## Logic Elements

<table>
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<tr>
<th>Cartridge Type</th>
<th>Page</th>
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<td>Normally Open Modulating Element</td>
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<td>Normally Closed, Pressure Adjustable</td>
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<td>Normally Closed, Vent-to-Operate</td>
<td>99</td>
</tr>
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<td>Normally Closed, Vent-to-Operate with Integral Pilot Control Cavity</td>
<td>100</td>
</tr>
</tbody>
</table>
UNBALANCED POPPET, PILOT-TO-CLOSE SWITCHING ELEMENT

Performance Curves

<table>
<thead>
<tr>
<th>LOD*</th>
<th>LOF*</th>
<th>LOH*</th>
<th>LOJ*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Open Pressure Drop</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Maximum operating pressure = 350 bar
- Area ratio: A3 to A1 = 1.8:1
- Area ratio: A3 to A2 = 2.25:1
- Control orifice diameter = LODA, LODB, LODF, LOFD: 0.53 mm, LOHA, LOHB, LOHD: 0.8 mm, LOJA, LOJB, LOJD: 0.9 mm.
- Pilot volume for complete shift = LOD*: 0.6 c.c., LOF*: 1.1 c.c., LOH*: 4.1 c.c., LOJ*: 6.9 c.c.
- These valves are pressure responsive at all three ports, therefore it is essential to consider all aspects of system operation through a complete cycle. Pressure changes at any one port may cause a valve to switch from a closed to an open position, or vice versa. All possible pressure changes in the complete circuit must be considered to assure a safe, functional system design.

**OPTION ORDERING INFORMATION**

Model Codes printed in Red are Preferred Versions and most readily available

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UNBALANCED POPPET, PILOT-TO-CLOSE SWITCHING ELEMENT WITH INTEGRAL PILOT CONTROL CAVITY

The -8 control option allows a pilot control valve to be incorporated directly into the end of the cartridge via the T-8A cavity. These pilot control cartridges are sold separately and include solenoid and air pilot operation. See Pilot Control Cartridges on page 121.

<table>
<thead>
<tr>
<th>Nominal Capacity</th>
<th>Typical Cartridge</th>
<th>Cavity</th>
<th>Cartridge Dimensions</th>
<th>Installation Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 L/min.</td>
<td>LODA – 8DN</td>
<td>T - 11A</td>
<td>a 34.9, b 22.2, c 28</td>
<td>40/50</td>
</tr>
<tr>
<td>160 L/min.</td>
<td>LOFA – 8DN</td>
<td>T - 2A</td>
<td>a 34.9, b 28.6, c 35</td>
<td>60/70</td>
</tr>
<tr>
<td>320 L/min.</td>
<td>LOHA – 8DN</td>
<td>T - 17A</td>
<td>a 46, b 31.8, c 46</td>
<td>200/215</td>
</tr>
<tr>
<td>640 L/min.</td>
<td>LOJA – 8DN</td>
<td>T - 19A</td>
<td>a 63.5, b 41.3, c 59</td>
<td>465/500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance Curves</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOD*-8</td>
</tr>
<tr>
<td>LOF*-8</td>
</tr>
<tr>
<td>LOH*-8</td>
</tr>
<tr>
<td>LOJ*-8</td>
</tr>
</tbody>
</table>

- Maximum operating pressure = 350 bar
- Area ratio: A3 to A1 = 1.8:1
- Area ratio: A3 to A2 = 2.25:1
- Control orifice diameter = LOD*-8, LOF*-8, LOH*-8, LOJ*-8: 0.53 mm, LOH*-8: 0.8 mm, LOJ*-8: 0.9 mm.
- These valves are pressure responsive at all three ports, therefore it is essential to consider all aspects of system operation through a complete cycle. Pressure changes at any one port may cause a valve to switch from a closed to an open position, or vice versa. All possible pressure changes in the complete circuit must be considered to assure a safe, functional system design.
- With the -8 control option, the main stage valve should first be installed to the correct torque value. The T-8A pilot control valve should then be installed into the main stage valve to its required torque value.

Option Ordering Information
Model Codes printed in Red are Preferred Versions and most readily available

<table>
<thead>
<tr>
<th>Nominal Capacity</th>
<th>Version</th>
<th>Control**</th>
<th>Cracking Pressure</th>
<th>Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>D 80 L/min.</td>
<td>A</td>
<td>T-8A Cavity in hex body for pilot operation (Pilot valve to be ordered separately)</td>
<td>3.5 bar at Port 1</td>
<td>Buna-N</td>
</tr>
<tr>
<td>F 160 L/min.</td>
<td>B</td>
<td></td>
<td></td>
<td>Viton</td>
</tr>
<tr>
<td>H 320 L/min.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J 640 L/min.</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** See page 162 for information on Control Options
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Logic Elements

UNBALANCED POPPET, PILOT-TO-OPEN SWITCHING ELEMENT

- Maximum operating pressure = 350 bar
- Area ratio: A3 to A1 = 1.8:1
- Area ratio: A3 to A2 = 2.25:1
- Control orifice diameter = LKDC: 0.8 mm, LKFC: 0.9 mm, LKHC: 1.6 mm, LKJC: 2.4 mm
- Pilot volume for complete shift = LKDC: 0.33 c.c., LKFC: 1.0 c.c., LKHC: 2.5 c.c., LKJC: 4.9 c.c.
- These valves are pressure responsive at all three ports, therefore it is essential to consider all aspects of system operation through a complete cycle. Pressure changes at any one port may cause a valve to switch from a closed to an open position, or vice versa. All possible pressure changes in the complete circuit must be considered to assure a safe, functional system design.

OPTION ORDERING INFORMATION

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** See page 162 for information on Control Options
Logic Elements

NORMALLY OPEN MODULATING ELEMENT

Performance Curves

LPBC

LPDC

LPFC

LPHC

LPJC

- Maximum operating pressure = 350 bar
- Maximum leakage at 150 SUS, port 3 = 16.4 cc/min.
- Control orifice diameter = LPB*, LPD*, LPF*: 0.4 mm, LPH*, LPJ*: 0.53 mm.

OPTION ORDERING INFORMATION

Model Codes printed in Red are Preferred Versions and most readily available

<table>
<thead>
<tr>
<th>Nominal Capacity</th>
<th>Version</th>
<th>Control**</th>
<th>Control Pressure</th>
<th>Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>B 30 L/min.</td>
<td>A Internal pilot Port 1 to Port 3 (mainstage reducing element)</td>
<td>X Non-adjustable</td>
<td>D 3.5 bar</td>
<td>N Buna-N</td>
</tr>
<tr>
<td>D 60 L/min.</td>
<td>C External pilot (restrictive compensator)</td>
<td>Available in D Adjustment Range only</td>
<td>F 7.0 bar</td>
<td>V Viton</td>
</tr>
<tr>
<td>F 120 L/min.</td>
<td></td>
<td></td>
<td>G*10.0 bar</td>
<td></td>
</tr>
<tr>
<td>H 240 L/min.</td>
<td></td>
<td>L Tuning Adjustment ± 25% of customer specified flow</td>
<td>H 14.0 bar</td>
<td></td>
</tr>
<tr>
<td>J 480 L/min.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** See page 162 for information on Control Options

* G Adjustment Range not available in LPBA, LPBC.

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Logic Elements

NORMALLY CLOSED MODULATING ELEMENT

- Maximum operating pressure = 350 bar
- Control orifice diameter = LRB*, LRD*, LRF*: 0.4 mm, LRH*, LRJ*: 0.53 mm.

OPTION ORDERING INFORMATION

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Logic Elements

NORMALLY OPEN, DIRECT OPERATED

- Maximum operating pressure = 350 bar (Port 1 and Port 2).
- Minimum pilot pressure to shift valve = DODS: 30 bar, DOFS, DOHS, DOJS: 20 bar.
- Maximum valve leakage, Port 1 to Port 2 or Port 2 to Port 1 = 0.4 cc/min.
- Pilot volume for complete shift = DODS: 0.16 c.c., DOFS: 0.33 c.c., DOHS: 0.82 c.c., DOJS: 2.8 c.c.
- Valve will open when the pilot pressure falls below 10 bar.
- Any back pressure at the drain port is directly additive to the required pilot pressure for reliable operation.

OPTION ORDERING INFORMATION

Model Codes printed in red are Preferred Versions and most readily available

- **See page 162 for information on Control Options**

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Logic Elements

NORMALLY OPEN, VENT-TO-OPERATE

- Maximum operating pressure = 350 bar
- Minimum pilot pressure to shift valve with Port 4 vented to tank = DODR: 30 bar, DOFR, DOHR, DOJR: 20 bar
- Maximum valve leakage, Port 1 to Port 2 or Port 2 to Port 1 = 0,4 cc/min.
- Control pilot flow = DODR, DOFR: 0,4 L/min., DOHR, DOJR: 0,6 L/min.
- Valve will open when the pilot pressure falls below 10 bar or with Port 4 blocked.
- Port 4 may be externally connected to a pilot switching valve. The pilot valve should have a leakage rate of less than 10 drops/min. and be able to satisfy the pilot flow requirements. Sun model DAAA-*** solenoid pilot valve is ideal for this application.

OPTION ORDERING INFORMATION  Model Codes printed in Red are Preferred Versions and most readily available

<table>
<thead>
<tr>
<th>Nominal Capacity</th>
<th>Control**</th>
<th>Control Pressure</th>
<th>Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>D 60 L/min.</td>
<td>X Non-adjustable</td>
<td>H 14,0 bar</td>
<td>N Buna-N</td>
</tr>
<tr>
<td>F 120 L/min.</td>
<td></td>
<td></td>
<td>V Viton</td>
</tr>
<tr>
<td>H 240 L/min.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J 480 L/min.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** See page 162 for information on Control Options

Visit www.sunhydraulics.com for detailed and complete technical information on our full line of products.
Logic Elements

NORMALLY OPEN, VENT-TO-OPEARTIE WITH INTEGRAL PILOT CONTROL CAVITY

The -8 control option allows a pilot control valve to be incorporated directly into the end of the cartridge via the T-8A cavity. These pilot control cartridges are sold separately and include solenoid, air pilot, and hydraulic pilot operation. See Pilot Control Cartridges on page 121.

### Nominal Capacity
- 60 L/min.
- 120 L/min.
- 240 L/min.
- 480 L/min.

### Cavity
- DODR – 8HN: T - 21 A
- DOFR – 8HN: T - 22 A
- DOHR – 8HN: T - 23 A
- DOJR – 8HN: T - 24 A

### Topical Cartridge Model Code
- DODR – 8HN
- DOFR – 8HN
- DOHR – 8HN
- DOJR – 8HN

### Cartridge Dimensions
- Installation Torque (Nm)
  - 40/50
  - 60/70
  - 200/215
  - 465/500

### Performance Curves

<table>
<thead>
<tr>
<th>Flow (L/min)</th>
<th>P = bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>600</td>
</tr>
<tr>
<td>20</td>
<td>1200</td>
</tr>
<tr>
<td>40</td>
<td>2400</td>
</tr>
<tr>
<td>80</td>
<td>4800</td>
</tr>
</tbody>
</table>

### Performance Curves

- Fully Open Pressure Differential vs. Flow

- Maximum operating pressure = 350 bar
- Minimum pilot pressure to shift valve = DODR: 30 bar, DOFR, DOHR, DOJR: 20 bar,
- Maximum valve leakage, Port 1 to Port 2 or Port 2 to Port 1 = 0.4 cc/min.
- Control pilot flow = DODR, DOFR: 0.4 L/min., DOHR, DOJR: 0.6 L/min.
- Valve will open when the pilot pressure falls below 10 bar.
- Any back pressure at the drain port is directly additive to the required pilot pressure.
- With the -8 control option, the main stage valve should first be installed to the correct torque value. The T-8A pilot control valve should then be installed into the main stage valve to its required torque value.

### OPTION ORDERING INFORMATION

Model Codes printed in Red are Preferred Versions and most readily available

- **D** 60 L/min.
- **F** 120 L/min.
- **H** 240 L/min.
- **J** 480 L/min.

- **Control**
  - **D** with T-8A cavity in hex body for pilot operation (see pilot control section for alternate options)
  - **H** 14.0 bar

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

**See page 162 for information on Control Options**

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Logic Elements

NORMALLY OPEN, PRESSURE ADJUSTABLE

- Maximum operating pressure = 350 bar
- Minimum pilot pressure to shift valve = DODP: 30 bar, DOFP, DOHP, DOJP: 20 bar,
- Maximum valve leakage, Port 1 to Port 2 or Port 2 to Port 1 = 0.4 cc/min.
- Control pilot flow at shift = DODP, DOFP: 0.4 L/min., DOHP, DOJP: 0.6 L/min.
- Valve will open when the pilot pressure drops 85% below setting.
- Any back pressure at the drain port is directly additive to the required pilot pressure.

OPTION ORDERING INFORMATION Model Codes printed in Red are Preferred Versions and most readily available

** See page 162 for information on Control Options

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Logic Elements

NORMALLY CLOSED, DIRECT OPERATED

- Maximum operating pressure = 350 bar
- Minimum pilot pressure to shift valve = DKDS: 30 bar, DKFS, DKHS, DKJS: 20 bar,
- Maximum valve leakage, Port 1 to Port 2 or Port 2 to Port 1 = 0.4 cc/min.
- Pilot volume for complete shift = DKDS: 0.16 c.c., DKFS: 0.33 c.c., DKHS: 0.82 c.c.,
  DKJS: 2.8 c.c.
- Valve will reseat when the pilot pressure drops 85% below setting.
- Any back pressure at the drain port is directly additive to the required pilot pressure.

OPTION ORDERING INFORMATION  Model Codes printed in Red are Preferred Versions and most readily available

<table>
<thead>
<tr>
<th>Nominal Capacity</th>
<th>Typical Cartridge Model Code</th>
<th>Cavity</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>Installation Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 L/min.</td>
<td>DKDS – XHN</td>
<td>T - 21A</td>
<td>34.9</td>
<td>22.2</td>
<td>46</td>
<td>40/50</td>
</tr>
<tr>
<td>120 L/min.</td>
<td>DKFS – XHN</td>
<td>T - 22A</td>
<td>34.9</td>
<td>28.6</td>
<td>51</td>
<td>60/70</td>
</tr>
<tr>
<td>240 L/min.</td>
<td>DKHS – XHN</td>
<td>T - 23A</td>
<td>46</td>
<td>31.8</td>
<td>63</td>
<td>200/215</td>
</tr>
<tr>
<td>480 L/min.</td>
<td>DKJS – XHN</td>
<td>T - 24A</td>
<td>63.5</td>
<td>41.3</td>
<td>81</td>
<td>465/500</td>
</tr>
</tbody>
</table>

Performance Curves

DKDS

- Maximum operating pressure = 350 bar
- Minimum pilot pressure to shift valve = DKDS: 30 bar, DKFS, DKHS, DKJS: 20 bar,
- Maximum valve leakage, Port 1 to Port 2 or Port 2 to Port 1 = 0.4 cc/min.
- Pilot volume for complete shift = DKDS: 0.16 c.c., DKFS: 0.33 c.c., DKHS: 0.82 c.c.,
  DKJS: 2.8 c.c.
- Valve will reseat when the pilot pressure drops 85% below setting.
- Any back pressure at the drain port is directly additive to the required pilot pressure.

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Logic Elements

NORMALLY CLOSED, PRESSURE ADJUSTABLE

- Maximum operating pressure = 350 bar
- Minimum pilot pressure to shift valve = DKDP: 30 bar, DKFP, DKHP, DKJP: 20 bar,
- Maximum valve leakage, Port 1 to Port 2 or Port 2 to Port 1 = 0.4 cc/min.
- Control pilot flow at shift = DKDP, DKFP: 0.4 L/min., DKHP, DKJP: 0.6 L/min.
- Any back pressure at the drain port is directly additive to the required pilot pressure.
- Valve will reseat when the pilot pressure falls to 85% of the cracking value.

**OPTION ORDERING INFORMATION** Model Codes printed in Red are Preferred Versions and most readily available

<table>
<thead>
<tr>
<th>Nominal Capacity</th>
<th>Control**</th>
<th>Nominal Adjustable Shift Pressure Range</th>
<th>Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>D 60 L/min.</td>
<td>L Standard Screw</td>
<td>A 21 - 210 bar</td>
<td>N Buna-N</td>
</tr>
<tr>
<td>F 120 L/min.</td>
<td>C Tamper Resistant</td>
<td>B 21 - 105 bar</td>
<td>V Viton</td>
</tr>
<tr>
<td>H 240 L/min.</td>
<td>K Handknob</td>
<td>W 21 - 315 bar</td>
<td></td>
</tr>
<tr>
<td>J 480 L/min.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Adjustment Range Options:** A, B, and W are standard set at 70 bar. Customer may specify pressure setting.

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Logic Elements

NORMALLY CLOSED, VENT-TO-OPERATE

Performance Curves

- Maximum operating pressure = 350 bar
- Minimum pilot pressure to shift valve with Port 4 vented to tank = DKDR: 30 bar, DKFR, DKHR, DKJR: 20 bar.
- Maximum valve leakage, Port 1 to Port 2 or Port 2 to Port 1 = 0.4 cc/min.
- Control pilot flow = DKDR, DKFR: 0.4 L/min., DKHR, DKJR: 0.6 L/min.
- Valve will reseat when the pilot pressure falls below 10 bar.
- Port 4 may be externally connected to a pilot switching valve. The pilot valve should have a leakage rate of less than 10 drops/min. and be able to satisfy the pilot flow requirements. Sun model DAAA-*** solenoid pilot valve is ideal for this application.

OPTION ORDERING INFORMATION

Model Codes printed in Red are Preferred Versions and most readily available

- ** See page 162 for information on Control Options

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The -8 control option allows a pilot control valve to be incorporated directly into the end of the cartridge via the T-8A cavity. These pilot control cartridges are sold separately and include electro-proportional, solenoid, air pilot, and hydraulic pilot operation. See Pilot Control Cartridges on page 121.

### Logic Elements

**NORMALLY CLOSED, VENT-TO-OPTERATE WITH INTEGRAL PILOT CONTROL CAVITY**

The cartridge will open when the pilot pressure falls below 10 bar.

Any back pressure at the drain port is directly additive to the required pilot pressure for reliable operation.

With the -8 control option, the main stage valve should first be installed to the correct torque value. The T-8A pilot control valve should then be installed into the main stage valve to its required torque value.

### Performance Curves

#### DKDR-8

- Maximum operating pressure = 350 bar
- Minimum pilot pressure to shift valve with Port 4 vented to tank = DKDR: 30 bar, DKFR, DKHR, DKJR: 20 bar
- Maximum valve leakage, Port 1 to Port 2 or Port 2 to Port 1 = 0.4 cc/min.
- Control pilot flow = DKDR, DKFR: 0.4 L/min, DKHR, DKJR: 0.6 L/min.
- Valve will open when the pilot pressure falls below 10 bar.
- Any back pressure at the drain port is directly additive to the required pilot pressure for reliable operation.

#### DKFR-8

#### DKHR-8

#### DKJR-8

### OPTION ORDERING INFORMATION

**Model Codes printed in Red are Preferred Versions and most readily available**

<table>
<thead>
<tr>
<th>Nominal Capacity</th>
<th>Control**</th>
<th>Nominal Shift Pressure</th>
<th>Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 L/min. (D)</td>
<td>B</td>
<td>H 14.0 bar</td>
<td>N</td>
</tr>
<tr>
<td>120 L/min. (F)</td>
<td>(see pilot control section for alternate options)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>240 L/min. (H)</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>480 L/min. (J)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**See page 162 for information on Control Options**

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