

Reliable Detection of Transparent Objects

The E3S-DB photoelectric sensor contributes to the food and packaging industry by detecting transparent objects regardless of changes in materials, shapes, and types.



- » Consistently accurate clear object detection
- » Detergent washdown resistant to IP69K
- » Prevents intermittent line stoppages



IP69K
ECOLAB



Reliably detect various types of transparent workpieces

Transparent Object Detection
Photoelectric Sensor

E3S-DB

High detection capabilities for reliable detection of a wide range of transparent objects in the food and packaging industries, including glass bottles, PET bottles, films, and trays. You can increase equipment operating rates while reducing set-up and maintenance work.



Improved Equipment Operating Rates

Prevent intermittent line stoppage and shorten cycle time with reliable detection capabilities

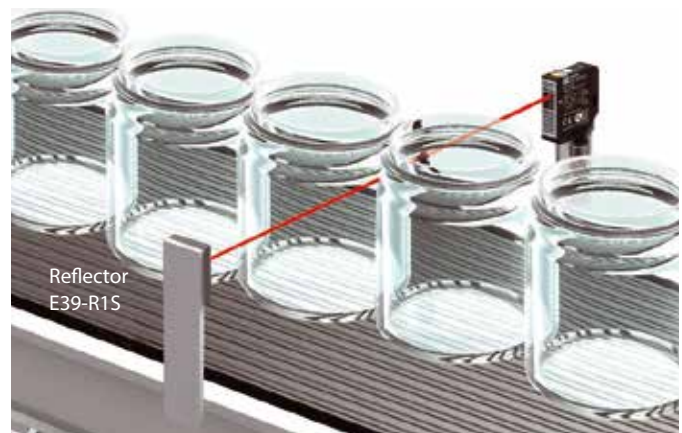
Increase operating efficiency for transparent bottle detection

Typical Problems

Detection of transparent bottles with photoelectric sensors is not stable, which prevents increasing equipment operating rates. Sensors have to be selected on a case-by-case basis or expensive laser sensors have to be used.

With the E3S-DB

These photoelectric sensors can **reliably detect** transparent glass bottles allowing increased equipment operating rates.

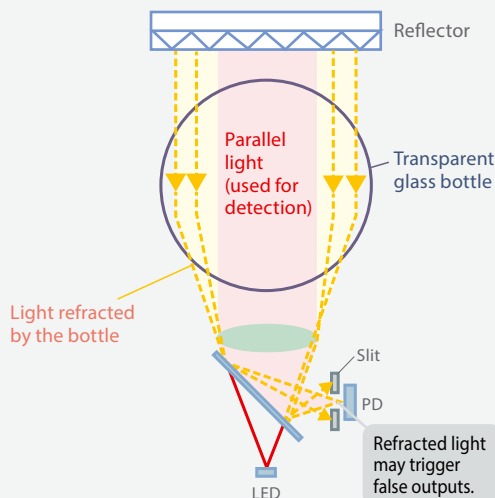


New technology

Double-slit Optical Design

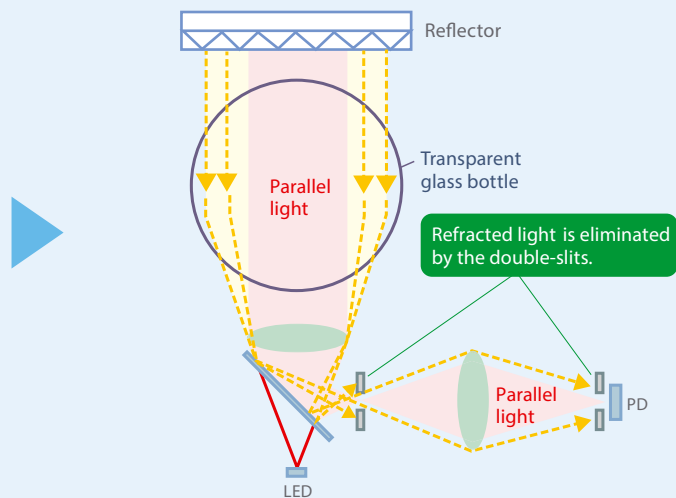
Model with a slit

Light refracted from the bottles increases the incident light, making detection unstable.



E3S-DB

New double-slit technology ensures reception of only parallel light to stabilize detection.



Three benefits of transparent object detection



**Improved
Equipment
Operating Rates**

Reliable part detection.



**Reduced
Commissioning and
Maintenance**

Easy setup and operation.



**High
Usability**

**IP69K rated, Ecolab certified
for washdown resistance.**

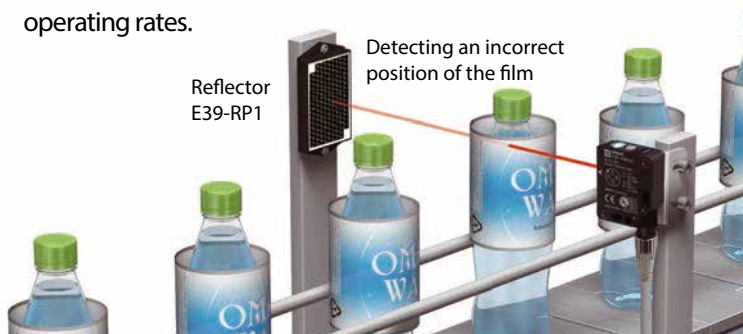
Increase operating efficiency to detect loose shrinkwrapping

Typical
Problems

Detection of transparent film is not consistent, which prevents increasing equipment operating rates.

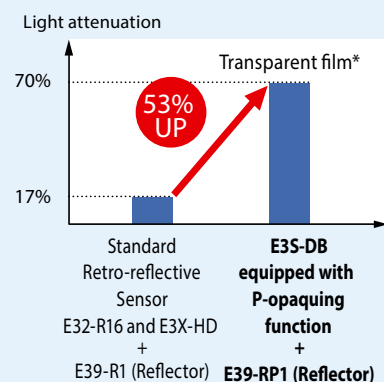
With the
E3S-DB

P-opaquiring function **ensures attenuation of 70%*** even with films with little difference in light levels. Stable detection lets you increase equipment operating rates.



P-opaquiring function

The E3S-DB utilizes the birefringent (double refraction) property of PET bottles to dramatically increase the level of excess gain. The polarization component that is disturbed by the PET bottles as they pass along the line is cut by a special and unique OMRON polarization filter. This greatly lowers the intensity of the light received to provide stable detection with a simple sensitivity adjustment.



*The data are obtained by OMRON from measurement of cigarette pack film.

Shorten cycle time for transparent bottle detection

Typical
Problems

When the pitch between glass or PET bottles on conveyor belts is too tight, sensors do not have enough time to turn ON and OFF, which prevents shortening the cycle time.

With the
E3S-DB

The narrow beam **enables incident light with gaps as narrow as 3 mm.***

You can reduce the pitch between workpieces to maximize conveyance.

*When using the E39-R21 Reflector, adjusting the threshold to 25% or less, and using stationary workpieces.



Narrow beam diameter of minimum 2.5 mm



The E3S-DB has a response time of 0.5 ms for a pitch of 5 mm, so detection is possible at a conveyor speed of up to 4 m/s. (With the E3S-DB □□Z(T) and a sensing distance of 200 mm.)



Reduced Work

Easy setup and operation; reduced commissioning and maintenance work

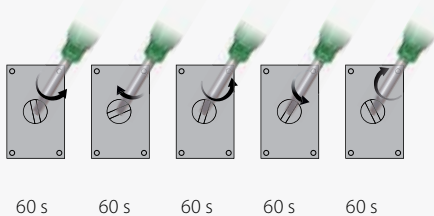
Large reductions in adjustment time for sensitivity and threshold

Standard sensor with multi-turn adjuster

You have to adjust the sensitivity adjuster on each Sensor individually to achieve the optimum sensitivity for each.

Examples for setting five sensors

With 11 turns, you end up turning the adjuster left and right. Sensitivity depends on the installation location, so all Sensors have to be adjusted individually.

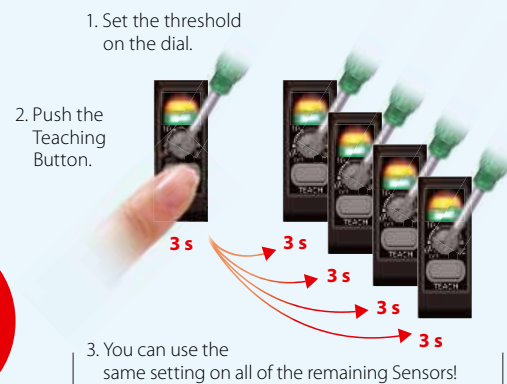


60 s 60 s 60 s 60 s 60 s

$$60 \text{ s} \times 5 \text{ Sensors} = 300 \text{ s}$$

E3S-DB Smart teaching type

Set the optimum threshold and sensitivity by adjusting the setting to the same scale (2 s) and pushing a button (1 to 5 s).



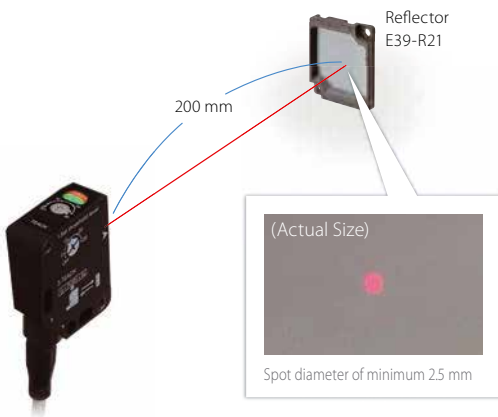
Adjustment work reduced by 95%.

$$3 \text{ s} \times 5 \text{ Sensors} = 15 \text{ s}$$

Visualization reduces work in changeovers and installation

● Visible spot

The visible spot in the Reflector lets you easily adjust the height of the optical axis and reduces time required for adjustment.



● Easy to see indicators

Large, easy-to-see light and stability indicators let you easily check operation from any angle.





High Usability

Resistance to water and detergents

Reliable structure that resists water and detergents

● IP69K water resistance

Withstands harsh environments with high temperatures and high water pressures.



IP69K Degree Protection

IP69K is defined in DIN 40050 Part 9 of the German standards for protection against high temperatures and high water pressures.

● Resistance to detergents certified by Ecolab

Third-party certification has been received from the Ecolab company in Europe for applications in washdown environments.



Rotating connector/cable



Connectors and cables can be rotated for ease of wiring.

Information printed on sensor

Smart Teaching and wiring information is printed on the Sensor to eliminate the need for manuals onsite.



Smart Teaching Information

Wiring Information

PC Monitoring Software helps you visualize detection status (to be released soon).

You can easily monitor Sensor status.

- **Testing** Check detection stability for new workpieces or when using a new Reflector.
- **Setup** Check the optimum threshold.
- **Maintenance** Check Sensor detection status data.



Total Solutions to Increase Equipment Operating Rates

Example in beverage line

Benefit Icons



Improved equipment operating rates

Devices that ensure rapid recovery or stable operation.



Reduced work

Devices that reduce the work required for setup, adjustment, or changeovers.

Transparent Object Detection
Photoelectric Sensors

E3S-DB



Easy threshold setting for each transparent object

Smart teaching.



Reduced work in changeovers and adjustment

Small spot.

Digital
Temperature
Controllers

E5□C Series



Reduced work in creating communications programs

Programless communications.

Reduced time in adjusting pid values

Control simulator.

AC Servomotors and Servo Drives

R88M-K and R88D-KN□-ECT G5 Series



Rapid recovery with servomotor torque error monitoring

Torque error monitoring.



Reduced work in changeovers and adjustment

Parameter setting and switching.

Multi-function Compact
Inverters

MX2 Series V1 Type



Reduced work in changeovers and adjustment

Parameter setting and switching.

Machine Automation
Controllers

NJ/NX Series



Rapid recovery with error detection for various devices

- Records device status when errors occur.
- High-speed execution of user programs.
- Function blocks to monitor safety device operation time for preventive maintenance.

Filling Equipment

Hot-water Washing

Image Inspections

Solid-state Relays
with Built-in CTs

G3PF



Rapid recovery by identifying faulty locations

- SSR short-circuit failure detection.
- Heater burnout detection.

Smart Fiber Amplifier Units

E3NX-FA



Alarm output for reduced light level for preventive maintenance

Sensor Incident level monitoring.



Reduced work in changeovers and adjustment

Threshold setting.

and Reduce Work in Setup and Maintenance

Programmable
Terminals

NA Series



Reduced Work in Setting and Adjusting Various Devices

Set and change parameters on a touch panel.



Preventive Maintenance for Various Devices

Monitors device status to quickly identify error locations.

Reduced Work in Changeovers

Records device parameters for each product to quickly and accurately make changeovers.



Transparent Object Detection
Photoelectric Sensors

E3S-DB



Detect all sorts of transparent objects with high sensitivity for reliable operation

- P-opaque function.
- Optimum double-slit optical design.



Digital
Temperature
Controllers

E5□C Series



Rapid Recovery by Identifying Faulty Locations with Temperature Control

- Heater burnout detection.
- Temperature sensor burnout detection.



Palletizer

Caser

Shrink Wrapping

Inspection for Tilted Caps

Switch Mode Power Supplies

S8VS



Long-life Power Supplies for Preventive Maintenance against Stoppage

Maintenance forecast monitor.



Buffer Blocks

S8T-DCBU



Stable Operation because Power Is Supplied during Momentary and Long-term Power Interruptions



Vision Systems

FH Series



Stable Operation by Preventing Excessive Filtering Out

High-accuracy OCRs.



Reduced Work in Dictionary Registration

Built-in dictionary.



OMRON helps you increase equipment operating rates while reducing work. We also provide a wide range of safety components for machine and equipment safety measures.

Safety Light Curtains

F3SG-R Series F3SJ Series

Finger, Arm, and Body Protection



Safety Door Switches

D4SL-N Series D40Z Series

Open/Close Detection of Mechanical Guards and Covers



Emergency Stop Switches



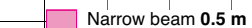


A165E Series A22E Series

Emergency Stopping of Machines



*Catalog numbers are shown in the brackets "()".

Sensors

Sensing method	Appearance	Sensitivity adjustment	Connection method	Sensing distance*2	Model			
					NPN output	PNP output		
Retro-reflective (with MSR function)		Smart Teaching	Pre-wired (2 m)	 3.5 m	E3S-DBN11 2M	E3S-DBP11 2M		
			Connector (M12)		E3S-DBN21	E3S-DBP21		
			M12 Smartclick pre-wired connector (0.3 m)		(with E39-R8)	E3S-DBN31 0.3M	E3S-DBP31 0.3M	
			Pre-wired (2 m)		 Narrow beam 0.5 m	E3S-DBN12 2M	E3S-DBP12 2M	
			Connector (M12)			(with E39-R21)	E3S-DBN22	E3S-DBP22
			M12 Smartclick pre-wired connector (0.3 m)			E3S-DBN32 0.3M	E3S-DBP32 0.3M	
		Eleven-turn adjuster	Pre-wired (2 m)	 3.5 m	E3S-DBN11T 2M	E3S-DBP11T 2M		
			Connector (M12)		(with E39-R8)	E3S-DBN21T	E3S-DBP21T	
			M12 Smartclick pre-wired connector (0.3 m)		E3S-DBN31T 0.3M	E3S-DBP31T 0.3M		
			Pre-wired (2 m)		 Narrow beam 0.5 m	E3S-DBN12T 2M	E3S-DBP12T 2M	
			Connector (M12)			(with E39-R21)	E3S-DBN22T	E3S-DBP22T
			M12 Smartclick pre-wired connector (0.3 m)			E3S-DBN32T 0.3M	E3S-DBP32T 0.3M	

***2.** There is no close-range dead zone between the Sensor and Reflector.

Sensing method		Retro-reflective (with MSR function)			
Model	NPN output	E3S-DBN□1	E3S-DBN□1T	E3S-DBN□2	E3S-DBN□2T
Item	PNP output	E3S-DBP□1	E3S-DBP□1T	E3S-DBP□2	E3S-DBP□2T
Sensing distance		0 to 3.5 m (with E39-R8)			0 to 0.5 m (with E39-R21)
Power consumption		720 mW max. (current consumption: 30 mA max. at power supply voltage of 24 VDC)			
Control output		Load power supply voltage: 30 VDC max., Load current: 100 mA max. (Residual voltage: 2 V max.) Open-collector output (NPN/PNP output depending on model.)			
Response time		Operate or reset: 0.5 ms max.			
Smart Teaching lock function		Provided.	—	Provided.	—
Automatic compensation (AC ³)		Provided (OFF by default).	—	Provided (OFF by default).	—
Ambient illumination		(Receiver side) Incandescent lamp: 3,000 lx max., Sunlight: 10,000 lx max.			
Materials	Case	Polybutylene terephthalate (PBT)/ABS			
	Lens	Methacrylic resin (PMMA)			
	Indicators	Methacrylic resin (PMMA)			
	Sensitivity adjuster and operation selector	Polyester elastomer			
	Cable	Polyvinyl chloride (PVC)			

(Unit: mm)

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

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