

## Special-Purpose Photoelectric Sensor

## E3C-L

### Miniature Convergent Beam Sensor With Separate Amplifier

- Ignores background objects to prevent false signaling in inspection and mark detection applications
- Fast, 1 ms response time
- Prewired with 2 m (6.56 ft) cable
- Choose AC or DC amplifiers
- Amplifier with built-in ON-, OFF- and one-shot timer functions available
- Prewired DC amplifiers offer fine sensitivity adjustment and diagnostic alarm output



## Ordering Information

### ■ SENSORS

| Part number         | E3C-LS3R                            |
|---------------------|-------------------------------------|
| Method of detection | Convergent beam diffuse reflective  |
| Application         | Mark detection and parts inspection |
| Sensing distance    | 3 ± 0.3 cm (1.18 ± 0.118 in)        |
| Light source        | Red LED (680 nm)                    |

### ■ AMPLIFIERS

| Part number     | E3C-A                                                                                                          | E3C-C                                                                                                   | E3C-WH4F                                                                                      | E3C-GE4                                                                                              | E3C-GF4         | E3C-JC4P        | E3C-JB4P |
|-----------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-----------------|-----------------|----------|
| Description     |  Fits 1/16 DIN panel cutout |  For S3D8 Controller |  Miniature |  Slim, prewired |                 |                 |          |
| Supply voltage  | 100 to 240 VAC, 50/60 Hz                                                                                       |                                                                                                         | 12 to 24 VDC                                                                                  |                                                                                                      |                 |                 |          |
| Output          | Relay and NPN solid-state                                                                                      |                                                                                                         | NPN and PNP solid-state                                                                       | NPN solid-state                                                                                      | PNP solid-state | NPN             | PNP      |
| Timer functions | —<br><br>ON-delay<br>OFF-delay<br>One-shot                                                                     |                                                                                                         | —                                                                                             | —                                                                                                    |                 | 40 ms OFF-delay |          |
| Mounting style  | Socket (included)                                                                                              |                                                                                                         | Track                                                                                         | Socket Track (order separately)                                                                      |                 |                 |          |

## ■ ACCESSORIES

| Description                            |                                                   | Part number |
|----------------------------------------|---------------------------------------------------|-------------|
| Mounting bracket for sensor            |                                                   | E39-L41     |
| Sockets required for E3C-GE4 amplifier | Bottom surface mount socket                       | PYF08M      |
|                                        | Combination bottom surface and track-mount socket | PYF08A-E    |
| Mounting track                         | DIN rail, 50 cm (1.64 ft) length                  | PFP-50N     |
|                                        | DIN rail, 1 m (3.28 ft) length                    | PFP-100N    |
|                                        | End plate                                         | PFP-M       |
|                                        | Spacer                                            | PFP-S       |

## ■ REPLACEMENT PARTS

| Description                                       | Part number |
|---------------------------------------------------|-------------|
| Track-mount socket for E3C-A and E3C-C amplifiers | PF113A-E    |

# Specifications

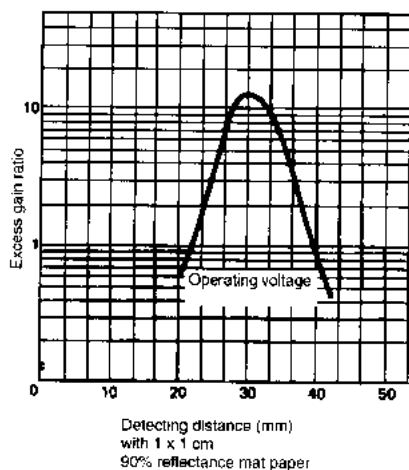
|                                |              |                                                                                           |
|--------------------------------|--------------|-------------------------------------------------------------------------------------------|
| Part number                    |              | E3C-LS3R                                                                                  |
| Method of detection            |              | Convergent beam diffuse reflective                                                        |
| Sensing distance               |              | 3 ±0.3 cm (1.18 ±0.118 in)<br>with 1 x 1 cm (0.39 x 0.39 in)<br>90% reflectance mat paper |
| Light source                   |              | Pluse modulated red LED (680 nm)                                                          |
| Detectable object type         |              | Opaque objects                                                                            |
| Required amplifier             |              | E3C-A, E3C-C, E3C-GE4, E3C-GF4, E3C-JC4P, E3C-JB4P, E3C-WH4F                              |
| Mutual interference protection |              | Provided                                                                                  |
| Indicators                     |              | Light incident (red LED)                                                                  |
| Materials                      | Lens         | Plastic                                                                                   |
|                                | Case         | Plastic                                                                                   |
|                                | Cable sheath | Plastic, polyethylene                                                                     |
| Mounting                       |              | Side surface with two through holes; Bracket E39-L41 optional. See Accessories            |
| Connections                    | Prewired     | 4-conductor cable, 2 m (6.56 ft) length                                                   |
| Weight                         |              | 55 g (1.9 oz.)                                                                            |
| Enclosure ratings              | NEMA         | 1, 2, 12                                                                                  |
|                                | IEC 144      | IP64                                                                                      |
| Approvals                      | UL           | Recognized                                                                                |
|                                | CSA          | —                                                                                         |
| Ambient temperature            | Operating    | -25° to 70°C (-13° to 158°F)                                                              |
|                                | Storage      | -25° to 70°C (-13° to 158°F)                                                              |

## ■ AMPLIFIERS

Refer to the E3C data sheet for details about output circuit diagrams, amplifier connections and operation.

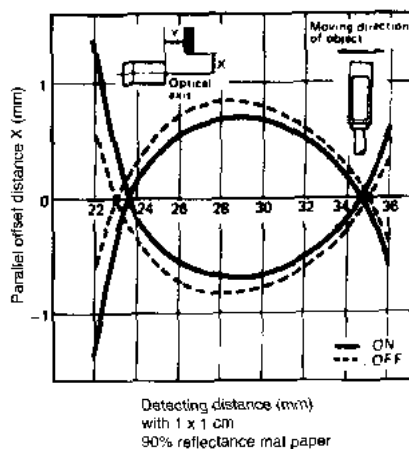
## Engineering Data

### ■ EXCESS GAIN RATIO

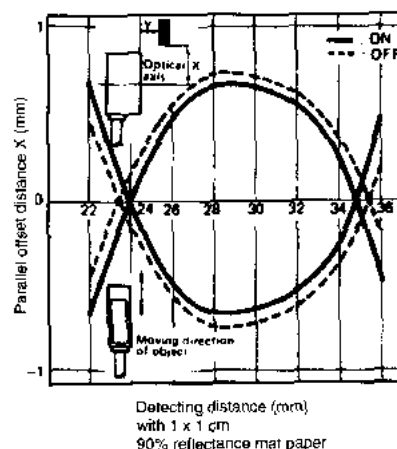


### ■ OPERATING RANGE

E3C-LS3R (Example 1)



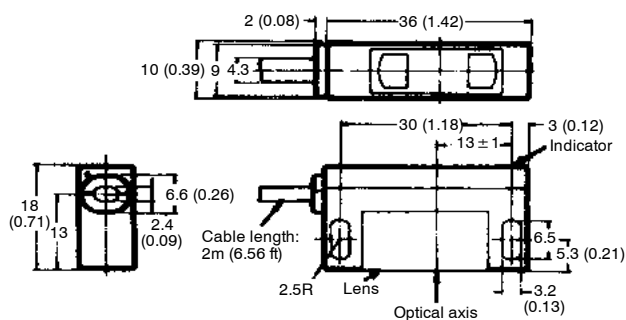
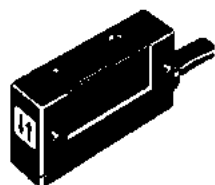
E3C-LS3R (Example 2)



## Dimensions

Unit: mm (inch)

### ■ SENSORS



### ■ AMPLIFIERS, SOCKETS, MOUNTING TRACK

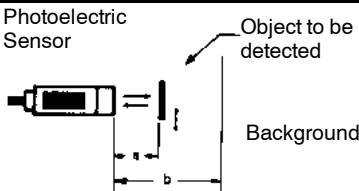
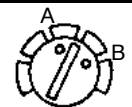
Refer to the E3C data sheet for dimensions of amplifiers, sockets, mounting track and accessories.

# Operation

## ■ SENSITIVITY ADJUSTMENT

Select the proper sensitivity adjustment method based on the conditions listed in the table. Both methods assume the amplifier is set to DARK-ON operation mode.

| Conditions        | The reflection factor of the object to be detected is equal to, or higher than, that of the background object. | The reflection factor of the object to be detected is lower than that of the background object. |
|-------------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Adjustment method | Use Method 1.                                                                                                  | Use Method 2.                                                                                   |

| Distance between sensor and object                                                                                                                                             | Sensitivity adjuster positions                                                                             |                                                                                                              |                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
|  <p>Photoelectric Sensor</p> <p>Object to be detected</p> <p>Background</p> <p>a</p> <p>b</p> |  <p>Reference point A</p> |  <p>Reference point B</p> |  <p>Optimum setting between A and B</p> |

### Adjustment Method 1

- Set distance "A" between the sensor and the object to be detected to 30 mm (1.18 in)
- Set the sensitivity adjuster to the MAXIMUM position (fully clockwise) and check that both the STABILITY and LIGHT indicators of the amplifier unit light. If both indicators do not light, move the sensor back and forth within the range of 2 to 3 mm (0.079 to 0.118 in) until the indicators light.
- Remove the object to be detected and gradually turn the sensitivity adjuster counterclockwise toward MINIMUM position to find the point where the LIGHT and STABILITY indicators change from lit to dark. Assume this is reference point "B" on the sensitivity adjuster.
- Place the object to be detected in position.
- Gradually turn the sensitivity adjuster further counterclockwise toward MINIMUM position to find a point where the LIGHT and STABILITY indicators change from lit to dark. Assume this is reference point "A" on the sensitivity adjuster.
- Set the sensitivity adjuster between reference points "A" and "B" for the optimum sensitivity adjustment. Finally, confirm that the LIGHT and STABILITY indicators operate as shown in the table at the right.

| Sensing condition                                                                         | LIGHT indicator on amplifier | STABILITY indicator on amplifier |
|-------------------------------------------------------------------------------------------|------------------------------|----------------------------------|
| When the object to be detected is present                                                 | ON                           | ON                               |
| When only the background object is present, and the object to be detected is not present. | OFF                          | ON                               |

### Adjustment Method 2

- Set distance "B" between the sensor and the background object to 30 mm (1.18 in).
- Remove the object to be detected.
- Set the sensitivity adjuster to the MAXIMUM position (fully clockwise) and check that both the STABILITY and LIGHT indicators of the amplifier unit light. Gradually turn the sensitivity adjuster counterclockwise toward MINIMUM position to find the point where the LIGHT and STABILITY indicators change from lit to dark. ASSUME this is reference point "B" on the sensitivity adjuster.
- Place the object to be detected in position.
- Gradually turn the sensitivity adjuster further clockwise toward MINIMUM position to find a point where the LIGHT indicator changes from dark to lit, and the STABILITY indicator from lit to dark. Assume this is reference point "A" on the sensitivity adjuster.
- Set the sensitivity adjuster between reference points "A" and "B" for the optimum sensitivity adjustment. Finally, confirm that the LIGHT and STABILITY indicators operate as shown in the table at the right.

| Sensing condition                                                                         | LIGHT indicator on amplifier | STABILITY indicator on amplifier |
|-------------------------------------------------------------------------------------------|------------------------------|----------------------------------|
| When the object to be detected is present                                                 | OFF                          | ON                               |
| When only the background object is present, and the object to be detected is not present. | ON                           | ON                               |

**NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches divide by 25.4.**

**OMRON**<sup>®</sup>  
**OMRON ELECTRONICS LLC**  
 One East Commerce Drive  
 Schaumburg, IL 60173  
**1-800-55-OMRON**

**OMRON ON-LINE**  
 Global - <http://www.omron.com>  
 USA - <http://www.omron.com/oei>  
 Canada - <http://www.omron.com/oci>

**OMRON CANADA, INC.**  
 885 Milner Avenue  
 Scarborough, Ontario M1B 5V8  
**416-286-6465**