NEW

OMRON

N-Smart
Presence / Detection / Measurement

Smart Laser Sensors
E3NC-L/E3NC-S

Get the Ability to Handle Applications

Beyond the Realm of Fiber Sensors

Compact
Laser Sensors
E3NC-L

NEW

Ultra-compact
CMOS Laser Sensors
E3NC-S

realizing

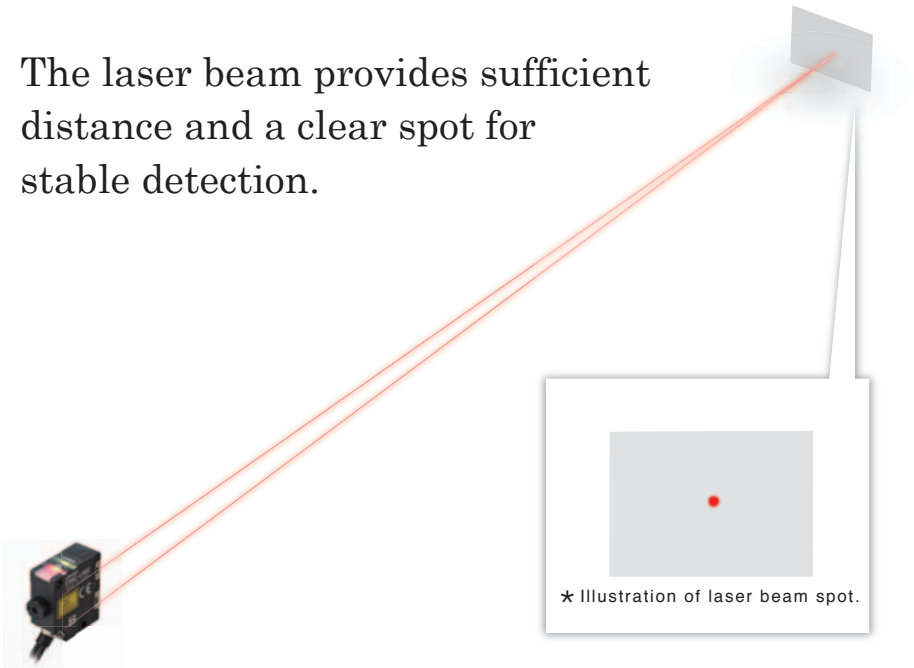
EtherCAT

CompoNet

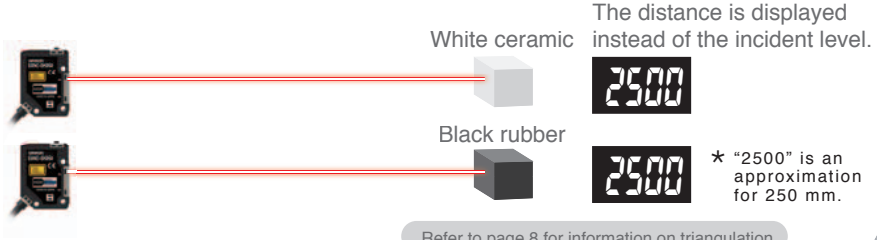
CC-Link V2

A Wide Variety of Laser Sensor Heads That Handle

Fiber Sensor Topics	E3NC Laser Sensor Solutions
The sensing distance is short.	The laser beam provides sufficient distance and a clear spot for stable detection.
The beam spreads out.	
The spot is not visible.	



Colors influence detection.	The use of triangulation and CMOS provides stable detection for workpieces with different colors or with an inclination of the Sensor.
Inclination influences detection.	



Refer to page 8 for information on triangulation.

Applications Beyond the Realm of Fiber Sensors

Detection Requirement

Stable presence detection

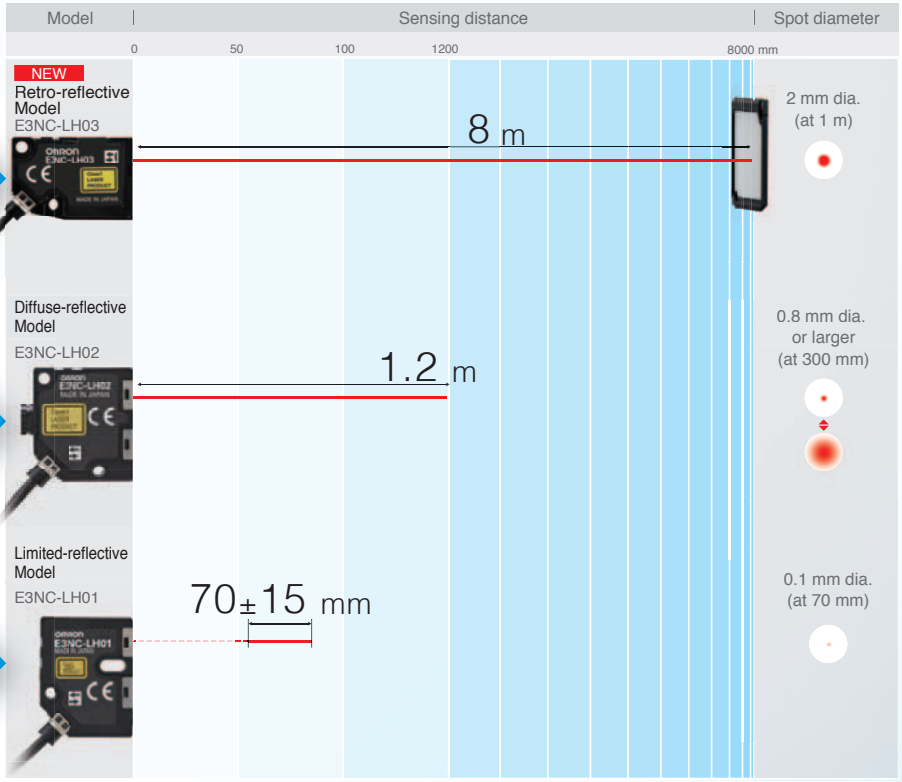
Long-distance detection with installation on only one side

High-precision positioning

Stable detection even with workpieces of different colors

Stable detection even with the Sensor installed at an angle

Presence **E3NC-L** series of Compact Laser Sensors



Detection **E3NC-S** series of Ultra-compact CMOS Laser Sensors

Retro-reflective Model

E3NC-LH03

NEW

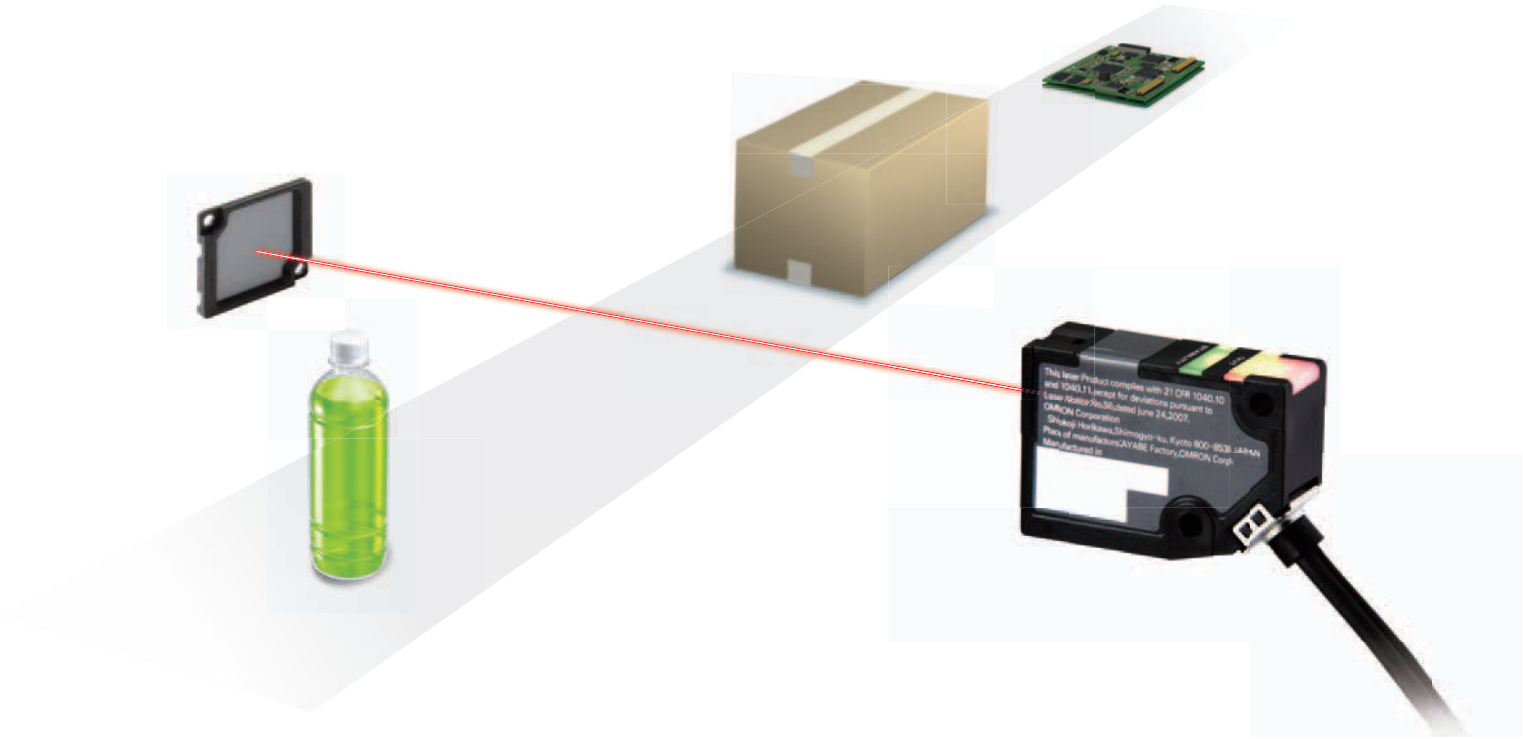
Laser Class 1

IP67 ★

Robot Cable

★ The E39-R21 and E39-R22 Reflectors are also IP67.

Stable Detection of Many Types of Workpieces, Even Transparent Ones

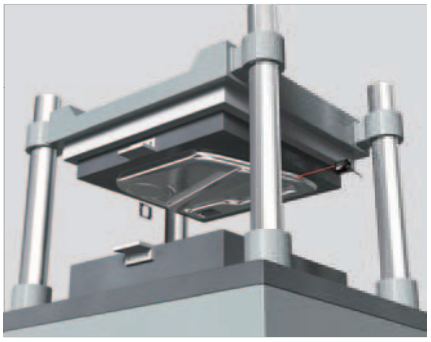


Visible spot even at long distances.

Maximum sensing distance of **8** m

Application

Detection of Remaining Sheet Metal

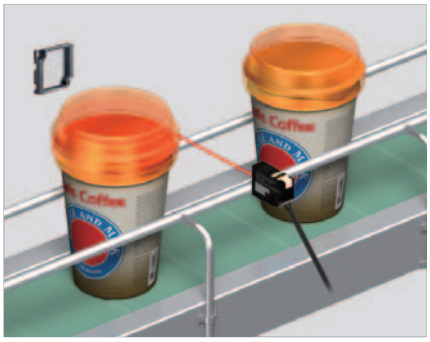


The small, long-distance spot can stably detect large pieces of sheet metal that remain on a press.

Detection of Two PCBs

The small beam spot can detect two PCBs inserted together.

Detection of Overlapping Lids



The small beam spot stably detects overlapping lids on cups.

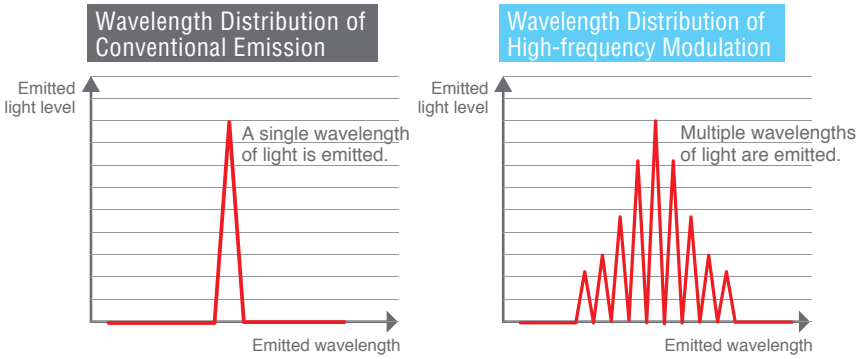
And, Convenient!

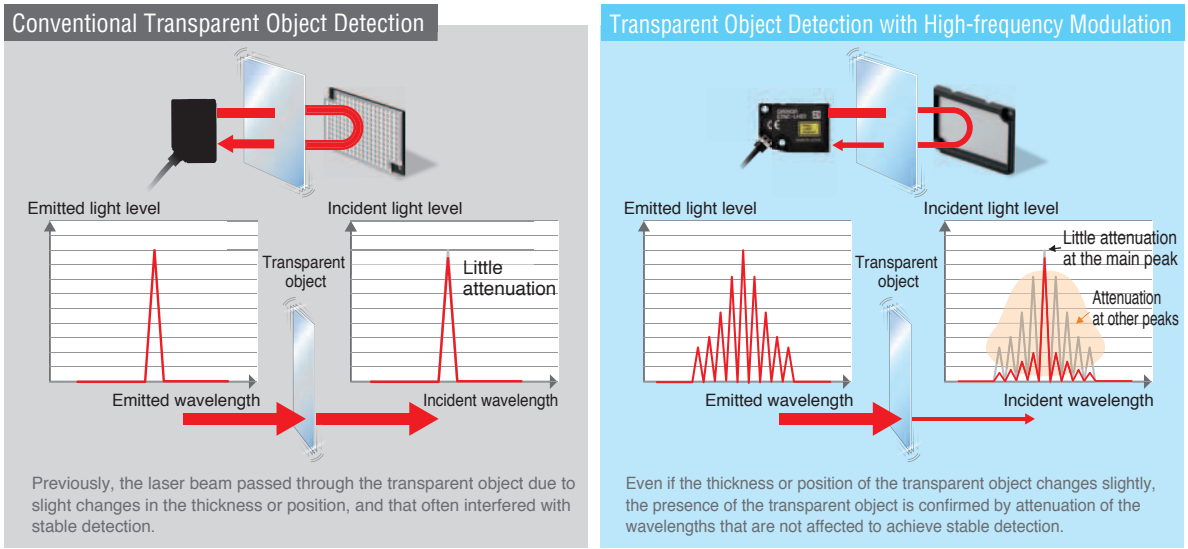
Detects Film That's 95% Transparent

High-frequency Modulation for Stable Detection of Even Minor Variations in the Thickness or Position of Transparent Objects

High-frequency Modulation

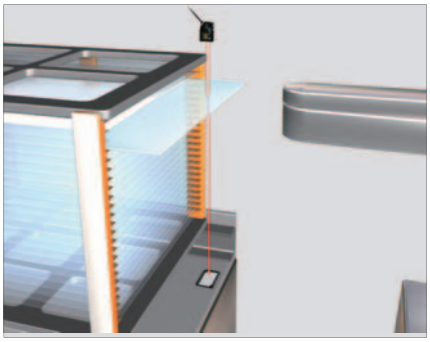
Conventional emitted laser beams have a single wavelength. With high-frequency Modulation, the emitted laser beam is controlled so that it contains multiple wavelengths.





Application

Detecting Glass Wafer Protrusion

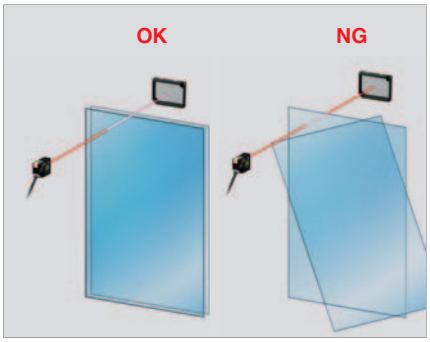


The high ability to detect transparent objects enables stable detection of highly transparent glass wafers.

Detecting the Height of Shrink Packaging Film

The large difference in light levels even for transparent films enables stable detection of thin packaging films.

Detecting Two Sheets of Transparent Film



Even small differences in incident light level are captured to enable detection of two sheets of transparent film.

Diffuse-reflective Model

E3NC-LH02

Laser Class 1 | IP65 ✶ | Robot Cable

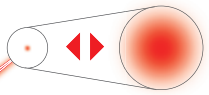
✶ Only when adjuster is locked.

Long-distance and Variable Spot to Stably Detect the Target Workpiece

Visible spot even at long distances.

Maximum Sensing Distance:

1.2 m



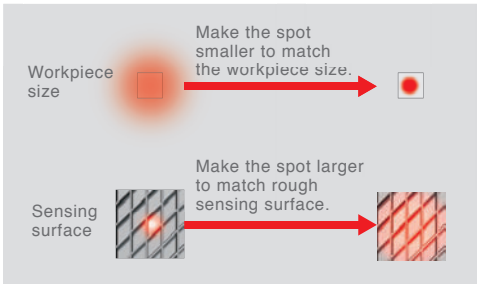
0.8 mm dia. or larger
(Approx. 0.8 mm dia. at 300 mm)

And, Convenient!

Adjust the Spot to the Workpiece or Application for Stable Detection.

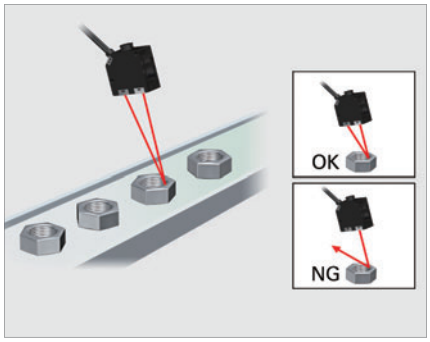
Variable Spot

You can adjust the spot size to the workpiece size or sensing surface conditions for even more-stable detection. The use of a crown lock eliminates the need for tools to lock the spot adjuster. Just press in the adjuster to lock it to prevent the setting from changing.



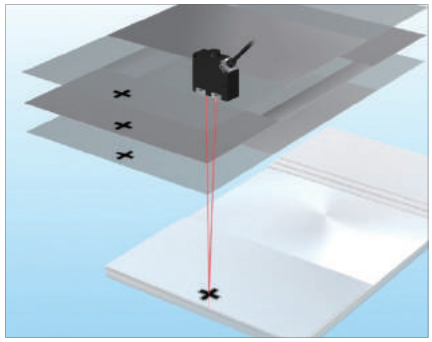
Application

Thread Presence Detection



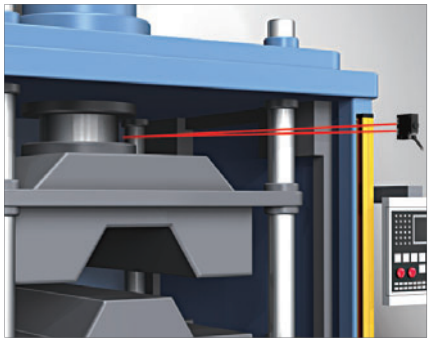
The spot is made wider so that the presence of threading in the nuts can be detected.

Glass Substrate Mark Detection



With a maximum sensing distance of 1.2 m, long-distance mark detection is stable.

Workpiece Presence Detection through Narrow Gaps



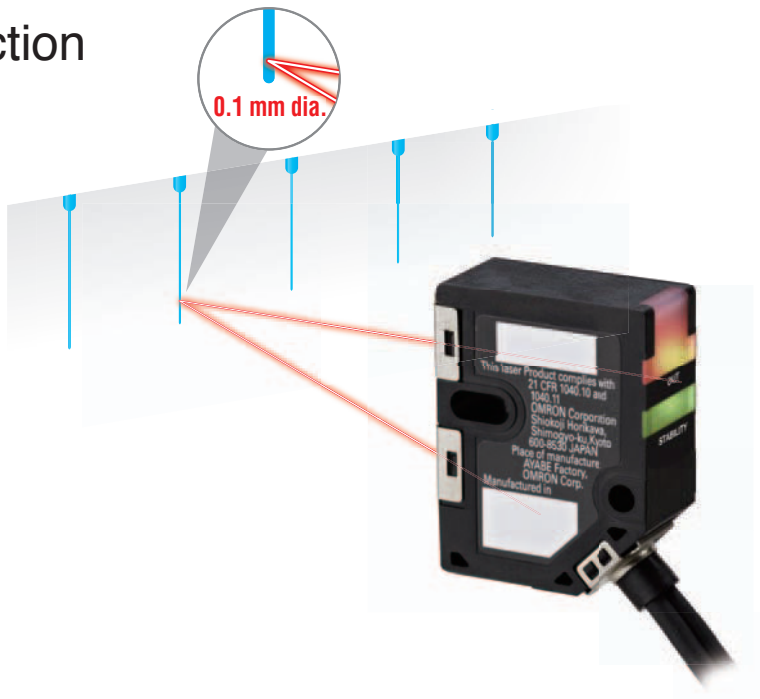
Even detailed locations that are recessed in machines can be stably detected from a distance.

Limited-reflective Model

E3NC-LH01

0.1 mm dia. | Laser Class 1 | IP65 | Robot Cable

Minute Spot for High-precision Detection



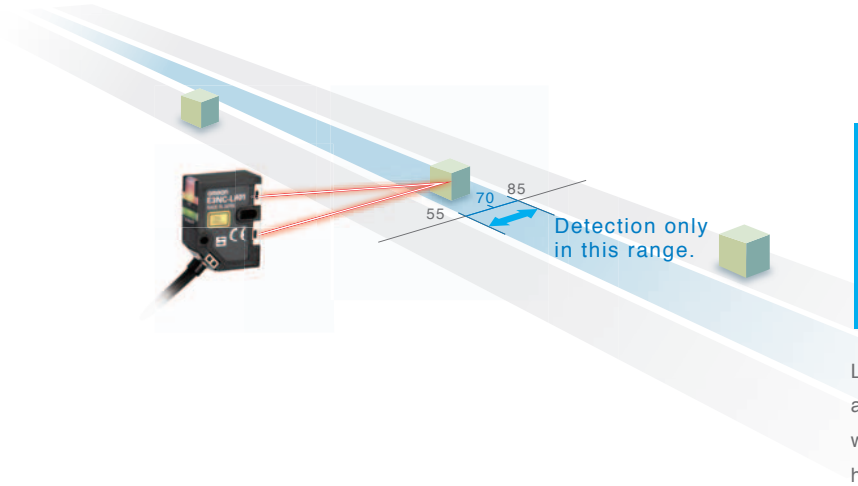
High-precision Positioning

Minute spot with

0.1 mm dia.

Pin-point precision positioning to ±10 μm.✶

✶ With Smart Tuning. Depends on the workpiece.



No Detection Closer or Farther Away

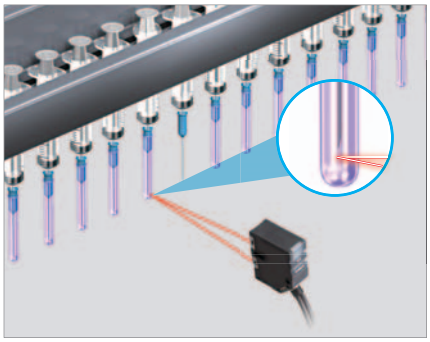
Limited detection with a sensing distance of

70±15 mm

Limited reflection means that objects are detected only within a sensing distance of 70 mm ±15 mm even if there are workpieces or reflective objects closer or farther away. This helps prevent false detection.

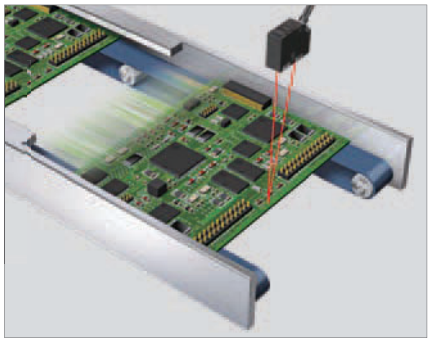
Application

Detecting the Presence of Needle Caps



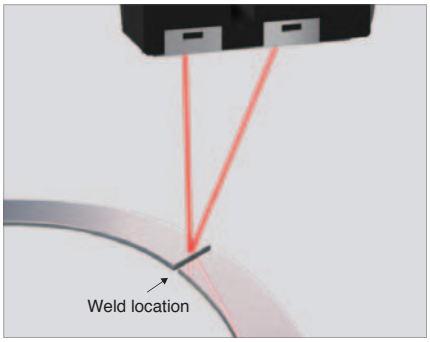
The minute 0.1-mm spot is targeted only at the end of the cap for stable detection.

PCB Arrival Confirmation



The laser beam forms a minute spot to detect arrival with high precision.

Ring Joint Location Detection



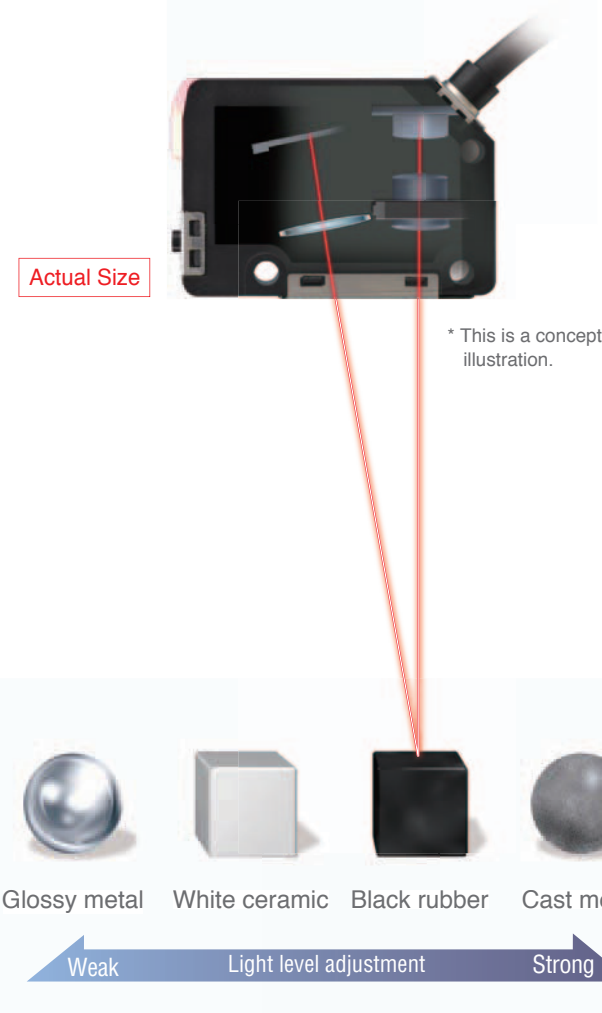
The minute, sharp laser beam stably detects 0.1 mm seams.

E3NC-SH250H/SH250 E3NC-SH100

Laser Class 2★ | IP67 | Robot Cable

★ E3NC-SH250H only. The E3NC-SH250 and E3NC-SH100 are laser class 1.

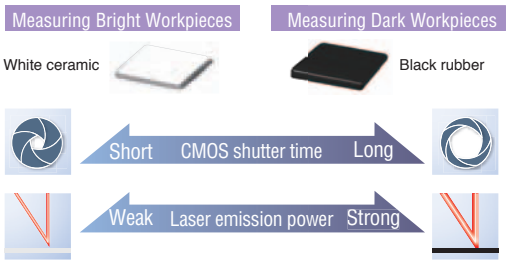
Stable Detection Even for Glossy Metals or Cast Metals Regardless of Workpiece Color, Material, or Surface Conditions



OMRON's Unique HSDR-CMOS (High Speed and Dynamic Range)

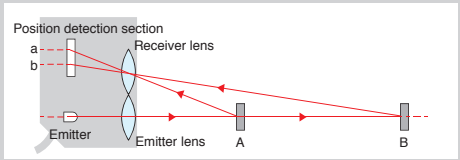
Dynamic Range of Up to 500,000 Times

The shutter time of the CMOS is adjusted to the workpiece. And then the emission power is adjusted to optimize the amount of dispersed light that is received.



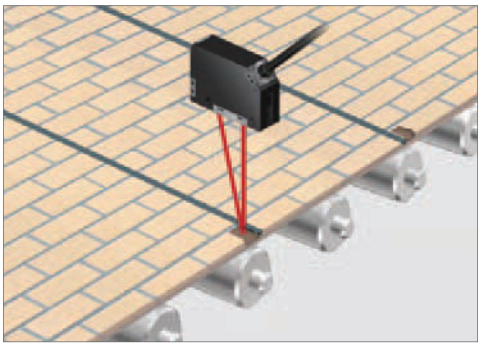
Stable Detection with Triangulation

With triangulation, the workpiece is measured by measuring the detection position on the position detection section, which receives the light. Therefore, the influence of changes in the incident level is limited.



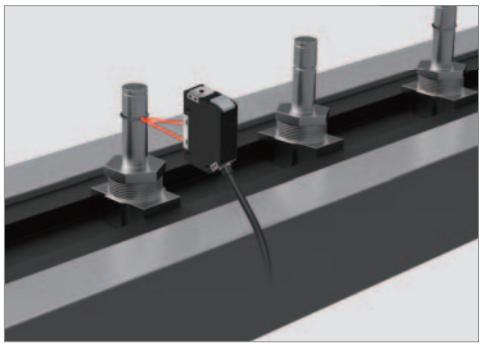
Application

Detecting the Presence of Exterior Wall Material



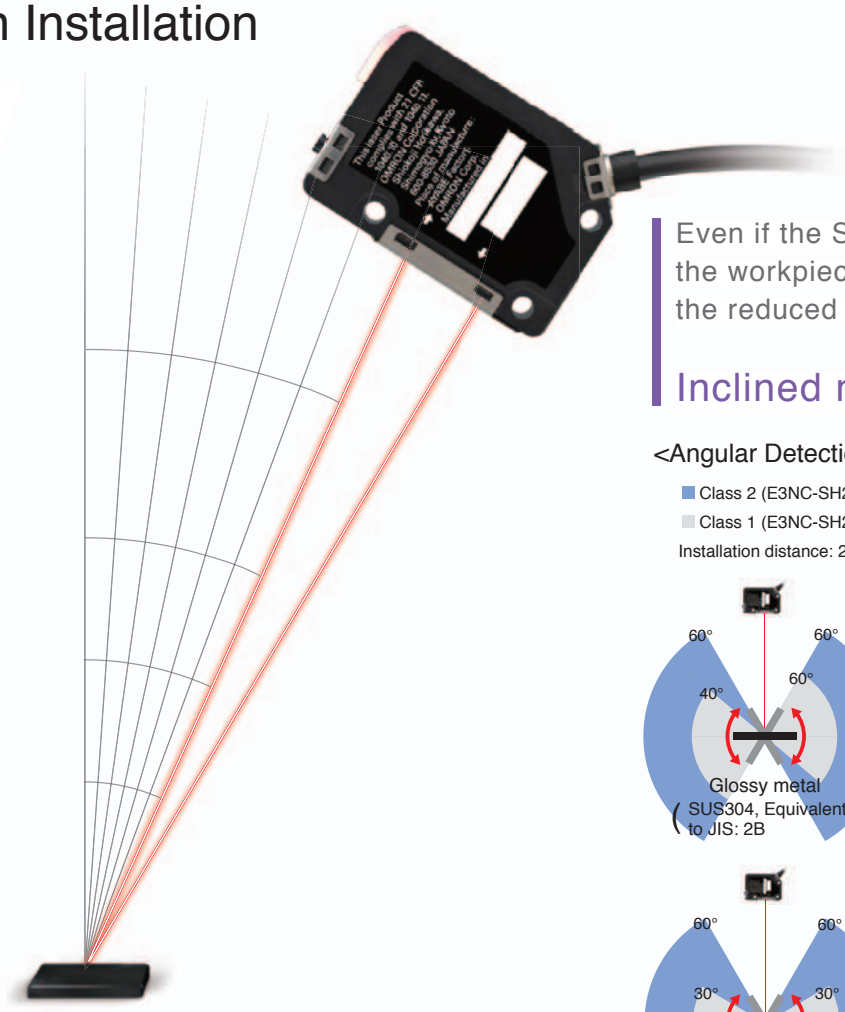
With the CMOS Sensor, stable detection is possible even if the workpiece's color or surface conditions are not consistent.

O-ring Presence Detection



With the CMOC Sensor, stable detection is possible even with low-reflectance workpieces.

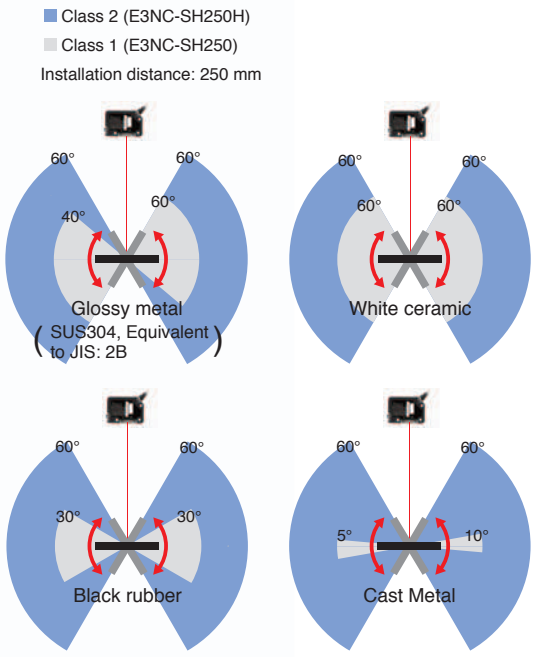
Limited Influence of Inclination in Sensor Installation. More Ability to Handle Workpieces and Greater Flexibility in Installation



Even if the Sensor is mounted at an angle, the workpiece can still be detected due to the reduced mounting restrictions.

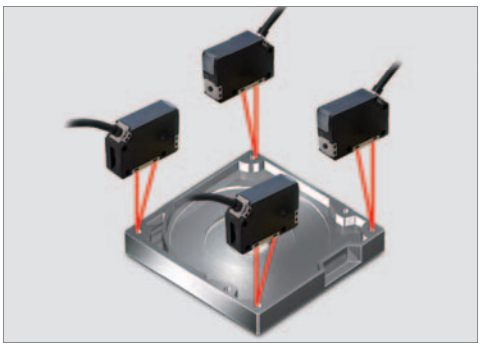
Inclined mounting at up to 60°

<Angular Detection Range>



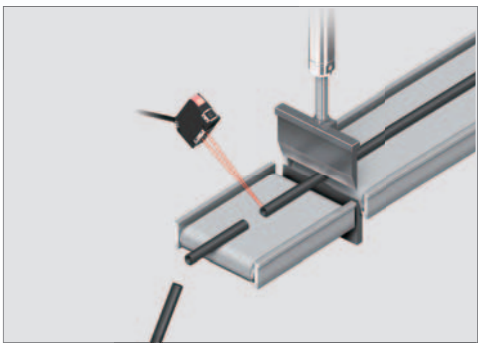
Application

Detecting Holes Made in Metal Parts



The Sensors are influenced very little by the surface conditions of the workpiece, so level differences on metal surfaces can be stably detected.

Detection of Cut Position on Rubber Hose



Even if the Sensor is mounted at an angle, stable detection is possible for workpieces with low reflection.

Lens Attachments

E39-P51 (For E3NC-LH03 Retro-reflective Models)

E39-P52 (For E3NC-LH02 Diffuse-reflective Models)

NEW

Handle Even More Applications with a Line Beam

And, Convenient!

Select the Line Beam Shape

PAT.P

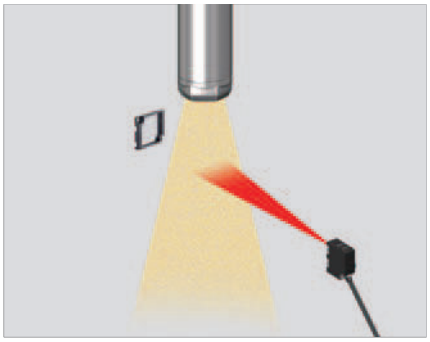
You can mount a Lens Attachment to the E3NC-LH02 and adjust the spot to create various shapes of line beams. Adjusting the beam shape to the workpiece enables even more-stable detection.

Rubber Packing

The Lens Attachments have internal rubber packings to reduce the entry of dirt between the Sensor Head and Lens Attachment.

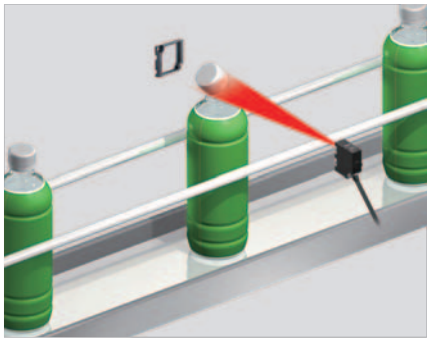
Application

Presence Detection of Powders or Liquids



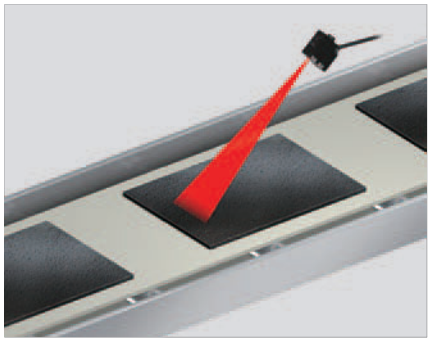
With a wider beam, you can stably detect powders and liquids because they are less likely to fall outside of the beam.

Detection of Faulty Cap Assembly



Using a line beam allows you to detect caps that are not attached correctly with only one Sensor.

Presence Detection of Rubber Sheets



The wide sensing area helps eliminate the influences of color differences in the rubber sheet to enable stable detection.

Laser Amplifier Units **E3NC-LA**

Laser Amplifier Units (CMOS Type) **E3NC-SA**

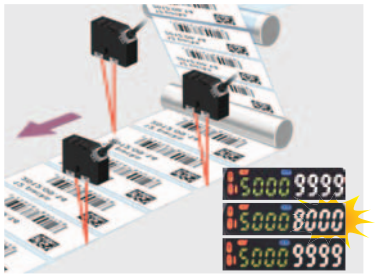
Consistent Operating Methods for All N-Smart Amplifier Units. White Display Characters for High Visibility.

Select the Best Tuning Method According to the Application

Smart Tuning

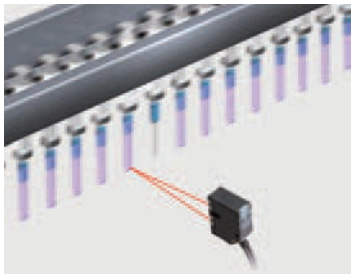
Common★ Functions — Basic Tuning **Two-point Tuning**

The larger incident level between measurements with and without a workpiece is set to 9,999.



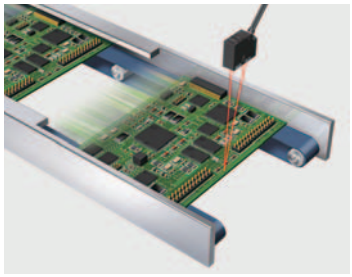
Common★ Functions — High-speed Workpieces **Full Auto Tuning**

You can adjust to moving workpieces without stopping the line.



Additional E3NC-LA Functions — High-precision Positioning **Position Tuning**

High-precision, pinpoint workpiece positioning is possible.

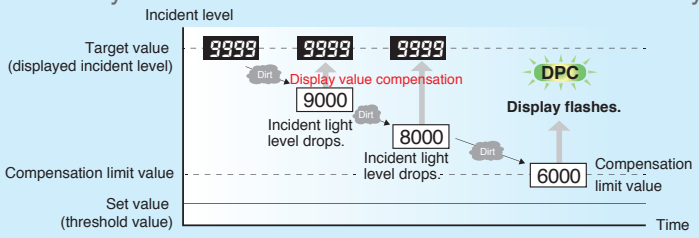


★ The common functions are provided by both the E3NC-LA and the E3NC-SA.

Additional E3NC-LA Functions — Long-term Stable Detection with Essentially No Maintenance Even When the Sensor Is Dirty

DPC (Dynamic Power Control)

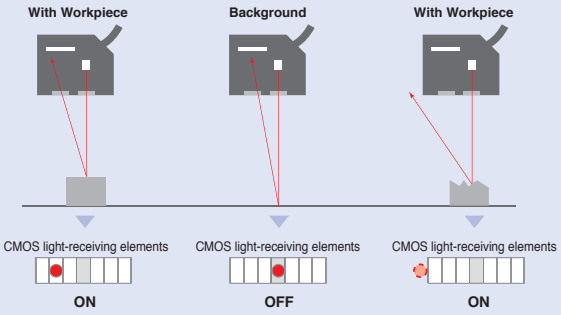
Even if dirt or machine vibration reduces the amount of light received, OMRON's unique DPC automatically compensates the displayed incident level to achieve stable, high-precision detection.



Additional E3NC-SA Functions — Stable Detection of Everything But the Background

Tuning without a Workpiece

The background is used as a reference to detect everything but the reference.The surface conditions or inclination of the workpiece do not influence detection, so stable detection is maintained without changing the settings even if the workpiece is changed.



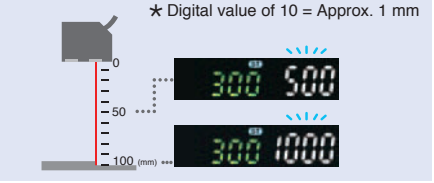
And, Convenient!

Easy Adjustment after Head Installation

Easy-to-understand Distance Display (★Approximation)

You can see the distance at a glance, which simplifies adjustment. After head installation, you can reduce adjustment time after line switchovers and reduce line stoppage time.

★ Digital value of 10 = Approx. 1 mm



Simpler and More Dependable

The N-Smart Lineup of Next-generation Fiber Sensors and Laser Sensors will quickly solve your problems and therefore increase equipment operation rates and minimize downtime with optimum cost performance.

Common Features and Models in the N-Smart Series

Common Buttons

Intuitive Operation and Easy Setup.

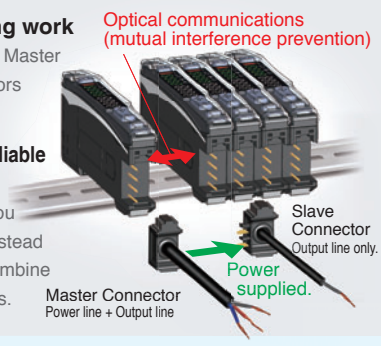
White Characters on a Black Background

High-contrast displays for easy visibility from a distance.

Models with Wire-saving Connectors **Popular**

No Master/Slave Distinctions in Amplifier Units

- **Reduce model numbers in stock**
  You do not need to stock both master and slave amplifier units.
- **Greatly reduced wiring work**
  Power is supplied from the Master Connector. Slave Connectors have only output lines.
- **Expansion is easy and reliable**
  Mutual interference prevention works even if you use a Master Connector instead of a Slave Connector or combine them with pre-wired models.



Model for Sensor Communications Unit

Data Management and Time Reduction with Network Communications

- **Three communications methods are supported**
- **Use Distributed Sensor Units to reduce equipment production costs and commissioning time**

E3NW Cat.No.E428

Ordering Information

Sensor Heads: E3NC-L Compact Laser Sensor Series

Sensing method	Appearance	Beam shape	Sensing distance	Laser class	Cable length	Model
Coaxial Retro-reflective with MSR function		Spot	8 m *	Class 1	2 m	**E3NC-LH03 2M** NEW
					5 m	**E3NC-LH03 5M** NEW
Diffuse-reflective		Variable spot	1.2 m		2 m	**E3NC-LH02 2M**
					5 m	**E3NC-LH02 5M** NEW
Limited-reflective		Spot	70±15 mm		2 m	**E3NC-LH01 2M**
					5 m	**E3NC-LH01 5M** NEW

* These values apply when an E39-R21, E39-R22, E39-RS10, or E39-RS11 Reflector is used. A Reflector is not included. Purchase a Reflector separately to match the intended use of the Sensor.

Note: Only an E3NC-LA□□ Amplifier Unit can be connected.

Amplifier Units: E3NC-L Compact Laser Sensor Series

Connecting method	Appearance	Inputs/outputs	Model	
			NPN output	PNP output
Pre-wired (2 m)		2 outputs + 1 input	**E3NC-LA21 2M**	**E3NC-LA51 2M**
Wire-saving Connector		1 output + 1 input	**E3NC-LA7**	**E3NC-LA9**
M8 Connector		1 output + 1 input	**E3NC-LA24**	**E3NC-LA54**
Connector for Sensor Communications Unit *		---	**E3NC-LA0**	

* A Sensor Communications Unit is required if you want to use the Amplifier Unit on a network.

Note: Only an E3NC-LH□□ Sensor Head can be connected.

Sensor Heads: E3NC-S Ultra-compact CMOS Laser Sensor Series

Sensing method	Appearance	Beam shape	Measurement range	Laser class	Cable length	Model
Distance-settable		Spot	35 to 250 mm	Class 2	2 m	**E3NC-SH250H 2M**
				Class 1	2 m	**E3NC-SH250 2M**
			35 to 100 mm		2 m	**E3NC-SH100 2M**

Note: Only an E3NC-SA□□ Amplifier Unit can be connected.

Amplifier Units: E3NC-S Ultra-compact CMOS Laser Sensor Series

Connecting method	Appearance	Inputs/outputs	Model	
			NPN output	PNP output
Pre-wired (2 m)		2 outputs + 1 input	**E3NC-SA21 2M**	**E3NC-SA51 2M**
Wire-saving Connector		1 output + 1 input	**E3NC-SA7**	**E3NC-SA9**
M8 Connector		1 output + 1 input	**E3NC-SA24**	**E3NC-SA54**
Connector for Sensor Communications Unit *		---	**E3NC-SA0**	

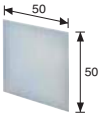
* A Sensor Communications Unit is required if you want to use the Amplifier Unit on a network.
Note: Only an E3NC-SH□□ or E3NC-SH□□H Sensor Head can be connected.

Accessories (Sold Separately)

Sensor Head Accessories

Reflectors for Retro-reflective Sensors *NEW*

A Reflector is not provided with the Sensor Head. It must be ordered separately as required.

Applicable Sensor Head	Appearance	Model	Quantity
E3NC-LH03		**E39-R21**	1
		**E39-R22**	
		**E39-RS10**	
		**E39-RS11**	

Lens Attachments for Sensor Heads *NEW*

A Lens Attachment is not provided with the Sensor Head. It must be ordered separately as required.

Applicable Sensor Head	Appearance	Model	Quantity
E3NC-LH03		**E39-P51**	1
E3NC-LH02		**E39-P52**	

Note: You can combine the Lens Attachment with an applicable Sensor Head to create a line beam.

Sensor Head Mounting Brackets

A Mounting Bracket is not provided with the Sensor Head. It must be ordered separately as required.

Applicable Sensor Head	Appearance	Model	Quantity	Contents
E3NC-LH03		**E39-L190** *NEW*	1	Mounting Bracket: 1 Nut plate: 1 Phillips screws (M3×18): 2
E3NC-LH02		**E39-L185**		
E3NC-LH01		**E39-L186**		
E3NC-SH250H E3NC-SH250 E3NC-SH100		**E39-L187**		
		**E39-L188**		

Amplifier Unit Accessories

Wire-saving Connectors (Required for models for Wire-saving Connectors.)

Connectors are not provided with the Amplifier Unit and must be ordered separately. *Protective stickers are provided.

Type	Appearance	Cable length	No. of conductors	Model
Master Connector		2 m	4	**E3X-CN21**
Slave Connector			2	**E3X-CN22**

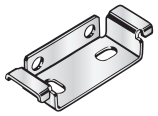
Sensor I/O Connectors (Required for models for M8 Connectors.)

Connectors are not provided with the Amplifier Unit and must be ordered separately.

Size	Cable	Appearance	Cable type		Model
M8	Standard cable	Straight 	2 m	4-wire	**XS3F-M421-402-A**
			5 m		**XS3F-M421-405-A**
		L-shaped 	2 m		**XS3F-M422-402-A**
			5 m		**XS3F-M422-405-A**

Amplifier Unit Mounting Bracket

A Mounting Bracket is not provided with the Amplifier Unit. It must be ordered separately as required.

Appearance	Model	Quantity
	**E39-L143**	1

DIN Track

A DIN Track is not provided with the Amplifier Unit. It must be ordered separately as required.

Appearance	Type	Model	Quantity
	Shallow type, total length: 1 m	**PFP-100N**	1
	Shallow type, total length: 0.5m	**PFP-50N**	
	Deep type, total length: 1 m	**PFP-100N2**	

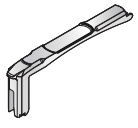
End Plate

Two End Plates are provided with the Sensor Communications Unit. End Plates are not provided with the Amplifier Unit. They must be ordered separately as required.

Appearance	Model	Quantity
	**PFP-M**	1

Cover

Attach these Covers to Amplifier Units.
Order a Cover when required, e.g., if you lose the covers.

Appearance	Model	Quantity
	**E39-G24 FOR E3NC-LA**	1
	E39-G21 FOR E3NC-SA	

Related Products

Sensor Communications Units

Type	Appearance	Model
Sensor Communications Unit for EtherCAT		**E3NW-ECT**
Sensor Communications Unit for CompoNet *1		**E3NW-CRT**
Sensor Communications Unit for CC-Link *1		**E3NW-CCL**
Distributed Sensor Unit *2		**E3NW-DS**

*1. Refer to your OMRON website for details.
*2. The Distributed Sensor Unit can be connected to any of the Sensor Communications Units.

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.
CompoNet is a registered trademark of the ODVA.
CC-Link is a registered trademark of Mitsubishi Electric Corporation. The trademark is managed by the CC-Link Partner Association.

OMRON's CMOS Laser Sensor Lineup

Select the best match to your site and topics from our wide lineup.

		Installation distance	Detectable level difference	Resolution
Measurement	Stable measurements in the order of 10 μm at a reasonable cost with essentially manual-free operation. **ZX2** Cat. No. E406		100 mm*1	——	5 μm
Measurement	Ideal for simple measurements. **ZX1** Cat. No. E416		300 mm*1	——	30 μm
			100 mm*1	——	7 μm
Detection	Stable detection of level differences in the order of 0.1 mm. **ZX0**		300 mm*1	3.0 mm*2	350 μm
			100 mm*1	0.7 mm*2	80 μm
Detection	Dependable detection in a compact body. **E3NC-S** Cat. No. E427		250 mm	9.0 mm*2	——
			100 mm	1.5 mm*2	——

*1. Sensors are also available for other installation distances.
*2. The value depends on conditions. Refer to product datasheets or refer to product information on your OMRON website.

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CSM_9_1_0916
Cat. No. E427-E1-02
Printed in Japan
0214 (0113)