

Transparent Object Detection Sensor

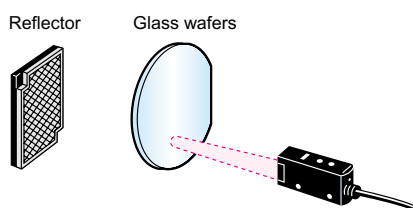
E3S-R

- Senses glass wafers and LCD glass circuit boards.



Applications

Sensing of Glass Wafers and LCD Glass Circuit Bottles



Ordering Information

Sensors

█ Red light

Sensor type	Shape	Connection method	Sensing distance		Model	
					NPN output	PNP output
Retroreflective Models	Horizontal 	Pre-wired	█ 1m [100mm] *	E3S-R11	E3S-R31	
		Connector type		E3S-R16	E3S-R36	
	Vertical 	Pre-wired		E3S-R61	E3S-R81	
		Connector type		E3S-R66	E3S-R86	

* Values in parentheses indicate the minimum required distance between the sensor and reflector.

Note: Stable detection may not be possible of some glass wafer materials. Be sure to test whether the work can be detected.

Accessories (Order Separately)


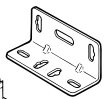




Driver

Name	Model	Quantity	Remarks
Sensitivity adjustment driver	E39-G2	1	Included as an accessory for the E3S-R1□ and E3S-R6□.

Reflectors



Name	Sensing distance	Model	Quantity	Remarks
Reflectors	Refer to ratings/performance	E39-R1	1	Supplied with the product.

Clamps/Other

Shape	Model	Quantity	Remarks
	E39-L69	1	Included as an accessory for the E3S-R1□.
	E39-L70	1	Included as an accessory for the E3S-R6□.
	E39-L93	One set	Sensor adjuster: Easy mounting and adjustment on aluminum frame and rail of conveyors and other equipment.
	E39-L97	1	Horizontal protective cover clamp.
	E39-L98	1	Vertical protective cover clamp.
	E39-L60	1	Contact mounting plate: Accessory to E3S-R□.

Note: 1. If a through-beam model is used, order two Mounting Brackets for the emitter and receiver respectively.
 2. For details, refer to "Mounting bracket list".

Sensor I/O Connectors

Cable	Shape	Cable length	Model
Standard cable	Straight 	2 m	XS2F-D421-DC0-A
		5 m	XS2F-D421-GC0-A
	L-shape 	2 m	XS2F-D422-DC0-A
		5 m	XS2F-D422-GC0-A

Rating/performance

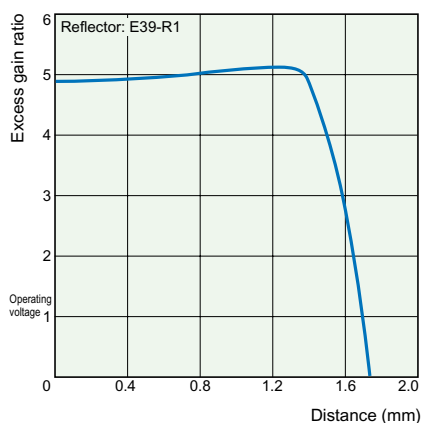
Sensor type		Retroreflective Models (with M.S.R)
Item	Model	
	NPN output	E3S-R11/-R16/-R61/-R66
	PNP output	E3S-R31/-R36/-R81/-R86
Sensing distance	1 m (100 mm) *1(When using the E39-R1)	
Standard sensing object	75-mm dia. or larger opaque LCD glass plate (thickness: 0.7 mm)	
Directional angle	3 to 10°	
Light source (wave length)	Red LED (700 nm)	
Power supply voltage	10 to 30 V DC (including 10% ripple (p- p))	
Current consumption	30 mA max.	
Control output	Load power source voltage: 30 VDC or less, load current: 100 mA or less (residual voltage of 1 V or less), NPN open collector output, Light ON / Dark ON switching	
Protective circuits	Reverse polarity protection, output short-circuit protection, mutual interference prevention	
Response time	Operation or reset: 1 ms max.	
Sensitivity adjustment	2-revolution endless volume	
Ambient illuminance	Incandescent lamp: 5,000 lux max. Sunlight 10,000 lux max.	
Ambient temperature	Operating: 0 to +40°C, storage: -40 to +70°C (no ice formation or condensation)	
Ambient humidity	Operating: 35 to 85% RH, Storage: 35 to 95% RH (no condensation)	
Insulation resistance	20 M Ω min. at 500 VDC	
Dielectric strength	1,000 VAC at 50/60 Hz for 1 minute	
Vibration resistance	10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions	
Shock resistance	Destruction: 500 m/s ² for 3 times each in X, Y, and Z directions	
Protective structure	IEC 60529 IP67	
Connection method	Pull-out cable type (standard cord length: 2 m) / connector type	
Weight (Packed state)	Approximately 110 g (pull-out cable type) Approximately 60 g (connector type)	
Material	Case	PBT (polybutylene terephthalate)
	Lens	Denatured polyarylate
	Mounting Brackets	Stainless steel (SUS304)
Accessories	Clamps (with screws), sensitivity adjustment driver, operation manual, reflective plate	

*1. Values in parentheses indicate the minimum required distance between the sensor and reflector.

Characteristic data (typical)

Operating Range

E3S-R11, E3S-R61+ E39R1 (reflective plate accessory)



Changes in light intensity when detecting various transparent objects (Note 1)

The following are the permeation rates of a various transparent objects on condition that a permeation rate of 100 means that there is no object within the sensing distance of the E3S-R. The permeation rate of any type of object sensed by the E3S-R must be as low as possible for the stable sensing of the object. Before using the E3S-R to sense objects, use samples of the objects to check if the E3S-R can sense the samples easily.

Sensing object		Model	E3S-R11, R61, R81; E3S-R16, R66, R36, R86
Shape	Passage position		Center
Glass plate	50 × 50 t = 0.5		82
	50 × 50 t = 1		74
	50 × 50 t = 2		73
	50 × 50 t = 3		62
	50 × 50 t = 5		53
	50 × 50 t = 10		38
Liquid crystal glass	t = 0.5 (98% transparency)		86
	t = 0.7 (95% transparency)		81
	t = 1.1 (91% transparency)		75
Operating range			95 max.
Stable operating range			90 max.

- Note: 1. The sensing distance of each model was set to the rated sensing distance.
 2. The permeability values were checked with light with a wavelength of 700 μm.

Output Circuit Diagram

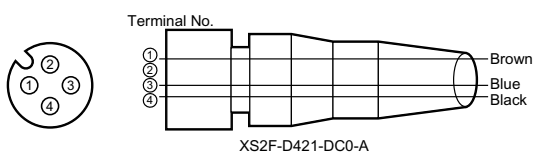
NPN output

Model	Operating status of output transistor	Timing chart	Mode selection switch	Output circuit
E3S-R11 E3S-R61 E3S-R16 E3S-R66	Light ON	Incident Interrupted Light indicator (red) ON OFF Output transistor ON OFF Load (Relay) Operate Reset (Between brown and black)	LIGHT ON (L/ON)	<p>Connector Pin arrangement</p> <p>Note: Terminal 2 is not used.</p>
	Dark ON	Incident Interrupted Light indicator (red) ON OFF Output transistor ON OFF Load (Relay) Operate Reset (Between brown and black)	DARK ON (D/ON)	

PNP output

Model	Operating status of output transistor	Timing chart	Mode selection switch	Output circuit
E3S-R31 E3S-R36 E3S-R81 E3S-R86	Light ON	Incident Interrupted Light indicator (red) ON OFF Output transistor ON OFF Load (Relay) Operate Reset (Between blue and black)	LIGHT ON (L/ON)	<p>Connector Pin arrangement</p> <p>Note: Terminal 2 is not used.</p>
	Dark ON	Incident Interrupted Light indicator (red) ON OFF Output transistor ON OFF Load (Relay) Operate Reset (Between blue and black)	DARK ON (D/ON)	

Connectors (Sensor I/O connectors)



Class	Wire, outer jacket color	Connector pin No.	Application
For DC	Brown	①	+V
	---	②	---
	Blue	③	0V
	Black	④	Output

Note: Pin 2 is not used.

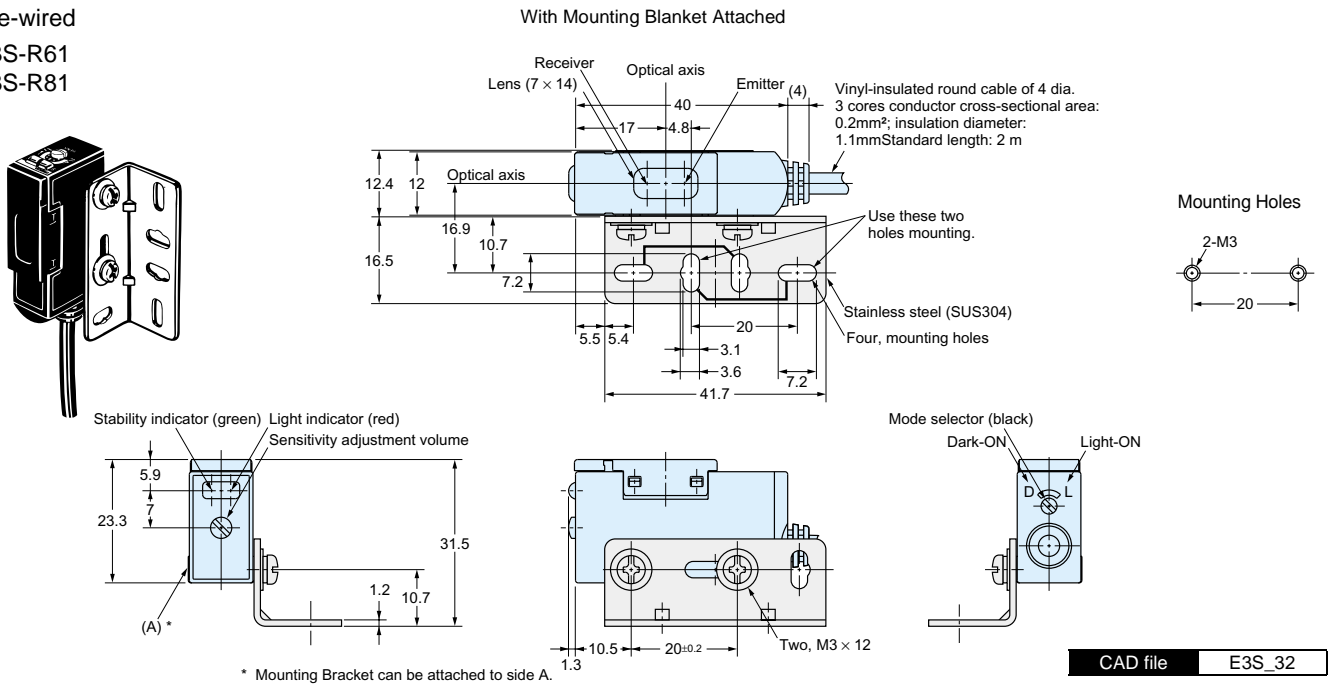
Precautions

Correct Use

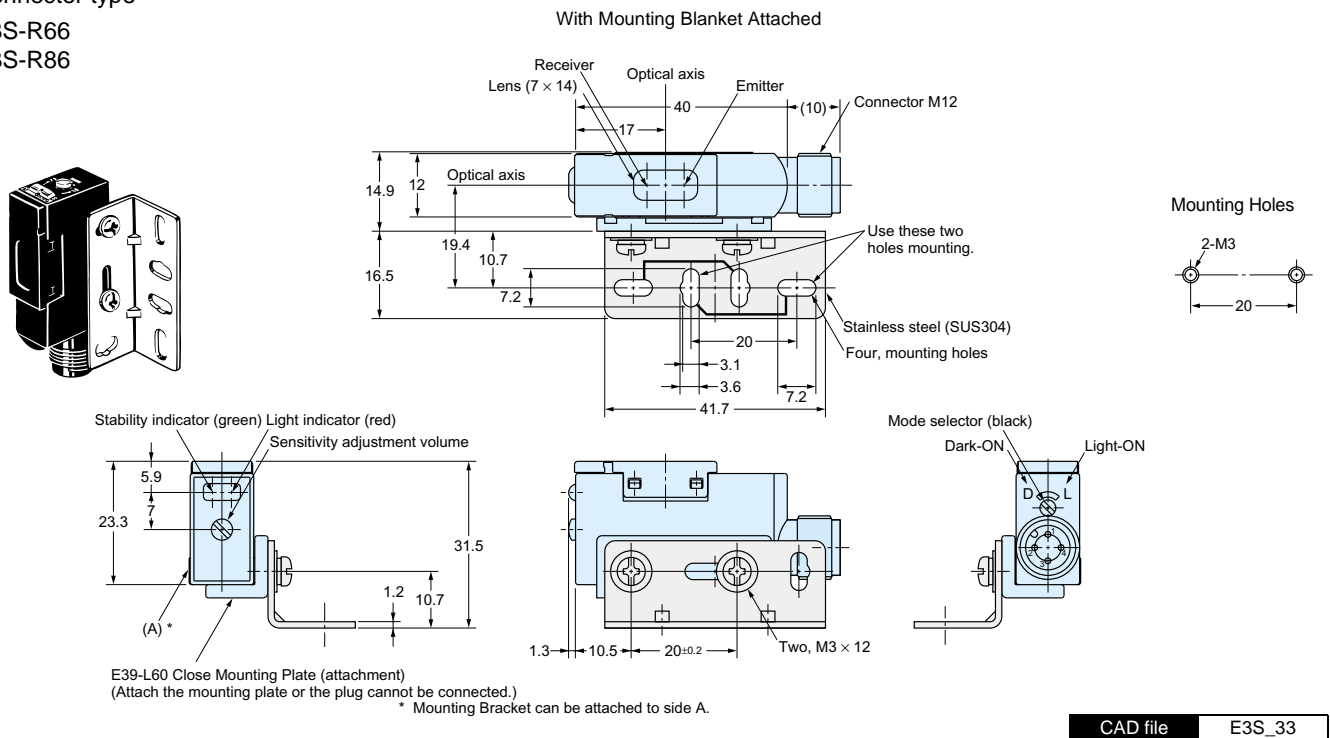
- For adjustment
- The passage point of the detection object should be the central point between the reflective plate and the photoelectric switch. If too close to the reflective plate, an error may result.
- To obtain sufficient detection performance, the E39-R1 must be used for the reflective plate unless otherwise specified.

Small plastic case type (vertical)

Pre-wired
E3S-R61
E3S-R81



Connector type
E3S-R66
E3S-R86



Accessories (Order Separately)