

## 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        | E3S-LS3N 2M   | E3S-LS3P 2M   |
|                       |                                                                                    |                   |                                                                                                   | With           | E3S-LS3NT 2M  | E3S-LS3PT 2M  |
|                       |                                                                                    |                   |  10 to 60 mm * | Without        | E3S-LS3NW 2M  | E3S-LS3PW 2M  |
|                       |                                                                                    |                   |                                                                                                   | With           | E3S-LS3NWT 2M | E3S-LS3PWT 2M |

\* For white paper: 80 × 80 mm.

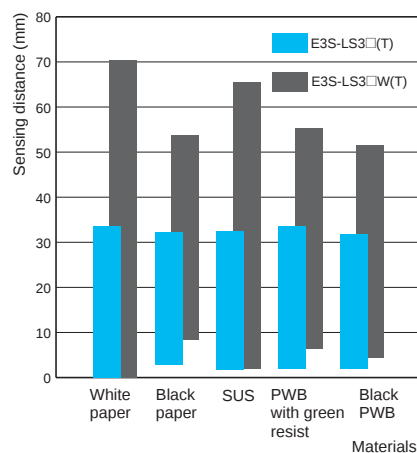
## Ratings and Specifications

| Sensing method                                      |               | Convergent-reflective                                                                                                                                                                                                                                      |                        |
|-----------------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Item                                                | Model         | 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.,<br>Load current: 100 mA max., (Residual voltage: 1 V max. for NPN output or 2 V max. for PNP output)<br>Open collector output configuration: NPN or PNP output depending on the model,<br>Operating mode: Light-ON |                        |
| Response time                                       |               | Operate or reset: 1 ms max.                                                                                                                                                                                                                                |                        |
| Timer function<br>(only models with timer function) |               | OFF-delay range: 0.1 to 1.0 s (adjustable)                                                                                                                                                                                                                 |                        |
| Ambient illumination<br>(Receiver side)             |               | Incandescent lamp: 5,000 lux max.                                                                                                                                                                                                                          |                        |
| Ambient temperature range                           |               | Operating: -10 to 55°C (with no icing or condensation)<br>Storage: -25 to 70°C (with no icing or condensation)                                                                                                                                             |                        |
| Ambient humidity range                              |               | Operating: 35% to 85% (with no condensation)<br>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)                                                                                                                                                                    |                        |

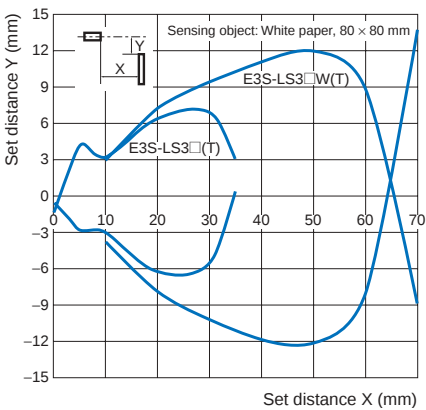
\* For 80 × 80 mm.

## Engineering Data (Typical)

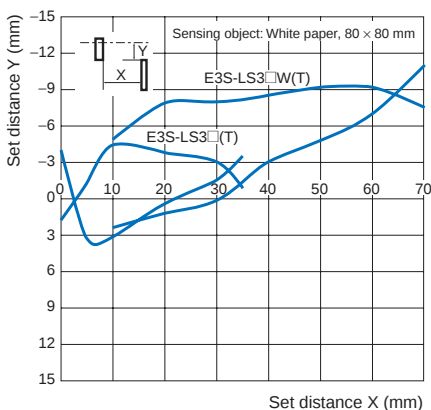
### Sensing Distance vs. Materials



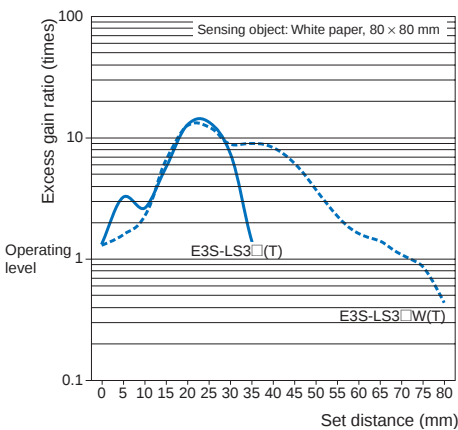
Operating Range (Left and Right)



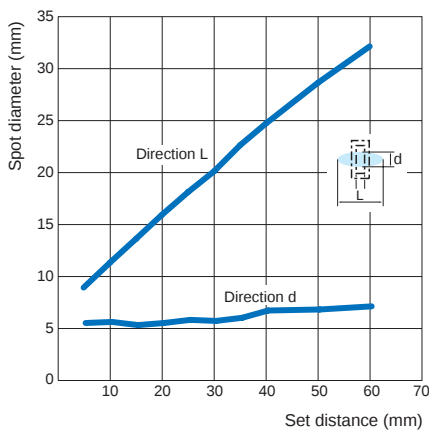
Operating Range (Up and Down)



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<br>E3S-LS3NW   | Light-ON       | <p>Incident light</p> <p>No incident light</p> <p>Operation indicator (orange)</p> <p>ON</p> <p>OFF</p> <p>Output transistor</p> <p>ON</p> <p>OFF</p>                                          |                |
| E3S-LS3NT<br>E3S-LS3NWT |                | <p>Incident light</p> <p>No incident light</p> <p>Operation indicator (orange)</p> <p>ON</p> <p>OFF</p> <p>Output transistor</p> <p>ON</p> <p>OFF</p> <p>T: OFF-delay timer (0.1 to 1.0 s)</p> |                |

PNP Output

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

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.



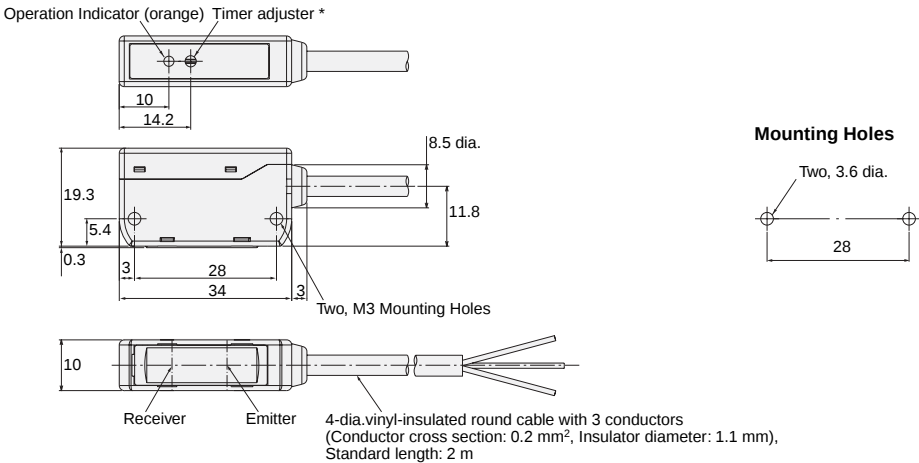
Precautions for Correct Use

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)



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

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**OMRON Corporation**  
Industrial Automation Company

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