E3AS Reflective Sensors
Designed to tackle all Food & Commodities challenges
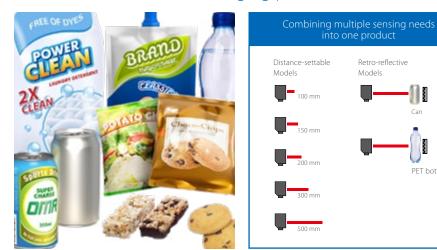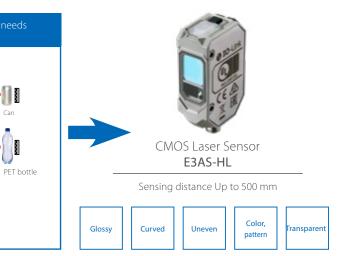
IO-Link   ECOLAB®

Three models to cover all targets and sensing distances

Manufacturers are diversifying their products and shortening their life cycles. Quick equipment design and stable operation are critical issues at manufacturing sites. The Omron E3AS Series addresses these issues by expanding the options for using reflective photoelectric sensors and helping to reduce and improve equipment commissioning.
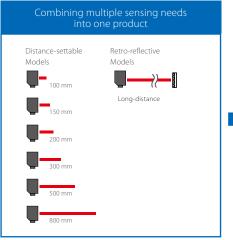
TOF Laser Sensor
E3AS-F

CMOS Laser Sensor
E3AS-HL

Distance-settable Sensor
E3AS-L

E3AS-HL: For small or challenging part detection

Combining multiple sensing needs into one product

Distance-settable Models
- 100 mm
- 150 mm
- 200 mm
- 300 mm
- 500 mm

Retro-reflective Models
- Can
- PET bottle

CMOS Laser Sensor
E3AS-HL

Sensing distance Up to 500 mm

| Glossy | Curved | Uneven | Color, pattern | Transparent |

E3AS-F: For final packaging targets with simple shapes

Combining multiple sensing needs into one product

Distance-settable Models
- 100 mm
- 150 mm
- 200 mm
- 300 mm
- 500 mm
- 800 mm

Retro-reflective Models
- Long-distance

TOF Laser Sensor
E3AS-F

Sensing distance Up to 1,500 mm

| Flat | Large | Low-reflective | Color, pattern | Uneven |

E3AS-L: For small or thin part detection

Combining multiple sensing needs into one product

Distance-settable Models
- 100 mm
- 150 mm
- 200 mm

Distance-settable Photoelectric Sensor E3AS-L

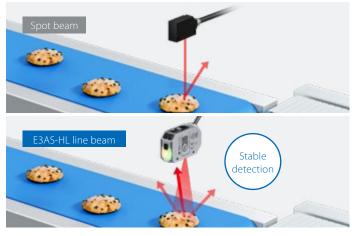Sensing distance Up to 200 mm

| Small | Flat | Thin | Low-reflective |

Stable detection for variable targets

Conventional sensors must be reselected or reconfigured whenever the target's shape, color, pattern or reflectivity changes. The E3AS Series saves design time by reliably detecting targets without being overly influenced by target variation.

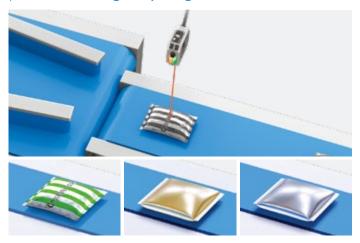## E3AS-HL for complex-shaped, colored, patterned, or glossy targets

Primary and secondary packaging

Stable detection for uneven surfaces

Spot beam

E3AS-HL line beam

Stable detection

Surface variation causes unreliable light reception back to the sensor with a spot beam. The E3AS-HL line beam minimizes the impact of the surface profile by reflecting off more surface area.
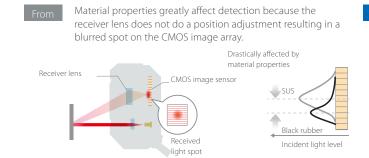
Stable detection for diversely colored, patterned, or glossy targets
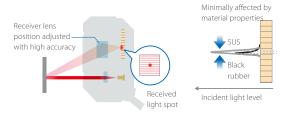

Detection is prone to instability because color, pattern, or reflectivity affects the sensing distance. Since the E3AS-HL is less likely to be affected by these characteristics, it provides stable detection even when packaging materials change.

CMOS sensing with built-in lens alignment technology minimizes the influence of material properties

PATENT PENDING[1]

From — Material properties greatly affect detection because the receiver lens does not do a position adjustment resulting in a blurred spot on the CMOS image array.

Receiver lens

CMOS image sensor

Received light spot

Drastically affected by material properties

SUS

Black rubber

Incident light level

To — Material properties minimally affect detection because the receiver lens position is automatically adjusted to the micrometer level to minimize the received light spot.
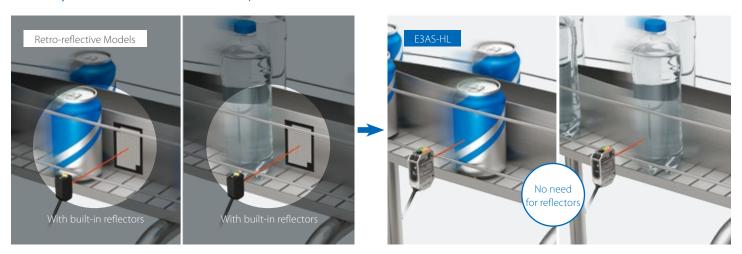

Receiver lens position adjusted with high accuracy

Received light spot

Minimally affected by material properties

SUS

Black rubber

Incident light level

Overcome space limitations and boost design flexibility

Retro-reflective sensors are used to detect difficult targets or where long sensing distance is needed due to the space constraints of installing more complex and sophisticated equipment. The E3AS Series increases flexibility by enabling a design without reflectors.

E3AS-HL for multi-lane conveyor lines of targets with curved surfaces

Primary and secondary packaging

Reliably detects cans and clear plastic bottles without reflectors

Retro-reflective Models

With built-in reflectors

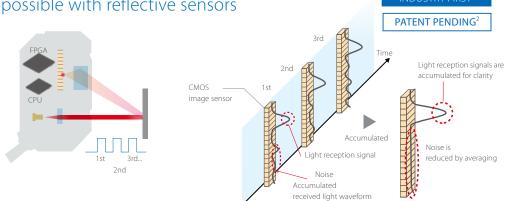With built-in reflectors

E3AS-HL

No need for reflectors

Retro-reflective sensors are used to detect curved surfaces of cans and transparent plastic bottles, but present installation issues when mounting reflectors on multi-lane conveyors.

The E3AS-HL Sensor, a reflective model capable of detecting the slightest change in the incident light level or distance, can detect cans and plastic bottles without reflectors.

Advanced sensing algorithms detect minimal reflected light from curved surfaces, which is impossible with reflective sensors

E3AS-HL Sensors equipped with FPGA[3] use a sensing algorithm to perform high-speed sampling of received light waveforms at 10,000 times per second and unique Omron accumulation processing, significantly increasing its sensitivity. Together, they amplify the slightest amount of light to stably detect targets with glossy or uneven surfaces, or other targets from which it is difficult to receive reflected light.

Note: Not applicable to transparent objects.

INDUSTRY FIRST[1]

PATENT PENDING[2]

FPGA

CPU

1st 3rd...
2nd

CMOS image sensor

1st

2nd

3rd

Time

Light reception signals are accumulated for clarity

Accumulated

Light reception signal

Noise

Accumulated received light waveform

Noise is reduced by averaging

1. Based on an Omron investigation in September 2019.   2. Patent pending in Japan. (As of September 2020)   3. FPGA = Field Programmable Gate Array)

Flexible design over a broad range of distances

E3AS-F and E3AS-L sensors use advanced technologies to accommodate flexible manufacturing lines and challenging targets.

E3AS-F for long-distance sensing on converging and diverging lines

final packaging

No reflector is required to design long-distance sensing target color or material

Retro-reflective Models

With Installation reflectors

E3AS-F

No need for reflectors

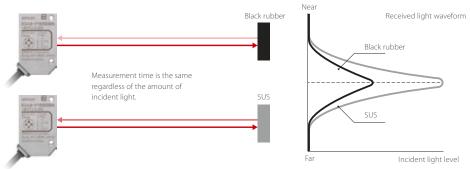Long-distance detection of various colored targets

Although retro-reflective sensors are used for long-distance sensing in converging and diverging lines, space may be in a issue for mounting reflectors.

The E3AS-F Sensor, a reflective model with long sensing distance, does not require reflectors. Moreover, it is less likely to be affected by color even from long distances.
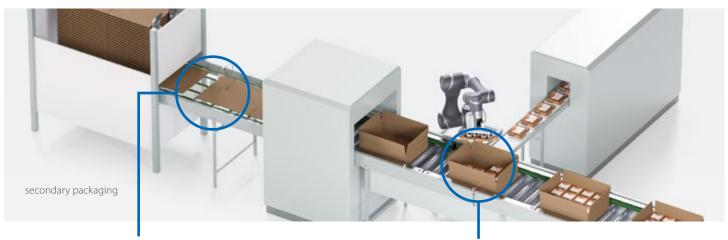
TOF detects varying targets and measures distance

In the time-of-flight method, distance is calculated based on the time elapsed between the light emission and its reception by the sensor once it is reflected off the target. Detection is therefore not affected by changes in the color or material of the target.
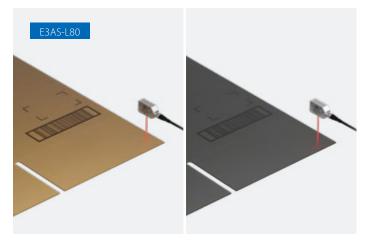
Black rubber

Measurement time is the same regardless of the amount of incident light.

SUS

Distance
Near

Received light waveform

Black rubber

SUS

Far

Incident light level

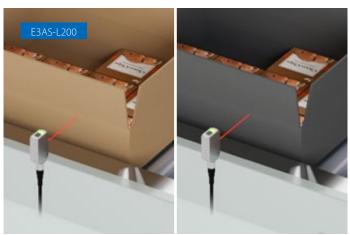# E3AS-L for thin and low-reflective targets

secondary packaging

Stable detection for thin targets with varying colors

E3AS-L80

Detection may become unstable as differential travel varies depending on the target color. The E3AS-HL80 Sensor can reliably detect level difference regardless of color since its differential travel[2] for black paper is 5%.
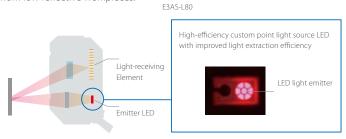
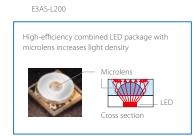## Stable detection for differently colored boxes at longer range

E3AS-L200

When the target is low-reflective black paper, detection may become unstable due to insufficient sensing distance. The E3AS-L200 Sensor can stably detect at the same distance regardless of color since its sensing distance for both white paper and black paper is 200 mm.

Omron-unique LED package reliably detects low-reflective targets

The E3AS-L Sensor is equipped with an emitter 6 times more powerful than those of conventional models[1], allowing it to receive light from low reflective workpieces.

E3AS-L80

High-efficiency custom point light source LED with improved light extraction efficiency

Light-receiving Element

LED light emitter

Emitter LED

E3AS-L200

High-efficiency combined LED package with microlens increases light density

Microlens

LED

Cross section

1. Comparison with E3Z-LS products.   2. Differential travel is the minimum distance away from the background an object must be to be detected
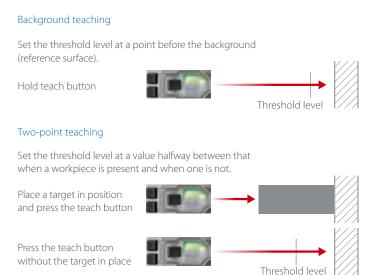
Quick and easy configuration

The E3AS Series' simple teaching method allows easy implementation of the optimal settings and eliminates unnecessary rework due to problems during commissioning.

Single teach button prevents setting inconsistencies

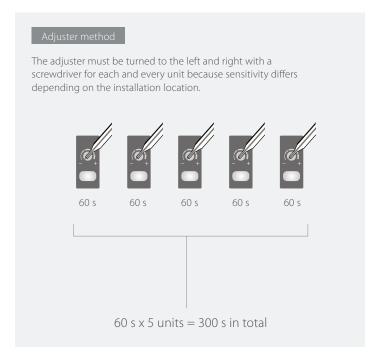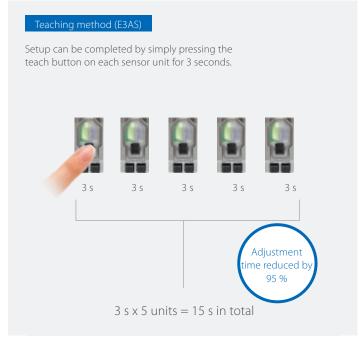Easily and consistently set the optimal threshold level using the teach button

Large and easy to press teach button

Background teaching

Set the threshold level at a point before the background (reference surface).

Hold teach button

Threshold level

Two-point teaching

Set the threshold level at a value halfway between that when a workpiece is present and when one is not.

Place a target in position and press the teach button

Press the teach button without the target in place

Threshold level

Key locking

The key locking function prevents malfunction after setting.

Fast and easy setup when setting a large number of sensors

Sensitivity adjustment using the conventional adjuster method requires experience, finesse and time since the threshold level must be adjusted one unit at a time.

With the E3AS Series, simply press the teach button to automatically set the threshold level..

Adjuster method

The adjuster must be turned to the left and right with a screwdriver for each and every unit because sensitivity differs depending on the installation location.

60 s   60 s   60 s   60 s   60 s

60 s x 5 units = 300 s in total

Teaching method (E3AS)

Setup can be completed by simply pressing the teach button on each sensor unit for 3 seconds.

3 s   3 s   3 s   3 s   3 s

Adjustment time reduced by 95 %

3 s x 5 units = 15 s in total

Background Reference Teaching (sensitive) for easy setup of transparent object detection
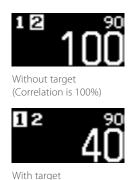
PATENT PENDING[1]

CMOS E3AS-HL

The E3AS-HL Sensor detects presence of targets from the variation (correlation) of background distance information and incident light level information.

1. Correlation is 100% without a target in place.

1 2 90
100

Without target
(Correlation is 100%)

2. A transparent object (e.g., glass or plastic bottle) passing through is detected as the correlation with the background changes.

1 2 90
40

With target
(Example: Correlation is 40%)

Easy-to-read, easy-to-understand OLED display

CMOS E3AS-HL

Threshold level and detected value display on the same screen making threshold level setting easy. Moreover, wide viewing angle and display inverting allow on-site workers to easily see the display.

Detected value and threshold level at a glance

Set threshold level

Current detected value

Detection display switching based on purpose

Bar display to grasp detection margin at a glance

Threshold level — Current detected value

ON/OFF display to easily check control output status

Control output 1 — Control output 2

Easy-to-read setup menu display

Setting — Selection

Wide viewing angle allows reading from an angle

150º horizontal and vertical viewing angle

Invert display depending on sensor installation orientation
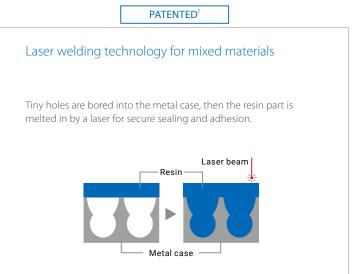
Inverting: Disabled

Inverting: Enabled

Robust design minimizes downtime and maintenance

When a sensor malfunctions due to the environment and causes a line stoppage during mass production, it can take a long time to restart. With enhanced environmental resistance, the E3AS Series minimizes line downtime and maximizes uptime.

Unique case design reduces the frequency of replacements caused by failure

The sensor case is made of stainless steel (SUS316L). The unique Omron laser welding technology for mixed materials enhances the sealing and adhesion between stainless steel and resin.

IP69K
High temperatures/
high water pressure

IP67G
Oil resistance

ECOLAB
Detergent resistance

Welded indicator

Welded display

Welded cover lens

PATENTED[1]

Laser welding technology for mixed materials

Tiny holes are bored into the metal case, then the resin part is melted in by a laser for secure sealing and adhesion.

Laser beam

Resin

Metal case

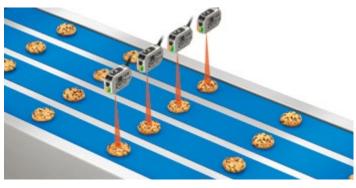## False detections due to environmental changes can be prevented

CMOS E3AS-HL

False detection may occur due to the effects of lights for vision sensors or nearby sensors after the production line layout is changed.

E3AS-HL Sensors can be operated in high ambient illumination conditions and have the mutual interference prevention function, reducing the frequency of false detections when mounting near other sensors.

Operation under high ambient illumination

Mutual interference prevention

E3AS-HL Sensors can be operated under ambient illumination of 20,000 lx, which reaches the best in class level[2], preventing false detections caused by camera lights or sunlight.

The mutual interference prevention function includes up to 4 units, allowing users to limit false detections when using multiple sensors on the same line.

1. Patent pending in Japan and patented in Japan. (As of May 2020)
2. Based on an Omron investigation in September 2020.

Antifouling coating on sensing surface reduces false detection and cleaning frequency

INDUSTRY FIRST[1]

PATENT PENDING[2]

A dirty sensing surface can cause false detection. The E3AS Series has an antifouling coating on the sensing surface which prevents water droplets and paper dust from sticking to the sensing surface and keeps the lens from fogging.

Antifouling coating on sensing surface

Antifouling coating

Antifouling coating

Antifouling coating

Water

Paper dust

Water vapor

Accessories enhance sensor usability

The E3AS Series comes with a lineup of accessories that shorten sensor adjustment time upon commissioning and reduce the frequency of false detections during production.

They can be used with non-E3AS sensors with a standard mounting hole pitch of 25.4 mm as well.

PATENT PENDING[2]

PATENT PENDING[2]

Flexible Mounting Bracket

Optical axis can be adjusted in three directions: vertical, horizontal, and angular.

Air Blow Unit

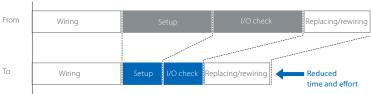Blows paper dust and cleaning solutions off the sensing surface.

Front Protection Cover[3]

Protects sensing surfaces from collisions with workpieces, containers, and pallets.

1. Based on an Omron investigation in September 2019.
2. Patent pending in Japan and patented in Japan. (As of May 2020)

3. E3AS-HL only. Note: For details on ratings and specifications, refer to the *Ratings and Specifications* in this catalog.

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IO-Link speeds up line commissioning and reduces maintenance

Reduce commissioning time by batch-setting the sensors and cut troubleshooting time during mass production by utilizing field data.

| From | Wiring | Setup | I/O check | Replacing/rewiring |

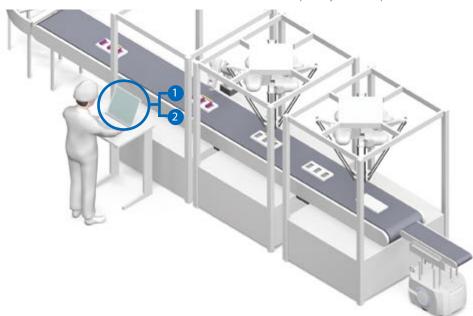| To | Wiring | Setup | I/O check | Replacing/rewiring | ← Reduced time and effort |

1
Sensor data monitoring improves predictive maintenance and supports quick recovery

Setting information can be batch-written to thousands of sensors on a line, effectively reducing commissioning time and inconsistent settings.

2
Predictive monitoring and quick recovery by checking and monitoring sensor data

The monitor shows light intensity decrease due to sensing surface contamination allowing users to take proactive actions to prevent potential false detections. This reduces the frequency of unexpected failures.

OMRON AUTOMATION AMERICAS HEADQUARTERS • Chicago, IL USA • 847.843.7900 • 800.556.6766 • automation.omron.com

OMRON CANADA, INC. • HEAD OFFICE
Toronto, ON, Canada • 416.286.6465 • 866.986.6766 • automation.omron.com

OMRON ELECTRONICS DE MEXICO • HEAD OFFICE
Ciudad de México • 52.55.5901.4300 • 01.800.386.6766 • mela@omron.com

OMRON ELECTRONICS DE MEXICO • SALES OFFICE
San Pedro Garza García, N.L. • 81.12.53.7392 • 01.800.386.6766 • mela@omron.com

OMRON ELECTRONICS DE MEXICO • SALES OFFICE
Eugenio Garza Sada,León, Gto • 01.800.386.6766 • mela@omron.com

OMRON ELETRÔNICA DO BRASIL LTDA • HEAD OFFICE
São Paulo, SP, Brasil • 55 11 5171-8920 • automation.omron.comr

OMRON ARGENTINA • SALES OFFICE
Buenos Aires, Argentina • +54.11.4521.8630 • +54.11.4523.8483 mela@omron.com

OTHER OMRON LATIN AMERICA SALES
+54.11.4521.8630 • +54.11.4523.8483 • mela@omron.com