Cylinder End-of-Stroke Proximity Sensors
For Schrader Series PA-2, PH-2, PL-2, PH-3, & SHM Cylinders

INNOVATIONS

Step Up to the Next Level
Bulletin SB0840-B11
Effective: November, 2002

“EPS” Style Inductive Sensors
For General Industrial AC and DC Applications

“CLS” Style Magnetic Sensors
For Extreme Temperature Applications

All Sensors Are:
Non-Contacting
Water Resistant
Weld-Field Immune
Shock and Vibration Resistant
Flange-Mounted to Cylinder End Caps
Cylinder End-of-Stroke Proximity Sensors

Dimensional Information

**EPS 7 & 6 Sensors**

- **Series A max.**
  - PH2, PH3 1.5"-8" bores: .86"
  - PL2: 1.55"
  - PA2: 1.55"
  - SHM: 1.19"

- **C max.**
  - PH2, PH3 1.75"
  - PL2: 1.05"
  - PA2: 1.30"
  - SHM: 1.05"

For exact dimensions, see Bulletin SB0840-G-E1

**CLS 1 & 4 Sensors**

**EPS 5 Automotive Applications**

(Meets some Automotive Manufacturer’s Specifications)

**Series and Parallel Wiring**

When Schrader Bellows EPS-5, 6 or 7 proximity switches are used as inputs to programmable controllers, the preferred practice is to connect each switch to a separate input channel of the PC. Series or parallel operations may then be accomplished by the internal PC programming.

Schrader Bellows EPS-5, 6 or 7 switches may be hard wired for series operation, but the voltage drop through the switches (see specifications) must not reduce the available voltage below what is needed to actuate the load.

Schrader Bellows EPS-5, 6 or 7 switches may also be hard wired for parallel operation. However, the leakage current of each switch will pass through the load. The total of all leakage currents must not exceed the current required to actuate the load. In most cases, the use of two or more EPS-5, 6 or 7 switches in parallel will require the use of a bypass (shunt) resistor.

**Connector Pin Numbering**

- **3-Pin Mini**
  - Male Receptacle End View
  - AC L2 or DC L1 or (+/−)
  - (+/−)

- **5-Pin Mini**
  - Male Receptacle End View
  - N.O. Load Source
  - N.O. Load Sink

Schrader Bellows
Des Plaines, IL USA
Owen Sound, Ontario Canada
## Specifications

<table>
<thead>
<tr>
<th>Style:</th>
<th>EPS-7</th>
<th>EPS-5</th>
<th>EPS-6</th>
<th>CLS-1</th>
<th>CLS-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code Designator:</td>
<td>H</td>
<td>R</td>
<td>D</td>
<td>F</td>
<td>B</td>
</tr>
</tbody>
</table>

### Description:
- **EPS-5** only suitable for automotive industry customers who specify them.
- **CLS-1** functional replacement for AB (Mechanical) Limit Switches in many applications, or where customer needs NC contacts, zero leakage, zero voltage drop, higher or lower load current than EPS-style.
- **CLS-4** functional replacement for AB (Mechanical) Limit Switches in many high temperature applications, or where customer needs NC contacts, zero leakage, zero voltage drop, higher or lower load current than EPS-style.

### Supply Voltage
- 20 to 250 VAC/DC
- 20 to 230 VAC/DC
- 10 to 30 VDC
- 24 to 240 VAC/DC
- 24 to 240 VAC/DC

### Load Current, min:
- 8 mA
- 5 mA
- NA
- NA
- NA

### Load Current, max:
- 300 mA
- 500 mA
- 200 mA
- 4 AMPS @ 120 VAC
- 3 AMPS @ 24 VDC
- 4 AMPS @ 120 VAC
- 3 AMPS @ 24 VDC

### Leakage Current:
- 1.7 mA
- 1.7 mA
- 10 microamps max.
- NA
- NA

### Voltage Drop:
- 7 V
- 10 V
- 2 VDC max.
- NA
- NA

### Operating Temperature:
- -14° to +158° F
- -4° to +158° F
- -14° to +158° F
- -40°F to +221° F
- -40°F to +400° F

### Sensor Type:
- Inductive proximity
- Inductive proximity
- Inductive proximity
- Non-contacting magnetically actuated
- Non-contacting magnetically actuated

### Part Number:
- 148897****
- 146617****
- 148896****
- 148275****
- 149109****

### Part Number Suffix ****:
- 4-digit suffix indicates probe length: 0125 = 1.25", 0206 = 2.06", 0288 = 2.875", 0456 = 4.562*

### Connection:
- 3 pin mini
- 3 pin mini
- 5 pin mini
- 3 pin mini
- 144" PTFE Coated Flying Leads with 1/2" conduit hub

### Enclosure Rating:
- IEC IP67
- NEMA 4, 6, 12, 13
- IEC IP67
- NEMA 1, 2, 3, 4, 4x, 5, 6, 6P, 11, 12, 12K, 13
- NEMA 1, 2, 3, 4, 5

### LED indication:
- Yes
- Yes
- Yes
- No
- No

### Short Circuit Protection:
- Yes
- Yes
- Yes
- No
- No

### Weld Field Immunity:
- Yes
- Yes
- Yes
- Yes
- Yes

### Output:
- Dual output: DC Sinking and DC Sourcing, user selectable via wiring
- SPDT (Single Pole Double Throw), Normally Open/Normally Closed, Form C
- SPDT (Single Pole Double Throw), Normally Open/Normally Closed, Form C

### Approvals/ Marks:
- CE, UL, CSA
- UL
- CE, UL, CSA
- UL or CSA
- UL or CSA

### Make/ Break Location:
- 0.125" from end of stroke, typical. Tolerance is 0/-0.125"

### Wiring Instructions:
- Pin 1: AC Ground (Green)
- Pin 2: Output (Black)
- Pin 3: AC Line (White)
- Pin 1: +10 to 30 VDC (White)
- Pin 2: Sourcing Output (Red)
- Pin 3: Grounded (not connected or required)
- Pin 4: Sinking Output (Orange)
- Pin 5: DC Common (Black)
- Pin 1: Common (Green)
- Pin 2: Normally Closed (Black)
- Pin 3: Normally Open (White)
- Common: (Black)
- Normally Open: (Blue)
- Normally Closed: (Red)

### Cable:
- 6' 085355-0006
- 085355-0012
- 087547-0006
- 085917-0006
- 085355-0006
- 085355-0012
- 087547-0006
- -
- -
- -
Schrader Bellows EPS proximity switches may be ordered on Series PA-2-PN, PL-2, PH-3, and SHM cylinders as follows:
1) Complete the basic cylinder model number.
2) Place an “S” in the model number to denote switches and/or special features.
3) Mounting styles MS3, MT1, MT2, ME5, MF5, MF6 should be used with caution because of possible mounting interferences. Consult bulletin SB0840-G-E1 for additional information.
4) Special modifications to cylinders other than switches must have a written description.

How to Specify EPS Switches
5) Specify letter prefix “H” for EPS-7, “D” for EPS-6, and “F” for CLS-1, or “B” for CLS-4, then fill in the four blanks specifying port location, switch orientation and actuation point for both head and cap. If only one switch is used, place “XXXX” in the unused blanks.

Example = H13CGG-XXXX denotes a switch on the head end only, EPS-7
Example = BXXXX-42BGG denotes a switch on the cap end only, CLS-4

<table>
<thead>
<tr>
<th>R</th>
<th>1</th>
<th>3</th>
<th>A</th>
<th>GG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specify:</td>
<td>Port Location See Figure 1.</td>
<td>Switch Location See Figure 1.</td>
<td>Switch Orientation See Figure 2 for EPS-7 and EPS-6 only.</td>
<td>Actuation Point GG = End of Stroke FF = Stroke to Go; See Bulletins SB0840-G-E1 for stroke remaining.</td>
</tr>
<tr>
<td>“H” = EPS-7</td>
<td>“D” = EPS-6</td>
<td>“F” = CLS-1</td>
<td>“B” = CLS-4</td>
<td></td>
</tr>
<tr>
<td>“N” = Prepared for switches only</td>
<td></td>
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<td></td>
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</tbody>
</table>

Note: All specified switch and port locations are as seen from rod end of cylinder.

EPS-5 switches will be oriented so that the connectors face each other.

Figure 1 Figure 2

<table>
<thead>
<tr>
<th>4</th>
<th>2</th>
<th>B</th>
<th>GG</th>
</tr>
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<tr>
<td>Port Location See Figure 1.</td>
<td>Switch Location See Figure 1.</td>
<td>Switch Orientation* See Figure 2 for EPS-7 and EPS-6 only.</td>
<td>Actuation Point GG = End of Stroke FF = Stroke to Go; See Bulletins SB0840-G-E1 for stroke remaining.</td>
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*EPS-5 switches will be oriented so that the connectors face each other.