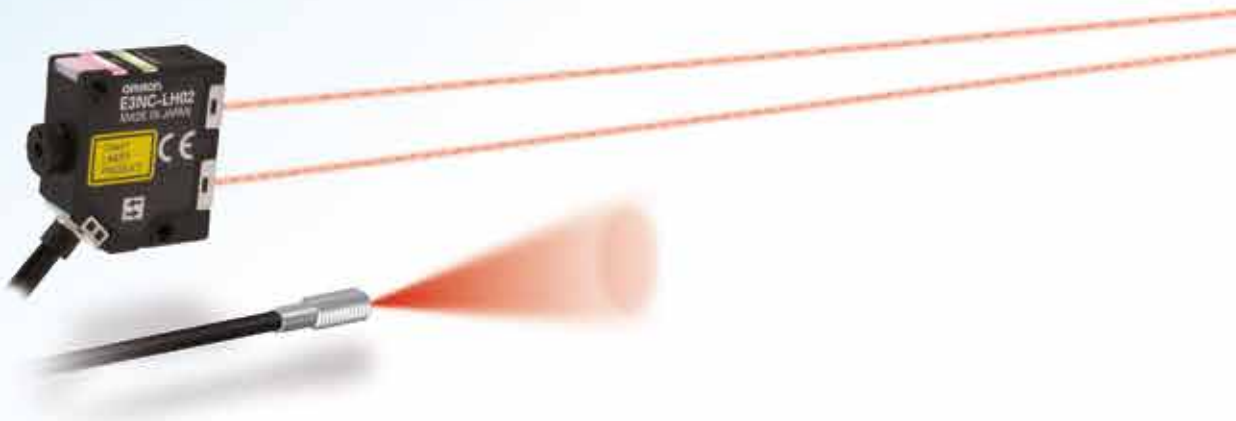
OMRON

Smart Laser Sensor

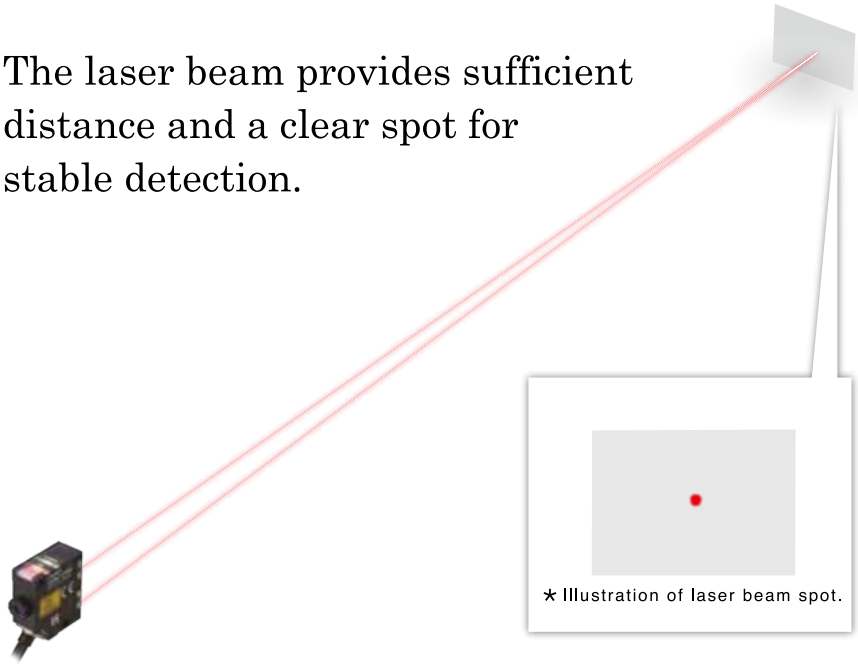
# E3NC Series

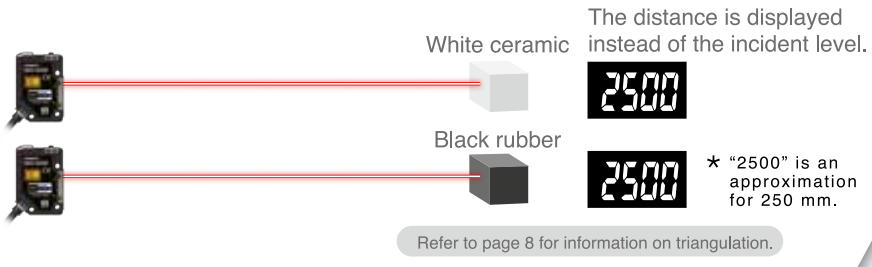

- Precise Laser spot of min. 0.8 mm
- Independency of color or surface structure
- Adjustable focus and line beam
- EtherCAT connectivity

# A Wide Variety of Laser Sensor Heads That Handle




| Fiber Sensor Topics | E3NC Laser Sensor Solutions |
|---|---|
| The sensing distance is short.<br>The beam spreads out.<br>The spot is not visible. | The laser beam provides sufficient distance and a clear spot for stable detection. |
| Colors influence detection.<br>Inclination influences detection. | The use of triangulation and CMOS provides stable detection for workpieces with different colors or with an inclination of the Sensor. |




Refer to page 8 for information on triangulation.

# Applications Beyond the Realm of Fiber Sensors



## Detection Requirement

Stable presence detection

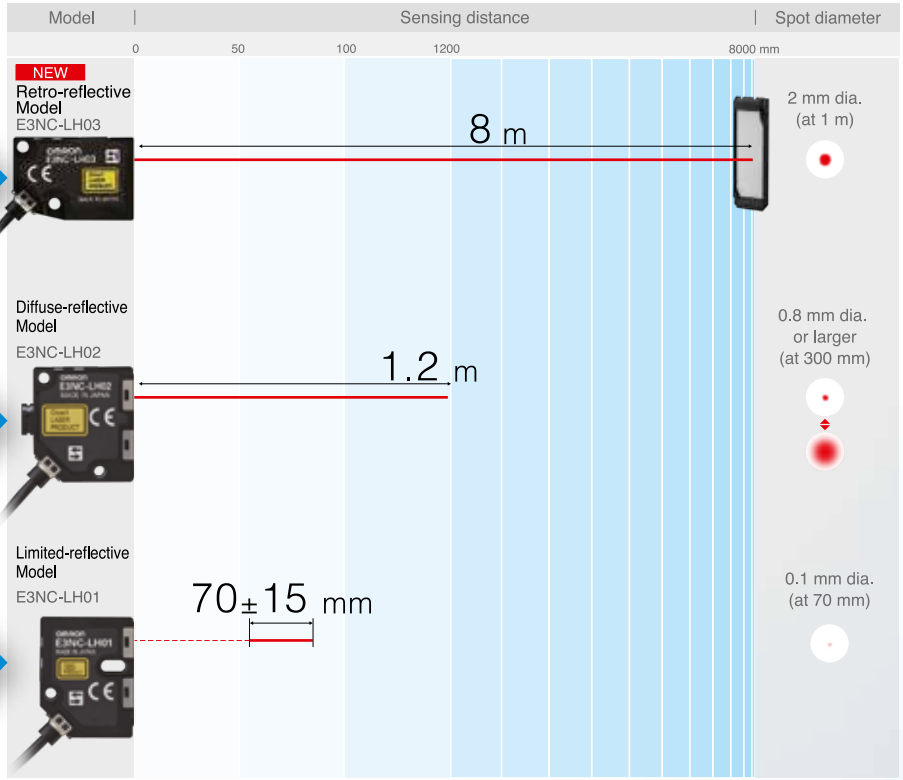
Long-distance detection with installation on only one side

High-precision positioning

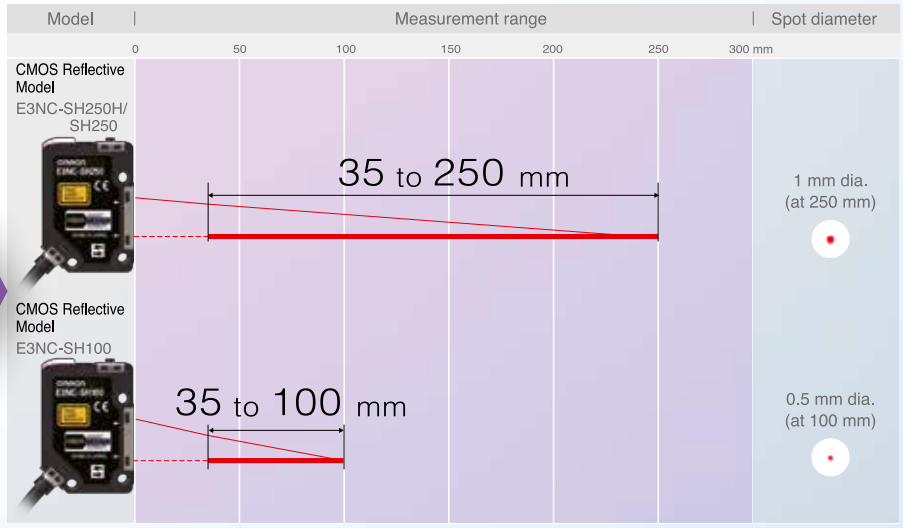
Stable detection even with workpieces of different colors

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

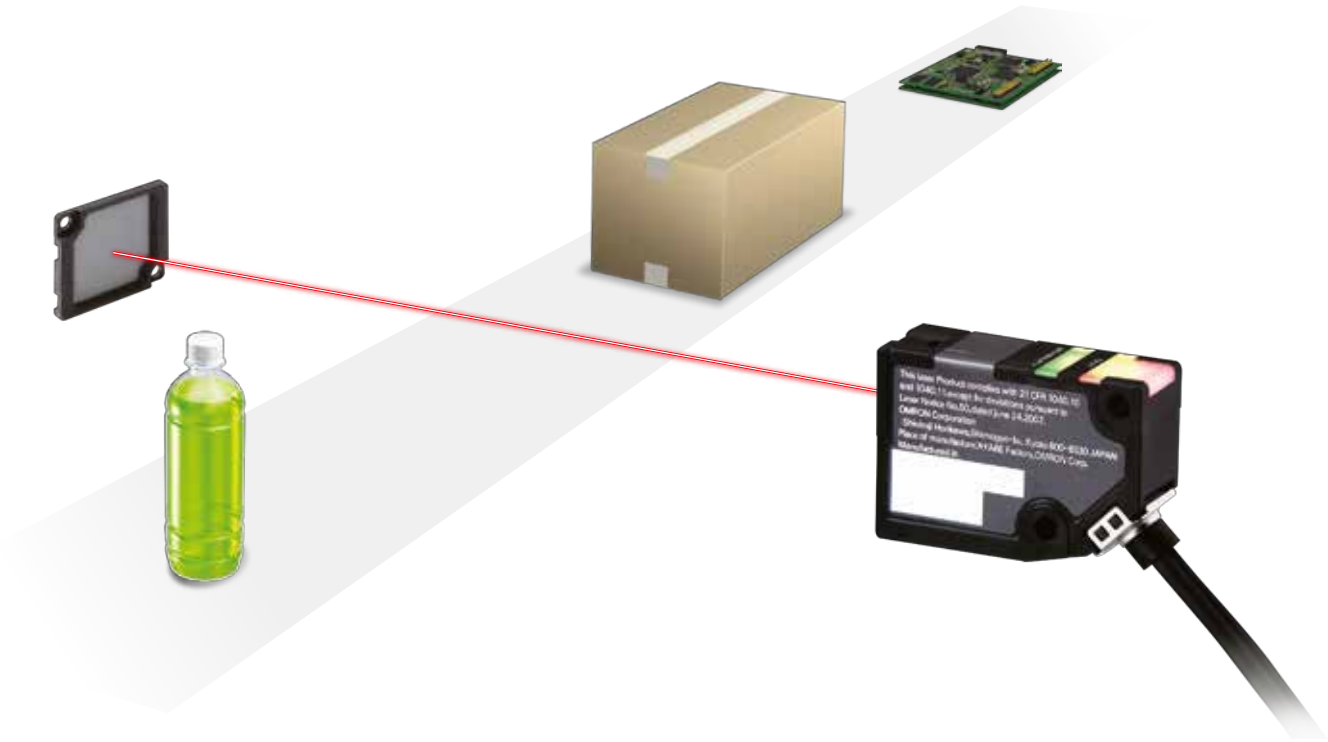
Laser Class 1

IP67 *

Robot Cable

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

## Stable Detection of Many Types of Workpieces, Even Transparent Ones

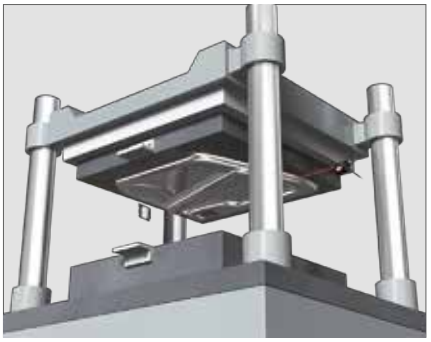


Visible spot even at long distances.

Maximum sensing distance of **8** m

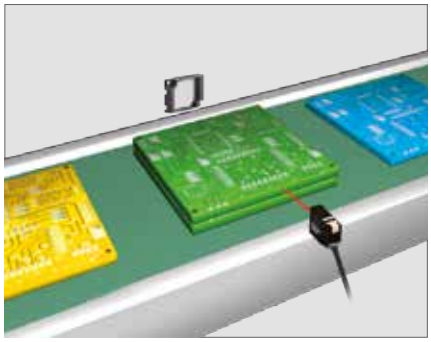
## Application

### 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!

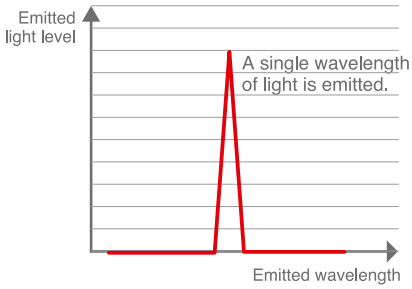
# Detects Film That's 95% Transparent

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

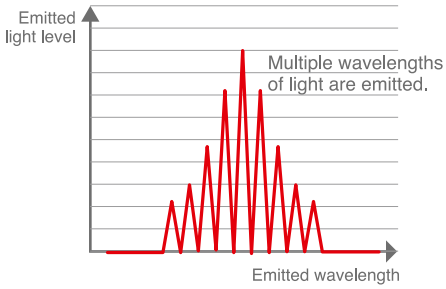
## High-frequency Modulation

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

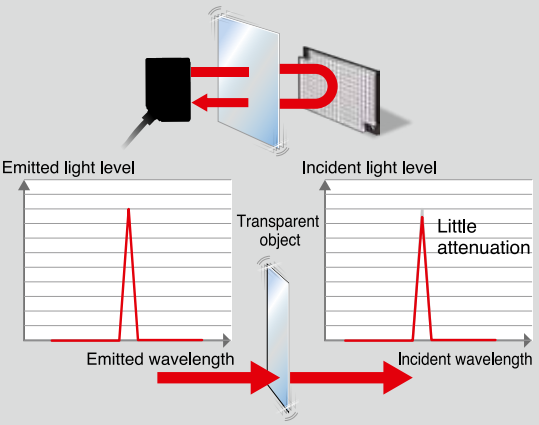
### Wavelength Distribution of Conventional Emission




### Wavelength Distribution of High-frequency Modulation

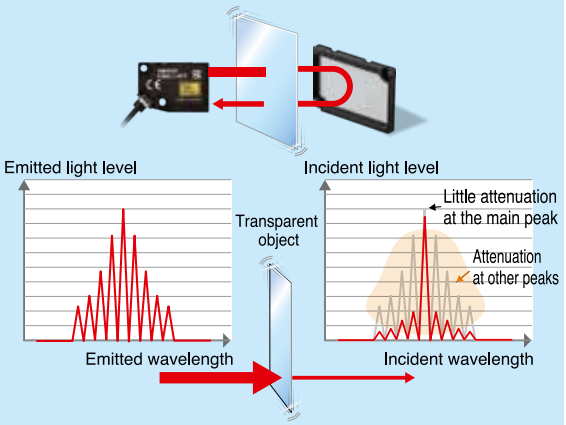



### Conventional Transparent Object Detection




Previously, the laser beam passed through the transparent object due to slight changes in the thickness or position, and that often interfered with stable detection.

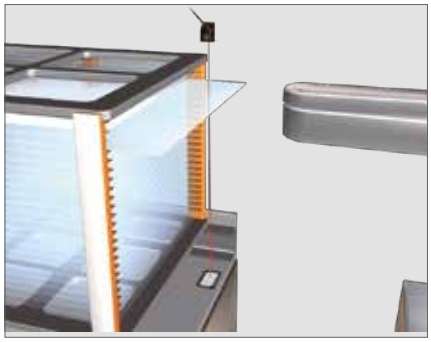
### Transparent Object Detection with High-frequency Modulation




Even if the thickness or position of the transparent object changes slightly, the presence of the transparent object is confirmed by attenuation of the wavelengths that are not affected to achieve stable detection.

## Application

### Detecting Glass Wafer Protrusion

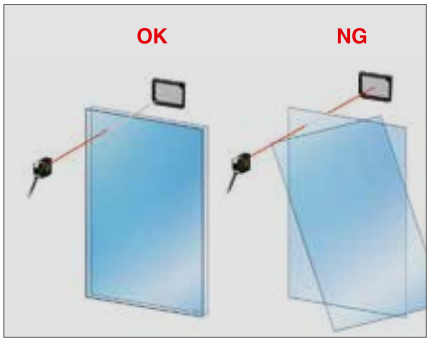


The high ability to detect transparent objects enables stable detection of highly transparent glass wafers.

### 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:

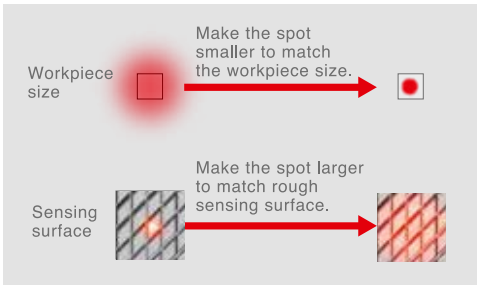
**1.2 m**

**And, Convenient!**

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

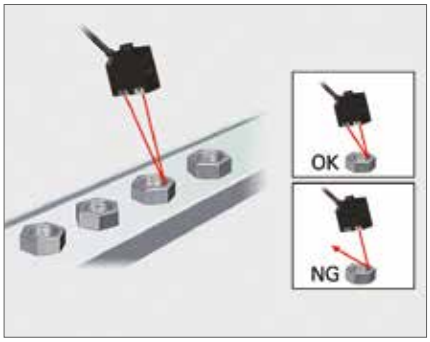
### Variable Spot

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.



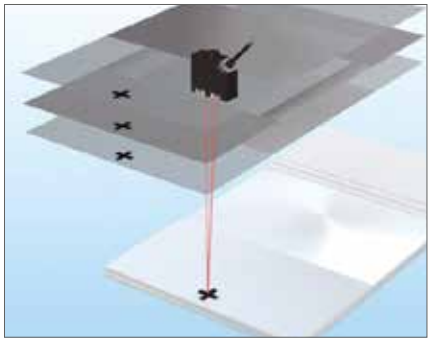

## Application

### Thread Presence Detection



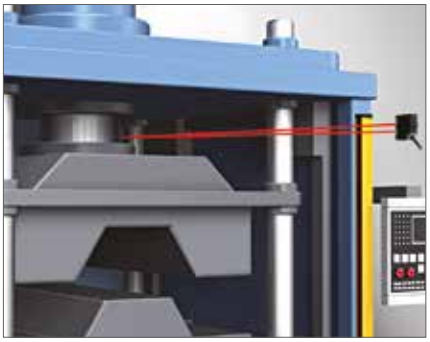

The spot is made wider so that the presence of threading in the nuts can be detected.

### 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



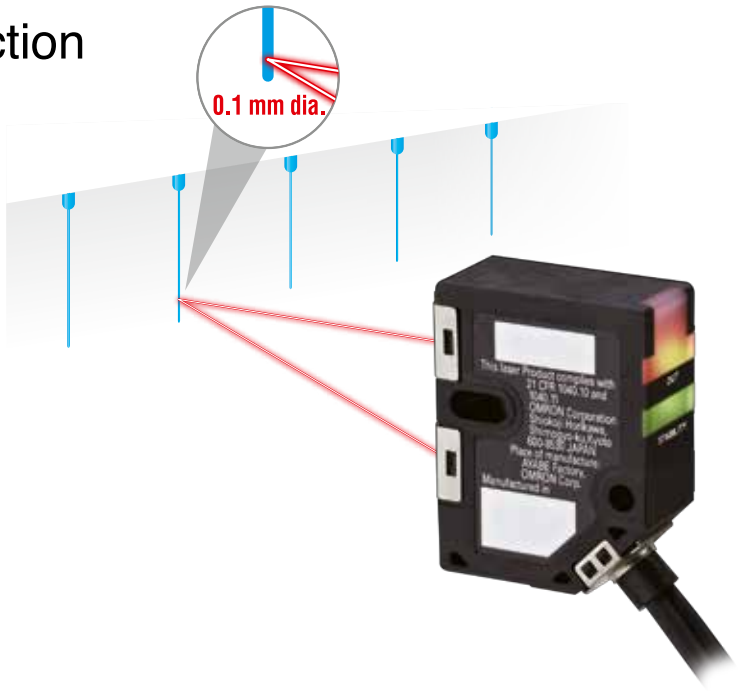
Even detailed locations that are recessed in machines can be stably detected from a distance.

Limited-reflective Model

# E3NC-LH01

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

## Minute Spot for High-precision Detection



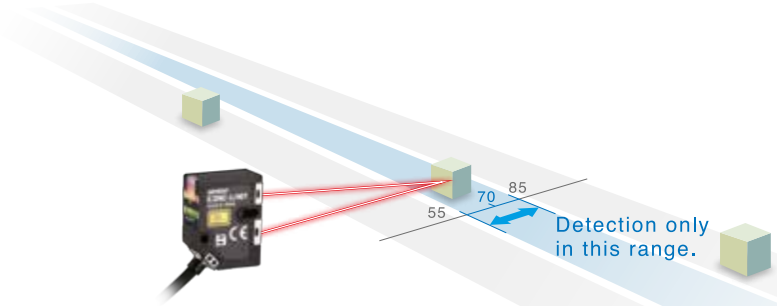

### High-precision Positioning

**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

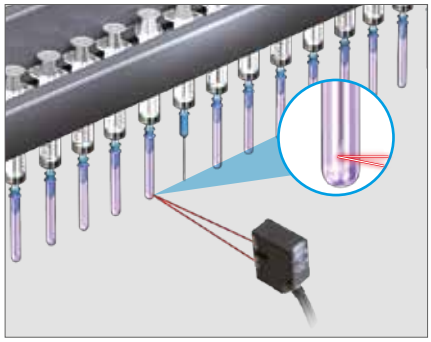
**Limited detection with a sensing distance of**

**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.

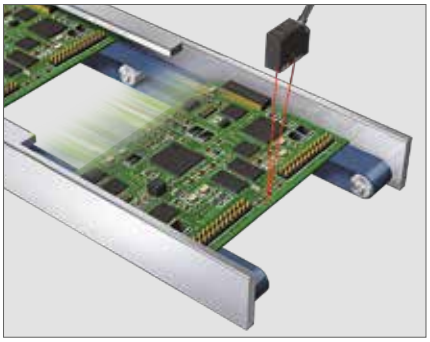
## Application

### Detecting the Presence of Needle Caps



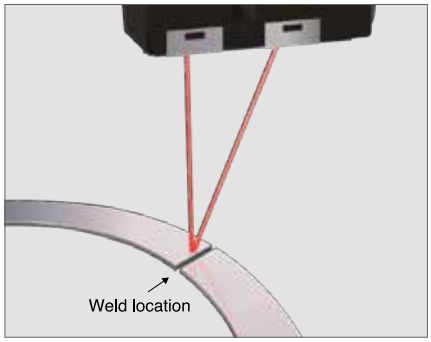
The minute 0.1-mm spot is targeted only at the end of the cap for stable detection.

### PCB Arrival Confirmation



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

### Ring Joint Location Detection



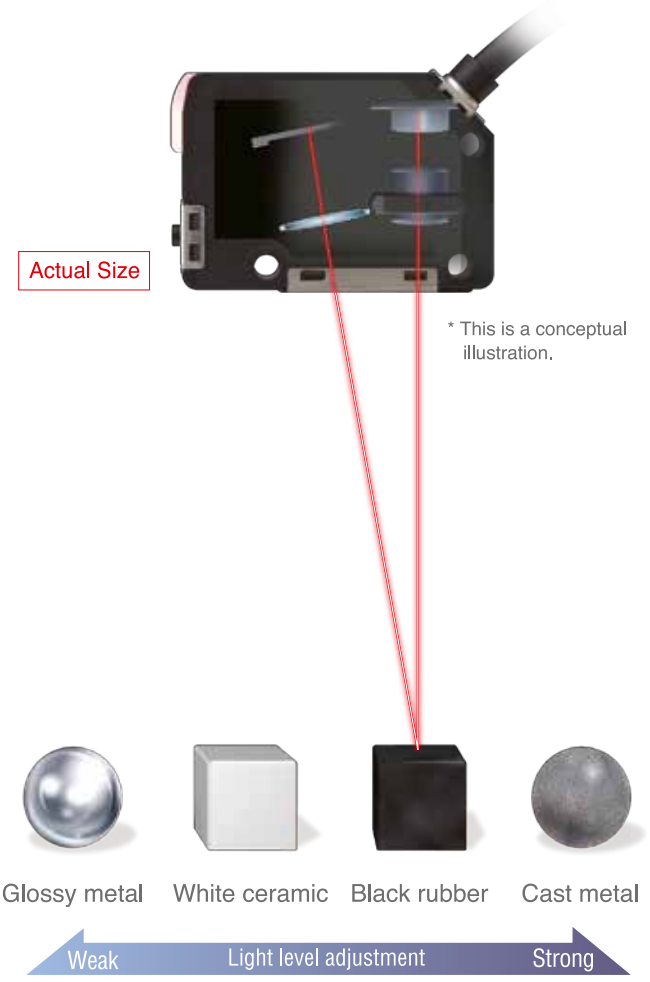

The minute, sharp laser beam stably detects 0.1 mm seams.

# 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

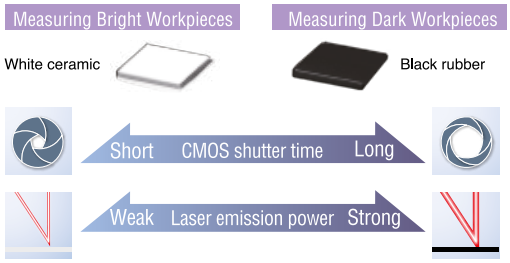



* This is a conceptual illustration.

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

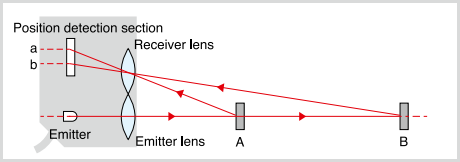
### Dynamic Range of Up to 500,000 Times

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.



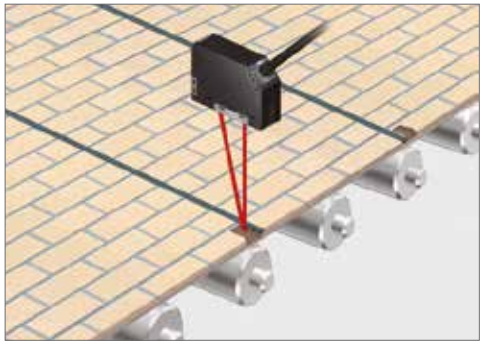

### Stable Detection with Triangulation

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.



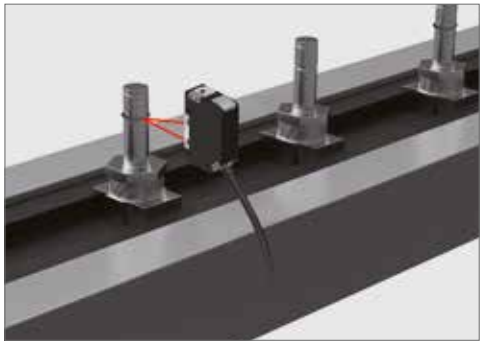

## Application

### Detecting the Presence of Exterior Wall Material



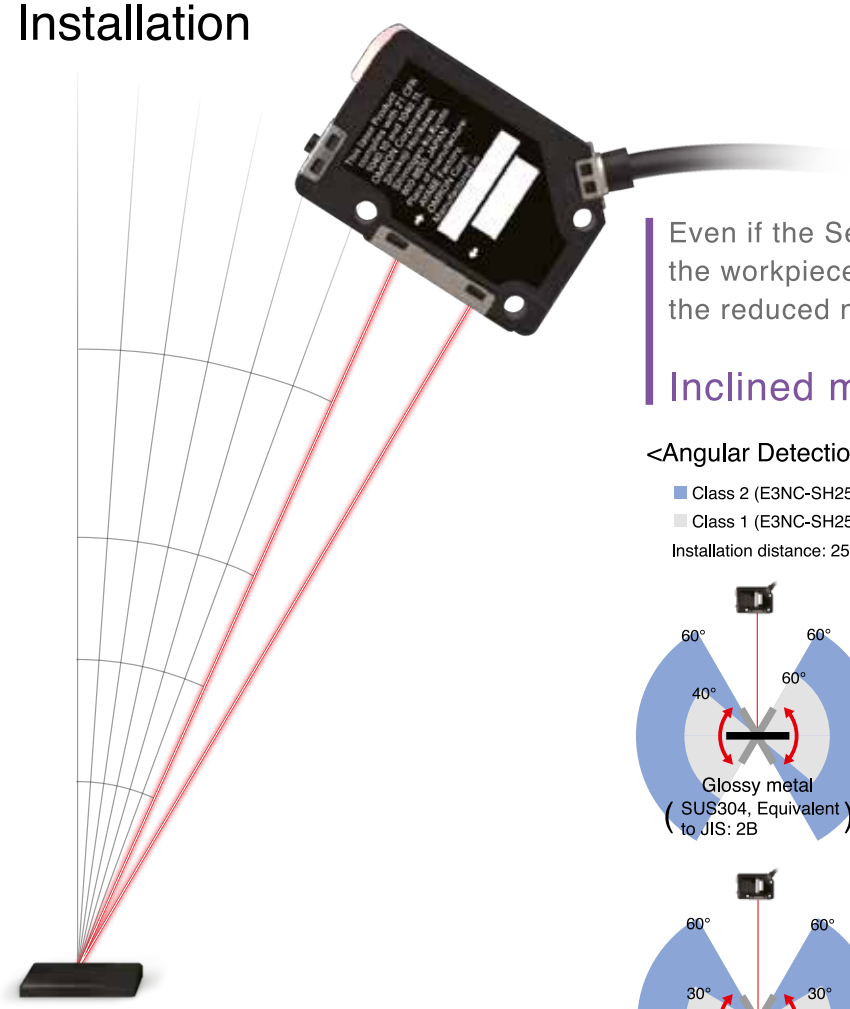
With the CMOS Sensor, stable detection is possible even if the workpiece's color or surface conditions are not consistent.

### O-ring Presence Detection



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

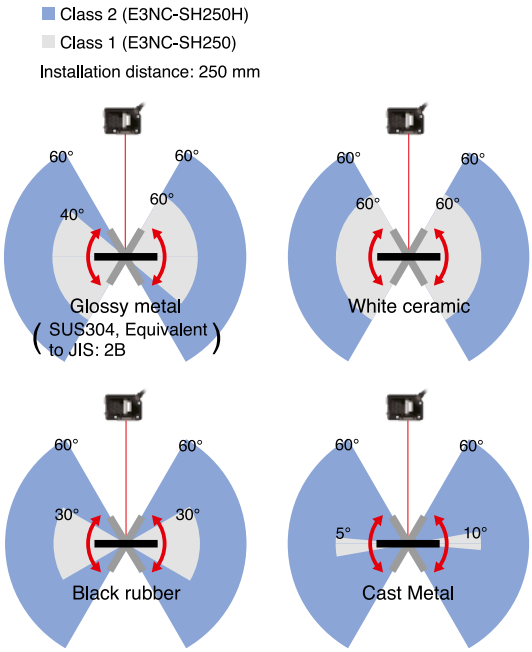
# Limited Influence of Inclination in Sensor Installation. More Ability to Handle Workpieces and Greater Flexibility in Installation



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

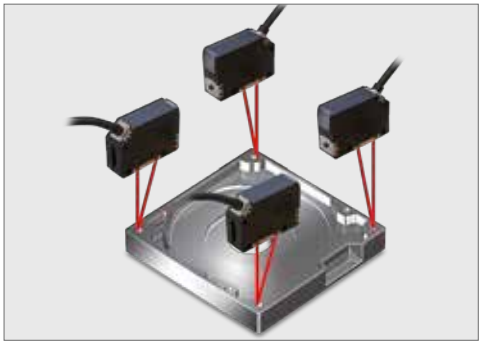
## Inclined mounting at up to 60°

<Angular Detection Range>



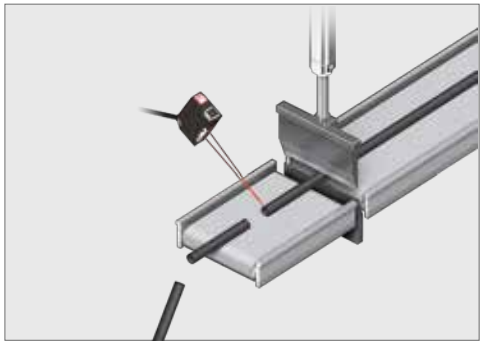

## Application

### 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

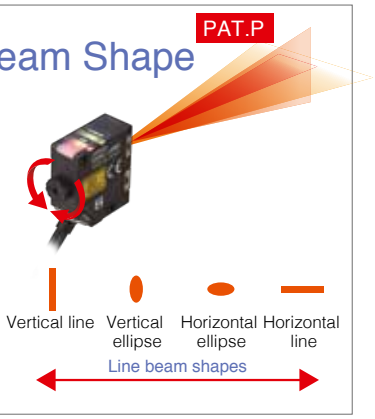
## Handle Even More Applications with a Line Beam


**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.

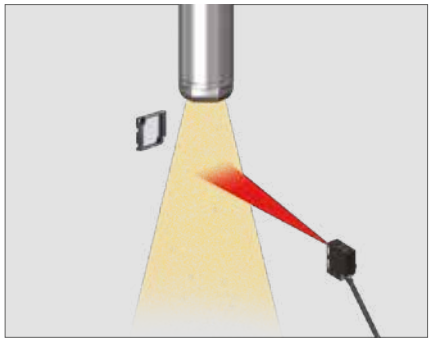



### Rubber Packing

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

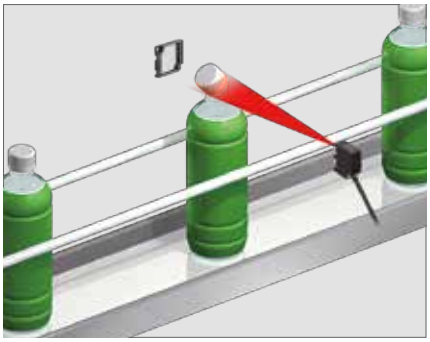
## Application

### Presence Detection of Powders or Liquids



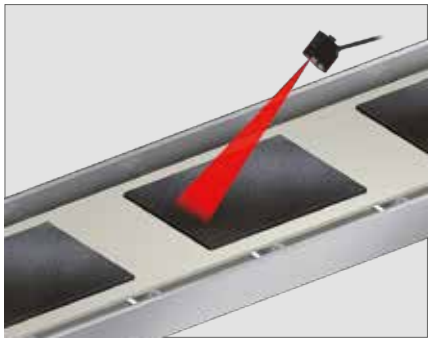
With a wider beam, you can stably detect powders and liquids because they are less likely to fall outside of the beam.

### 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**

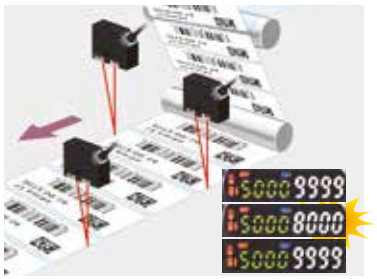
# Consistent Operating Methods for All N-Smart Amplifier Units. White Display Characters for High Visibility.

## Select the Best Tuning Method According to the Application

### Smart Tuning

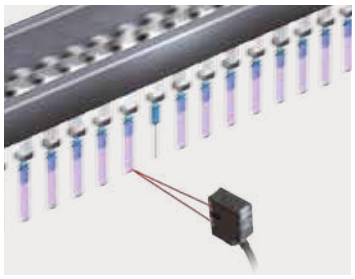

**Common★ Functions** Basic Tuning **Two-point Tuning**

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



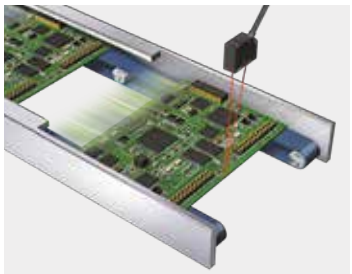

**Common★ Functions** High-speed Workpieces **Full Auto Tuning**

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.

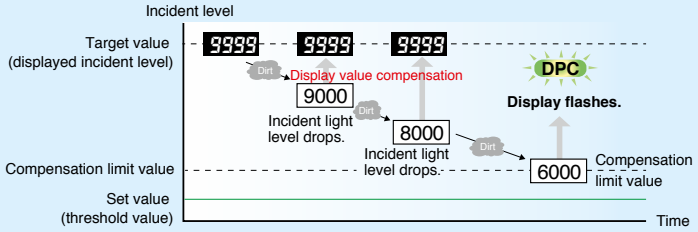


★ The common functions are provided by both the E3NC-LA and the E3NC-SA.

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

### DPC (Dynamic Power Control)

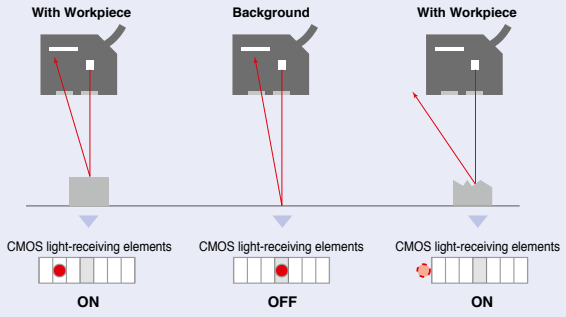
Even if dirt or machine vibration reduces the amount of light received, OMRON's unique DPC automatically compensates the displayed incident level to achieve stable, high-precision detection.




**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.



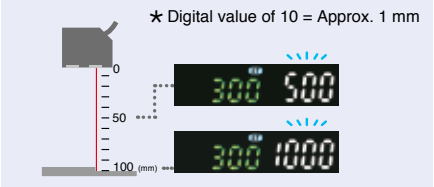

**And, Convenient!**

Easy Adjustment after Head Installation

### Easy-to-understand Distance Display (★Approximation)

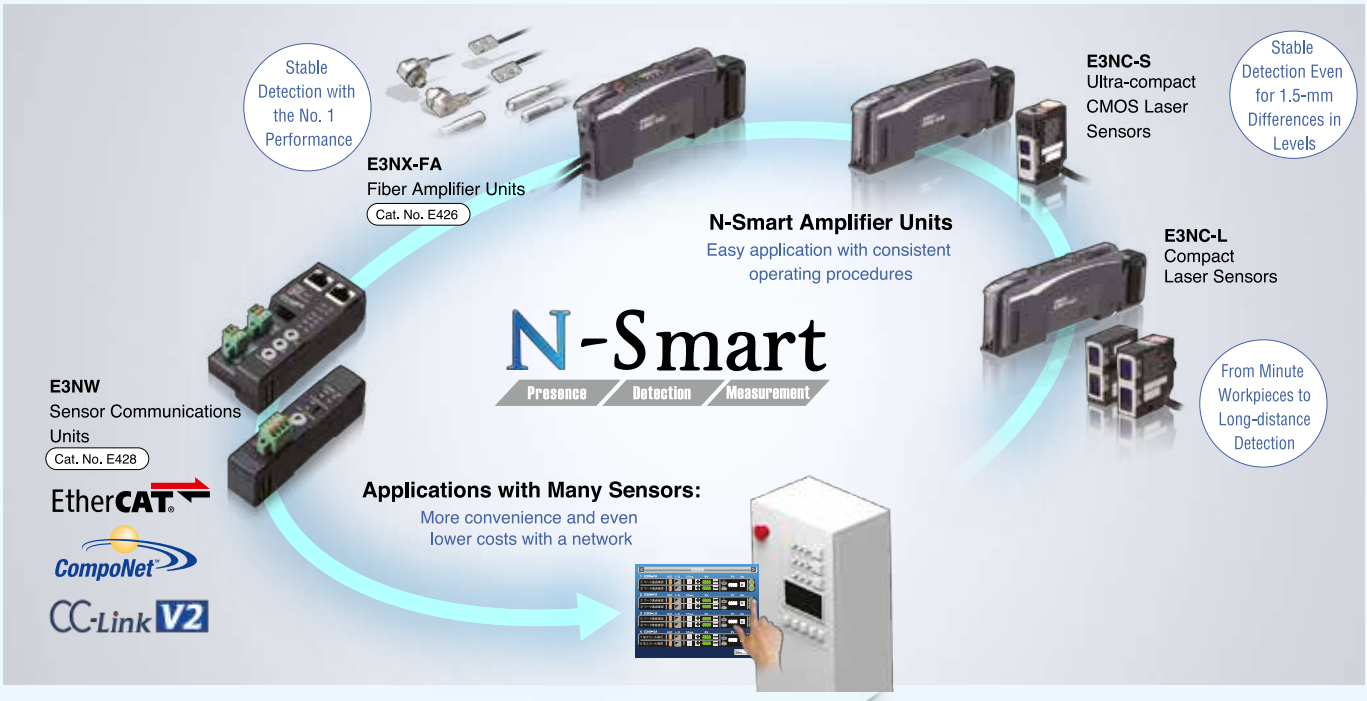
You can see the distance at a glance, which simplifies adjustment. After head installation, you can reduce adjustment time after line switchovers and reduce line stoppage time.

★ Digital value of 10 = Approx. 1 mm

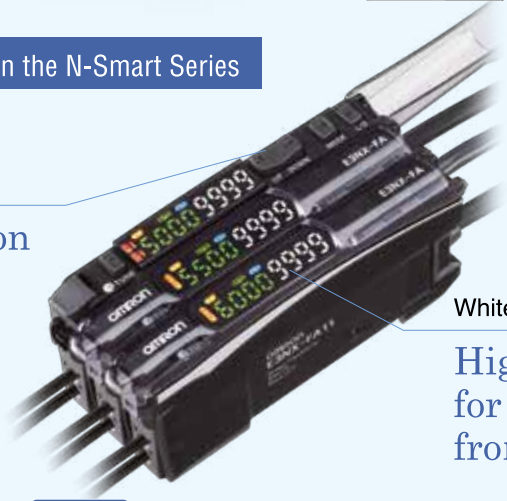


# Simpler and More Dependable

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.

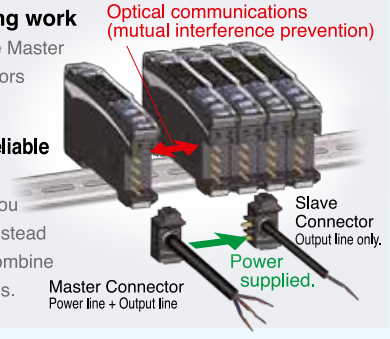
White Characters on a Black Background

### High-contrast displays for easy visibility from a distance.

Models with Wire-saving Connectors **Popular**

### No Master/Slave Distinctions in Amplifier Units

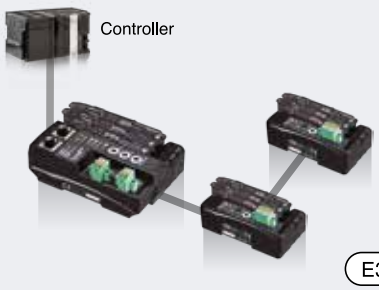
- **Reduce model numbers in stock**
  You do not need to stock both master and slave amplifier units.
- **Greatly reduced wiring work**
  Power is supplied from the Master Connector. Slave Connectors have only output lines.
- **Expansion is easy and reliable**
  Mutual interference prevention works even 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