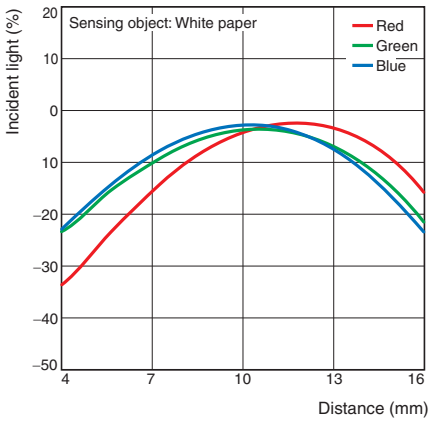


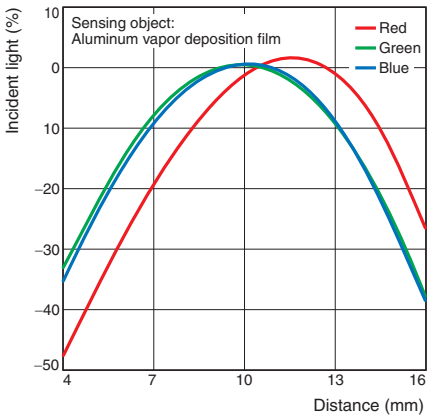




Excess Gain vs. Distance

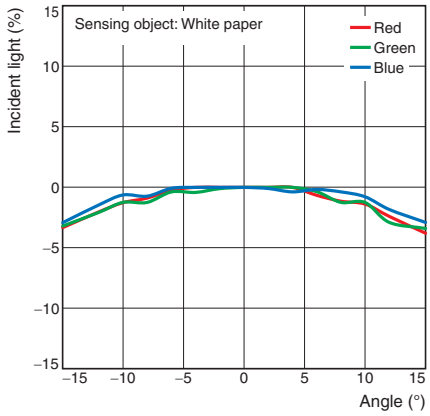
E3S-DC

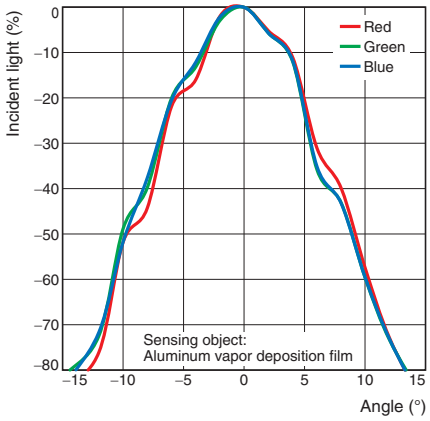




Angle vs. Incident Characteristics

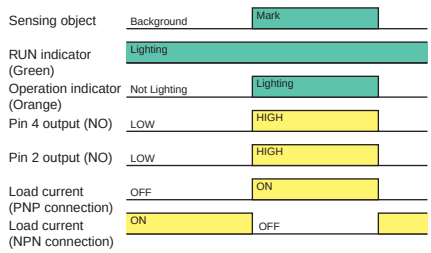
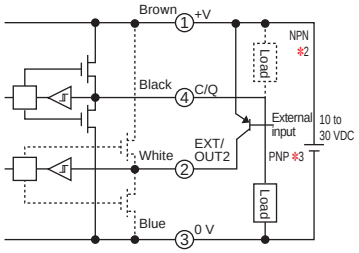
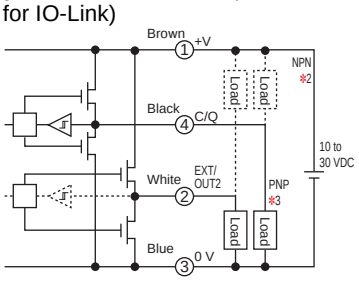
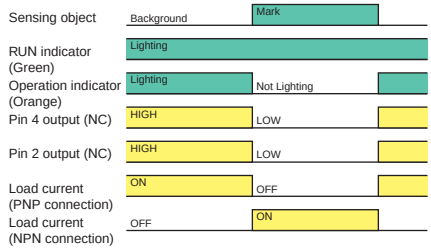
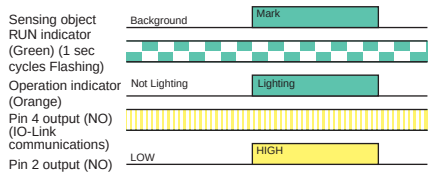
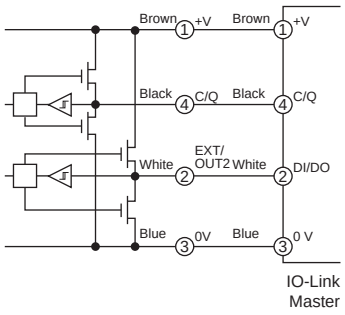
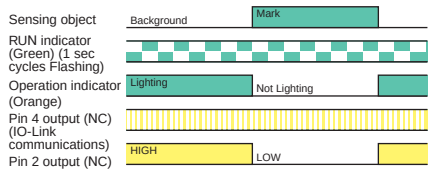
E3S-DC





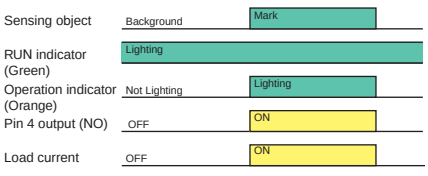
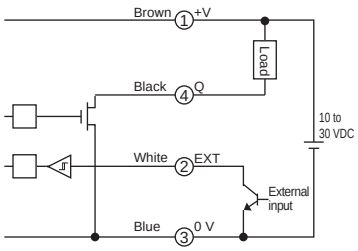
I/O Circuit Diagrams

Push-Pull Output

Model	Output mode	NO/NC setting ✻4	Timing chart	Output circuit
E3S-DCP21-IL2 E3S-DCP21-IL3	Standard I/O mode (SIO mode) (Pin 2 Output Settings)	NO ✻5		Using Pin 2 as an external input ✻1 (enabled by default)  Using Pin 2 with a control output ✻1 (set for IO-Link) 
		NC		
	IO-Link mode (Pin 2 Output Settings)	NO ✻5		
		NC		

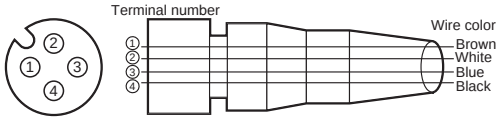
✻1. Pin 2 input/output can be switched with the IO-Link communication command “Switchpoint Pin 2”.
✻2. In case of NPN connection, please connect the load between Pin 1 and Pin 4.
✻3. In case of PNP connection, please connect the load between Pin 3 and Pin 4.
✻4. It can be switched in IO-Link.
✻5. Factory default
Note: You can use IO-Link communications to reverse the operation logic, set an output delay, and change between an input and output.

NPN Output

Model	Timing chart	Output circuit
E3S-DCN21		

Plugs (Sensor I/O Connectors)

M12, 4-pin Connector

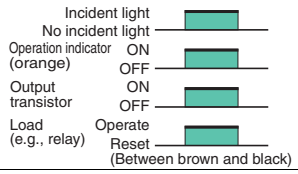
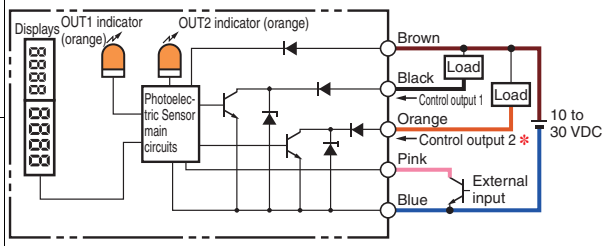
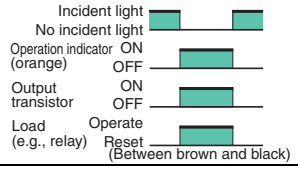


Classification	Wire color	Connector pin No.	Application	
			E3S-DCP21-IL2 E3S-DCP21-IL3	E3S-DCN21
DC	Brown	c	Power supply (+V)	Power supply (+V)
	White	d	External input ✻	External input
	Blue	e	Power supply (0 V)	Power supply (0 V)
	Black	f	Output C/Q	Control output

✻ It can be set as the control output with IO-Link.

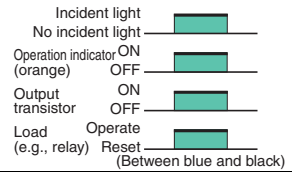
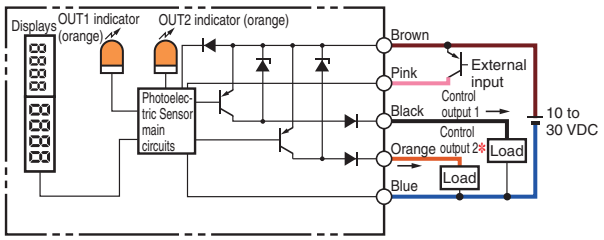
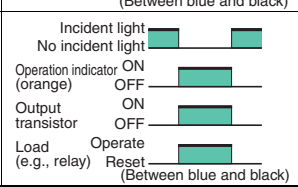
I/O Circuit Diagrams

NPN Output

Model	Operation mode	Timing chart	NO/NC indicator	Output circuit
E3NX-CA11 E3NX-CA21 E3NX-CA6	NO (Light-ON)		NO ON	
	NC (Dark-ON)		NC ON	

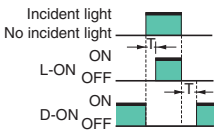
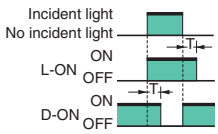
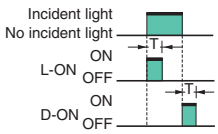
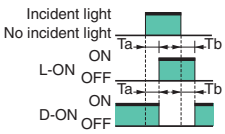
✻ The CA11 and CA6 have only control output 1. These models do not have control output 2 or an external input, so they do not have the OUT2 indicator.

PNP Output

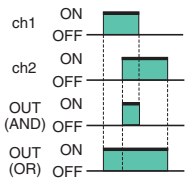
Model	Operation mode	Timing chart	NO/NC indicator	Output circuit
E3NX-CA41 E3NX-CA51 E3NX-CA8	NO (Light-ON)		NO ON	
	NC (Dark-ON)		NC ON	

✻ The CA41 and CA8 have only control output 1. These models do not have control output 2 or an external input, so they do not have the OUT2 indicator.

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

ON-delay Timer	OFF-delay Timer	One-shot Timer	ON/OFF-delay Timer
Delays the output ON after detection.	Holds the output ON for detection by PLC when the detection time is too short.	Keeps the output ON for a specified time regardless of the workpiece size variations.	Sets both OFF-delay Timer and ON-delay Timer.
			

2. Timing Chart for Control Output (AND or OR) (T: Set Time)



Nomenclature

Standard Models

E3NX-CA11/CA41/CA6/CA8

△ NO/NC Button
Used to set the external output polarity.
When NO (normally open) is set, the output is ON when a workpiece is in the sensing area.
When NC (normally closed) is set, the output is ON when a workpiece is not in the sensing area.

NO/NC Indicator (Orange)
Indicates the current NO/NC setting status.

OUT Indicator (Orange)
Turns ON when the output is ON.

ST Indicator (Blue)
Turns ON when Smart Tuning is in progress.

Threshold level (green digital display)

Incident level (white digital display)

□MODE Button
Hold down for at least 3 seconds to change between Detection Mode and Setting Mode.

TUNE Button
Executes Smart Tuning.

+-UP/DOWN Button
Used to fine-tune the threshold or change set values.

Advanced Models and Model for Sensor Communications Unit

E3NX-CA21/CA51/CA0

△ NO/NC Button
Used to set the external output polarity.
When NO (normally open) is set, the output is ON when a workpiece is in the sensing area.
When NC (normally closed) is set, the output is ON when a workpiece is not in the sensing area.

NO/NC Indicator (Orange)
Indicates the current NO/NC setting status.

OUT1 Indicator/OUT2 Indicator (Orange)
Turns ON when OUT1 or OUT2 is ON.

ST Indicator (Blue)
Turns ON when Smart Tuning is in progress.

TUNE Button
Executes Smart Tuning.

Threshold level (green digital display)

Incident level (white digital display)

□MODE Button
Hold down for at least 3 seconds to change between Detection Mode and Setting Mode. Hold down for 1 second to change between OUT1 and OUT2.

OUT1 Selection Indicator/OUT2 Selection Indicator
The indicator for the selected output channel is lit.

+-UP/DOWN Button
Used to fine-tune the threshold or change set values.

Safety Precautions

Be sure to read the precautions for all models in the website at: http://www.ia.omron.com/.

Warning Indications

⚠WARNING	**Warning level** Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally, there may be significant property damage.
Precautions for Safe Use	Supplementary comments on what to do or avoid doing, to use the product safely.
Precautions for Correct Use	Supplementary comments on what to do or avoid doing, to prevent failure to operate, malfunction or undesirable effect on product performance.

Meaning of Product Safety Symbols

	General prohibition Indicates the instructions of unspecified prohibited action.
	Caution, explosion Indicates the possibility of explosion under specific conditions.
	Caution, fire Indicates the possibility of fire under specific conditions.

⚠ WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly.
Do not use it for such purposes.

Do not use the product with voltage in excess of the rated voltage.
Excess voltage may result in malfunction or fire.

Never use the product with an AC power supply.
Otherwise, explosion may result.

Precautions for Safe Use

The following precautions must be observed to ensure safe operation of the product. Doing so may cause damage or fire.

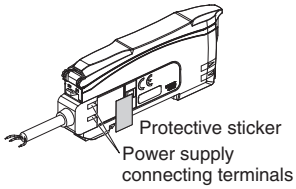
1. Do not install the product in the following locations.
- Locations subject to direct sunlight
- Locations subject to condensation due to high humidity
- Locations subject to corrosive gas
- Locations subject to vibration or mechanical shocks exceeding the rated values
- Locations subject to exposure to water, oil, chemicals
- Locations subject to steam
- Locations subject to strong magnetic field or electric field

2. Do not use the product in environments subject to flammable or explosive gases.
3. Do not use the product in any atmosphere or environment that exceeds the ratings.
4. To secure the safety of operation and maintenance, do not install the product close to high-voltage devices and power devices.
5. High-Voltage lines and power lines must be wired separately from this product. Wiring them together or placing them in the same duct may cause induction, resulting in malfunction or damage.
6. Do not apply any load exceeding the ratings. Otherwise damage or fire may result.
7. Do not short the load. Otherwise damage or fire may result.
8. Connect the load correctly.
9. Do not miswire such as the polarity of the power supply.
10. Do not use the product if the case is damaged.
11. Burn injury may occur. The product surface temperature rises depending on application conditions, such as the ambient temperature and the power supply voltage. Attention must be paid during operation or cleaning.
12. When setting the sensor, be sure to check safety such as by stopping the equipment.
13. Be sure to turn off the power supply before connecting or disconnecting wires.
14. Do not attempt to disassemble, repair, or modify the product in any way.
15. When disposing of the product, treat it as industrial waste.
16. Do not use the Sensor in water, rain, or outdoors.
17. UL Standard Certification
    Only the Sensors with the Enhanced UL Certification Mark are certified by UL. They are intended to be supplied by a "Class 2 circuit". When used in United States and Canada, please use the same Class 2 source for input and output. The overcurrent protection current rating is 2 A max. They were evaluated as Open type and shall be installed within a enclosure.

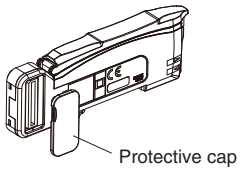
Precautions for Correct Use

1. Be sure to mount the unit to the DIN track until it clicks.
2. When using the Amplifier Units with Wire-saving Connectors, attach the protective stickers (provided with E3X-CN-series Connectors) on the unused power pins to prevent electrical shock and short circuiting. When using Amplifier Units with Connectors for Communications Units, attach the protective caps (provided with E3NW-series Sensor Communications Units).

Amplifier Unit with Wire-saving Connector



Amplifier Unit with Connector for Communications Unit



3. Use an extension cable with a maximum length of 30 m. Be sure to use a cable of at least 0.3 mm^2 for extension. The power voltage must be 24 to 30 V when connecting Amplifier Units with extension cable and wire-saving connector.
4. Do not apply the forces on the cable exceeding the following limits:
   Pull: 40 N; torque: 0.1 N·m; pressure: 20 N; bending: 29.4 N
5. Use the E32-☐☐ Fiber Unit.
6. Do not apply excessive force such as tension, compression or torsion to the Fiber Amplifier Unit with the Fiber Unit fixed to the Fiber Amplifier Unit.
7. Always keep the protective cover in place when using the product. Not doing so may cause malfunction.
8. It may take time until the incident level and measurement value become stable immediately after the power is turned on depending on use environment.
9. The product is ready to operate 200 ms after the power supply is turned ON.
10. The Mobile Console E3X-MC11, E3X-MC11-SV2 and E3X-MC11-S cannot be connected.
11. The mutual interference prevention function does not work when in combination with E3C/E2C/E3X.
12. Excessive incident light cannot be sufficiently handled by the mutual interference prevention function and may cause malfunction. To prevent this, set a higher threshold level.
13. The Communication Unit E3X-DRT21-S, E3X-CRT, E3X-ECT and E3NW cannot be connected.
14. If you notice an abnormal condition such as a strange odor, extreme heating of the unit, or smoke, immediately stop using the product, turn off the power, and consult your dealer.
15. Do not use thinner, benzine, acetone, and lamp oil for cleaning.

Dimensions

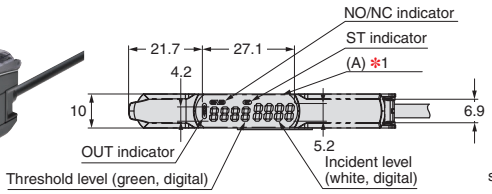
(Unit: mm)
Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

Fiber Amplifier Units

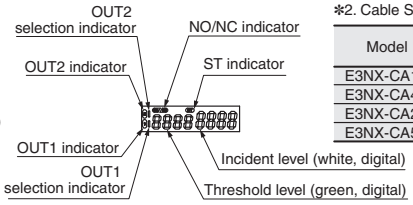
Pre-wired Amplifier Units

E3NX-CA11
E3NX-CA41
E3NX-CA21
E3NX-CA51

E3NX-CA11/CA41



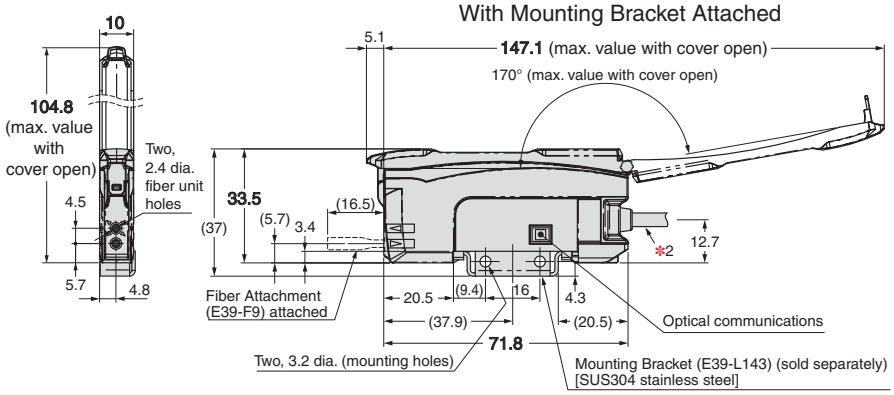
E3NX-CA21/CA51



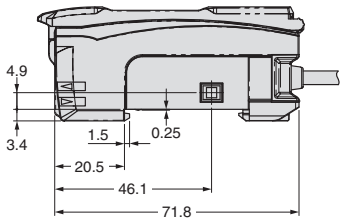
✻1. The Mounting Bracket can also be used on side A.
✻2. Cable Specifications

Model	Outer diameter	No. of conductors	Others
E3NX-CA11	4.0 dia.	3	Conductor cross-section: 0.2 mm²
E3NX-CA41			
E3NX-CA21		5	Insulator dia.: 0.9 mm
E3NX-CA51			

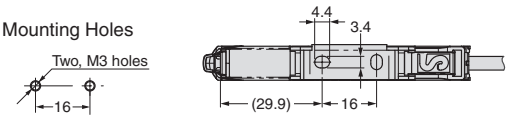
With Mounting Bracket Attached



Standalone Product Diagram

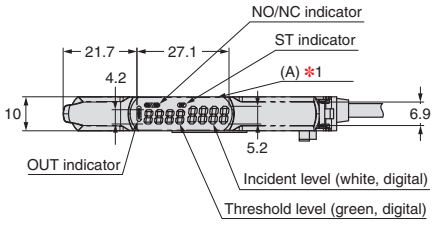


Mounting Holes



Amplifier Units with Wire-saving Connectors

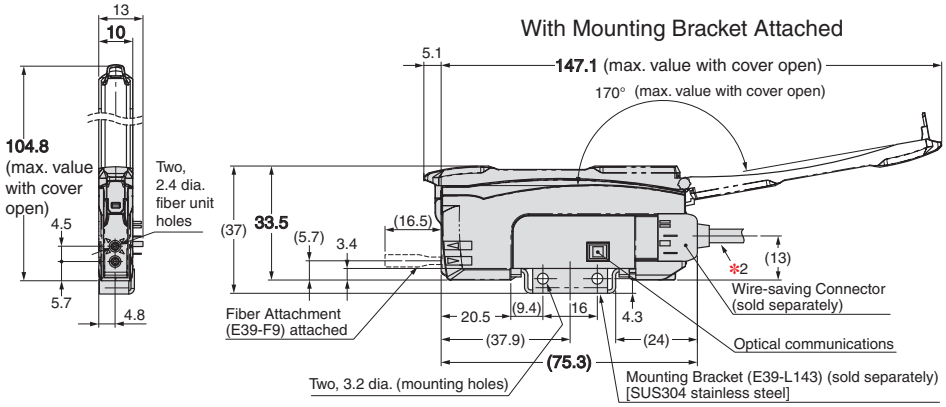
E3NX-CA6
E3NX-CA8



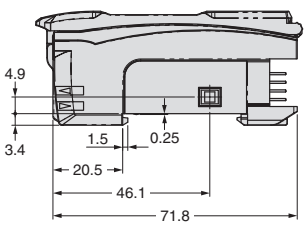
✻1. The Mounting Bracket can also be used on side A.
✻2. Cable Specifications

Model	Outer diameter	No. of conductors
E3X-CN12	2.6 dia.	1
E3X-CN22	4.0 dia.	2
E3X-CN11		3

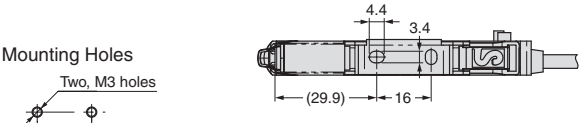
With Mounting Bracket Attached



Standalone Product Diagram

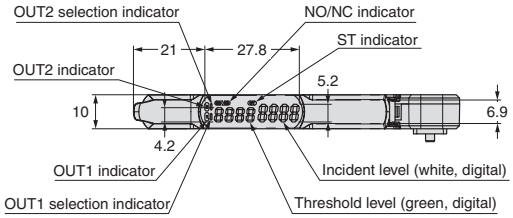


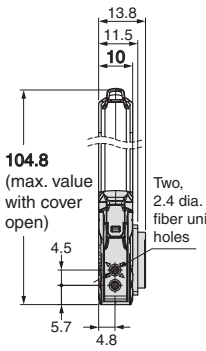
Mounting Holes



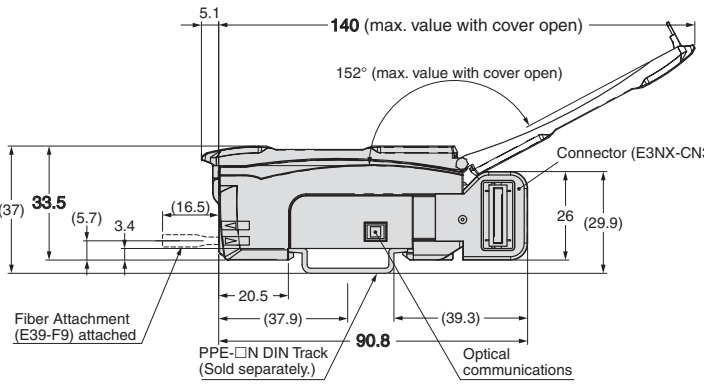
Amplifier Unit with Connector for Sensor Communications Unit

E3NX-CA0

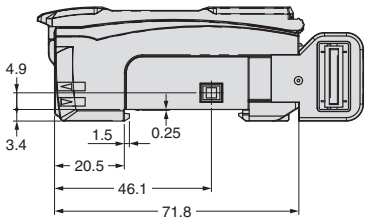




Mounted to DIN Track



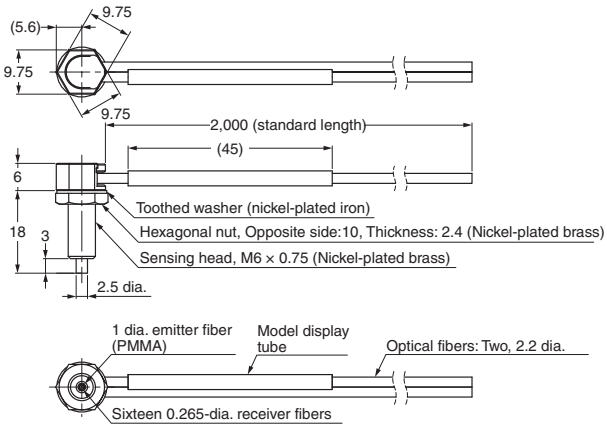
Standalone Product Diagram



Fiber Units

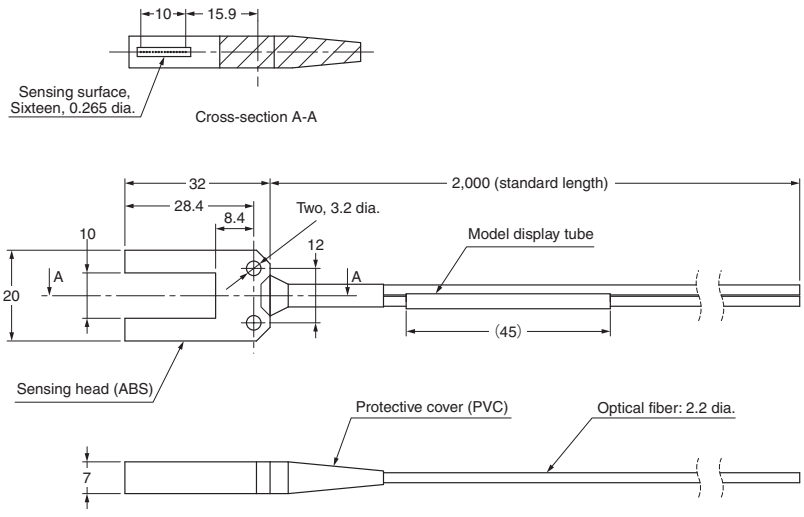
Reflective Models

E32-C91N

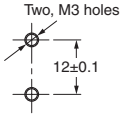


Through-beam Models (Grooved Type)

E32-G16



Mounting Holes

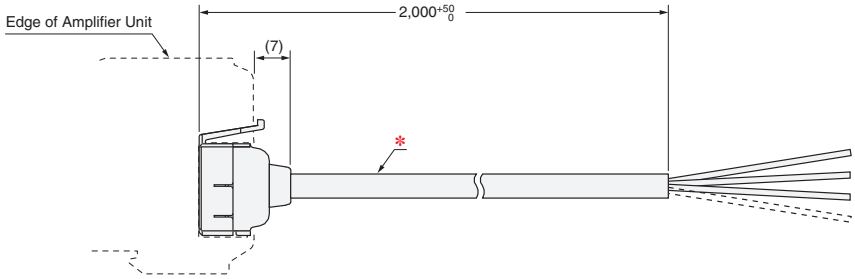


Accessories (Sold Separately)

Wire-saving Connectors

Master Connector

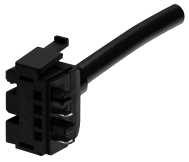
E3X-CN11

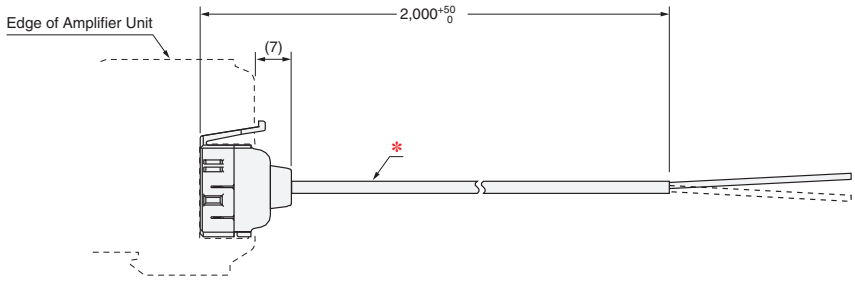


* 4-dia. cable with 3 conductors, Standard cable length: 2 m (Conductor cross-section: 0.2 mm² (AWG24), Insulator diameter: 1.1 mm)

Slave Connector

E3X-CN12

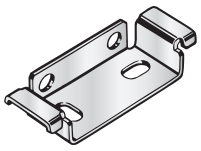




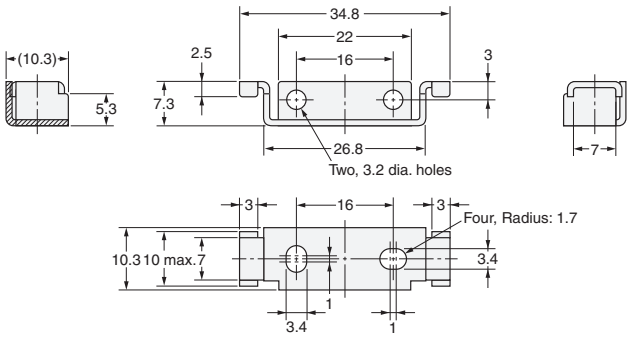
* 2.6-dia. cable with 1 conductor, Standard cable length: 2 m (Conductor cross-section: 0.2 mm² (AWG24), Insulator diameter: 1.1 mm)

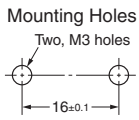
Mounting Bracket

E39-L143



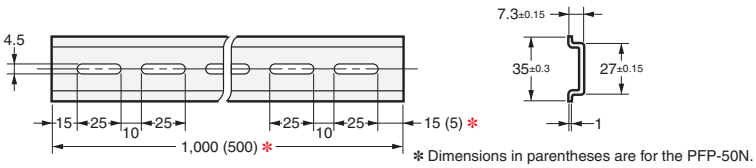
Material: Stainless steel (SUS304)





DIN Tracks

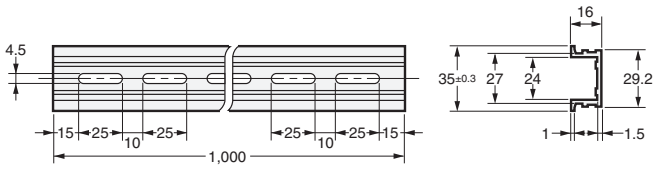
PFP-100N
PFP-50N



✻ Dimensions in parentheses are for the PFP-50N.

Material: Aluminum

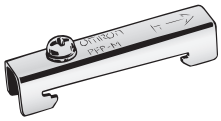
PFP-100N2

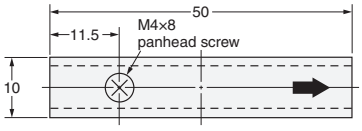


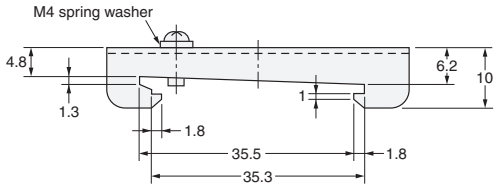
Material: Aluminum

End Plate

PFP-M







Materials: Iron, zinc plating

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OMRON Corporation **Industrial Automation Company**

Kyoto, JAPAN

Contact: www.ia.omron.com

Regional Headquarters

OMRON EUROPE B.V.
Sensor Business Unit
Carl-Benz-Str. 4, D-71154 Nufringen, Germany
Tel: (49) 7032-811-0/Fax: (49) 7032-811-199

OMRON ELECTRONICS LLC
2895 Greenspoint Parkway, Suite 200
Hoffman Estates, IL 60169 U.S.A.
Tel: (1) 847-843-7900/Fax: (1) 847-843-7787

OMRON ASIA PACIFIC PTE. LTD.
No. 438A Alexandra Road # 05-05/08 (Lobby 2),
Alexandra Technopark,
Singapore 119967
Tel: (65) 6835-3011/Fax: (65) 6835-2711

OMRON (CHINA) CO., LTD.
Room 2211, Bank of China Tower,
200 Yin Cheng Zhong Road,
PuDong New Area, Shanghai, 200120, China
Tel: (86) 21-5037-2222/Fax: (86) 21-5037-2200

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