

### E51 Limit Switch Style, Modular Sensors



### E51 Limit Switch Style, Modular Sensors

#### Product Description

E51 Limit Switch Style Modular Sensors from Eaton's electrical sector are available in thru-beam, reflex, polarized reflex, diffuse reflective and fiber optic sensing modes to solve a wide variety of sensing applications. Modular, plug-in components are easy to maintain, meaning less downtime and reduced inventory. Choose between two-wire sensors with AC/DC operation and four-wire sensors in either AC or DC styles. Connection options include terminal, mini-connector and various lengths of cable. Sensors can be ordered in component form or as fully assembled units.

#### Features

- Choose from five different sensing modes including fiber optic
- All heads feature a selector switch for light or dark operation
- Logic modules are available to provide additional control functions
- Rugged construction, ideal for industrial environments
- Viton gaskets ensure a positive seal and high chemical resistance
- Sensor heads can be rotated to any of four positions
- Components are interchangeable with E51 proximity sensors
- Sensors accommodate both U.S. and DIN mounting dimensions
- Sensor bodies feature bifurcated engagement prongs for a reliable electrical connection when plugging into receptacle stabs

### Contents

#### Description

#### Page

|   |     |
|---|-----|
| E51 Limit Switch Style, Modular Sensors |     |
| Product Selection                       |     |
| Assembled Sensors                       | 326 |
| Sensor Heads                            | 328 |
| Sensor Bodies                           | 329 |
| Logic Module                            | 330 |
| Receptacles                             | 330 |
| Compatible Connector Cables             | 331 |
| Accessories                             | 331 |
| Technical Data and Specifications       | 332 |
| Excess Gain                             | 332 |
| Wiring Diagrams                         | 333 |
| Dimensions                              | 334 |

#### Standards and Certifications

- UL Listed
- CSA Certified
- CE (where shown)



#### Safety Note

**Unless otherwise noted, the products contained in this document are not designed or intended for use in human safety applications.**

For the most current information on this product, visit our web site: [www.eaton.com](http://www.eaton.com)

For Customer Service in the U.S. call 1-877-ETN CARE (386-2273),  
in Canada call 1-800-268-3578.  
For Application Assistance in the U.S. and Canada  
call 1-800-426-9184.

# 49.10 Photoelectric Sensors

## E51 Limit Switch Style, Modular Sensors

### Product Selection

#### Assembled Sensors

##### Assembled Sensor



##### Sensor Heads <sup>④</sup>

##### Reflex



##### Polarized Reflex



##### Diffuse Reflective



##### Thru-Beam Detector



##### Thru-Beam Source



#### Reflex, Diffuse Reflective and Thru-Beam Sensors

##### Sensor Body and Receptacle



Operating voltage  
Output  
Sensor body

##### Two-Wire Sensors

20–264 Vac/Vdc  
NO or NC <sup>①</sup>  
**E51SAL**

##### Four-Wire Sensors

120 Vac  
NO and NC complementary  
**E51SCL**  
**E51SCN**  
Accepts logic module <sup>②</sup>  
**E51RCB**

10–30 Vdc  
NO and NC complementary  
**E51SNL**  
NPN  
**E51SPL**  
PNP  
**E51RN**

Receptacle <sup>③</sup>

**E51RA**

**E51RC**

**E51RN**

**E51RN**

##### Assembled Sensors with Head, Sensor Body and Receptacle

##### Reflex

|               |                   |          |               |                |     |                |                |                |     |                |     |
|---------------|-------------------|----------|---------------|----------------|-----|----------------|----------------|----------------|-----|----------------|-----|
| 18 ft (5.5m)  | Standard response | Infrared | <b>E51DP1</b> | <b>E51ALP1</b> | Ⓢ Ⓢ | <b>E51CLP1</b> | <b>E51CNP1</b> | <b>E51NLP1</b> | Ⓢ Ⓢ | <b>E51PLP1</b> | Ⓢ Ⓢ |
| 35 ft (10.7m) | Standard response |          | <b>E51DP3</b> | —              |     | <b>E51CLP3</b> | <b>E51CNP3</b> | <b>E51NLP3</b> | Ⓢ Ⓢ | <b>E51PLP3</b> | Ⓢ Ⓢ |

##### Polarized Reflex

|              |                   |             |               |   |  |                |                |                |     |                |     |
|--------------|-------------------|-------------|---------------|---|--|----------------|----------------|----------------|-----|----------------|-----|
| 15 ft (4.5m) | Standard response | Visible red | <b>E51DP5</b> | — |  | <b>E51CLP5</b> | <b>E51CNP5</b> | <b>E51NLP5</b> | Ⓢ Ⓢ | <b>E51PLP5</b> | Ⓢ Ⓢ |
|--------------|-------------------|-------------|---------------|---|--|----------------|----------------|----------------|-----|----------------|-----|

##### Diffuse Reflective

|                |                   |          |                |                |     |                 |                 |                 |     |                 |     |
|----------------|-------------------|----------|----------------|----------------|-----|-----------------|-----------------|-----------------|-----|-----------------|-----|
| 8 in (200 mm)  | Standard response | Infrared | <b>E51DP2</b>  | <b>E51ALP2</b> | Ⓢ Ⓢ | <b>E51CLP2</b>  | <b>E51CNP2</b>  | <b>E51NLP2</b>  | Ⓢ Ⓢ | <b>E51PLP2</b>  | Ⓢ Ⓢ |
|                | Fast response     |          | <b>E51DP22</b> | —              |     | <b>E51CLP22</b> | <b>E51CNP22</b> | <b>E51NLP22</b> | Ⓢ Ⓢ | <b>E51PLP22</b> | Ⓢ Ⓢ |
| 18 in (450 mm) | Standard response |          | <b>E51DP6</b>  | —              |     | <b>E51CLP6</b>  | <b>E51CNP6</b>  | <b>E51NLP6</b>  | Ⓢ Ⓢ | <b>E51PLP6</b>  | Ⓢ Ⓢ |
| 40 in (1m)     | Standard response |          | <b>E51DP4</b>  | —              |     | <b>E51CLP4</b>  | <b>E51CNP4</b>  | <b>E51NLP4</b>  | Ⓢ Ⓢ | <b>E51PLP4</b>  | Ⓢ Ⓢ |

##### Thru-Beam Detector

|              |                   |   |               |                |     |                |                |                |     |                |     |
|--------------|-------------------|---|---------------|----------------|-----|----------------|----------------|----------------|-----|----------------|-----|
| 300 ft (90m) | Standard response | — | <b>E51DC1</b> | <b>E51ALC1</b> | Ⓢ Ⓢ | <b>E51CLC1</b> | <b>E51CNC1</b> | <b>E51NLC1</b> | Ⓢ Ⓢ | <b>E51PLC1</b> | Ⓢ Ⓢ |
|--------------|-------------------|---|---------------|----------------|-----|----------------|----------------|----------------|-----|----------------|-----|

##### Thru-Beam Source <sup>③</sup>

|              |   |   |               |                            |                            |                            |                            |                            |                            |
|--------------|---|---|---------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| 300 ft (90m) | — | Infrared with visible red alignment aid | <b>E51DEL</b> | <b>E51ELA</b> <sup>⑤</sup> | <b>E51ELA</b> <sup>⑤</sup> | <b>E51ELA</b> <sup>⑤</sup> | <b>E51ELA</b> <sup>⑤</sup> | <b>E51ELA</b> <sup>⑤</sup> | <b>E51ELA</b> <sup>⑤</sup> |
|              |   |   | <b>E51DED</b> | <b>E51EDN</b> <sup>⑥</sup> | <b>E51EDN</b> <sup>⑥</sup> | <b>E51EDN</b> <sup>⑥</sup> | <b>E51EDN</b> <sup>⑥</sup> | <b>E51EDN</b> <sup>⑥</sup> | <b>E51EDN</b> <sup>⑥</sup> |

##### Notes

Ⓢ Ⓢ See listing of compatible connector cables on **Page 331**.

<sup>①</sup> All sensor heads feature a light or dark operation selector switch which reverses the output function.

<sup>②</sup> Logic module must be ordered separately, see **Page 330**. These sensor bodies are rated NEMA 4, 4X and 13.

<sup>③</sup> Receptacles feature terminal wiring with a 1/2 in NPT thread at the conduit entrance. Other connection options are available (see below and **Page 331**).

| Connection Option                                    |                         | Suffix     | Example            |
|--|-------------------------|------------|--------------------|
| 20 mm thread at the conduit entrance                 |                         | <b>20</b>  | <b>E51ALP120</b>   |
| Built-in mini-connector with epoxy filled receptacle | 2-wire, 3-pin connector | <b>P3</b>  | <b>E51ALP1P3</b> Ⓢ |
|  | 4-wire, 5-pin connector | <b>P5</b>  | <b>E51CLP1P5</b> Ⓢ |
| Pigtail with mini-connector                          | 2-wire, AC/DC           | <b>T3</b>  | <b>E51RAPT3</b> Ⓢ  |
|  | 4-wire, AC              | <b>T5</b>  | <b>E51RCPT5</b> Ⓢ  |
|  | 4-wire, DC              | <b>T5</b>  | <b>E51RNPT5</b> Ⓢ  |
| Pre-wired cable with epoxy filled receptacle         | 8 ft long               | <b>S</b>   | <b>E51ALP1S</b>    |
|  | 12 ft long              | <b>S12</b> | <b>E51ALP1S12</b>  |
|  | 20 ft long              | <b>S20</b> | <b>E51ALP1S20</b>  |

<sup>④</sup> Includes sensor head mounted to sensor body. Head can be rotated to any of four discrete positions on body, 90° apart, but is not separate from body.

<sup>⑤</sup> 120 Vac operation.

<sup>⑥</sup> 10–30 Vdc operation.

### Assembled Sensor



### Sensor Heads ①

### Glass Fiber Optic, Standard Fiber Mounting Style



### Glass Fiber Optic, Collar Fiber Mounting Style



### Glass Fiber Optic Sensors

#### Sensor Body and Receptacle



Operating voltage  
Output  
Sensor body

#### Two-Wire Sensors

20–264 Vac/Vdc  
NO or NC ①

#### Four-Wire Sensors

120 Vac  
NO and NC complementary

10–30 Vdc

NO and NC complementary

**E51SAL**

**E51SCL**

**E51SCN**  
Accepts logic  
module ②

**E51SNL**  
NPN

**E51SPL**  
PNP

Receptacle ③

**E51RA**

**E51RC**

**E51RCB**

**E51RN**

**E51RN**

**Sensing  
Range**

**Response  
Time**

**Sensor Head Only  
Catalog Number**

**Assembled Sensors with Head, Sensor Body and Receptacle  
Catalog Number**

#### Glass Fiber Optic, Standard Fiber Mounting Style ④

|                                    |                      |                |   |                 |                 |                 |     |                 |     |
|------------------------------------|----------------------|----------------|---|-----------------|-----------------|-----------------|-----|-----------------|-----|
| 3 in (75 mm) ⑤<br>25 in (650 mm) ⑥ | Standard<br>response | <b>E51DF1</b>  | — | <b>E51CLF1</b>  | <b>E51CNF1</b>  | <b>E51NLF1</b>  | ⊗ ⊗ | <b>E51PLF1</b>  | ⊗ ⊗ |
| 1 in (25 mm) ⑤<br>9 in (225 mm) ⑥  | Fast response        | <b>E51DF11</b> | — | <b>E51CLF11</b> | <b>E51CNF11</b> | <b>E51NLF11</b> | ⊗ ⊗ | <b>E51PLF11</b> | ⊗ ⊗ |

#### Glass Fiber Optic, Collar Fiber Mounting Style ④

|                                    |                      |                |   |                 |                 |                 |     |                 |     |
|------------------------------------|----------------------|----------------|---|-----------------|-----------------|-----------------|-----|-----------------|-----|
| 3 in (75 mm) ⑤<br>25 in (650 mm) ⑥ | Standard<br>response | <b>E51DF3</b>  | — | <b>E51CLF3</b>  | <b>E51CNF3</b>  | <b>E51NLF3</b>  | ⊗ ⊗ | <b>E51PLF3</b>  | ⊗ ⊗ |
| 1 in (25 mm) ⑤<br>9 in (225 mm) ⑥  | Fast response        | <b>E51DF33</b> | — | <b>E51CLF33</b> | <b>E51CNF33</b> | <b>E51NLF33</b> | ⊗ ⊗ | <b>E51PLF33</b> | ⊗ ⊗ |

### Notes

⊗ ⊗ See listing of compatible connector cables on **Page 331**.

① All sensor heads feature a light or dark operation selector switch which reverses the output function.

② Logic module must be ordered separately, see **Page 330**. These sensor bodies are rated NEMA 4, 4X and 13.

③ Receptacles feature terminal wiring with a 1/2 in NPT thread at the conduit entrance.

Other connection options are available (see below and **Page 331**).

| Connection Option                                    |                         | Suffix     | Example              |
|--|-------------------------|------------|----------------------|
| 20 mm thread at the conduit entrance                 |                         | <b>20</b>  | <b>E51ALP120</b>     |
| Built-in mini-connector with epoxy filled receptacle | 2-wire, 3-pin connector | <b>P3</b>  | <b>E51ALP1P3</b> ⊗ ⊗ |
|  | 4-wire, 5-pin connector | <b>P5</b>  | <b>E51CLP1P5</b> ⊗ ⊗ |
| Pigtail with mini-connector                          | 2-wire, AC/DC           | <b>T3</b>  | <b>E51RAPT3</b> ⊗ ⊗  |
|  | 4-wire, AC              | <b>T5</b>  | <b>E51RCPT5</b> ⊗ ⊗  |
|  | 4-wire, DC              | <b>T5</b>  | <b>E51RNPT5</b> ⊗ ⊗  |
| Pre-wired cable with epoxy filled receptacle         | 8 ft long               | <b>S</b>   | <b>E51ALP1S</b>      |
|  | 12 ft long              | <b>S12</b> | <b>E51ALP1S12</b>    |
|  | 20 ft long              | <b>S20</b> | <b>E51ALP1S20</b>    |

④ Requires glass fiber optic cables for operation (not included), see **Tab 53, section 53.2**.

⑤ Sensing range for diffuse reflective mode for 0.125 in (3.2 mm) diameter fibers. See **Page 332** for complete sensing range specifications.






⑥ Sensing range in thru-beam mode for 0.125 in (3.2 mm) diameter fibers. See **Page 332** for complete sensing range specifications.

# 49.10 Photoelectric Sensors

## E51 Limit Switch Style, Modular Sensors

### Sensor Heads

#### Reflex, Diffuse Reflective and Thru-Beam Sensors <sup>①</sup>

|   | Sensing Range ②    | Field of View                            | Response Time |           |               |           | Sensing Beam                            | Adjustment  | Input Voltage | Catalog Number |
|---|--------------------|--|---------------|-----------|---------------|-----------|---|-------------|---------------|----------------|
|   |                    |  | ON AC Sensor  | DC Sensor | OFF AC Sensor | DC Sensor |   |             |               |                |
| Reflex  | Reflex             |  |               |           |               |           |   |             |               |                |
|    | 18 ft (5.5m)       | 6 in (152 mm) diameter at 15 ft (4.6m)   | 20 ms         | 20 ms     | 30 ms         | 22 ms     | Infrared                                | —           | —             | E51DP1         |
|   | 35 ft (10.7m)      | 12 in (305 mm) diameter at 35 ft (10.7m) | 20 ms         | 20 ms     | 30 ms         | 22 ms     | Infrared                                | —           | —             | E51DP3         |
| Polarized Reflex  | Polarized Reflex   |  |               |           |               |           |   |             |               |                |
|    | 15 ft (4.5m)       | 6 in (152 mm) diameter at 15 ft (4.6m)   | 20 ms         | 20 ms     | 30 ms         | 22 ms     | Visible red                             | —           | —             | E51DP5         |
| Diffuse Reflective  | Diffuse Reflective |  |               |           |               |           |   |             |               |                |
|    | 8 in (200 mm)      | 1 in (25 mm) diameter at 4 in (101m)     | 20 ms         | 20 ms     | 30 ms         | 22 ms     | Infrared                                | Near/far ③  | —             | E51DP2         |
|   |                    |  | 1 ms          | 0.5 ms    | 9 ms          | 0.5 ms    | Infrared                                | Near/far ③  | —             | E51DP22        |
|   | 18 in (450 mm)     | 1 in (25 mm) diameter at 9 in (228m)     | 20 ms         | 20 ms     | 30 ms         | 22 ms     | Infrared                                | Near/far ③  | —             | E51DP6         |
|   | 40 in (1m)         | 1.5 in (38 mm) diameter at 40 in (1m)    | 20 ms         | 20 ms     | 30 ms         | 22 ms     | Infrared                                | —           | —             | E51DP4         |
| Thru-Beam Detector  | Thru-Beam Detector |  |               |           |               |           |   |             |               |                |
|  | 300 ft (90m)       | 18 in (457 mm) diameter at 20 ft (6.1m)  | 10 ms         | 5 ms      | 10 ms         | 5 ms      | —                                       | Sensitivity | —             | E51DC1         |
| Thru-Beam Source  | Thru-Beam Source ④ |  |               |           |               |           |   |             |               |                |
|  | 300 ft (90m)       | 36 in (914 mm) diameter at 20 ft (6.1m)  | —             | —         | —             | —         | Infrared with visible red alignment aid | —           | 120 Vac       | E51DEL         |
|   |                    |  |               |           |               |           |   |             | 10–30 Vdc     | E51DED         |

#### Notes

- <sup>①</sup> All sensor heads feature a light or dark operation selector switch.
- <sup>②</sup> Reflex ranges are based on a 3 in retroreflector; diffuse reflective ranges are based on a 90% reflectance white card.
- <sup>③</sup> These sensor heads have a mechanical Near/Far adjustment which adjust the head for optimum performance at the expected target distance. The adjustment, which move the optics and adjustment indicator, is made before the head is mounted on the sensor body. Excess gain graphs are shown in the "Far" setting.
- <sup>④</sup> Includes sensor head mounted to sensor body. Use receptacles E51RA for AC or E51RN for DC sources. Head can be rotated to any of four discrete positions on body, 90° apart, but is not separate from the body.

### Glass Fiber Optic Sensors <sup>①</sup>

#### Sensing Range <sup>②</sup>

| Thru-Beam Mode                             |                      | Diffuse Reflective Mode |                      | Response Time |           |               |           | Sensing Beam | Adjustment  | Catalog Number |
|--|----------------------|-------------------------|----------------------|---------------|-----------|---------------|-----------|--------------|-------------|----------------|
| 0.063 In Dia. Fibers                       | 0.125 In Dia. Fibers | 0.063 In Dia. Fibers    | 0.125 In Dia. Fibers | ON AC Sensor  | DC Sensor | OFF AC Sensor | DC Sensor |              |             |                |
| Standard Fiber Mounting Style <sup>③</sup> |                      |                         |                      |               |           |               |           |              |             |                |
| 8 in (200 mm)                              | 25 in (650 mm)       | 0.6 in (15 mm)          | 3 in (75 mm)         | 20 ms         | 20 ms     | 30 ms         | 22 ms     | Infrared     | —           | E51DF1         |
| 3 in (75 mm)                               | 9 in (225 mm)        | 0.25 in (6 mm)          | 1 in (25 mm)         | 0.5 ms        | 0.5 ms    | 9 ms          | 0.5 ms    | Infrared     | —           | E51DF11        |
| Collar Fiber Mounting Style <sup>③</sup>   |                      |                         |                      |               |           |               |           |              |             |                |
| 8 in (200 mm)                              | 25 in (650 mm)       | 0.6 in (15 mm)          | 3 in (75 mm)         | 20 ms         | 20 ms     | 30 ms         | 22 ms     | Infrared     | Sensitivity | E51DF3         |
| 3 in (75 mm)                               | 9 in (225 mm)        | 0.25 in (6 mm)          | 1 in (25 mm)         | 0.5 ms        | 0.5 ms    | 9 ms          | 0.5 ms    | Infrared     | Sensitivity | E51DF33        |
| 10 in (250 mm)                             | 40 in (1000 mm)      | 0.8 in (20 mm)          | 4.5 in (115 mm)      | 20 ms         | 20 ms     | 30 ms         | 22 ms     | Infrared     | —           | E51DF4         |

#### Standard Fiber Mounting Style



#### Collar Fiber Mounting Style



### Sensor Bodies



#### AC/DC



### Two-Wire Sensors

| Operating Voltage        | Output   | Protection                          | Output Rating Continuous | Type | Catalog Number                       |
|--------------------------|--|-------------------------------------|--------------------------|------|--------------------------------------|
| <b>AC/DC</b>             |  |                                     |                          |      |                                      |
| 20–264 Vac/Vdc, 50/60 Hz | One output, load powered, NO or NC, programmable from head; OFF-state leakage current: 1.7 mA at 120 Vac/Vdc, <2.0 mA at 240 Vac | Latching short circuit and overload | 0.5A                     | —    | <b>E51SAL</b> <sup>④</sup> <b>CE</b> |

### Four-Wire Sensors

| Operating Voltage    | Output   | Protection       | Output Rating Continuous  | Type  | Catalog Number   |
|----------------------|--|------------------|---|---|--|
| AC                   |  |                  |   |   |  |
| 120 Vac,<br>50/60 Hz | Two complementary outputs,<br>line powered, NO and NC  | —                | 1.0A to 158°F (70°C),<br>linearly derated to 0.6A<br>at 176°F (80°C)  | —   | E51SCL ④   |
|                      |  |                  | 1.0A to 113°F (45°C),<br>linearly derated to 0.3A<br>at 176°F (80°C)  | Accepts logic modules<br>(see <b>Page 330</b> ) | E51SCN ⑤   |
| DC                   |  |                  |   |   |  |
| 10–30 Vdc            | Two complementary outputs,<br>line powered, NO and NC<br>Burden current: <25 mA<br>OFF-state leakage: <100 µA<br>ON-state: <2.5 Vdc<br>Power-up delay: <150 ms | Reverse polarity | 0.6A to 104°F (40°C),<br>linearly derated to 0.36A<br>at 176°F (80°C) | NPN   | E51SNL ④  |
|                      |  |                  |   | PNP   | E51SPL ④  |

#### AC (E51SCN Shown)



#### DC



#### Notes

- ① All sensor heads feature a light or dark operation selector switch.
- ② Diffuse reflective ranges are based on a 90% reflectance white card.
- ③ Requires glass fiber optic cables for operation (not included), see **Tab 53, section 53.2**.
- ④ This sensor body is available in a factory-sealed, non plug-in configuration (with 8 ft cable), add **6P** to listed catalog number. Example: E51SAL**6P**.
- ⑤ Sensor body is black. E51SCN sensor bodies are rated NEMA 4, 4X and 13.

# 49.10 Photoelectric Sensors

## E51 Limit Switch Style, Modular Sensors

### Logic Module

#### Logic Module <sup>①</sup>







#### Logic Module (for E51SCN Sensor Body Only)

| Type             | Reset Time    | Description   | Timing Range <sup>②</sup> | Catalog Number |
|------------------|---------------|---|---------------------------|----------------|
| ON and OFF delay | 25 ms minimum | Adjustable delay between time object is sensed and time switch function occurs<br><br>Adjustable delay between time object leaves sensing field and time switch transfers back to non-sensing state | 0.15 to 15.0 seconds      | <b>E51MTB</b>  |

### Receptacles

#### Receptacles for E51 Limit Switch

|   | Description   | Style         | Details            | Cable Length | Conduit Entrance<br>1/2 In NPT<br>Catalog Number | 20 mm<br>Catalog Number |
|---|---|---------------|--------------------|--------------|--|-------------------------|
| <b>Surface Mount</b><br>                 | <b>Surface Mount</b>  |               |                    |              |  |                         |
|   | Conduit entrance, front or rear mounting  | 2-wire, AC/DC | —                  | —            | <b>E51RA</b>                                     | <b>E51RA20</b>          |
|   |   | 4-wire, AC    | Gray               | —            | <b>E51RC</b>                                     | <b>E51RC20</b>          |
|   |   |               | Black <sup>③</sup> | —            | <b>E51RCB</b>                                    | <b>E51RCB20</b>         |
|   |   | 4-wire, DC    | —                  | —            | <b>E51RN</b>                                     | <b>E51RN20</b>          |
| <b>Built-In Mini-Connector</b><br>      | <b>Built-In Mini-Connector</b>  |               |                    |              |  |                         |
|   | Epoxy filled receptacle with pre-wired mini-connector   | 2-wire, AC/DC | 3-pin              | —            | <b>E51RAP3</b> ☼                                 | —                       |
|   |   | 4-wire, AC    | 5-pin              | —            | <b>E51RCP5</b> ☼                                 | —                       |
|   |   | 4-wire, DC    | 5-pin              | —            | <b>E51RNP5</b> ☼                                 | —                       |
| <b>Pigtail with Mini-Connector</b><br> | <b>Pigtail with Mini-Connector</b>  |               |                    |              |  |                         |
|   | Epoxy filled receptacle with mini-connector mounted on 3 ft (900 mm) cable  | 2-wire, AC/DC | 3-pin              | 3 ft (0.9m)  | <b>E51RAPT3</b> ☼                                | —                       |
|   |   | 4-wire, AC    | 5-pin              | 3 ft (0.9m)  | <b>E51RCP5T</b> ☼                                | —                       |
|   |   | 4-wire, DC    | 5-pin              | 3 ft (0.9m)  | <b>E51RNP5T</b> ☼                                | —                       |
| <b>Prewired Cable</b><br>              | <b>Prewired Cable</b>   |               |                    |              |  |                         |
|   | Epoxy filled receptacle with pre-wired 16 gauge, yellow jacketed, type SOOW-A cable. Cable enters through hole threaded for conduit | 2-wire, AC/DC | 3-conductor        | 8 ft (2.4m)  | <b>E51RAS</b>                                    | <b>E51RA20S</b>         |
|   |   |               |                    | 12 ft (3.6m) | <b>E51RAS12</b>                                  | —                       |
|   |   |               |                    | 20 ft (6m)   | <b>E51RAS20</b>                                  | —                       |
|   |   | 4-wire, AC    | 5-conductor        | 8 ft (2.4m)  | <b>E51RCS</b>                                    | <b>E51RC20S</b>         |
|   |   |               |                    | 12 ft (3.6m) | <b>E51RCS12</b>                                  | —                       |
|   |   |               |                    | 20 ft (6m)   | <b>E51RCS20</b>                                  | —                       |
|   |   | 4-wire, DC    | 5-conductor        | 8 ft (2.4m)  | <b>E51RNS</b>                                    | <b>E51RN20S</b>         |
|   |   |               |                    | 12 ft (3.6m) | <b>E51RNS12</b>                                  | —                       |
|   |   |               |                    | 20 ft (6m)   | <b>E51RNS20</b>                                  | —                       |

#### Notes

☼☼ See listing of compatible connector cables on **Page 331**.

① Rated NEMA 4, 4X and 13.

② Repeatability of the timing cycle is ±1% at constant voltage, ambient temperature and reset time.



③ Black receptacle is for color compatibility with E51SCN sensor body.

### Compatible Connector Cables

#### Mini Style Straight Female



#### E51 Limit Switch Style, Modular Sensors <sup>①</sup>

| Current Rating<br>at 600V         | Voltage<br>Style | Number<br>of Pins | Gauge  | Length    | Pin Configuration/Wire Colors<br>(Face View Female Shown)   | Catalog Number |
|-----------------------------------|------------------|-------------------|--------|-----------|---|----------------|
| <b>Standard Cables—Mini Style</b> |                  |                   |        |           |   |                |
| 13A                               | AC/DC            | 3-pin             | 16 AWG | 6 ft (2m) |  1-Green<br>2-Black<br>3-White                      | CSMS3F3CY1602  |
| 8A                                | AC/DC            | 5-pin             | 16 AWG | 6 ft (2m) |  1-White<br>2-Red<br>3-Green<br>4-Orange<br>5-Black | CSMS5D5CY1602  |

### Accessories

#### E51 Limit Switch Style, Modular Sensors

| Description   | Catalog Number |
|---|----------------|
| <b>One-hole, Universal</b>                                      |                |
| <b>Universal Mounting Bracket</b>                               |                |
| One-hole, includes mounting hardware, stainless steel           | E51KH2         |
| <b>Two-hole, Universal</b>                                      |                |
| <b>Universal Mounting Bracket</b>                               |                |
| Two-hole, includes mounting hardware, steel                     | E51KH4         |
| <b>Machine Mounting Bracket</b>                                 |                |
| <b>Machine Mounting Bracket</b>                                 |                |
| Zinc die cast   | E50KH3         |
| <b>Stand-Off Mounting Bracket</b>                               |                |
| <b>Stand-Off Mounting Bracket</b>                               |                |
| Steel   | E51KH3         |
| <b>Remote Sensor Head Assembly</b>                              |                |
| <b>Remote Sensor Head Assembly</b>                              |                |
| Permits mounting sensor head up to 3 ft (0.9m) from sensor body | E51KRM         |

#### Connector Cables

A variety of cables, connector blocks and accessories, see **Tab 54, section 54.1**

**Dimensions**, see **Page 334**.

#### Note

<sup>①</sup> For a full selection of connector cables, see **Tab 54, section 54.1**.

# 49.10 Photoelectric Sensors

## E51 Limit Switch Style, Modular Sensors

### Technical Data and Specifications

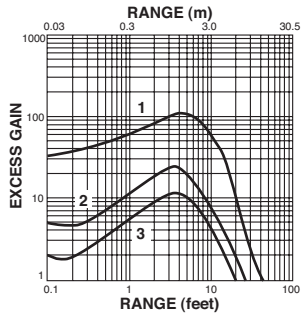
#### E51 Limit Switch Style, Modular Sensors

| Description                 | Specification  |
|-----------------------------|--|
| Output ratings (NEMA D150)  |  |
| AC/DC models                | 0.5A continuous  |
| AC models                   | 1A continuous  |
| DC models                   | 0.6A continuous  |
| Protection                  | Latching short circuit protection on two-wire AC/DC and four-wire DC models                |
| Indicator LEDs              | Lights when output is ON. One LED for each output  |
| Enclosure material          | Zinc die cast  |
| Gasket material             | Viton  |
| Enclosure ratings           | NEMA 3, 3S, 4, 4X, 6, 6P, 12 and 13 (IP67)<br>E51SCN sensor body only: NEMA 4, 4X and 13 ① |
| Hazardous locations ratings |  |
| Class I                     | Division II—GRPS ABCD  |
| Class II                    | Division II—GRPS F and G   |
| Class III                   | Division 2   |
| Temperature range           | −13° to 158°F (−25° to 70°C)   |
| Torque requirements         | Switch body screws: 25–30 in-lb; Sensing head screws: 14–18 in-lb                          |
| Vibration                   | 10–55 Hz, 1 mm amplitude   |
| Shock                       | 30g, 11 ms, 1/2 sine wave  |
| Humidity                    | 95% non-condensing   |

#### Excess Gain

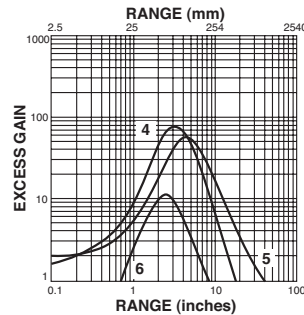
#### Sensor Heads—Reflex, Diffuse Reflective and Thru-Beam

##### Reflex (3 in diameter retroreflector)



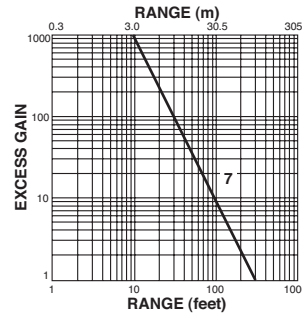
1. E51DP3
2. E51DP1
3. E51DP5

##### Diffuse Reflective (90% reflective white card)



4. E51DP6
5. E51DP4
6. E51DP2 and E51DP22

##### Thru-Beam



7. E51DEL and E51DED sources using E51DC1 detector

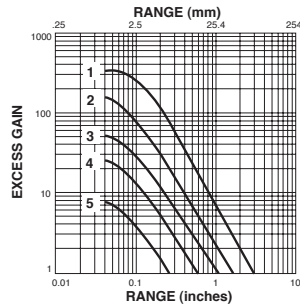
#### Note

① Our products conform to NEMA tests as indicated, however, some severe washdown applications can exceed these NEMA test specifications.



## Sensor Heads—Glass Fiber Optic

### Diffuse Reflective (90% reflective white card)



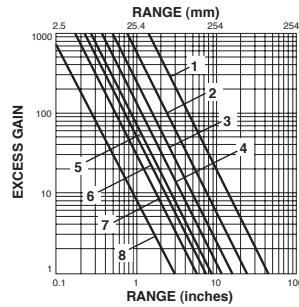
#### E51DF1 and E51DF3 high power sensor head with:

1. 0.125 in fiber bundle
2. 0.094 in fiber bundle
4. 0.063 in fiber bundle

#### E51DF33 fast response sensor head with:

3. 0.125 in fiber bundle
4. 0.094 in fiber bundle
5. 0.063 in fiber bundle

### Thru-Beam



#### E51DF4 extended range sensor head with:

1. 0.125 in fiber bundle
4. 0.063 in fiber bundle

#### E51DF1 and E51DF3 high power sensor head with:

2. 0.125 in fiber bundle
3. 0.094 in fiber bundle
6. 0.063 in fiber bundle

#### E51DF33 fast response sensor head with:

5. 0.125 in fiber bundle
7. 0.094 in fiber bundle
8. 0.063 in fiber bundle

## Wiring Diagrams

Pin numbers are for reference, rely on pin location when wiring.

### E51 Limit Switch Style, Modular Sensors

| Operating Voltage          | Output ①      | Terminal and Cable Models | Mini-Connector Models (Face View Male Shown) |
|----------------------------|---------------|---------------------------|--|
| <b>Two-Wire Sensors</b>    |               |                           |  |
| 20–264 Vac or Vdc 50/60 Hz | NO or NC      |                           |  |
| <b>Four-Wire Sensors</b>   |               |                           |  |
| 120 Vac 50/60 Hz           | NO and NC     |                           |  |
| 10–30 Vdc                  | NO and NC NPN |                           |  |
|                            | NO and NC PNP |                           |  |

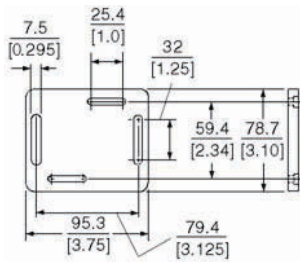
#### Note

- ① Changing light/dark switch on sensor head will reverse output function (NO becomes NC, and NC becomes NO).

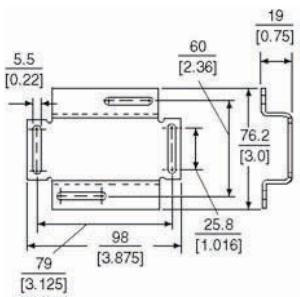


Approximate Dimensions in mm [in]

## Machine Mounting Bracket



## Stand-Off Mounting Bracket



Approximate Dimensions in Inches [mm]

## Remote Sensor Head Assembly

