Pilot Operated Directional Valves

DG3V-8; 700 l/min (185 USgpm) 350 bar (5000 psi)
DG5V-8; 700 l/min (185 USgpm) 350 bar (5000 psi)
NFPA D08, ISO-4401-08, CETOP 8
### General Description

The Size 8 Directional Control Valve serves as a control valve package. It offers directional control, pilot pressure reducers, pilot chokes, and main stage stroke adjustment to control the flow.

The valves are generally used to control large flows up to 700 l/min (185 USgpm) at 350 bar (5000 psi) and provide low pressure drops. The range includes:

- **DG3V-8** - remote pilot operated valve.
- **DG5V-8-S** - DG4V-3S-60 standard performance D03 pilot valve 100 bar (1450 psi) tank line rating.
- **DG5V-8-H** - DG4V-3-60 high performance D03 pilot valve 210 bar (3000 psi) tank line rating.

Each valve contains a main stage spool which is positioned in the valve by special arrangement. The four arrangements are:

- **Spring offset** - For single stage operation, one spring returns spool to an offset position. For two–stage operation, springs and washers are removed from main stage and offset action is obtained from pilot valve.
- **Spring centered** - Spring and washer are located on both ends of main stage spool to control centering.
- **Pressure centered** - Centering springs are used in addition to pilot pressure, to provide positive centering should pilot pressure fail.
- **No-spring detented** - Springs and washers are provided so that in the event of pilot pressure failure, the main spool will spring center.

### Features and Benefits

- A “mini-system” capability with wide variety of spool and spring arrangements, stroke and pilot choke adjustments, integral check valves and port orifices.
- High force solenoids and centering springs assure consistent shifting through a wide range of pressure and silting extremes.
- Provides maximum strength at low pressure drop; in a small package, capable of high flow and high pressure.
- Suitable for demanding industrial or mobile applications by providing for reliable operations.
- Endurance tested to 10 million cycles and fatigue tested without failure to ensure highest reliability.
- Fatigue testing performed to NFPA specifications to ensure the highest reliability in applications requiring high flows and pressure.
- Solid cast body and cored passages for maximum strength and minimal pressure drop.
- Electrical options including coil types, connections, and wiring housings allow full compatibility and reliable performance in any system application.
- Plain, waterproof, and lockable manual override options are available to facilitate system troubleshooting or servicing.
- The DG3V and DG5V are 100% interchangeable with previous H8 design valves.

### Service Information

Refer to specific Vickers parts drawing for service parts information.

Order by literature number:
- **DG3V-8** . . . . . . . 5007.03/EN/0196/S
- **DG5V-8-S** . . . . . 5007.04/EN/0196/S
- **DG5V-8-H** . . . . . 5007.04/EN/0196/S
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**DG3V-8 Remote Pilot Operated Directional Valves**

### Model Code

| (F*) | DG3V | (B) | **(L)** | (X) | (*) | (EN**) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|------|------|-----|---------|-----|-----|--------|---|---|---|---|---|---|---|---|----|----|----|

#### Special Seals
- (F3) - Seals for fire resistant fluids.
- (F6) - Seals for water glycol.

#### Directional Control Valve
- DG3V - Subplate mounting; pilot operated-remote operator. Pressure rating 350 bar (5000 psi) for all ports. (See minimum pilot pressure requirements on page 6.)

#### Valve Size
- 8 - Valve size CETOP 8, NFPA D08

#### Gauge Ports
- Blank - .4375-20 UNF-2B Thread
- B - 1/4 BSP Thread

#### Spool Types
- 0 - Open to T all ports
- 1 - Open P&A to T, closed B
- 2 - Closed to T all ports
- 3 - Closed P&B, open A to T
- 4 - Tandem P to T, closed crossover
- 5 - Closed P only, open A&B to T
- 6 - Open P to A&B, closed T
- 7 - Tandem P to T, open crossover
- 8 - Open to T all ports over tapers
- 9 - Open P&B to T, closed A
- 31 - Closed P&A, open B to T
- 33 - Closed P, open A&B to T over tapers
- 52 - Closed center, regen. by operator ‘A’
- 521 - Closed center, regen. by operator ‘B’
- 7 - Stroke adjusters on cylinder A end only (available on A, C & Blank (no spring) models)
- 8 - Stroke adjusters on cylinder ‘B’ end only (available on A, C, & Blank (no spring) models)
- 27 - If both are required (available on A, C, & Blank (no spring) models)
- 28 - If both are required (available on AL left hand build, C & Blank (no spring) models)

#### Check Valve in Pressure Port
- Blank - No spring
- A - Spring offset to cylinder ‘A’
- C - Spring centered
- D - Pressure centered

#### Left Hand Build
- L - A Models only, omit if not required.

#### Fast Response
- Blank - No spring
- A - Spring offset to cylinder ‘A’
- C - Spring centered
- D - Pressure centered

#### Spool Control Modifications
- 1 - Stroke adjustment (both ends) (available on C & Blank (no spring) models)
- 2 - Pilot choke adjustment (available on all models)
- 3 - Pilot choke and stroke adjusters (both ends) (available on C & Blank (no spring) models)

#### Spool/Spring Arrangement
- 0 - Open to T all ports
- 1 - Open P&A to T, closed B
- 2 - Closed to T all ports
- 3 - Closed P&B, open A to T
- 4 - Tandem P to T, closed crossover
- 5 - Closed P only, open A&B to T
- 6 - Open P to A&B, closed T
- 7 - Tandem P to T, open crossover
- 8 - Open to T all ports over tapers
- 9 - Open P&B to T, closed A

#### Check Valve in Pressure Port
- Blank - No spring
- A - Spring offset to cylinder ‘A’
- C - Spring centered
- D - Pressure centered

#### Design Number
- Blank - No spring
- A - Spring offset to cylinder ‘A’
- C - Spring centered
- D - Pressure centered

#### Ratings

<table>
<thead>
<tr>
<th>Maximum Flow Without Malfunction* (L/min (USgpm))</th>
<th>Maximum Fatigue Pressure (Ports P, A, B &amp; T) bar (psi)</th>
<th>Maximum Operating Pressure (Ports T &amp; Y) bar (psi)</th>
<th>Mounting Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>To 700 (185)</td>
<td>350 (5000)</td>
<td>350 (5000)</td>
<td>CETOP 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ISO 4401 Size 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NFPA D08</td>
</tr>
</tbody>
</table>

* See malfunction flow curves on page 7.
Model Description/Performance Characteristics

General Description

DG3V-8 models are single stage remote pilot operated directional control valves. These valves are generally used to control the direction of flow in a hydraulic circuit. This in turn would control the movement of a work cylinder or the rotation of a fluid motor.

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.

Pressure Centered Models

Designated by “D” under spring/spool arrangement in model code.

This option provides faster, more positive spring centering time by use of pilot pressure to center the spool. The valve spool is returned to center position when pilot pressure is applied at both ends of the spool. The centering springs are used in addition to pilot pressure to ensure positive centering of spool.

If pilot pressure fails or falls below the required minimum, the spool will spring return to center position. Pilot pressure is not available through the use of and integral check valve. Pressure centered valves have a drain port “W” and subplate must have provisions for this feature.

Note

Pressure centered valves require a pilot valve which directs pilot oil to connections “X” and “Y” of the valve at the same time pressure centering is desired. The centering time depends on the rate of pressure rise in the pilot chamber.

Spring Offset Models

Designated by “A” under spring/spool arrangement in model code.

Spring offset model has an internal spring which returns the spool to offset position when the pilot connection “X” is open to tank. Pilot connection “Y” becomes a drain connection and must be piped directly to tank at atmospheric pressure through a surge-free tank line. Back pressure at this connection would cause valve to malfunction.

Caution: Spring offset models contain a high assembled spring load. Call Vickers Service for disassembly instructions.

Spring Centered Models

Designated by “C” under spring/spool arrangement in model code.

A spring and washer arrangement is used on both ends of the spool. If control pressure is removed, the valve will go to center position due to spring force.

No-Spring Models

Designated by a “Blank” under spring/spool arrangement in model code.

When pilot pressure is removed on no-spring models, the spool remains in the last position attained provided there is no unusual shock, vibration, pressure transients and the spool axis is horizontal.

Performance Characteristics

Spring centered, pressure centered and spring offset models require continuous pilot pressure to maintain shifted position. Spring centered models return valve spool to center position by centering springs when pilot pressure fails or falls below minimum requirement.

Port connections are made by mounting the valves on a subplate or manifold having mounting dimensions which conform to NFPA-D08/D10 (ISO-4401-08/10) pattern.

Shift Times

Shift times are defined as the time from pilot pressure application/removal to the point of the start of a pressure rise/decline in appropriate port.

Caution: Flow conditions of the spring centered position must be selected with care, both for the effect on the direction of the flow, and the pilot pressure. (The “9” main spool will not ensure sufficient pilot pressure in the center position for internal pilot pressure models.)

Pressure centered models: Valve spool is returned to center position by pilot pressure, when pilot pressure is removed. If pilot pressure fails or falls below the required minimum, the valve spool will spring return to center position. (At spring centered valve flow rates).

Caution: Surges of oil in a common pilot valve drain 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 type valves. Separate drain lines or a vented drain manifold with a continuous downward path to tank is necessary. This applies to connection “Y” on spring offset valves where “Y” is piped as a drain for pressure centered models. Drain connection “W” must be piped directly to tank through a surge free line so there will be no back pressure at drain.

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.

If used as other than a normal 4-way valve, consult your Vickers representative.

Minimum Pilot Pressure Requirements

<table>
<thead>
<tr>
<th>Spool Type</th>
<th>Blank, A, C Models</th>
<th>D Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed center</td>
<td>P to A: 12 (175)</td>
<td>P to B: 21 (300)</td>
</tr>
<tr>
<td>Open center</td>
<td>P to A: 10 (150)</td>
<td>P to B: 10 (150)</td>
</tr>
</tbody>
</table>
## Spool Type and Center Position

<table>
<thead>
<tr>
<th>Spool Type</th>
<th>Center Position</th>
<th>Spool Type</th>
<th>Center Position</th>
<th>Spool Type</th>
<th>Center Position</th>
<th>Spool Type</th>
<th>Center Position</th>
<th>Spool Type</th>
<th>Center Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>PT</td>
<td>AB</td>
<td>PT</td>
<td>AB</td>
<td>PT</td>
<td>0</td>
<td></td>
<td>1</td>
<td>(Closed Crossover)</td>
</tr>
<tr>
<td>AB</td>
<td>PT</td>
<td>AB</td>
<td>PT</td>
<td>AB</td>
<td>PT</td>
<td>3</td>
<td></td>
<td>4</td>
<td>(Open Crossover)</td>
</tr>
<tr>
<td>AB</td>
<td>PT</td>
<td>AB</td>
<td>PT</td>
<td>AB</td>
<td>PT</td>
<td>6</td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>AB</td>
<td>PT</td>
<td>AB</td>
<td>PT</td>
<td>AB</td>
<td>PT</td>
<td>9</td>
<td></td>
<td>11</td>
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<tr>
<td>AB</td>
<td>PT</td>
<td>AB</td>
<td>PT</td>
<td>AB</td>
<td>PT</td>
<td>11</td>
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<td>AB</td>
<td>PT</td>
<td>AB</td>
<td>PT</td>
<td>33</td>
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<td>33</td>
<td></td>
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<tr>
<td>AB</td>
<td>PT</td>
<td>AB</td>
<td>PT</td>
<td>AB</td>
<td>PT</td>
<td>33</td>
<td></td>
<td>33</td>
<td></td>
</tr>
</tbody>
</table>

### Graphical Symbols

- **SPRING OFFSET ‘A’**
- **SPRING CENTERED ‘C’**
- **PRESSURE CENTERED ‘D’**
- **NO-SPRING**

### Flow Ratings

<table>
<thead>
<tr>
<th>Maximum flow without malfunction</th>
<th>See malfunction flow curves on page 7.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum fatigue pressure (P, A, B &amp; T ports)◆</td>
<td>350 bar (5000 psi)</td>
</tr>
<tr>
<td>Maximum operating pressure (P, A, B &amp; X ports)</td>
<td>350 bar (5000 psi)</td>
</tr>
<tr>
<td>Maximum operating pressure (T &amp; Y ports)</td>
<td>350 bar (5000 psi)</td>
</tr>
</tbody>
</table>

◆ The method for verifying the rated fatigue pressure of the complete unit conforms to NFPA/T2.6.1 R1-1991 (Catalog C/90), Fluid Power Systems and Products method for verifying the fatigue pressure rating of the pressure containing envelope.
1. Figures in the pressure drop chart give approximate pressure drop ($\Delta P$) when passing 473 l/min (125 USgpm) flow ($Q$) of 35 cSt (164 SUS) fluids(s) having .865 specific gravity.

2. For any other flow rate ($Q_1$), the pressure drop ($\Delta P_1$) will be approximately: $\Delta P_1 = \Delta P (Q_1/Q)^2$.

3. For any other viscosity(s), the pressure drop ($\Delta P$), will change as follows:

4. For any other specific gravity ($G_1$), the pressure drop ($\Delta P_1$) will be approximately: $\Delta P_1 = \Delta P (G_1/G)$.

The following table lists the appropriate pressure drop curve and malfunction flow curve between ports for each spool type. Use the following example to determine pressure drop for a selected spool.

**Example:** Find the pressure drop from P→B for type 7 spool. Using the table find numeral 7 in the spool type column. To the right of numeral 7 find the reference curve 2 (from pressure drop curve chart at bottom of page) under P→B column.

The pressure drop from P→B for type 7 spool would be obtained on curve 2. Likewise, the malfunction for numeral 7 would be found on curve 1 (from malfunction flow curve chart at bottom of page).

<table>
<thead>
<tr>
<th>Spool Type</th>
<th>Pressure Drop Curve Number</th>
<th>Malfunction Flow Curve Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P→A</td>
<td>B→T</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>2</td>
</tr>
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<td>8</td>
<td>4</td>
<td>3</td>
</tr>
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<td>9</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>33</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>52</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>521</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

### Pressure Drop Curves

![Pressure Drop Curves](image)

### Malfunction Flow Curves

![Malfunction Flow Curves](image)
Response Time

The response time shown in the charts are defined as the time between pilot pressurization/de-pressurization and the initial change in the inlet port pressure.

Offset to Offset

Center to Offset

Spring Centering Times @ Rated Flow & Pressure

<table>
<thead>
<tr>
<th>Spool Type</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed Center</td>
<td>.040 sec.</td>
</tr>
<tr>
<td>Open Center</td>
<td>.050 sec.</td>
</tr>
</tbody>
</table>

Centering Times for Pressure Centered Valves @ Rated Pressure (A to P or B to P)
## Installation Dimensions

### DG3V-8-(C)-**-**-10 Spring Centered Model

#### Millimeters (inches)

### Spool Control Modifications

<table>
<thead>
<tr>
<th>Without pilot choke or stroke adjustment</th>
<th>“A” Dimension</th>
<th>“B” Dimension</th>
<th>“C” Dimension</th>
<th>“D” Dimension (pilot choke adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke adjustment (both ends)</td>
<td>133.0 (5.23)</td>
<td>265.3 (10.44)</td>
<td>132.6 (5.22)</td>
<td>—</td>
</tr>
<tr>
<td>Pilot choke adjustment</td>
<td>173.0 (6.81)</td>
<td>265.3 (10.44)</td>
<td>132.6 (5.22)</td>
<td>134.2 (5.28)</td>
</tr>
<tr>
<td>Stroke adjustment on cyl. ‘A’</td>
<td>133.0 (5.23)</td>
<td>340.6 (13.40)</td>
<td>208.0 (8.18)</td>
<td>—</td>
</tr>
<tr>
<td>Stroke adjustment on cyl. ‘B’</td>
<td></td>
<td></td>
<td>132.6 (5.22)</td>
<td>—</td>
</tr>
<tr>
<td>Pilot choke and stroke adjustment on cyl. ‘A’</td>
<td>173.0 (6.81)</td>
<td></td>
<td>208.0 (8.18)</td>
<td>—</td>
</tr>
<tr>
<td>Pilot choke and stroke adjustment on cyl. ‘B’</td>
<td></td>
<td>132.6 (5.22)</td>
<td>134.2 (5.28)</td>
<td>—</td>
</tr>
<tr>
<td>Pilot choke and stroke adjustment (both ends)</td>
<td></td>
<td>415.9 (16.37)</td>
<td>208.0 (8.18)</td>
<td>—</td>
</tr>
</tbody>
</table>
DG3V-8-A(L)-*-*-10 Spring Offset Model
Millimeters (inches)

![Diagram of DG3V-8-A(L)-*-*-10 Spring Offset Model]

<table>
<thead>
<tr>
<th>Spool Control Modifications</th>
<th>“A” Dimension</th>
<th>“B” Dimension</th>
<th>“C” Dimension</th>
<th>“D” Dimension (pilot choke adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without pilot choke or stroke adjustment</td>
<td>133.0 (5.23)</td>
<td>326.9 (12.87)</td>
<td>132.6 (5.22)</td>
<td>–</td>
</tr>
<tr>
<td>Without pilot choke or stroke adjustment (left-hand build)</td>
<td>133.0 (5.23)</td>
<td>326.9 (12.87)</td>
<td>194.4 (7.65)</td>
<td>134.2 (5.28)</td>
</tr>
<tr>
<td>Pilot choke adjustment</td>
<td>173.0 (6.81)</td>
<td>265.3 (10.44)</td>
<td>132.6 (5.22)</td>
<td>134.2 (5.28)</td>
</tr>
<tr>
<td>Stroke adjustment on cyl. ‘A’ (left-hand build)</td>
<td>133.0 (5.23)</td>
<td>402.3 (15.83)</td>
<td>208.0 (8.18)</td>
<td>–</td>
</tr>
<tr>
<td>Stroke adjustment on cyl. ‘B’</td>
<td>173.0 (6.81)</td>
<td>340.6 (13.40)</td>
<td>208.0 (8.18)</td>
<td>134.2 (5.28)</td>
</tr>
<tr>
<td>Pilot choke and stroke adjustment on cyl. ‘A’ (left-hand build)</td>
<td>173.0 (6.81)</td>
<td>340.6 (13.40)</td>
<td>132.6 (5.22)</td>
<td>134.2 (5.28)</td>
</tr>
</tbody>
</table>

DG3V-8-D-*-*-10 Pressure Centered Model
Millimeters (inches)

![Diagram of DG3V-8-D-*-*-10 Pressure Centered Model]
Optional Features

Integral Check Valves

For internal pilot pressure, an integral pressure port check valve is available. This back pressure will be present at the cylinder ports. The pilot pressure generated is the total of: \( P \rightarrow T \) drop through the valve in center condition, pressure drop through the check valve, plus the pressure at the tank port.

To prevent load drop, a check valve in the pressure port can be used to prevent reverse flow from a cylinder port to the pressure port.

Pilot Choke

DGMFN-3-Y-A2W-B2W-41

Pilot choke increases the amount of time to shift the mainstage spool, lowering the possibility of large flow transients in the circuit. It is adjusted by backing off locknuts and turning adjusting screws inward to decrease rate of spool travel and outward to increase spool travel rate. See spool control modifications in model code.

Stroke Adjustment

Stroke adjustment limits movement of the mainstage spool. Backing off the jamnut and turning the adjusting screw inward decreases spool stroke. See spool control modifications in model code.
DG5V-8 Pilot Operated Directional Valves

Model Code
(F*) - DG5V - 8 - * - (R) - (B) - ** - (L) - (ss) - (X) - (r) - (E) - (T) - (s) - (V)M - (Se) - ** ** ** - (L) - (*) - ** - (ss*) - 10 - (ENss)

1 Special Seals
(Omit if not required.)
F3 - Seals for fire resistant fluids.
F6 - Seals for water glycol.

2 Directional Control Valve
DG5V - Subplate mounting; pilot operated. Pressure rating 350 bar (5000 psi) for all ports. (See minimum pilot pressure requirements on p. 15.)

3 Valve Size
8 - Valve size CETOP 8, NFPA D08

4 Pilot Valve Type
H - CETOP 3, High performance
S - CETOP 3, Standard performance

5 Reducer Module
See Fast Response restriction. (Omit if not required.)

6 Gauge Ports
Blank - .4375-20 UNF-2B Thread
B - 1/4 BSP Thread

7 Spool Types
0 - Open center (all ports)
1 - Open center (P to A & T) B blocked
2 - Closed center (all ports)
3 - Open center (P & B blocked) A to T
4 - Tandem center (P to T) closed crossover
6 - Closed center (P blocked) A & B to T
7 - Open center (P to A & B) T blocked
8 - Tandem center (P to T) open crossover
9 - Open center, partial to all ports
11 - Open center (P to B & T) A blocked B to T
31 - Closed center (P & A blocked) towards workport A
33 - Closed center, bleed A & B to T
52 - Closed center (All ports) regen. towards workport A
521 - Closed center (All ports) regen. towards workport B
9 - Open center, partial to all ports
11 - Open center (P to B & T) A blocked
31 - Closed center (P & A blocked) B to T
33 - Closed center, bleed A & B to T
52 - Closed center (All ports) regen. towards workport A
521 - Closed center (All ports) regen. towards workport B

8 Spool Spring Arrangement
A - Spring offset to ‘A’ port
B - Spring centered, with solenoid ‘A’ removed
C - Spring centered
D - Pressure centered
F - Spring offset to ‘A’ port, shift to center
N - No spring detented (pilot valve only)

9 Left Hand Build
L - Single solenoid models only, omit if not required.

10 Manual Override Options
Blank - Plain override in solenoid ends only
H - Waterproof override in solenoid ends only
H2 - Waterproof override in both ends of single solenoid
P2 - Plain override in both ends of single solenoid
Y - Lockable manual override in solenoid ends only (DC models only)
Z - No override in either end

11 Fast Response
X - Not recommended for pilot pressures above 210 bar (3000 psi). (Omit for standard low shock models.)

When the standard performance pilot is selected and pilot pressure is above 3000 psi, the reducer module is required to limit high drain line pressure transients generated during shifting.

12 Spool Control Modifications
(Omit when not required)
1 - Stroke adjustment (both ends) (not available on D models)
2 - Pilot choke adjustment (available on all models)
3 - Pilot choke and stroke adjusters (both ends) (not available on D models)
7 - Stroke adjusters on A port end only (not available on D models)
8 - Stroke adjusters on B port end only (not available on D models)
27 - 2 and 7 combined (not available on D models)
28 - 2 and 8 combined (available on all models)

13 External Pilot Pressure
E - External pilot pressure. Omit for internal pilot pressure models.

14 Internal Pilot Drain
T - Internal pilot drain to ‘T’ port. Omit for external pilot drain models.

15 Check Valve in Pressure Port
(Omit if not required)
K - 0,35 bar (5 psi) check
Q - 2,42 bar (35 psi) check
R - 3,45 bar (50 psi) check
S - 5,20 bar (75 psi) check
Model Code (continued)

18 Solenoid Energization Identity
Blank - Standard arrangement for ANSI B93.9 (i.e. energize solenoid A to follow flow P to A).
V - Solenoid identification determined by position of solenoid (i.e. solenoid A at port A end/solenoid B at port B end).

Note
4 and 8 type spools are always V. Solenoid energization identity is independent of mainstage porting.

17 Heading Electrical Flag Symbol
M - Features and options for pilot valve.

18 Pilot Valve Monitoring Switch
(Omit if not required)
S3 - Limit switch normally open, wired to electrical connector with PA/PB/PA5 (H piloted models only)
S4 - Limit switch normally closed, wired to electrical connector with PA/PB/PA5 (H piloted models only)
S5 - Limit switch - FW, FJ (H piloted models only)
S6 - Position switch with U coils (H piloted models only)

19 Coil Type
F - Flying lead (required for wiring housing option)
KU - Top exit flying lead
P - Plug in
SP1 - Single 6.3mm spade
SP2 - Dual 6.3mm spade
U - ISO 4400 (DIN 43650)
X1 - Flameproof solenoids BASEEFA/CENELEC (S piloted models only)
X2 - Explosion proof solenoids CSA/UL (S piloted models only)
X3 - Explosion proof solenoids BASEEFA ExS (S piloted models only)

20 Electrical Connections
(F type coils only, omit if not required)
PA - Insta-plug, male receptacle only
PB - Insta-plug, male and female receptacle
PA3 - 3-pin connector
PA5 - 5-pin connector
T - Wired terminal block (wiring housing option also required)

21 Wiring Housing
W - 1/2" NPT threaded connection
J - 20mm threaded connection
G - 1/2" BSP threaded connection

22 Electrical Options
(Omit if not required)
U-type coils only
1 - Fitted connector
2 - Fitted connector and variable grommet
6 - Fitted connector with lights

23 Solenoid Indicator Lights
(Omit if not required)

24 Surge Suppressor/Damper
(DC voltages only, omit if not required)
D1 - Encapsulated diode (industrial applications)
D2 - Encapsulated diode (mobile applications)
D7 - Encapsulated transzorb

25 Coil Identification Letter
See electrical information on page 25 for voltages available. Others available upon request.

26 Pilot Valve Port Orifices
(Omit if not required)

27 Design Number

28 Special Modifications
(Omit if not required)

Ratings

<table>
<thead>
<tr>
<th>Maximum Flow Without Malfunction*</th>
<th>Maximum Fatigue Pressure (Ports P, A, B &amp; T) bar (psi)</th>
<th>Maximum Operating Pressure (Ports T &amp; Y) bar (psi)</th>
<th>Mounting Pattern</th>
</tr>
</thead>
</table>
| To 700 (185)                   | 350 (5000)                                         | 350 (5000)                                       | CETOP 8
|                                 |                                                   |                                                  | ISO 4401 Size 8 |
                                 |                                                   |                                                  | NFPA D08 |

* See malfunction flow curves on page 16.
Model Description

DG5V-8 models are two-stage directional control valves having an integrally mounted wet armature solenoid pilot valve. These valves are generally used to control the movement of a work cylinder or the rotation of a fluid motor.

Pressure Centered Models

Designated by “D” under spring/spool arrangement in model code.

This option provides faster, more positive spring centering by use of pilot pressure to center the spool. The valve spool is returned to center position when pilot pressure is applied at both ends of the spool. The centering springs are used in addition to pilot pressure to ensure positive centering of spool.

If pilot pressure fails or falls below the required minimum, the spool will spring return to the center position. Pilot pressure is not available through the use of and integral check valve. Pressure centered valves have a drain port “W” and must have provisions for this feature.

Note

Pressure centered valves require a pilot valve which directs pilot oil to connections “A” and “B” of the valve at the same time pressure centering is desired. The centering time depends on the rate of pressure rise in the pilot chamber.

Spring Offset Models

Designated by “A” under spring/spool arrangement in model code.

Spring offset model has an internal spring which offsets the spool when pilot connection “X” is vented to tank. When pressure is removed, the spring is used to return the spool to an offset position.

Spring Centered Models

Designated by “C” under spring/spool arrangement in model code.

A spring and washer arrangement is used on both ends of the spool. If control pressure is removed, the valve will go to center position due to spring force.

No-Spring Models

Designated by a “Blank” under spring/spool arrangement in model code.

When the solenoid is de-energized, the spool returns to the last position attained.

Performance Characteristics

Spring centered, pressure centered and spring offset models require continuous pilot pressure to maintain shifted position. Centering springs on spring centered and pressure centered models return the valve spool to the center position pilot pressure fails or falls below minimum requirement.

Shift Times

Shift times are defined as the time from solenoid energization/de-energization to the point of the start of a pressure rise/decline in appropriate port.

Caution: Flow conditions of the spring centered position must be selected with care, both for the effect on the direction of the flow, and the pilot pressure. (The “9” main spool will not ensure sufficient pilot pressure in the center position.)

Pressure centered models: Valve spool is returned to center position by pilot pressure, when pilot pressure is removed. If pilot pressure fails or falls below the required minimum, the valve spool will spring return to center position. (At spring centered valve flow rates).

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

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.

Shifting Action

The pilot valve solenoids of spring centered, pressure centered, and spring offset models must be energized continuously to keep the main stage spool in the shifted position. No-spring detented models only need to be energized momentarily (for approximately 0.1 second).

Spring centered and pressure centered models return the valve spool to the center position when both solenoids are de-energized or pilot pressure fails or falls below minimum requirements. Spring offset models return the spool to the offset position by pilot pressure when the solenoid is de-energized.

When no-spring detented models are de-energized, the pilot and main spools remain in their last position as long as there are no unusual shock, vibration, or pressure transients, and the spool axis is horizontal. If pilot pressure fails or falls below minimum requirements, the main spool will spring center (at spring centered flow rates), but will not drift to a reversal of flow position. The pilot stage will remain in the detented position.

When used as other than a normal 4-way valve, consult your Vickers representative.

Minimum Pilot Pressure Requirements (when operating at 350 bar (5000 psi) maximum)

<table>
<thead>
<tr>
<th>Spool Type</th>
<th>Pilot Pressure bar (psi)</th>
<th>D Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed center</td>
<td>10 (150)</td>
<td>P to A: 12 (175)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P to B: 21 (300)</td>
</tr>
<tr>
<td>Open center</td>
<td>5 (75)</td>
<td>P to A: 10 (150)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P to B: 10 (150)</td>
</tr>
</tbody>
</table>
### Spool Type and Center Position

<table>
<thead>
<tr>
<th>Spool Type</th>
<th>Center Position</th>
<th>Spool Type</th>
<th>Center Position</th>
<th>Spool Type</th>
<th>Center Position</th>
<th>Spool Type</th>
<th>Center Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>P T</td>
<td>AB</td>
<td>P T</td>
<td>AB</td>
<td>P T</td>
<td>AB</td>
<td>P T</td>
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<tr>
<td>0</td>
<td></td>
<td>3</td>
<td></td>
<td>7</td>
<td></td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>AB</td>
<td>P T</td>
<td>AB</td>
<td>P T</td>
<td>AB</td>
<td>P T</td>
<td>AB</td>
<td>P T</td>
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<tr>
<td>1</td>
<td>Closed Crossover</td>
<td>4</td>
<td></td>
<td>8</td>
<td>Open Crossover</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>AB</td>
<td>P T</td>
<td>AB</td>
<td>P T</td>
<td>AB</td>
<td>P T</td>
<td>AB</td>
<td>P T</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>6</td>
<td></td>
<td>9</td>
<td></td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>AB</td>
<td>P T</td>
<td>AB</td>
<td>P T</td>
<td>AB</td>
<td>P T</td>
<td>AB</td>
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<tr>
<td>52</td>
<td></td>
<td>521</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Graphical Symbols

- **SPRING OFFSET ‘A’**
- **SPRING CENTERED ‘C’**
- **PRESSURE CENTERED ‘D’**
- **SPRING OFFSET SHIFT TO CENTER ‘F’**
- **SPRING CENTERED SINGLE SOLENOID ‘B’**
- **NO-SPRING DETENTED ‘N’**

### Flow Ratings

<table>
<thead>
<tr>
<th></th>
<th>Maximum flow without malfunction</th>
<th>See flow chart on page 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum fatigue pressure (P, A, B &amp; T ports)</td>
<td>350 bar (5000 psi)</td>
<td></td>
</tr>
<tr>
<td>Maximum operating pressure (P, A, B &amp; X ports)</td>
<td>350 bar (5000 psi)</td>
<td></td>
</tr>
<tr>
<td>Maximum operating pressure (T &amp; Y ports)</td>
<td>350 bar (5000 psi)</td>
<td></td>
</tr>
</tbody>
</table>

◆ The method for verifying the rated fatigue pressure of the complete unit conforms to NFPA/T2.6.1 R1-1991 (Catalog C/90), Fluid Power Systems and Products method for verifying the fatigue pressure rating of the pressure containing envelope.

▲ Internal drain models drain the pilot valve through the tank port of the mainstage. External drain models drain the pilot valve through the “Y” port of the mainstage. To provide proper operation without malfunction, the pilot pressure must always exceed tank or drain line pressure by the minimum pilot pressure required per valve and spool type (see charts on page 16). Tank or drain line surges which would reduce this differential are to be avoided as they may cause the mainstage to shift. Mainstage tank pressure is limited to the tank line rating of the pilot valve on internally drained models (with “T” included in the model code). Internal drains may be used with all models except pressure centered “D” models. Pressure centered models must be externally drained through “Y” and “W” ports. To achieve the maximum tank line rating of 350 bar (5000 psi) of the mainstage, an external pilot drain must be used and it is recommended that a separate line be provided directly to the tank.
1. Figures in the pressure drop chart give approximate pressure drop \((\Delta P)\) when passing 473 l/min \((125\text{ USgpm})\) flow \((Q)\) of 35 cSt \((164\text{ SUS})\) fluids(s) having .865 specific gravity.

2. For any other flow rate \((Q_1)\), the pressure drop \((\Delta P_1)\) will be approximately:
   \[ \Delta P_1 = \Delta P \left( \frac{Q_1}{Q} \right)^2. \]

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

4. For any other specific gravity \((G_1)\), the pressure drop \((\Delta P_1)\) will be approximately:
   \[ \Delta P_1 = \Delta P \left( \frac{G_1}{G} \right). \]

---

**Spool Type**

<table>
<thead>
<tr>
<th>Spool Type</th>
<th>Pressure Drop Curve Number</th>
<th>Malfunction Flow Curve Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>P→A</td>
<td>B→T</td>
<td>P→B</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>2</td>
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<td>3</td>
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<td>33</td>
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<tr>
<td>52</td>
<td>2</td>
<td>–</td>
</tr>
<tr>
<td>521</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

---

**Pressure Drop Curves**

**Malfunction Flow Curves**

Example: Find the pressure drop from P→B for type 7 spool. Using the table find numeral 7 in the spool type column. To the right of numeral 7 find the reference curve 2 (from pressure drop curve chart at bottom of page) under P→B column.

The pressure drop from P→B for type 7 spool would be obtained on curve 2. Likewise, the malfunction for numeral 7 would be found on curve 1 (from malfunction flow curve chart at bottom of page).

1. Figures in the pressure drop chart give approximate pressure drop \((\Delta P)\) when passing 473 l/min \((125\text{ USgpm})\) flow \((Q)\) of 35 cSt \((164\text{ SUS})\) fluids(s) having .865 specific gravity.

2. For any other flow rate \((Q_1)\), the pressure drop \((\Delta P_1)\) will be approximately: \(\Delta P_1 = \Delta P \left( \frac{Q_1}{Q} \right)^2.\)

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

4. For any other specific gravity \((G_1)\), the pressure drop \((\Delta P_1)\) will be approximately: \(\Delta P_1 = \Delta P \left( \frac{G_1}{G} \right).\)
Shift Response Times

Response Times
Response times are defined as the time from solenoid energization/de-energization to the point of the start of a pressure rise/decline in appropriate port.

Solenoid Energizing
Spring centered, pressure centered and spring offset DG5V-8 types must be energized continuously. No-spring detented DG5V-8 type may be energized momentarily. Pressure centered and spring centered DG5V-8 types return valve spool to center position when both solenoids are de-energized.

Mounting Position
No-spring detented valves must be installed with the longitudinal axis horizontal for good machine reliability. The mounting position of spring centered and spring offset models is unrestricted provided that the pilot pressure supply is maintained as required. (Spring offset valves do not have a spring in the main spool section.)

Offset to Offset

![Graph showing offset to offset response times]

Center to Offset

![Graph showing center to offset response times]

Spring Centering Times @ Rated Flow & Pressure

<table>
<thead>
<tr>
<th>Spool Type</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed Center</td>
<td>.040 sec.</td>
</tr>
<tr>
<td>Open Center</td>
<td>.050 sec.</td>
</tr>
</tbody>
</table>

Centering Times for Pressure Centered Valves @ Rated Pressure (A to P or B to P)

![Graph showing centering times for pressure centered valves]
Pilot Valves

General Description

Pilot valves are identified in the model code by the following letters: “S” Standard or “H” High Performance. The pilot valves can be ordered to match a variety of mainstage spool types and valve bodies.

The chart below shows ordering information for each pilot valve. For example, to order a High Performance pilot “H” with a Spring Offset mainstage “A”, use the following model code: DG4V-3-2A-M-*-60

<table>
<thead>
<tr>
<th>Valve Model Code: High Performance/Standard</th>
<th>Main Stage Spool Type</th>
<th>Pilot Valve Model Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG5V-8-S/H-<em>A-</em>-M-*-10</td>
<td>All except 4 &amp; 8</td>
<td>DG4V-3(S)-2A-M-*-60</td>
</tr>
<tr>
<td></td>
<td>4A &amp; 8A only</td>
<td>DG4V-3(S)-2AL-VM-*-60</td>
</tr>
<tr>
<td></td>
<td>4AL &amp; 8AL only</td>
<td>DG4V-3(S)-2A-VM-*-60</td>
</tr>
<tr>
<td>DG5V-8-S/H-<em>B-</em>-M-*-10</td>
<td>All except 4 &amp; 8</td>
<td>DG4V-3(S)-6B-M-*-60</td>
</tr>
<tr>
<td></td>
<td>4B &amp; 8B only</td>
<td>DG4V-3(S)-6BL-VM-*-60</td>
</tr>
<tr>
<td></td>
<td>4BL &amp; 8BL only</td>
<td>DG4V-3(S)-6B-VM-*-60</td>
</tr>
<tr>
<td>DG5V-8-S/H-<em>C-</em>-M-*-10</td>
<td>All except 4 &amp; 8</td>
<td>DG4V-3(S)-6C-M-*-60</td>
</tr>
<tr>
<td></td>
<td>4C &amp; 8C only</td>
<td>DG4V-3(S)-6C-VM-*-60</td>
</tr>
<tr>
<td>DG5V-8-S/H-<em>D-</em>-M-*-10</td>
<td>All except 4 &amp; 8</td>
<td>DG4V-3(S)-7C-M-*-60</td>
</tr>
<tr>
<td></td>
<td>4D &amp; 8D only</td>
<td>DG4V-3(S)-7C-VM-*-60</td>
</tr>
<tr>
<td>DG5V-8-S/H-<em>F-</em>-M-*-10</td>
<td>All except 4 &amp; 8</td>
<td>DG4V-3(S)-6F-M-*-60</td>
</tr>
<tr>
<td></td>
<td>4F &amp; 8F only</td>
<td>DG4V-3(S)-6FL-VM-*-60</td>
</tr>
<tr>
<td></td>
<td>4FL &amp; 8FL only</td>
<td>DG4V-3(S)-6F-VM-*-60</td>
</tr>
<tr>
<td>DG5V-8-S/H-<em>N-</em>-M-*-10</td>
<td>All except 4 &amp; 8</td>
<td>DG4V-3(S)-6N-M-*-60</td>
</tr>
<tr>
<td></td>
<td>4N &amp; 8N only</td>
<td>DG4V-3(S)-6N-VM-*-60</td>
</tr>
</tbody>
</table>
Installation Dimensions

DG5V-8-S/H-**-M-**-10
Spring Centered Model
Millimeters (inches)

Tank Port
Ø 25.0 (0.98)

Pilot Drain Port Y
(For External Pilot Drain Models)
Ø 25.0 (0.98)

Pressure Port
Ø 25.0 (0.98) Std. Model
Ø 27.3 (1.07) P-port Check Model

Pilot Pressure Port X
(For External Pilot Pressure Models)
Port A
Ø 25.0 (0.98)

Gauge ports
.4375-20
UNF-2B thread
.250 O.D. tubing
or 1/4 BSP Thread

Dimensions

<table>
<thead>
<tr>
<th>Spool Control Modifications</th>
<th>“A”</th>
<th>“B”</th>
<th>“C”</th>
<th>“D”</th>
<th>“E” pilot</th>
<th>“F”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without pilot choke or stroke adjustment</td>
<td>135.6  (5.33)</td>
<td>265.3 (10.44)</td>
<td>132.6 (5.22)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke adjustment (both ends)</td>
<td>415.9  (16.37)</td>
<td>208.0 (8.18)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot choke adjustment</td>
<td>175.6  (6.91)</td>
<td>265.3 (10.44)</td>
<td>132.6 (5.22)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke adjust. on cyl. ‘A’</td>
<td>135.6  (5.33)</td>
<td>200.0 (7.87)</td>
<td>108.8 (4.28)</td>
<td>200.0 (7.87)</td>
<td>146.5 (5.76)</td>
<td></td>
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<tr>
<td>Stroke adjust. on cyl. ‘B’</td>
<td>340.6  (13.40)</td>
<td>132.6 (5.22)</td>
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<td></td>
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<tr>
<td>Pilot choke and stroke adjust. on cyl ‘A’</td>
<td>175.6  (6.91)</td>
<td>200.0 (8.18)</td>
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<td></td>
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<tr>
<td>Pilot choke and stroke adjust. on cyl ‘B’</td>
<td>415.9  (16.37)</td>
<td>200.0 (8.18)</td>
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<td></td>
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</tr>
<tr>
<td>Pilot choke and stroke adjust. on both ends</td>
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</tbody>
</table>


---

19
### DG5V-8-A(L)-*-*-10 Spring Offset Model

Millimeters (inches)

<table>
<thead>
<tr>
<th>Spool Control Modifications</th>
<th>&quot;A&quot;</th>
<th>&quot;B&quot;</th>
<th>&quot;C&quot;</th>
<th>&quot;D&quot;</th>
<th>&quot;E&quot; pil</th>
<th>&quot;F&quot;</th>
<th>&quot;G&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without pilot choke or stroke adjustment</td>
<td>175.6</td>
<td>265.3</td>
<td>132.6</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Stroke adjustment (both ends)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot choke adjustment</td>
<td>215.6</td>
<td>265.3</td>
<td>132.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke adjust. on cyl. 'A'</td>
<td>175.6</td>
<td></td>
<td>208.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke adjust on cyl. 'B'</td>
<td>340.6</td>
<td></td>
<td>132.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot choke and stroke adjust. on cyl. 'A'</td>
<td></td>
<td>208.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot choke and stroke adjust. on cyl. 'B'</td>
<td></td>
<td></td>
<td>208.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot choke and stroke adjust. on both ends</td>
<td>415.9</td>
<td></td>
<td>208.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dimensions

- "A" = 122.9 (4.84)
- "D" = 83.4 (3.28)
- "G" = 194.4 (7.65)
Spool Control Modifications (without Reducer)

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>&quot;A&quot;</th>
<th>&quot;B&quot;</th>
<th>&quot;C&quot;</th>
<th>&quot;D&quot;</th>
<th>&quot;E&quot; pilot</th>
<th>&quot;F&quot;</th>
<th>&quot;G&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AC Sol.</td>
<td>DC Sol.</td>
<td>Dual Solenoid</td>
<td>Single Solenoid</td>
<td>Reducer Module</td>
<td>Pilot Choke</td>
<td></td>
</tr>
<tr>
<td>Without pilot choke or stroke adjustment</td>
<td>135.6 (5.33)</td>
<td>326.1 (12.83)</td>
<td>193.5 (7.61)</td>
<td>98.8 (3.88)</td>
<td>108.8 (4.28)</td>
<td>200.0 (7.87)</td>
<td>220.0 (8.66)</td>
</tr>
<tr>
<td>Stroke adjust on cyl. ‘B’</td>
<td>175.6 (6.91)</td>
<td>401.5 (15.80)</td>
<td>193.5 (7.61)</td>
<td>98.8 (3.88)</td>
<td>108.8 (4.28)</td>
<td>200.0 (7.87)</td>
<td>220.0 (8.66)</td>
</tr>
</tbody>
</table>

(With reducer)

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>&quot;A&quot;</th>
<th>&quot;B&quot;</th>
<th>&quot;C&quot;</th>
<th>&quot;D&quot;</th>
<th>&quot;E&quot; pilot</th>
<th>&quot;F&quot;</th>
<th>&quot;G&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AC Sol.</td>
<td>DC Sol.</td>
<td>Dual Solenoid</td>
<td>Single Solenoid</td>
<td>Reducer Module</td>
<td>Pilot Choke</td>
<td></td>
</tr>
<tr>
<td>Without pilot choke or stroke adjustment</td>
<td>175.6 (6.91)</td>
<td>326.1 (12.83)</td>
<td>193.5 (7.61)</td>
<td>98.8 (3.88)</td>
<td>108.8 (4.28)</td>
<td>200.0 (7.87)</td>
<td>220.0 (8.66)</td>
</tr>
<tr>
<td>Stroke adjust on cyl. ‘B’</td>
<td>215.6 (8.48)</td>
<td>401.5 (15.80)</td>
<td>193.5 (7.61)</td>
<td>98.8 (3.88)</td>
<td>108.8 (4.28)</td>
<td>200.0 (7.87)</td>
<td>220.0 (8.66)</td>
</tr>
</tbody>
</table>
Optional Features

Pilot Choke
DGMFN-3-Y-A2W-B2W-41

Pilot choke increases the amount of time to shift the mainstage spool, lowering the possibility of large flow transients in the circuit. It is adjusted by backing off locknuts and turning adjusting screws inward to decrease rate of spool travel and outward to increase spool travel rate. See spool control modifications in model code.

Stroke Adjustment

Stroke adjustment limits movement of the mainstage spool. Backing off the jamnut and turning the adjusting screw inward decreases spool stroke. See spool control modifications in model code.

Reducer Module
DGMX2-3-PP-FW-S-40-EN91

The reducer module is required for piloted models when pilot pressure exceeds 210 bar (3000 psi). These two-stage spool valves maintain a reduced outlet pressure against variations in inlet pressure. These valves are able to act as relief valves (at 50% of the maximum flow) to prevent excess pressure being developed when an actuator is subject to a reactive load.

Pressure Centered Models

This option provides faster spring centering time by using pilot pressure to center the spool. The centering springs are used in addition to pilot pressure to ensure positive centering of the spool. The valve spool is returned to center position by pilot pressure and centering springs. If pilot pressure fails or falls below the required minimum, the spool will return to center position at minimum pilot pressure flow rates for pressure centered valves.
Integral Check Valves

For internal pilot pressure, an integral pressure port check valve is required for internally piloted valves with open center spools (0, 1, 4, 8 & 9). The pilot pressure generated is the total of: P→T drop through the valve in center condition, pressure drop through the check valve, plus the pressure at the tank port.

For proper operation, total pressure drop must be greater than the minimum required pilot pressure (see chart). To prevent load drop, a check valve in the pressure port can be used to prevent reverse flow from a cylinder port to pressure port. If using as reverse flow check, maximum reverse pressure is limited to 210 bar (3000 psi).

**X - Fast Response**

Use of this option decreases the shift time and increases the system shock generation. This requires the removal of an orifice plug within the mainstage body. It is available on all models by adding “X” to the model code. Example: DG5V-8-(*)-2C-X-(*)-10

![Pressure Drop Across Check Valve](chart)

When a standard performance pilot is selected and pilot pressure is above 3000 psi, the reducer module is required to limit high drain line pressure transients generated during shifting.
Electronic Information

Typical Solenoid Energizing

Solenoids identified to U.S. standards

Functional symbols related to solenoid identity “A” and/or “B” according to NFPA/ANSI standards, i.e. energizing solenoid “A” gives flow P to A, solenoid “B” gives flow P to B (as applicable).

Solenoids identified to European standards (specify “V” in model code)

Functional symbols related to solenoid identity “A” and/or “B” according to European convention i.e. solenoid “A” adjacent to “A” port, solenoid “B” adjacent to “B” port of valve.

For spool type solenoids:

- A: All except “B”
- B: “B” only

For valves with type “8” spools, solenoid identity to U.S. convention is the same as for European convention.

DG4V-3 High Performance Solenoid Coil Ratings

<table>
<thead>
<tr>
<th>Solenoid Identification Letter</th>
<th>Solenoid Voltage Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>BL</td>
<td>110V AC 50Hz</td>
</tr>
<tr>
<td></td>
<td>120V AC 60 Hz</td>
</tr>
<tr>
<td>DL</td>
<td>220V AC 50 Hz</td>
</tr>
<tr>
<td></td>
<td>240V AC 60 Hz</td>
</tr>
<tr>
<td>GL</td>
<td>12V DC</td>
</tr>
<tr>
<td>HL</td>
<td>24V DC</td>
</tr>
</tbody>
</table>

DG4V-3(S) Standard Performance Solenoids Coil Ratings

<table>
<thead>
<tr>
<th>Solenoid Identification Letter</th>
<th>Solenoid Voltage Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>110V AC 50Hz</td>
</tr>
<tr>
<td>B</td>
<td>110V AC 50 Hz</td>
</tr>
<tr>
<td></td>
<td>120V AC 60 Hz</td>
</tr>
<tr>
<td>C</td>
<td>220V AC 50 Hz</td>
</tr>
<tr>
<td>D</td>
<td>220V AC 50 Hz</td>
</tr>
<tr>
<td></td>
<td>240V AC 60 Hz</td>
</tr>
<tr>
<td>G</td>
<td>12V DC</td>
</tr>
<tr>
<td>H</td>
<td>24V DC</td>
</tr>
</tbody>
</table>

Power Consumption

<table>
<thead>
<tr>
<th>AC solenoids (for coils listed in model code)</th>
<th>Initial VA (RMS)</th>
<th>Holding VA (RMS)</th>
<th>Initial VA (RMS)</th>
<th>Holding VA (RMS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full power coils:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single frequency coils AC 50 Hz</td>
<td>225</td>
<td>39</td>
<td>265</td>
<td>54</td>
</tr>
<tr>
<td>Dual frequency coils at 50 Hz</td>
<td>265</td>
<td>49</td>
<td>280</td>
<td>61</td>
</tr>
<tr>
<td>Dual frequency coils at 60 Hz</td>
<td>260</td>
<td>48</td>
<td>300</td>
<td>58</td>
</tr>
<tr>
<td>Low power coils, “BL” and “DL”:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dual frequency coils at 50 Hz</td>
<td>Low power coils not usable</td>
<td>170</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>Dual frequency coils at 60 Hz</td>
<td>with DG4V-3S valves.</td>
<td>190</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>Power consumption, DC solenoids at rated voltage and 20°C (68°F).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full power coils:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12V, model type “G”</td>
<td>30W</td>
<td>–</td>
<td>30W</td>
<td>–</td>
</tr>
<tr>
<td>24V, model type “H”</td>
<td>30W</td>
<td>–</td>
<td>30W</td>
<td>–</td>
</tr>
<tr>
<td>Low power coils:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12V, model type “GL”</td>
<td>Low power coils not usable with DG4V-3S valves.</td>
<td>18W</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>24V, model type “HL”</td>
<td></td>
<td></td>
<td>18W</td>
<td>–</td>
</tr>
</tbody>
</table>

▲ 1st half cycle; armature fully retracted.
Models for use with ISO 4400 (DIN 43650) connectors

Millimeters (inches)

Double solenoid models
DG4V-3(S)-*C-**-(V)M-U-**-60
DG4V-3(S)-*N-**-(V)M-**-60

Single solenoid models
DG4V-3(S)-*A(-**)
DG4V-3(S)-*B(-**)
DG4V-3(S)-*AL(-**)
DG4V-3(S)-*BL(-**)
DG4V-3(S)-*F
DG4V-3(S)-*FL(-**)
DG3V-3(S)-*E
DG4V-3-****(L)-Y
DG4V-3S-****(L)-Y

As shown
DG4V-3(S)-*C-**-(V)M-U-**-60
DG4V-3(S)-*N-**-(V)M-**-60

Solenoid and end cap interchanged
DG4V-3(S)-*C-**-(V)M-U-**-60
DG4V-3(S)-*N-**-(V)M-**-60

Note:
1. Opposite solenoid (on “C” and “N” double solenoid models) should not be energized while the valve is latched in selected position; AC solenoid coils will burn out under this improper usage.

2. “Y” feature is field-convertible from “H” type manual override (omitting spacer), but is not field-convertible from other models.

Latching manual override on solenoid
DG4V-3-****(L)-Y-(V)M-**-60
DG4V-3S-****(L)-Y-(V)M-**-60, DC coil models only

Application
Stainless steel lever/latch mechanism and water-resistant seal make this feature ideal for vehicle-mounted and exposed applications requiring emergency selection of valve for a period of time in the event of electrical failure.

Alternative plug positions by loosening knurled nut, turning coil, and re-tightening.

Note: “H” feature is not field convertible from other models; specify with order.

Water-resistant manual override on solenoid
DG4V-3(S)-****(L)-H-(V)M-**-60

Application
General use where finger operation is required (standard manual overrides cannot be operated without using small tool).

1. Opposite solenoid (on “C” and “N” double solenoid models) should not be energized while the valve is latched in selected position; AC solenoid coils will burn out under this improper usage.

2. “Y” feature is field-convertible from “H” type manual override (omitting spacer), but is not field-convertible from other models.
Models with “F” type coils (lead wires) and conduit box.
Millimeters (inches)

Double solenoid models ▲
DG4V-3(S)-“C”-(V)M-Ε”-60
DG4V-3(S)-“N”-(V)M-Ε”-60

Single solenoid models ▲
DG4V-3(S)-“A”(-**)
DG4V-3(S)-“B”(-**)
DG4V-3(S)-8BL(-**)
DG3V-3(S)-“F”

As shown
DG4V-3(S)-“AL”(-**)
DG4V-3(S)-“BL”(-**)
DG4V-3(S)-8B(-**)
DG4V-3(S)-“FL”(-**)

Solenoid and end cap interchanged

Not applicable to type “8” spool.

Codes “FJ” and “FW”:
2 lead wires for each solenoid, approximately 150,00 (6.00) long. M3 (#6) terminals provided for customer connection.

Codes “FTJ” and “FTW”:
Valve supplied with lead wires connected into terminal strip suitable for M3 (#6) terminals for customer connection.
DG4V-3-*A(L)-(V)M-S6-U-**-60
Millimeters (inches)
Single solenoid models with LVDT type switch indicating when the spool is in the spring off-set position. ISO 4400 (DIN 43650) connection to solenoid; Pg7 connection to switch.

DG4V-3-*A(L)-(Z)-(V)M-S3-FPA5W-**-60
DG4V-3-*A(L)-(Z)-(V)M-S4-FPA5W-**-60
DG4V-3-*A(L)-(Z)-(V)M-S5-F-**-60
Single solenoid models with mechanical type switch monitoring of spool movement.
Conduit box with leads, or pre-wired to NFPA T3.5.29-1980 receptacle.

Restrictor plugs
Restrictor plugs are available for use in ports P, T, A or B. These can be used for restricting flow or for circuit dampening. Restrictor plugs are not recommended for use above 210 bar (3000 psi) system pressure.

Port restrictor plugs
Restrictor plug selection table

<table>
<thead>
<tr>
<th>Code</th>
<th>Orifice diameter</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>'00</td>
<td>Blank</td>
<td>694353</td>
</tr>
<tr>
<td>'03</td>
<td>0.30 (0.012)</td>
<td>694341</td>
</tr>
<tr>
<td>'06</td>
<td>0.60 (0.024)</td>
<td>694342</td>
</tr>
<tr>
<td>'08</td>
<td>0.80 (0.030)</td>
<td>694343</td>
</tr>
<tr>
<td>'10</td>
<td>1.00 (0.040)</td>
<td>694344</td>
</tr>
<tr>
<td>'13</td>
<td>1.30 (0.050)</td>
<td>694345</td>
</tr>
<tr>
<td>'15</td>
<td>1.50 (0.060)</td>
<td>694346</td>
</tr>
<tr>
<td>'20</td>
<td>2.00 (0.080)</td>
<td>694347</td>
</tr>
<tr>
<td>'23</td>
<td>2.30 (0.090)</td>
<td>694348</td>
</tr>
</tbody>
</table>

* = P, T, A or B, as required
■ Available in multiples of 25 per part number

Maximum port dia in subplate/manifold block:
For steel and SG (ductile) iron: 7.0 (0.3)
For gray iron: 6.5 (0.25)
Terminal strip and lights

For valves with type “F” coils.

Millimeters (inches)

- Terminal strip (part number 890345) clips to cover and can be field-fitted
- Conduit box cover and nameplate complete with sealing gasket and 4 screws
- M3 x 0.5-6H screws (part number 02-113355) 2 each end
- 4 terminal screws M3 x 0.5-6H (part number 02-113355)
- Connections to solenoid A (or B, according to model type)
- Anti-rotation tab ensures correct orientation of cover to junction box
- Rubber gasket 2 lenses in cover

1. For DC coils the +ve lead(s) must be connected to the terminal(s) marked +. When using 3-wire incoming leads to double solenoid valves (i.e. common neutral) the inner pair of terminals must be interconnected

2. For correct light indication of energized solenoid ensure that solenoid leads are correctly connected: light terminals are common with each outer pair of solenoid terminals according to the side with + mark.

Insta-Plug

DG4V-3(S)---FPA---60
DG4V-3(S)---FPBW---60

Vickers 2-part “Insta-Plug” eliminates breaking electrical inputs for valve disconnect. A male half is pre-wired to the valve body. The mating plug is inside a wire housing with external terminals for machine wire connections.

Captive thumb screws, when loosened, permit the wire housing to be pulled clear of the valve for disconnect. A longer ground post provides first make/last break ground connection.

The PBW configuration combines both male and female plugs in the wiring housing for a self-contained plug-in unit.

Optional solenoid indicator lights are pre-wired to the female plug. Solenoids “A” and/or “B” are identified on the wiring housing.

PA configuration

Millimeters (inches)

- Port A
- Port B
- 16.25 (0.64)
- 20.25 (0.79) M4-6H thd.
- 32.50 (1.28)
- 15.5 (0.61)
- 71.1 (2.80)
- 47.5 (1.87) ref.
- 48.0 (1.89) clearance to remove female receptacle

PBW configuration

- 24.0 (0.95)
- 23.1 (0.91)
- 98.5 (3.88)
- 69.0 (2.72) ref.
- 69.0 (2.72) ref.
- 89.0 (3.50) ref.
- 48.0 (1.89) clearance to remove female receptacle

WARNING TAG
“Electrical power must be disconnected before removing or replacing this receptacle”.

The conduit box dimensions used for the PA/PBW type connector are different from those on the other “F” type coil models.

Port A
Port B

The conduit box dimensions used for the PA/PBW type connector are different from those on the other “F” type coil models.
NFPA Connector T3.5.29-1980

Connection details and model type/model code references.

Millimeters (inches)
DG4V-3(S)---FPA3W(L)---*A
DG4V-3(S)---FPA5W(L)---*B
DG4V-3---S3-FPA5W(L)---*A
DG4V-3---S4-FPA5W(L)---*B

The receptacle is a standard three or five pole connector with shortened leads and terminals added. The five pole plug has four leads 101.6 (4.0) long and one 177.8 (7.0) long. The three pole plug has two leads 101.6 (4.0) long and one 177.8 (7.0). All wires have underwriters recognized non-solder insulated eyelet terminals. The green wire is used for the ground (earth) connection (No. 8 screw furnished). Valves are supplied pre-wired.

3 pin connector
Use with single solenoid valve
Key model code designations:
DG4V-3(S)---A(L)(---*)M-FPA3W(L)
DG4V-3(S)---B(L)(---*)M-FPA3W(L)

5 pin connector
Use with single solenoid valve
Key model code designations:
DG4V-3(A(L)(---*)M-FPA5W(L)
DG4V-3---S3-FPA5W(L)
DG4V-3---S4-FPA5W(L)

5 pin connector
Use with double solenoid valve
Key model code designations:
DG4V-3---S/L---FPA5W(L)

Warning tag:
"Electrical power must be disconnected before removing or replacing electrical plug."

5 pin connector
Use with single solenoid valve with S3 spool position monitor switch
Key model code designations:
DG4V-3---A(L)(---*)M-S3-FPA5W(L)

5 pin connector
Use with single solenoid valve with S4 spool position monitor switch
Key model code designations:
DG4V-3---A(L)(---*)M-S4-FPA5W(L)
DIN 43650 Connector

Millimeters (inches)

Cable diameter range .... Ø6–10 mm (0.24–0.40)
Wire section range ....... Ø0.5–1.5 mm² (0.0008–0.0023 in²)
Terminals ............... Screw type
Type of protection ......... IEC144 class IP65, when plugs are fitted correctly to the valves with interface seals (supplied with plugs) in place.

Connector can be positioned at 90° intervals on valve by re-assembling contact holder into appropriate position inside connector housing.

Use U12 or U11 type connectors with 12 and 24V DC coils if rectification is required.

Connectors with and without indicator lights are available (order separately):

<table>
<thead>
<tr>
<th>Receptacle</th>
<th>Voltage (AC or DC)</th>
<th>Part Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1 Coils without lights</td>
<td>—</td>
<td>710776 710775</td>
</tr>
<tr>
<td>U6 Coils with lights</td>
<td>12-24</td>
<td>977467 977466</td>
</tr>
<tr>
<td></td>
<td>100-125</td>
<td>977469 977468</td>
</tr>
<tr>
<td></td>
<td>200-240</td>
<td>977471 977470</td>
</tr>
<tr>
<td>U11 Rectified coils with lights</td>
<td>12 DC</td>
<td>02-141358</td>
</tr>
<tr>
<td></td>
<td>24 DC</td>
<td>02-141359</td>
</tr>
<tr>
<td></td>
<td>98-240 VDC</td>
<td>02-141360</td>
</tr>
<tr>
<td></td>
<td>200-240 VDC</td>
<td>02-141361</td>
</tr>
<tr>
<td>U12 Rectified coils without lights</td>
<td>—</td>
<td>02-141357</td>
</tr>
</tbody>
</table>

Surge Suppression Devices
(For DC Valves)

Standard diode
Diode in parallel with coil. When switch (S1) is opened, the energy stored in the coil is trapped and dissipated by the diode (D1).

D Works only with DC voltage
D Polarity dependent
D Increases drop out time

Transzorb
Diode and Zener diode in parallel with coil. When switch (S1) is opened, the energy stored in the coil is trapped and dissipated by the diode (D1) and Zener diode (Z1) and the coil resistance.

D The Zener makes exact limitation of inductive spikes.
D Works only with DC voltage
D Polarity dependent

NOTE: These surge suppression devices are “Polarity Dependent.” Proper biasing conditions must be met when installing/connecting a coil in a system.

Valve Shift and Dropout Times With and Without Surge Suppression

<table>
<thead>
<tr>
<th>CETOP 3</th>
<th>CETOP 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Diode</td>
<td>No Diode</td>
</tr>
<tr>
<td>23</td>
<td>70</td>
</tr>
<tr>
<td>Diode Alone</td>
<td>Diode Alone</td>
</tr>
<tr>
<td>23</td>
<td>70</td>
</tr>
<tr>
<td>Diode/Zener</td>
<td>Diode/Zener</td>
</tr>
<tr>
<td>23</td>
<td>70</td>
</tr>
</tbody>
</table>

Times represent cessation/application of voltage to coil versus velocity (start/stop) of a cylinder using a single solenoid, spring offset valve (time in milliseconds).
**Mounting Surface**

### Subplates

Subplates must be ordered separately. When a subplate is not used, a machined pad must be provided for mounting. Pad must be flat within 0.13 mm (0.0005 inch) and smooth within 0.8 mm (32 microinch).

**Note**

“E” in subplate model code designates side ported models.

<table>
<thead>
<tr>
<th>Subplate Model Code</th>
<th>Thread Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>DGVM-8-10-T12</td>
<td>1.062&quot;-12UN</td>
</tr>
<tr>
<td>DGVM-8-10-T16</td>
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<td>DGVM-8-10-T20</td>
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<td>DGVM-8-10-T16</td>
<td>1.312&quot;-12UN</td>
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<tr>
<td>DGVM-8-D-10-T12</td>
<td>1.062&quot;-12UN</td>
</tr>
<tr>
<td>DGVM-8-D-10-T16</td>
<td>1.312&quot;-12UN</td>
</tr>
</tbody>
</table>

### Mounting Bolts

Mounting bolts not included with subplate mounted valves or subplates for those valves. Bolts used should be grade 7 or better. Order kits to obtain correct bolts:

<table>
<thead>
<tr>
<th>Mounting Bolt Kits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metric</td>
</tr>
<tr>
<td>BKDG8-655M</td>
</tr>
<tr>
<td>Inch</td>
</tr>
<tr>
<td>BKDG06-635</td>
</tr>
</tbody>
</table>

### Application Data

#### 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.

Vickers products, as any components, will operate with apparent satisfaction in fluids with higher cleanliness codes than those described. Other manufacturers will often recommend levels above those specified. Experience has shown, however, that life of any hydraulic component is shortened in fluids with higher cleanliness codes than those listed below. These codes have been proven to provide a long, trouble-free service life for the products shown, regardless of the manufacturer.

#### Fluids and Seals

The use of synthetic, fire resistant fluids requires a valve with special seals. Add prefix “F3” to the model code when phosphate ester oil or its blend are to be used. Add prefix “F6” to the model code when water glycol or water-in-oil emulsions are to be used.

The pilot valve has “F3” seals (Viton®) as standard. All internal seals of the mainstage are also “F3”. Mounting face seals are standard (Buna-N). “F6” prefix denotes special seals (Nitrile) throughout the valve assembly.

#### Fluid Cleanliness Rating

20/18/15

#### Viscosity Range

75 to 600 Ssu (15 to 128 cSt)

#### Operating Temperature Range

−18° to 66°C (0° to 150°F)