S-SERIES Temperature Switches

Switches for -30 through 640°F with Adjustable Set Points, Fixed or Adjustable Deadband and General Purpose, Watertight or Explosion-Proof Enclosures

Features:
• Set point repeatability, ±1°F (1/2°C).
• All wiring terminals, adjustments and visual scales are accessible from the front of the switch.
• Choice of general purpose, watertight or explosion-proof enclosures.
• Choice of fixed or full-range adjustable deadband.
• Choice of single or two-stage units.
• Manual reset units available.
• Mounts in any position.
• Rugged and vibration resistant.
• Visual adjustment scales in °F and °C.
• External adjusting nuts.
• Separate temperature, electrical and adjusting chambers.
• Direct mount (local) or capillary and bulb (remote) sensors.
• Temperature transducers available with copper or 316 stainless steel wetted material.
• Withstands high overrange temperatures.
• Mix and match switch and transducer components for increased stock flexibility or to change pressure ranges in field.

General Description:
ASCO S-Series temperature switches consist of a switch unit and a transducer unit. They can be ordered separately for customer stocking and/or field assembly or as a complete factory-assembled unit.

Switch
S-Series temperature switch units incorporate the unique ASCO TRI-POINT alternating fulcrum balance plate to control the operation of one or more electrical snap-action switches. The electrical snap-action switch together with the adjusting mechanism is a fully-tested, self-contained subassembly.

Transducer
The temperature transducer unit uses a vapor pressure principle where the internal pressure within the unit is generated by the vapor pressure of a chemical within a sealed system. Temperature transducers are available in two constructions, a direct mount or capillary and bulb construction. The direct mount unit includes a 1/2” NPT connection for direct mounting to the process. The capillary and bulb construction allows remote mounting

Standard Electrical Ratings

<table>
<thead>
<tr>
<th>Series</th>
<th>Current (A)</th>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA, SB, SC, SD and SE Series</td>
<td>15 Amp Res., 125 VAC</td>
<td>10 Amp Res., 250 VAC</td>
</tr>
<tr>
<td></td>
<td>1/8 HP, 125 VAC</td>
<td>1/4 HP, 250 VAC</td>
</tr>
<tr>
<td></td>
<td>1/2 Amp Res., 125 VDC</td>
<td>1/4 Amp Res., 250 VDC</td>
</tr>
</tbody>
</table>

Standard Temperature Ratings

| Ambient: | -4°F (-20°C) to 140°F (60°C) |
| Fluid: | See specification table on page 32 for rated overrange temperature. |

Operation
Temperature sensed by the bulb creates an internal pressure within the transducer. This pressure is then converted into movement of the piston. This piston movement is then used to control the operation of the electrical snap-action switch in the switch unit.

Options (See pages 34-35)
Enclosures

ASCO TRI-POINT S-Series switches are available in three standard enclosures. All of these enclosed units are made in accordance with NEMA and UL standards.

General Purpose – Type 1. These enclosures are designed for indoor use to protect personnel from accidental contact with the equipment. S-Series general purpose switch units consist of a copper-free* aluminum die-cast body with a formed copper-free* aluminum cover; two 3/4” conduit hubs with one plug are provided.

Watertight – Type 4. Watertight and dust-tight enclosures are intended for use indoors and outdoors to protect the enclosed equipment against splashing or falling water, windblown dust and water, hose directed water, and severe external condensation. S-Series watertight switch units have a copper-free* aluminum die-cast body and a formed copper-free* aluminum cover with Buna “N” gaskets; two 3/4” conduit hubs with one plug are provided.

Explosion-Proof – Types 7 and 9. Type 7 enclosures are intended for use in locations defined by the National Electrical Code as Class I. Type 9 enclosures are intended for Class II locations.

Class I locations are those in which flammable gases are or may be present in the air in sufficient quantities to produce explosive or ignitable mixtures. Class I locations are classified by group letter, which defines particular atmospheres. Division 1 locations are areas where the hazardous concentration exists continuously, intermittently or periodically under normal operating conditions. Division 2 locations are those where the hazardous vapors are present only in case of accidental rupture or breakdown of equipment.

ASCO TRI-POINT explosion-proof enclosures with letter B, C or D in the fifth position are listed for Class I, Groups B, C, and D, Division 1. They are also suitable for the less stringent Division 2 environment.

Class II locations are those which are hazardous because of the presence of combustible dust. All ASCO TRI-POINT explosion-proof enclosures are listed for Groups E, F, and G locations.

The switch body and cover are die-cast copper-free* aluminum with a Buna “N” gasket. Two 3/4” conduit hubs with one plug are provided.

Dimensions (inches)

<table>
<thead>
<tr>
<th>S-Series Temperature</th>
<th>With Direct Mount Transducer</th>
<th>With Capillary and Bulb Transducer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADDITIONAL SPACE REQUIRED FOR REMOVAL OF COVER</td>
<td></td>
</tr>
<tr>
<td>2.3</td>
<td>11.6</td>
<td>4.1</td>
</tr>
<tr>
<td>3.7</td>
<td>3.5</td>
<td>1.03</td>
</tr>
<tr>
<td>3.8</td>
<td>11/32 DIA. FOR MOUNTING (2PLACES)</td>
<td>3.5</td>
</tr>
<tr>
<td>3.2</td>
<td>1/2 NPT</td>
<td>1.60</td>
</tr>
<tr>
<td>3.5</td>
<td>4.0</td>
<td>1.0</td>
</tr>
<tr>
<td>3.2</td>
<td>1.0</td>
<td>1.03</td>
</tr>
<tr>
<td>3.5</td>
<td>1.5</td>
<td>1.03</td>
</tr>
<tr>
<td>2.2</td>
<td>1.5</td>
<td>1.03</td>
</tr>
<tr>
<td>1.5</td>
<td>1.5</td>
<td>1.03</td>
</tr>
<tr>
<td>1.0</td>
<td>1.5</td>
<td>1.03</td>
</tr>
<tr>
<td>0.8</td>
<td>1.5</td>
<td>1.03</td>
</tr>
<tr>
<td>0.8</td>
<td>1.5</td>
<td>1.03</td>
</tr>
</tbody>
</table>

* Less than 0.6% copper.
How to Select and Order

ASCO S-Series switches consist of two components, the switch unit and the transducer unit.

How to Select
1. Select the adjustable operating range based on desired actuation temperature.
2. Check that rated overrange temperature is sufficient.
3. Read across and select the desired S-Series switch unit with the proper enclosure.
4. Continue across and select a matching transducer unit compatible with the fluid.

How to Order

Factory assembled – Simply order the switch and transducer units separately by individual catalog number, e.g., SA10D/QA10A1.

Field assembled – Simply order the switch and transducer units separately by individual catalog number, e.g., one SB40D and one QA10A1.

Options – Add appropriate suffix for desired option (see pages 34-35).

Important Note: The third digit of each of the catalog numbers must be identical, e.g., SA10D and QA10A1.

Select S-Series temperature switch SA, SB, SC, SD or SE unit below

SA Switch Unit

SB, SD or SE Switch Unit

SC Switch Unit

Select transducer unit below

1. Select the adjustable operating range based on desired actuation temperature.
2. Check that rated overrange temperature is sufficient.
3. Read across and select the desired S-Series switch unit with the proper enclosure.
4. Continue across and select a matching transducer unit compatible with the fluid.

How to Select

- Adjustable operating range based on desired actuation temperature.
- Rated overrange temperature is sufficient.

ASCO S-Series switches consist of two components, the switch unit and the transducer unit.

Temperature Switches

ASCO S-Series switches consist of two components, the switch unit and the transducer unit.

Selecting a Matching Transducer Unit

1. Select an adjustable operating range based on desired actuation temperature.
2. Check that the rated overrange temperature is sufficient.
3. Read across the table and select the desired S-Series switch unit with the proper enclosure.
4. Continue across the table and select a matching transducer unit compatible with the fluid.

S-Series Temperature Switches

S-Series Temperature Switches

S-Series Temperature Switches

Select S-Series temperature switch SA, SB, SC, SD or SE unit below

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SB, SD or SE Switch Unit

SC Switch Unit

Select transducer unit below

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SB, SD or SE Switch Unit

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SA Switch Unit

SB, SD or SE Switch Unit

SC Switch Unit

Select transducer unit below

1. Select the adjustable operating range based on desired actuation temperature.
2. Check that rated overrange temperature is sufficient.
3. Read across the table and select the desired S-Series switch unit with the proper enclosure.
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How to Select and Order

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How to Select
1. Select the adjustable operating range based on desired actuation temperature.
2. Check that rated overrange temperature is sufficient.
3. Read across and select the desired S-Series switch unit with the proper enclosure.
4. Continue across and select a matching transducer unit compatible with the fluid.

How to Order

Factory assembled – Simply order the switch and transducer units separately by individual catalog number, e.g., SA10D/DA10A1.
Field assembled – Simply order the switch and transducer units separately by individual catalog number, e.g., one SA10D and one QA10A1.
Options – Add appropriate suffix for desired option (see pages 34-35).

Important Note: The third digit of each of the catalog numbers must be identical, e.g., SA □□□ and QA □□□.

### How to Select and Order

#### General Purpose

**Select S-Series temperature switch SA, SB, SC, SD or SE unit below**

**How to Select**

1. **SB Switch Unit: Single-Stage Fixed Deadband** units allow independent adjustment of the set and reset points over the full operating range of the switch. The minimum difference between set and reset points is the deadband listed below; the maximum difference is the full range of the switch.

2. **SD Switch Unit: Manual reset on decreasing temperature** and a non-adjustable automatic reset point.

3. **SE Switch Unit: Manual reset on increasing temperature** units operate automatically on decreasing temperature and must be reset manually on increasing temperature. (To order, change second digit to letter "E", e.g., S □□□ becomes S □□□E).

4. **SB Switch Unit: Single-Stage Fixed Deadband** units have an adjustable set point and a non-adjustable automatic reset point. SD Switch Unit: Manual reset on decreasing temperature units operate automatically on increasing temperature and must be reset manually on decreasing temperature. (To order, change second digit to letter "D", e.g., S □□□D becomes S □□□D).

**How to Order**

1. **SB Switch Unit**
   - **1.** Select the adjustable operating range based on desired actuation temperature.
   - **2.** Check that rated overrange temperature is sufficient.
   - **3.** Read across and select the desired S-Series switch unit with the proper enclosure.
   - **4.** Continue across and select a matching transducer unit compatible with the fluid.

2. **Direct Mount**
   - **1.** Select transducer unit below
   - **2.** Order the switch and transducer unit by catalog number joined by a slash (/), e.g., SA10D/QA10A1.

3. **Capillary**
   - **1.** Select transducer unit below
   - **2.** Order the switch and transducer unit by catalog number joined by a slash (/), e.g., SA10D/QA10A1.

4. **Bulb**
   - **1.** Select transducer unit below
   - **2.** Order the switch and transducer unit by catalog number joined by a slash (/), e.g., SA10D/QA10A1.

5. **Field assembled**
   - **1.** Select transducer unit below
   - **2.** Order the switch and transducer unit by catalog number joined by a slash (/), e.g., SA10D/QA10A1.

6. **Adhesive**
   - **1.** Select transducer unit below
   - **2.** Order the switch and transducer unit by catalog number joined by a slash (/), e.g., SA10D/QA10A1.

7. **Direct Mount**
   - **1.** Select transducer unit below
   - **2.** Order the switch and transducer unit by catalog number joined by a slash (/), e.g., SA10D/QA10A1.

8. **Capillary**
   - **1.** Select transducer unit below
   - **2.** Order the switch and transducer unit by catalog number joined by a slash (/), e.g., SA10D/QA10A1.

9. **Bulb**
   - **1.** Select transducer unit below
   - **2.** Order the switch and transducer unit by catalog number joined by a slash (/), e.g., SA10D/QA10A1.

10. **Adhesive**
    - **1.** Select transducer unit below
    - **2.** Order the switch and transducer unit by catalog number joined by a slash (/), e.g., SA10D/QA10A1.

11. **General Purpose**
    - **1.** Select transducer unit below
    - **2.** Order the switch and transducer unit by catalog number joined by a slash (/), e.g., SA10D/QA10A1.

12. **Explosion Proof**
    - **1.** Select transducer unit below
    - **2.** Order the switch and transducer unit by catalog number joined by a slash (/), e.g., SA10D/QA10A1.

13. **Watertight**
    - **1.** Select transducer unit below
    - **2.** Order the switch and transducer unit by catalog number joined by a slash (/), e.g., SA10D/QA10A1.

### Specifications

<table>
<thead>
<tr>
<th>Adjustable Operating Range (°F)</th>
<th>Direct Mount Capillary Copper SS</th>
<th>Adjustable Deadband</th>
<th>Fixed Deadband or Manual Reset</th>
<th>Two-Stage Fixed Deadband</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 90</td>
<td>250</td>
<td>8</td>
<td>3</td>
<td>8</td>
<td>C°F = (°F -32) x 5/9</td>
</tr>
<tr>
<td>10 - 220</td>
<td>260</td>
<td>9</td>
<td>3</td>
<td>8</td>
<td>All switch units above are in stock for immediate delivery.</td>
</tr>
<tr>
<td>160 - 260</td>
<td>260</td>
<td>9</td>
<td>6</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>225 - 340</td>
<td>260</td>
<td>12</td>
<td>6</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>300 - 450</td>
<td>260</td>
<td>12</td>
<td>7</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>350 - 600</td>
<td>260</td>
<td>12</td>
<td>7</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>425 - 860</td>
<td>260</td>
<td>20</td>
<td>12</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

Values shown are nominal.
H-Series, P-Series and S-Series Snap-Action Switch Options

Optional snap-action switches to meet specific electrical loads or application conditions are available on most ASCO TRI-POINT switch units. Generally, the construction of a switch unit with optional snap-action switches contains other specific parts and may be ordered only as a factory-built unit. To specify a particular optional construction, add the appropriate suffix to the switch unit catalog number, e.g., SA10D with optional gold contact snap-action switch (suffix “P”) would become SA10DP.

P-Series Switch Options

Panel Mount – Open frame P-Series compact switch units are available for panel mounting with the switch unit inside and the transducer outside. The panel separates the fluid sensing portion from the electromechanical portion. Five holes for bolts and operating stem must be drilled or punched through the panel. Three constructions are available: add the suffix listed below to the switch unit catalog number for the desired thickness.

<table>
<thead>
<tr>
<th>Panel Thickness</th>
<th>Suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Ga (.135±.005)</td>
<td>10</td>
</tr>
<tr>
<td>14 Ga (.075±.005)</td>
<td>11</td>
</tr>
<tr>
<td>16 Ga (.060±.005)</td>
<td>12</td>
</tr>
</tbody>
</table>

S-Series Switch Options

Industrial Adjusting Nut Covers – Available in clear plastic or metal to prevent tampering with set point adjusting nuts.

Clear plastic cover: To order, add suffix “1” to the switch unit catalog number, or order separately as SP01.

Metal cover: To order, add suffix “2” to the switch unit catalog number, or order separately as SP02.

JIC Construction – A switch unit having the electrical and adjusting nut covers attached to the switch body by a chain. Also designed to Type 13 specifications. To order, add suffix “3” to the switch unit catalog number, or order separately as SP03.

Terminal Block – Applicable to switch units with one single-pole-double-throw switch. The terminal strip is prewired to the snap-action switch. To order, add suffix “4” to the switch unit catalog number, or order separately as SP04.

Factory Sealed – Explosion-proof units may be ordered with a factory seal separating the electrical chamber from the conduit hubs and 24” long #14 AWG 105°C rated lead wires. To order, change the fourth digit of the switch unit catalog number from “2” to “3”, e.g., SA12D becomes SA13D.
Pressure Transducer Options

Special Wetted Materials – The following diaphragms may be substituted on transducer body materials of aluminum, brass, polyester and stainless steel. To order, substitute the material code below in the seventh digit of the transducer catalog number, e.g., a TF10A11 with optional viton diaphragm becomes a TF10A12.

<table>
<thead>
<tr>
<th>Diaphragm</th>
<th>Material Code</th>
<th>Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna “N”</td>
<td>1</td>
<td>-4°F (-20°C) to 180°F (82°C)</td>
</tr>
<tr>
<td>Ethylene Propylene</td>
<td>6</td>
<td>-4°F (-20°C) to 250°F (121°C)</td>
</tr>
<tr>
<td>Neoprene</td>
<td>3</td>
<td>-4°F (-20°C) to 180°F (82°C)</td>
</tr>
<tr>
<td>Fluorosilicone</td>
<td>7</td>
<td>-40°F (-40°C) to 250°F (121°C)</td>
</tr>
<tr>
<td>Viton</td>
<td>2</td>
<td>-4°F (-20°C) to 250°F (121°C)</td>
</tr>
</tbody>
</table>

Oxygen Cleaning – Pressure transducers for oxygen service should be specially cleaned. They are degreased and blacklight inspected, then assembled in a clean area and tested with oil-free air or nitrogen. Use metal body transducer with viton or neoprene diaphragm and add suffix “H” to transducer catalog number, e.g., TA40A13 becomes TA40A13H.

Pressure Snubbers – A pressure snubber (1/4” NPTF by 1/4” NPTM) installed in the transducer pressure connection will dampen the pressure spikes to a value which will not cause damage. It consists of a body with a porous metal disc of stainless steel through which the fluid passes. To order, select a snubber compatible with the fluid. Available by separate catalog number only (see table below).

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Brass Catalog No.</th>
<th>303 SS Catalog No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air, Non-Hazardous Gases</td>
<td>TP04G2</td>
<td>TP04G3</td>
</tr>
<tr>
<td>Water, Light Oil (under 225 SSU)</td>
<td>TP04E2</td>
<td>TP04E3</td>
</tr>
<tr>
<td>Oil (Heavy, over 225 SSU)</td>
<td>TP04D2</td>
<td>TP04D3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressure Rating (psig)</th>
<th>Fluid</th>
<th>Brass Catalog No.</th>
<th>303 SS Catalog No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>Pressure Rating (psig)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Process Connection – A female process connection (1/4” NPT) is standard on all pressure transducers. A 1/2” NPT is available as an option on gauge pressure transducers. To order, add suffix “B” to transducer catalog number, e.g., RF10A21 becomes RF10A21B.

Note: Not available on nylon transducers.

P-Series and S-Series Temperature Transducer Options

Armored Capillaries – Double braided copper armor is standard for copper capillary units. Stainless steel spiral interlocked armor is available for stainless steel capillary units. Add suffix “C” to transducer catalog number.

Thermal Well – Use with direct or remote sensors for protecting sensing bulb. This allows removal of bulb while maintaining a pressure-tight vessel. Available in 1/2” NPT or 3/4” NPT process connection in brass or 316 SS. Dimensions are in accordance with SAMA Std. RC17-9. Standard “U” dimension (insertion length) is 2-1/2” for direct mount and 6” capillary units and is 4-1/2” for 12” capillary units.

<table>
<thead>
<tr>
<th>Material</th>
<th>Pressure Rating (psig)</th>
<th>“U” Dimensions (Inches)</th>
<th>Process Connection 1/2” NPT</th>
<th>Process Connection 3/4” NPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brass</td>
<td>1000</td>
<td>2-1/2</td>
<td>QP03</td>
<td>QP04</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-1/2</td>
<td>QP13</td>
<td>QP14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7-1/2</td>
<td>QP23</td>
<td>QP24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10-1/2</td>
<td>QP33</td>
<td>QP34</td>
</tr>
<tr>
<td>316 SS</td>
<td>6000</td>
<td>2-1/2</td>
<td>QP07</td>
<td>QP08</td>
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<tr>
<td></td>
<td></td>
<td>4-1/2</td>
<td>QP17</td>
<td>QP18</td>
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<td></td>
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<td>7-1/2</td>
<td>QP27</td>
<td>QP28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10-1/2</td>
<td>QP37</td>
<td>QP38</td>
</tr>
</tbody>
</table>

Union Connector – For use with remote units for mounting of bulb in fluid being controlled. Available in 1/2” NPT and 3/4” NPT process connections in brass or 316 SS.

<table>
<thead>
<tr>
<th>Material</th>
<th>Pressure Rating (psig)</th>
<th>Process Connection 1/2” NPT</th>
<th>Process Connection 3/4” NPT</th>
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<tr>
<td>Brass</td>
<td>500</td>
<td>QP01</td>
<td>QP02</td>
</tr>
<tr>
<td>316 SS</td>
<td>1500</td>
<td>QP05</td>
<td>---</td>
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