


## Reliable Detection Unaffected by PCB Holes or Notches

- High-limit E3S-LS3□ is suitable for incorporation in devices.
- Wide-range E3S-LS3□W is ideal for detecting tall components mounted on boards.
- Timer function models available.






 Be sure to read *Safety Precautions* on page 4.

## Ordering Information

### Sensors

 Red light

Sensing method	Appearance	Connection method	Sensing distance	Timer function	Model	
					NPN output	PNP output
Convergent-reflective		Pre-wired (2 m)	 20 to 35 mm *	Without	<b>E3S-LS3N 2M</b>	<b>E3S-LS3P 2M</b>
				With	<b>E3S-LS3NT 2M</b>	<b>E3S-LS3PT 2M</b>
			 10 to 60 mm *	Without	<b>E3S-LS3NW 2M</b>	<b>E3S-LS3PW 2M</b>
			With	<b>E3S-LS3NWT 2M</b>	<b>E3S-LS3PWT 2M</b>	

\* For white paper: 80 × 80 mm.

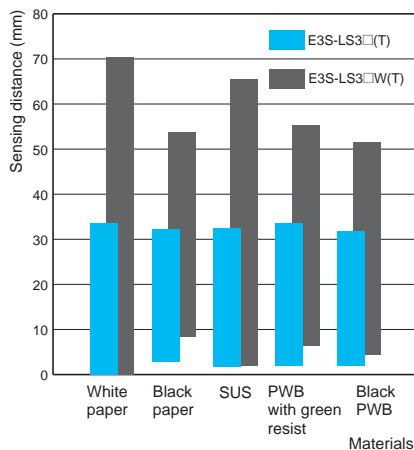
## Ratings and Specifications

Item	Sensing method Model	Convergent-reflective	
		E3S-LS3N(T)/-LS3P(T)	E3S-LS3NW(T)/-LS3PW(T)
Sensing distance	White paper *	20 to 35 mm	10 to 60 mm
	Black paper *	20 to 30 mm	15 to 50 mm
Light source (wavelength)		Red LED (660 nm)	
Power supply voltage		12 to 24 VDC±10%, ripple (p-p) 10% max.	
Current consumption		25 mA max.	
Control output		Load power supply voltage: 24 VDC max., Load current: 100 mA max., (Residual voltage: 1 V max. for NPN output or 2 V max. for PNP output) Open collector output configuration: NPN or PNP output depending on the model, Operating mode: Light-ON	
Response time		Operate or reset: 1 ms max.	
Timer function (only models with timer function)		OFF-delay range: 0.1 to 1.0 s (adjustable)	
Ambient illumination (Receiver side)		Incandescent lamp: 5,000 lux max.	
Ambient temperature range		Operating: -10 to 55°C (with no icing or condensation) Storage: -25 to 70°C (with no icing or condensation)	
Ambient humidity range		Operating: 35% to 85% (with no condensation) Storage: 35% to 95% (with no condensation)	
Insulation resistance		20 MΩ min. (at 500 VDC)	
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute	
Vibration resistance		Destruction: 10 to 55 Hz with a 1.5-mm double amplitude for 2 hrs each in X, Y and Z directions	
Shock resistance		Destruction: 500 m/s <sup>2</sup> , 3 times each in X, Y and Z directions	
Degree of protection		IEC 60529 IP40	
Connection method		Pre-wired (standard length: 2 m)	
Weight (packed state)		Approx. 80 g	
Material	Case	ABS (Acrylonitril Butadiene Styrene)	
	Lens	Methacrylic resin	
Accessories		Instruction manual, M3 screws, Adjustment screwdriver (only models with timer function)	

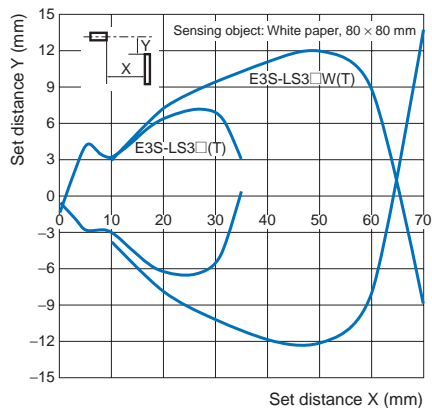
\* For 80 × 80 mm.

## Engineering Data (Typical)

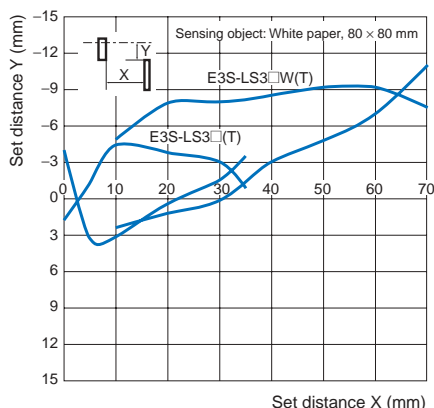
### Sensing Distance vs. Materials



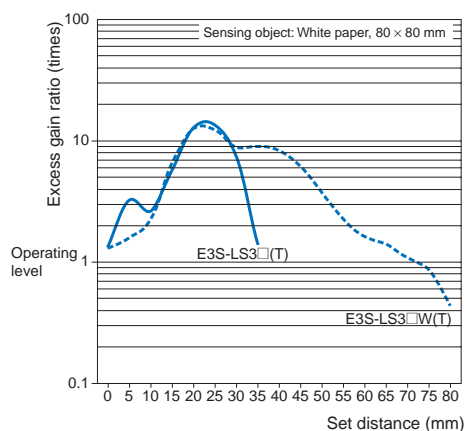
Operating Range (Left and Right)



Operating Range (Up and Down)

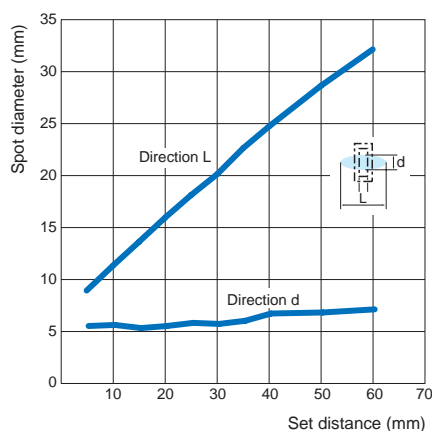


Excess Gain vs. Set Distance



Spot Diameter vs. Sensing Distance

(E3S-LS3□(T), E3S-LS3□W(T) (Common))







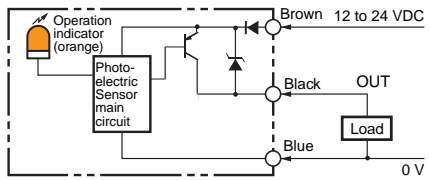








I/O Circuit Diagrams

NPN Output

Model	Operation mode	Timing charts	Output circuit
E3S-LS3N E3S-LS3NW	Light-ON	Incident light: ON (green bar), OFF (white bar) No incident light: OFF (white bar) Operation indicator (orange): ON (green bar), OFF (white bar) Output transistor: ON (green bar), OFF (white bar)	
E3S-LS3NT E3S-LS3NWT		Incident light: ON (green bar), OFF (white bar) No incident light: OFF (white bar) Operation indicator (orange): ON (green bar), OFF (white bar) Output transistor: ON (green bar), OFF (white bar) T: OFF-delay timer (0.1 to 1.0 s)	

## PNP Output

Model	Operation mode	Timing charts	Output circuit
E3S-LS3P E3S-LS3PW	Light-ON	Incident light  No incident light  Operation indicator (orange) ON  OFF  Output transistor ON  OFF 	
E3S-LS3PT E3S-LS3PWT		Incident light  No incident light  Operation indicator (orange) ON  OFF  Output transistor ON  OFF  T: OFF-delay timer (0.1 to 1.0 s)	

## Safety Precautions

Refer to *Warranty and Limitations of Liability*.

### ⚠ WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.



### Precautions for Correct Use

Do not use the product in atmospheres or environments that exceed product ratings

## Dimensions

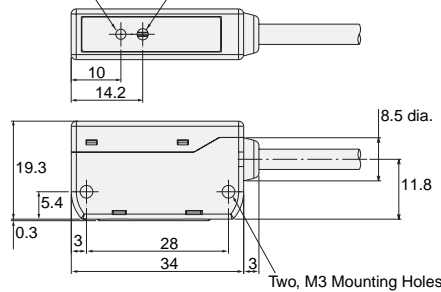
(Unit: mm)

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

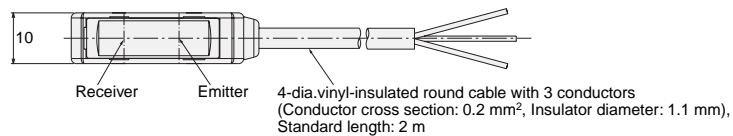
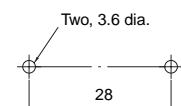
E3S-LS3N(T)/E3S-LS3P(T)  
E3S-LS3NW(T)/E3S-LS3PW(T)



Operation Indicator (orange) Timer adjuster \*



Mounting Holes



\* The timer adjuster is only for models with the timer function.

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- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

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