## Shuttle Valves

<table>
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</tr>
</thead>
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</table>
Shuttle Valves

SINGLE BALL SHUTTLE, SIGNAL EXTERNAL OR SIGNAL AT PORT 2

- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt = 0.3 cc/min.
- Shuttle cartridges feature hardened steel balls and seats for excellent wear characteristics and contamination tolerance.
- The single ball allows for the decay of the pressure signal when both load ports drop to a lower pressure.

### Performance Curves

**CSAW/CSAY**

**Typical Pressure Drop**

<table>
<thead>
<tr>
<th>Flow L/min</th>
<th>Pressure Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

**CSAA/CSAC**

**Typical Pressure Drop**

<table>
<thead>
<tr>
<th>Flow L/min</th>
<th>Pressure Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

### Option Ordering Information

**CS A * – X X**

- **Nominal Capacity and Version**
  - W 5 L/min.
  - Y 5 L/min.
  - A 10 L/min.
  - C 10 L/min.

- **Control**
  - B External 1/4 BSPP Port
  - E External SAE-A Port

- **Adjustment Range**
  - X Not Adjustable

- **Seal Material**
  - N Buna-N
  - V Viton

Consult the Sun website for our most recent and complete information on the full Corrosion Resistant line of products.

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Shuttle Valves

BACK-TO-BACK CHECK/SHUTTLE, SIGNAL EXTERNAL OR SIGNAL AT PORT 2

- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt = 0.3 cc/min.
- Back-to-back check cartridges feature hardened, spherically lapped, guided poppets and a lightly stressed helical spring that result in excellent wear characteristics and extremely low leakage rates.
- The back-to-back checks do not provide a means of lowering a signal. They will trap a high signal if the load pressures drop to a lower pressure. Some means of bleeding off the signal should be provided.

Performance Curves

CDAA/CDAC

Typical Pressure Drop

- Nominal Capacity and Version
  - A 10 L/min. Signal External
  - C 10 L/min. Signal at Port 2

- Control
  - B External 1/4 BSPP Port
  - E External SAE-4 Port

- Cracking Pressure
  - B 1 bar

- Seal Material
  - N Buna-N
  - V Viton

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Shuttle Valves

SINGLE BALL SHUTTLE VALVE WITH SIGNAL AT PORT 3 OR PORT 2

- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt = 0.3 cc/min.
- Shuttle cartridges feature hardened steel balls and seats for excellent wear characteristics and contamination tolerance.
- The single ball allows for the decay of the pressure signal when both load ports drop to a lower pressure.

OPTION ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Nominal Capacity and Version</th>
<th>Control</th>
<th>Adjustment Range</th>
<th>Seal Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>X 5 L/min. Signal at Port 3</td>
<td>X Not Adjustable</td>
<td>X Not Adjustable</td>
<td>N Buna-N</td>
</tr>
<tr>
<td>Z 5 L/min. Signal at Port 2</td>
<td>A Auxiliary</td>
<td>E External SAE-4 Port, Port 3 Blocked</td>
<td>V Viton</td>
</tr>
<tr>
<td>B 10 L/min. Signal at Port 3</td>
<td>A Auxiliary</td>
<td>E External SAE-4 Port, Port 3 Blocked</td>
<td></td>
</tr>
<tr>
<td>D 10 L/min. Signal at Port 2</td>
<td>A Auxiliary</td>
<td>E External SAE-4 Port, Port 3 Blocked</td>
<td></td>
</tr>
</tbody>
</table>

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Shuttle Valves

**BACK-TO-BACK CHECK/SHUTTLE, SIGNAL AT PORT 2 OR PORT 3**

- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt = 0.3 cc/min.
- Back-to-back check cartridges feature hardened, spherically lapped, guided poppets and a lightly stressed helical spring that result in excellent wear characteristics and extremely low leakage rates.
- The back-to-back checks do not provide a means of lowering a signal. They will trap a high signal if the load pressures drop to a lower pressure. Some means of bleeding off the signal should be provided.

**OPTION ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>Nominal Capacity and Version</th>
<th>Control</th>
<th>Cracking Pressure</th>
<th>Seal Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>B 10 L/min, Signal at Port 3</td>
<td>Not Adjustable</td>
<td>1 bar</td>
<td>Buna-N</td>
</tr>
<tr>
<td>D 10 L/min, Signal at Port 2</td>
<td>CDAB only:</td>
<td></td>
<td>Viton</td>
</tr>
<tr>
<td></td>
<td>A Auxiliary External SAE-4 Port</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B Auxiliary External 1/4 BSPP Port</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E External SAE-4 Port, Port 3 Blocked</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Shuttle Valves

LOW SIDE, 3-POSITION, HOT OIL SHUTTLE

- Maximum operating pressure = 350 bar.
- Pilot flow = DSCH, DSEH: 0.38 L/min., DSGH, DSIH: 0.75 L/min.
- The spool incorporates a hydraulic stop that eliminates mechanical impact and therefore the potential for internal damage.
- The hydraulic stop results in a small pilot flow from the high side work port (port 2 or 4) to the common port (port 3).
- A unique feature due to the hydraulic stop is that the hot oil relief setting can be confirmed with the transmission in neutral.
- Although this valve goes into a 4 port cavity, the nose (port 1) is not used.
- Low shift values can potentially result in charge pump pressure alone inadvertently shifting the valve. Use care when selecting shift pressure.

OPTION ORDERING INFORMATION

DS * H – X **

<table>
<thead>
<tr>
<th>Nominal Capacity</th>
<th>Control</th>
<th>Shifting Pressure</th>
<th>Seal Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 L/min.</td>
<td>X</td>
<td>G 10 bar</td>
<td>N Buna-N</td>
</tr>
<tr>
<td>80 L/min.</td>
<td>Not Adjustable</td>
<td>H 14 bar</td>
<td>V Viton</td>
</tr>
<tr>
<td>160 L/min.</td>
<td></td>
<td>E 5 bar</td>
<td></td>
</tr>
<tr>
<td>320 L/min.</td>
<td></td>
<td>DSEH, DSGH only:</td>
<td></td>
</tr>
</tbody>
</table>

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Shuttle Valves

HIGH SIDE, 3-POSITION, SHUTTLE

- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt: DSCS: 30 cc/min. at 70 bar, DSES: 50 cc/min. at 70 bar, DSGS: 65 cc/min. at 70 bar, DSIS: 80 cc/min. at 70 bar.
- Pilot flow = DSCS, DSES: 0.38 L/min., DSGS, DSIS: 0.75 L/min.
- This valve provides overrunning load control in regeneration applications where the load tends to extend the cylinder. Because there is spool leakage, it does not prevent drift.
- Hardened spool/sleeve construction provides excellent wear characteristics and minimizes cross leakage.
- Although this valve goes into a 4 port cavity, the nose (port 1) is not used.

**OPTION ORDERING INFORMATION**

- **DS**
  - **C** 60 L/min.
  - **E** 120 L/min.
  - **G** 240 L/min.
  - **I** 480 L/min.

- **S**
  - **X** Not Adjustable

- **SS**
  - **X** Control
  - **C** 2 bar
  - **E** 5 bar
  - **F** 7 bar
  - **G** 10.5 bar

- **XS**
  - **X** Shifting Pressure
  - **N** Buna-N
  - **V** Viton

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Shuttle Valves

SPRING OFFSET, 2-POSITION, HIGH SIDE SHUTTLE

- Maximum operating pressure = 350 bar.
- Although this valve goes into a 4 port cavity, the nose (port 1) is not used.

OPTION ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Nominal Capacity</th>
<th>Control</th>
<th>Minimum Control Pressure</th>
<th>Seal Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>C 60 L/min.</td>
<td>X Not Adjustable</td>
<td>C 2 bar</td>
<td>N Buna-N</td>
</tr>
<tr>
<td>E 120 L/min.</td>
<td>X Not Adjustable</td>
<td>E 5 bar</td>
<td>V Viton</td>
</tr>
<tr>
<td>G 240 L/min.</td>
<td>X Not Adjustable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I 480 L/min.</td>
<td>X Not Adjustable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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