Mechanical Actuators
Directional Control Valves

DG2S2/4-01*-52 Plunger Operated
DG16S2/4-01*-52 Deceleration Valve
DG1S2/4-01*-50 Knob Operated
DG17S2/4-01*-50 Lever Operated
NFPA D05, ISO-4401-05

Vickers®
Directional Controls

EATON

VICKERS
Released 6/94
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Functional Symbols

Spring offset - Two-way (mechanically operated)

Spring offset - Four-way (mechanically operated)

Spring offset - Deceleration (mechanically operated)

Model DG2S2-012A-52

Model DG2S4-012A-52

Model DG16S2-010A-52
Introduction

**General Description**

The mechanical directional control valves described in this brochure are:

- Two & Four-way cam operated valves
  DG2/16S4-01
- Knob & Lever operated valves
  DG1/17S4-01

Mechanical operation used by these valves is achieved by either hand actuation or roller cam. Many applications that use the roller cam feature are deceleration valves to control the movement of a load.

The DG2 two and four-way directional valves may be used for a wide range of applications where mechanical actuation is preferred.

The DG16 deceleration valve provides an ideal method of hydraulically controlling deceleration through mechanical actuation. An outstanding feature of this valve is its smooth deceleration capability for low flows.

DG1 and DG17 are manual knob and lever operated valves used for applications requiring two and four-way directional operation. The two-way valves are available in both spring offset and no-spring detented versions. The four-way valves are offered in spring offset, spring centered and no-spring detented versions.

**Basic Characteristics**

- Max. pressure: 207 bar (3000 psi)
- Max. flow: 75.7 l/min (20 USgpm)
- Max. pressure port T: 69 bar (1000 psi)
- Weight: 3.6 kg (8 lbs.)
- Fluid Cleanliness - See page 13.
- Mounting Subplate: 2.07 kg (4.5 lbs)

**Mounting Interface**

- ISO 4401-05
- CETOP 5
- NFPA D05

**Mounting Position**

Valves are spring offset and have no restrictions as to mounting position.

**Installation Data**

Drain connection must be piped directly to tank through a surge free line so there will be no back pressure at this port.

Maximum cam angle recommended: 35°

**NOTE**

Any sliding spool valve, if held for long periods of time, may stick and not spring return due to fluid residue formation and therefore, should be cycled periodically to prevent this from happening.

**Service Information**

Refer to specific Vickers parts drawing for service parts information. A complete parts breakdown is contained in this drawing.

Order by literature number:
- DG2S2/4-01-52 . . . . . . . I-3572-S
- DG16S2-01-52 . . . . . . . I-3572-S
- DG1S2-012(A)-50 . . . . I-3546-S
- DG1S4/2S2-01-50 . . . I-3546-S
Model Code

Deceleration, Two & Four-way Directional Valves

```
DG S -01 A - 52 - LH
```

1. Directional control
2. Mounting type
   G - Manifold or Subplate
3. Valve type
   2 - Mechanically operated
   16 - Non-adjustable deceleration
4. Sliding spool

5. Flow direction
   2 - Two-way
   4 - Four-way (not available on DG16)

6. Valve size
   01 - ISO-4401-05, NFPA-D05 interface

7. Spool type (crossover condition)
   0 - Open center (DG16S2 only)
   2 - Closed center (DG2S2 only)
   6 - Closed center, P only
   7 - Closed center, T blocked
   33 - Closed center, bleed A & B

8. Spool/Spring arrangement
   A - Spring offset

9. Design number
   Subject to change. Installation dimensions remain as shown for design numbers 50 through 59.

10. Left hand
    LH - Plunger assembled in the B port end of valve. Right hand models shown.

Specifications

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Max. Flow l/min (USgpm)</th>
<th>Actuation force under no-flow conditions approx. kg (lbs) max.</th>
<th>Valve Type</th>
<th>Direction of oil flow for valve spool position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Directional</td>
<td>Mechanical Deceleration</td>
<td>69 bar (1000 psi)</td>
<td>207 bar (3000 psi)</td>
<td></td>
</tr>
<tr>
<td>DG2S2-012A-52</td>
<td>–</td>
<td>45.4 (12)</td>
<td>30.3 (8)</td>
<td>8.6 (19)</td>
</tr>
<tr>
<td>DG2S4-012A-52</td>
<td>–</td>
<td>75.7 (20)</td>
<td>75.7 (20)</td>
<td>8.6 (19)</td>
</tr>
<tr>
<td>–</td>
<td>DG16S2-010A-52</td>
<td>45.4 (12)</td>
<td>30.3 (8)</td>
<td>8.6 (19)</td>
</tr>
</tbody>
</table>

— Full flow
Pressure Drop

Pressure Drop DG2S4

<table>
<thead>
<tr>
<th>Spool Type</th>
<th>P to A</th>
<th>B to T</th>
<th>P to B</th>
<th>A to T</th>
<th>P to T</th>
<th>Recommended Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.9 bar (28 psi)</td>
<td>1.7 bar (24 psi)</td>
<td>1.9 bar (28 psi)</td>
<td>2.3 bar (33 psi)</td>
<td>2.3 bar (33 psi)</td>
<td>37.9 l/min (10 USgpm)</td>
</tr>
<tr>
<td>2</td>
<td>2.1 bar (31 psi)</td>
<td>2.4 bar (35 psi)</td>
<td>2.1 bar (31 psi)</td>
<td>2.8 bar (40 psi)</td>
<td>2.8 bar (40 psi)</td>
<td>2.1 bar (31 psi)</td>
</tr>
<tr>
<td>6</td>
<td>2.1 bar (31 psi)</td>
<td>1.7 bar (24 psi)</td>
<td>2.1 bar (31 psi)</td>
<td>2.3 bar (33 psi)</td>
<td>2.3 bar (33 psi)</td>
<td>2.1 bar (31 psi)</td>
</tr>
<tr>
<td>7</td>
<td>1.9 bar (28 psi)</td>
<td>2.3 bar (33 psi)</td>
<td>1.9 bar (28 psi)</td>
<td>2.8 bar (40 psi)</td>
<td>2.8 bar (40 psi)</td>
<td>2.1 bar (31 psi)</td>
</tr>
<tr>
<td>33</td>
<td>2.1 bar (31 psi)</td>
<td>2.3 bar (33 psi)</td>
<td>2.1 bar (31 psi)</td>
<td>2.8 bar (40 psi)</td>
<td>2.8 bar (40 psi)</td>
<td>2.1 bar (31 psi)</td>
</tr>
</tbody>
</table>

Pressure Drop DG2S2/4 & DG16S2

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Valve Type</th>
<th>P to A</th>
<th>B to T</th>
<th>P to B</th>
<th>A to T</th>
<th>A to P</th>
<th>Recommended Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG2S2-012A-52</td>
<td>Two-way</td>
<td>1.4 bar (20 psi)</td>
<td>–</td>
<td>1.4 bar (20 psi)</td>
<td>–</td>
<td>–</td>
<td>37.9 l/min (10 USgpm)</td>
</tr>
<tr>
<td>DG2S4-012A-52</td>
<td>Four-way</td>
<td>1.4 bar (20 psi)</td>
<td>1.6 bar (23 psi)</td>
<td>1.4 bar (20 psi)</td>
<td>1.8 bar (26 psi)</td>
<td>–</td>
<td>37.9 l/min (10 USgpm)</td>
</tr>
<tr>
<td>DG16S2-010A-52</td>
<td>Deceleration</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>3.4 bar* (50 psi)</td>
</tr>
</tbody>
</table>

* Full open position

1. Figures in the pressure drop chart give approximate pressure drops (ΔP) when passing 38 l/min (10 USgpm) flow (Q) of 100 SUS fluid(s) having .865 specific gravity.

2. For any other flow rate (Q1), the pressure drop (ΔP1) will be approximately:

   \[ ΔP_1 = ΔP \left(\frac{Q_1}{Q_2}\right)^2 \]

3. For any other viscosity(s), the pressure drop (ΔP) will change as follows:

<table>
<thead>
<tr>
<th>Viscosity (cSt)</th>
<th>14</th>
<th>32</th>
<th>43</th>
<th>54</th>
<th>65</th>
<th>76</th>
<th>86</th>
</tr>
</thead>
<tbody>
<tr>
<td>(SUS)</td>
<td>(75)</td>
<td>(150)</td>
<td>(200)</td>
<td>(250)</td>
<td>(300)</td>
<td>(350)</td>
<td>(400)</td>
</tr>
<tr>
<td>% of ΔP (Approx.)</td>
<td>93</td>
<td>111</td>
<td>119</td>
<td>126</td>
<td>132</td>
<td>137</td>
<td>141</td>
</tr>
</tbody>
</table>

4. For any other specific gravity (G1)**, the pressure drop (ΔP1), will be approximately:

   \[ ΔP_1 = ΔP \left(\frac{G_1}{G}\right) \]

** Specific gravity of fluid may be obtained from its producer. The value is higher for fire-resistant fluids than for oil.

Pressure vs. Spool Position

Deceleration valve DG16S2-01A-52

30 l/min (8 USgpm) Flow - 100 SUS fluid

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![Graph showing pressure vs. spool position](image-url)
**Installation Dimensions**

**Mechanically Operated**

2-way, 4-way & Deceleration Valves

Spring Offset

<table>
<thead>
<tr>
<th>mm (inches)</th>
<th>DG2S2</th>
<th>DG2S4</th>
<th>DG16S2</th>
</tr>
</thead>
</table>

- "A" Connection - cyl. conn. for DG2, inlet for DG16
- "B" Connection - cyl. conn. for DG2, plug for DG16

12.2 (.48) Dia. roller

"T" Normal tank connection, four-way models (connect to reservoir). On two-way models and DG16 deceleration valve, "T" is drain.

7.1 (.28) Dia. - 10.4 (.41) C’ bore
4 holes for mounting (torque bolts 12.6 Nm (112 lbf.in.)

6.9 (.27) Spool travel

Spool depressed
Spool extended (offset)

Plunger may be rotated so roller will operate in a position 90° from that shown. Specify by ordering model S78.

Diagram plate showing piping information

Optional tank or drain conn. for convenience of user in applying to drilled panels.

Mounting surface (seals furnished)
Model Code

Knob & Lever Operated Directional Valves

DG * S * - 01 2 A - 50 - LH

1 Directional control

2 Mounting type
G - Manifold or Subplate

3 Valve operator
1 - Manual knob operated
17 - Manual lever operated

4 Sliding spool

5 Flow direction
2 - Two-way
4 - Four-way - spring offset model only

6 Valve size
01 - ISO-4401-05, NFPA-D05 interface

7 Spool type (center condition)
0 - Open center
2 - Closed center
3 - Closed center, P & B
6 - Closed center, P only
7 - Closed center, T blocked
8 - Tandem crossover
33 - Closed center, bleed A & B

8 Spool/Spring arrangement
A - Two-position, spring offset
C - Three position, spring centered
N - Three position, detented

9 Design number
Subject to change. Installation dimensions remain as shown for design numbers 50 through 59.

10 Left hand
Knob or lever on B end. (Reversed from A port end models shown.)

Functional Symbols
Spring offset - Two-way

No-spring - Two-way Detented

Spring offset - Four-way

Spring centered - C

No-spring - Detented N

Model DG1S2-012A-50
Model DG17S2-012A-50

Model DG1S2-012N-50
Model DG17S2-012N-50

Model DG1S4-012A-50
Model DG17S4-012A-50

Model DG1S4-010C-50
Model DG17S4-010C-50

Model DG1S4-010N-50
Model DG17S4-010N-50
**Basic Characteristics**

Max. pressure: 207 bar (3,000 psi)
Max. flow: 75,7 l/min (20 USgpm)
Max. pressure port T: 69 bar (1000 psi)
Weights:
- DG1 knob operated: 3.4 kg (7.5 lbs.)
- DG17 lever operated: 4.0 kg (9 lbs.)
- Subplate: 2 kg (4.5 lbs.)

Fluid Cleanliness - See page 13.

**Mounting Interface**

ISO 4401-05
CETOP 5
NFPA D05

**Shifting Action**

Spring offset valves are spring positioned unless lever is actuated. No-spring detented valves maintain the spool position last selected. Machine vibration, heat, improper circuitry and externally induced shocks may cause no-spring detented valves to shift prematurely.

**CAUTION**

Surges of oil in a common tank line serving these and other valves can be of sufficient magnitude to cause inadvertent shifting of these valves. This is particularly critical in the no-spring detented type valves. Separate tank lines or a vented manifold with a continuous downward path to tank is necessary.

**Mounting Position**

No-spring detented valves must be installed with the longitudinal axis horizontal for good machine reliability.

**Pressure Drop DG(1)7S**

<table>
<thead>
<tr>
<th>Spool Type</th>
<th>P to A (28 psi)</th>
<th>B to T (31 psi)</th>
<th>P to B (24 psi)</th>
<th>A to T (33 psi)</th>
<th>P to T (33 psi)</th>
<th>Recommended Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 2</td>
<td>1.9 bar</td>
<td>2.1 bar</td>
<td>1.7 bar</td>
<td>2.3 bar</td>
<td>2.3 bar</td>
<td>37.9 l/min (10 USgpm)</td>
</tr>
<tr>
<td>3 6 7</td>
<td>2.1 bar</td>
<td>2.1 bar</td>
<td>2.4 bar</td>
<td>2.1 bar</td>
<td>2.3 bar</td>
<td>30 l/min (8 USgpm)</td>
</tr>
<tr>
<td>8 33</td>
<td>2.1 bar</td>
<td>2.1 bar</td>
<td>2.3 bar</td>
<td>2.8 bar</td>
<td>37.9 l/min (10 USgpm)</td>
<td></td>
</tr>
</tbody>
</table>

1. Figures in the pressure drop chart give approximate pressure drops (ΔP) when passing 38 l/min (10 USgpm) flow (Q) of 100 SUS fluid(s) having .865 specific gravity.
2. For any other flow rate (Q<sub>1</sub>) the pressure drop (ΔP<sub>1</sub>) will be approximately:

   \[ \Delta P_1 = \Delta P(Q_1/Q_2)^2 \]

3. For any other viscosity(s), the pressure drop (ΔP) will change as follows:

4. For any other specific gravity (G<sub>1</sub>)*, the pressure drop (ΔA<sub>1</sub>) will be approximately:

   \[ \Delta A_1 = \Delta P(G_1/G) \]

* Specific gravity of fluid may be obtained from its producer. The value is higher for fire-resistant fluids than for oil.
**Installation Dimensions**

**Two-way, Four-way & Knob Operated**

**Spring Offset & No-Spring**

Millimeters (inches)

DG1S2-C  
DG1S4-C

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**“A” Connection - cyl. conn.**  
26.9 (1.06)  
10.4 (.41)

**“B” Connection - cyl. conn.**  
23.8 (.94)  
10.4 (.41)

**“P” Pressure connection**  
53.8 (2.12)

**“T” Normal tank connection, four-way models (connect to reservoir). On two-way models “T” is drain.**

7.1 (.28) Dia. - 10.4 (.41) C bore  
4 holes for mounting  
(torque bolts 12.6 Nm (112 lbf.in.)

**6.9 (.27) Spool travel**

Spool depressed  
Spool extended (offset)

**Diagram plate showing piping information**

**Mounting surface**  
(seals furnished)

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▲ See no-spring detented symbol. Center not used.
**Installation Dimensions**

**No-Spring Detented & Spring Centered Manual Knob Operated Valve**

Millimeters (inches)

DG1S4-01 C/N

- **Port “A” Connection**
  - 26.9 (.10)
  - 10.4 (.41)
  - 10.4 (.41)
- **Port “B” Connection**
  - 23.8 (.94)
  - 23.8 (.94)
  - 23.8 (.94)
- **“P” Pressure connection**
  - 45.9 (1.81)
  - 23.1 (0.91)
  - 1.5 (.06)
  - 9.7 (.38)
- **“T” Normal tank connection**
  - Optional tank or drain conn.
  - for convenience of user in applying to drilled panels.
- **Valve body edge**
- **C.L**
  - 41.1 (.16)
- **∅**
  - 57.9 (.23)
  - 3.0 (.12)
- **Stroke**
  - 69.9 (2.75)
  - 36 (1.42)
  - 35 (1.38)
  - 3.0 (.12)
  - 18.3 (.72)
- **Diagram plate showing piping information**
- **Mounting surface**
  - (seals furnished)

<table>
<thead>
<tr>
<th>Spool Type</th>
<th>Dimension</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 2, 3, 6, 7 &amp; 33</td>
<td></td>
<td>69.1 (2.72)</td>
<td>159 (6.26)</td>
<td>153.9 (6.06)</td>
</tr>
<tr>
<td>Type 8</td>
<td></td>
<td>73.9 (2.91)</td>
<td>168.6 (6.64)</td>
<td>158.7 (6.25)</td>
</tr>
<tr>
<td><strong>Stem - without knob</strong></td>
<td></td>
<td>56.4 (2.22)</td>
<td>146.3 (5.76)</td>
<td>141.2 (5.56)</td>
</tr>
<tr>
<td>0, 2, 3, 6, 7 &amp; 33</td>
<td></td>
<td>61.2 (2.41)</td>
<td>155.6 (6.14)</td>
<td>146 (5.75)</td>
</tr>
<tr>
<td>Type 8</td>
<td></td>
<td>61.2 (2.41)</td>
<td>155.6 (6.14)</td>
<td>146 (5.75)</td>
</tr>
</tbody>
</table>
## Spring Offset & No-Spring Manual Lever Operated Valves

**Millimeters (inches)**

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Manual Operator w/ knob</th>
<th>Manual Operator w/ lever</th>
<th>Valve Type</th>
<th>Max. Flow at 69 bar (1000 psi)</th>
<th>Max. Flow at 207 bar (3000 psi)</th>
<th>Direction of oil flow for valve spool position</th>
<th>Recommended Flow at 69 bar (1000 psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG1S2-012N-50</td>
<td>DG17S2-012N-50</td>
<td>2-way</td>
<td>75,7 (20)</td>
<td>56,8 (15)</td>
<td>P → A blocked</td>
<td>P → A blocked</td>
<td>37,9 (10)</td>
</tr>
<tr>
<td>DG1S2-012A-50</td>
<td>DG17S2-012A-50</td>
<td>2-way</td>
<td>30,3 (8)</td>
<td>18,9 (5)</td>
<td>P → blocked</td>
<td>P → A blocked</td>
<td></td>
</tr>
<tr>
<td>DG1S4-012A-50</td>
<td>DG17S4-012A-50</td>
<td>4-way</td>
<td>30,3 (8)</td>
<td>18,9 (5)</td>
<td>P → A blocked</td>
<td>P → B blocked</td>
<td></td>
</tr>
</tbody>
</table>

### Full flow
# Installation Dimensions

## Spring Centered & No-Spring Detented Manual Lever Operated Valves

**Millimeters (inches)**

DG17S4-01-C/N

### Specifications

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Manual Operator w/knob</th>
<th>Manual Operator w/ lever</th>
<th>Spool Type</th>
<th>Direction of oil flow for valve spool position</th>
<th>Rec. Flow I/min (USgpm)</th>
<th>Max Flow I/min (USgpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DG1S4-010*-50</td>
<td>DG17S4-010*-50</td>
<td>0 - Open center all ports</td>
<td>P — A B — T</td>
<td>37.9 (10)</td>
<td>30.3 (8) 18.9 (5)</td>
</tr>
<tr>
<td></td>
<td>DG1S4-012*-50</td>
<td>DG17S4-012*-50</td>
<td>2 - Closed center all ports</td>
<td>P &amp; B blocked A — T</td>
<td>Fully closed</td>
<td>30.3 (8) 18.9 (5)</td>
</tr>
<tr>
<td></td>
<td>DG1S4-013*-50</td>
<td>DG17S4-013*-50</td>
<td>3 - Closed center P and B</td>
<td>P blocked A &amp; B — T</td>
<td>45.4 (12)</td>
<td>45.4 (12)</td>
</tr>
<tr>
<td></td>
<td>DG1S4-016*-50</td>
<td>DG17S4-016*-50</td>
<td>6 - Closed center P only</td>
<td>P — A &amp; B blocked T</td>
<td>PB</td>
<td>AT</td>
</tr>
<tr>
<td></td>
<td>DG1S4-017*-50</td>
<td>DG17S4-017*-50</td>
<td>7 - Open center T blocked</td>
<td>P — A &amp; B blocked T</td>
<td>30,3 (8)</td>
<td>45,4 (12)</td>
</tr>
<tr>
<td></td>
<td>DG1S4-0133*-50</td>
<td>DG17S4-0133*-50</td>
<td>33 - Closed center Bleed A &amp; B</td>
<td>P blocked A &amp; B — T</td>
<td>PB</td>
<td>AT</td>
</tr>
<tr>
<td></td>
<td>DG1S4-018*-50</td>
<td>DG17S4-018*-50</td>
<td>8 - Open center P to T</td>
<td>P to T A &amp; B blocked</td>
<td>30,3 (8)</td>
<td>45,4 (12)</td>
</tr>
</tbody>
</table>

- **Full flow**
- **Restricted flow**
Subplates & Bolt Kits

Valves, subplates and mounting bolts must be ordered separately.

Example:
One (1) DG**S4-012A-5* Valve
One (1) DGSM(E)-01-20-T8 Subplate
One (1) BKG01-633 Bolt Kit

When subplate is not used, a machined pad must be provided for mounting. Pad must be flat within 0.0127 mm (.0005 inch) and smooth within 63 microinch. Mounting bolts, when provided by customer, should be SAE grade 7 or better.

Torque mounting bolts to:
13 Nm (115 lb. in.)

Mounting Subplate
DGSM-01-20-T8

Millimeters (inches)
Subplates & Bolt Kits

Mounting Subplate
DGSME-01-20-T8

Millimeters (inches)

- "P" Pressure Conn. 1/2" N.P.T.F. thd.
- 10.3 (.41 D.) Thru 20.6 (.81 D.)
- Spotface 4-holes for mounting
- .438 Dia. System ports
- 4 holes
- "B" Cyl. Conn. 1/2" N.P.T.F. thd.
- "T" Tank Conn. 1/2" N.P.T.F. thd.
- .250-20 UNC-2B Thd.
- 4-holes for mounting
**Fluid Cleanliness**

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials, and additives for protection against wear of components, elevated viscosity, and inclusion of air.

Essential information on the correct methods for treating hydraulic fluid is included in Vickers publication 561 “Vickers Guide to Systemic Contamination Control” available from your local Vickers distributor or by contacting Vickers, Incorporated. Recommendations on filtration and the selection of products to control fluid condition are included in 561.

Recommended cleanliness levels, using petroleum oil under common conditions, are based on the highest fluid pressure levels in the system and are coded in the chart below. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these cleanliness codes. See Vickers publication 561 for exact details.

<table>
<thead>
<tr>
<th>Product</th>
<th>System Pressure Level</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;70 ( &lt;1000)</td>
<td>70-207 (1000-3000)</td>
<td>207+ (3000+)</td>
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<tr>
<td>Vane Pumps – Fixed</td>
<td>20/18/15</td>
<td>19/17/14</td>
<td>18/16/13</td>
</tr>
<tr>
<td>Vane Pumps – Variable</td>
<td>18/16/14</td>
<td>17/15/13</td>
<td>18/16/13</td>
</tr>
<tr>
<td>Piston Pumps – Fixed</td>
<td>19/17/15</td>
<td>18/16/14</td>
<td>17/15/13</td>
</tr>
<tr>
<td>Piston Pumps – Variable</td>
<td>18/16/14</td>
<td>17/15/13</td>
<td>16/14/12</td>
</tr>
<tr>
<td><strong>Directional Valves</strong></td>
<td><strong>20/18/15</strong></td>
<td><strong>20/18/15</strong></td>
<td><strong>19/17/14</strong></td>
</tr>
<tr>
<td>Pressure/Flow Control Valves</td>
<td>19/17/14</td>
<td>19/17/14</td>
<td>19/17/14</td>
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<tr>
<td>CMX Valves</td>
<td>18/16/14</td>
<td>18/16/14</td>
<td>17/15/13</td>
</tr>
<tr>
<td>Servo Valves</td>
<td>16/14/11</td>
<td>16/14/11</td>
<td>15/13/10</td>
</tr>
<tr>
<td>Proportional Valves</td>
<td>17/15/12</td>
<td>17/15/12</td>
<td>15/13/11</td>
</tr>
<tr>
<td>Cylinders</td>
<td>20/18/15</td>
<td>20/18/15</td>
<td>20/18/15</td>
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<tr>
<td>Vane Motors</td>
<td>20/18/15</td>
<td>19/17/14</td>
<td>18/16/13</td>
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<tr>
<td>Axial Piston Motors</td>
<td>19/17/14</td>
<td>18/16/13</td>
<td>17/15/12</td>
</tr>
<tr>
<td>Radial Piston Motors</td>
<td>20/18/14</td>
<td>19/17/13</td>
<td>18/16/13</td>
</tr>
</tbody>
</table>

**Fluids and Seals**

Flourocarbon seals are standard and are suitable for use with phosphate ester type fluids or their blends, water glycol, water-in-oil emulsion fluids and petroleum oil.