Mechanical Actuators Directional Control Valves
Directional Control Valves

310 bar (4500 psi)

Flows to 114 l/min (30 USgpm)
NFPA D05, ISO-4401-05
DG1V4-01**-10 Knob Operated
DG17V4-01**-10 Lever Operated
Introduction

General Description
The mechanical directional control valves described in this brochure are:

- Knob & Lever operated valves
  DG1/17V4-01**-10

Mechanical operation used by these valves is achieved by hand actuation.

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

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Typical Sectional View
### Model Code
Two & Four-way Directional Valves

<table>
<thead>
<tr>
<th>1</th>
<th>Interface seals</th>
<th>5</th>
<th>Valve size</th>
<th>9</th>
<th>Flag symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Blank - Buna N (std.)</td>
<td></td>
<td>01 - ISO-4401-05, NFPA-D05 interface</td>
<td></td>
<td>M - Electrical features (applies only to switch models)</td>
</tr>
<tr>
<td></td>
<td>F3 - Viton (fire resistant seals)</td>
<td>2</td>
<td>Valve size</td>
<td>9</td>
<td>Omit if not required</td>
</tr>
<tr>
<td></td>
<td>F6 - Nitrile seals (water glycol)</td>
<td></td>
<td>Spool type (crossover condition)</td>
<td>10</td>
<td>Spool indicator switch</td>
</tr>
<tr>
<td>2</td>
<td>Directional control</td>
<td></td>
<td>0 - Open center</td>
<td>11</td>
<td>U - DIN 43650 connection for switch</td>
</tr>
<tr>
<td></td>
<td>Mounting type</td>
<td>1</td>
<td>1 - Open center, B blocked</td>
<td>12</td>
<td>S3 - Switch wired normally open</td>
</tr>
<tr>
<td></td>
<td>G - Manifold or subplate</td>
<td>2</td>
<td>2 - Closed center</td>
<td>13</td>
<td>S4 - Switch wired normally closed</td>
</tr>
<tr>
<td>3</td>
<td>Control type</td>
<td>3</td>
<td>3 - Closed center, P and B blocked</td>
<td></td>
<td>Omit if not required</td>
</tr>
<tr>
<td></td>
<td>17 - Manual lever operated</td>
<td>4</td>
<td>4 - Closed center, P only</td>
<td></td>
<td>Switch connection</td>
</tr>
<tr>
<td></td>
<td>1 - Knob operated</td>
<td></td>
<td>5 - Closed center, T blocked</td>
<td>14</td>
<td>U1 - DIN 43650 connector provided for switch</td>
</tr>
<tr>
<td>4</td>
<td>Flow direction</td>
<td>6</td>
<td>6 - Open center, A blocked</td>
<td></td>
<td>Omit if not required</td>
</tr>
<tr>
<td></td>
<td>V4 - Four-way, 310 bar (4500 psi)</td>
<td>7</td>
<td>Spool type (crossover condition)</td>
<td></td>
<td>Design number</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7 - Open center, A blocked</td>
<td>14</td>
<td>Subject to change. Installation dimensions remain as shown for design numbers 10 through 19.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8 - Closed center, 2-way</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>9 - Closed center, A and P blocked</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 - Closed center, bleed A &amp; B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Spool/Spring arrangement</td>
<td></td>
<td>Left hand build</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A - Spring offset (handle out)</td>
<td></td>
<td>Omit for standard right hand assembly</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A2 - Spring offset (handle in)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C - Spring centered</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N - No spring detented</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Handle</td>
<td></td>
<td>Handle</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H - Booted handle for harsh environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Omit if not required</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Viton is a registered trademark E.I. DuPont Co.
General Information

Spool Variations

DG**V4-010*-10

DG**V4-018*-10

DG**V4-011*-10

DG**V4-0111*-10

DG**V4-012*-10

DG**V4-0122*-10

DG**V4-013*-10

DG**V4-031*-10

DG**V4-016*-10

DG**V4-033*-10

DG**V4-017*-10

Build Variations

DG17V4-01*A-10

DG17V4-01*C-10

DG17V4-01*A2-10

DG17V4-01*CL-10

DG17V4-01*AL-10

DG17V4-01*N-10

DG17V4-01*A2L-10

DG17V4-01*NL-10

Operator Variations

DG17V4-01**-10 Lever operator

DG1V4-01**-10 Knob operator
Performance Data
Max. pressure P, A & B ports:
For all spools except type “8” 315 bar
(4500 psi)
For type “8” spools only 175 bar
(2500 psi)
Max. pressure T port: 70 bar (1000 psi)
Max. flow:
- All DG17V4 models except type “1”
  and “11” spools - 114 l/min
  (30 USgpm)
- All DG17V4 models with type “1”
  and “11” spools - 45 l/min
  (12 USgpm)
- All DG1V4-01*N models except type
  “1” and “11” spools - 76 l/min
  (20 USgpm)
- All DG1V4-01*N models with type
  “1” and “11” spools - 45 l/min
  (12 USgpm)
- All DG1V4-01*A/C models - 30 l/min
  (8 USgpm)
Handle shift force:
  DG17V4 “A” – 38 N. (8.5 lbs.)
  DG17V4 “C” – 36 N. (8.0 lbs.)
  DG17V4 “N” – 20 N. (4.5 lbs.)
Operating temperature:
  20° to 50° C (70° to 120° F)
Weights (approx):
DG1V4: 3.1 kg (6.9 lbs.)
DG17V4: 3.4 kg (7.4 lbs.)
Bolt kits:
  (metric) - BK855993M
  (inch) - BDKG01-633
SAE grade 8 (metric grade 12,9) or
better required
Max. bolt torque: 12.6 Nm (112 lb. in.)
Subplate: 2 kg (4.5 lbs.)
Fluid viscosity: 75-250 SUS (15-51 cSt)
Fluid Cleanliness - See page 11.

Fluids & Seals
BUNA-N seals are standard and are
compatible with water-in-oil emulsions,
high water based fluids, and petroleum
oil. “F3” (Viton) seals are compatible
with phosphate esters, and “F6” seals
are for water glycol. Maximum operating
pressure for high water based fluids is
69 bar (1000 psi).

Mounting Interface
ISO 4401-05
CETOP 5
NFPA D05

Shifting Action
Spring offset valves are spring
positioned unless lever is actuated.

Spring centered valves return the spool
to center position when the lever or
knob control is released.

No-spring detented valves will remain in
the last position attained provided there
is no severe shock, vibration or unusual
pressure transients.

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.
The mounting position of spring-offset,
and spring centered models is
unrestricted.

Installation Data
On two-way valves “T” is the drain
connection and must be piped directly to
tank through a surge-free line so there
will be no back pressure at this port.

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.
1. Figures in the pressure drop chart give approximate pressure drops (\(\Delta P\)) when passing 20.5 cSt (100 SUS) fluid having .865 specific gravity.

2. For any other flow rate \(Q_1\), the pressure drop \(\Delta P_1\) will be approximately:
   \[
   \Delta P_1 = \Delta P \left(\frac{Q_1}{Q_2}\right)^2
   \]

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:
   \[
   \Delta P_1 = \Delta P \left(\frac{G_1}{G}\right)
   \]

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

**Manual Lever Operated Valves**

Millimeters (inches)

DG17V4-01*A-10
DG17V4-01*A2-10

Position #3 (extreme in)
Neutral for DG17V4-01*A2-10 models

Position #1 (extreme out)
Neutral for DG17V4-01*A-10 models

DG1(7)V4-01*A-(H)-M-S*-U(1)-10

"U1" - DIN 43650 connector supplied for switch connection

"U" - DIN 43650 for switch

**Manual Knob Operated Valve**

DG1V4-01**-10

Position #3
Position #2
Position #1

3.6 (.14) stroke
Spring Centered & No-Spring Detented
Manual Lever Operated Valves

Millimeters (inches)
DG17V4-01-*C-10
DG17V4-01-*N-10

Position #3 - extreme in
Position #2 - intermediate
Position #1 - extreme out

NFPA D-01 (ISO 4401-05, CETOP 5)
interface, seals included

Mechanically Operated
for Harsh Environments

millimeters (inches) 39.2 (1.54)
DG17V4-01**-H-10
Subplates & Bolt Kits

Valves, subplates and mounting bolts must be ordered separately.

Example:
One (1) DG17V4-012A-10 Valve
One (1) DGSM(E)-01-20-T8 Subplate
One (1) BKDG01-633 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)

"P" Pressure Conn. 10.3 (.41 D.) Thru 20.6 (.81 D.) Spotface 4-holes for mounting
.438 Dia. System ports 4 holes
"B" Cyl. Conn.

.250-20 UNC-2B Thd. 4-holes for mounting

"T" Tank Conn.
.750-16 UNF-2B Thd. 4 holes System connections. User to plug port "B" of subplate used with DG16 valve.
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.  

- "A" Cyl. Conn.  
  1/2" N.P.T.F. thd.  

- .250-20 UNC-2B Thd.  
  4-holes for mounting  

10.3 (.41) Thru 20.6 (.81 D.)  
Spotface 4-holes for mounting
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, and additives for protection against wear of components.


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.

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.

<table>
<thead>
<tr>
<th>Product</th>
<th>System Pressure Level</th>
<th>System Pressure Level</th>
<th>System Pressure Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;70 ( &lt;1000)</td>
<td>70-210 (1000-3000)</td>
<td>210+ ( 3000+)</td>
</tr>
<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></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>Directional Valves</td>
<td>20/18/15</td>
<td>20/18/15</td>
<td>19/17/14</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>
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<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>
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</tr>
<tr>
<td>Vane Motors</td>
<td>20/18/15</td>
<td>19/17/14</td>
<td>18/16/13</td>
</tr>
<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. Refer to 694 for hydraulic fluid and temperature recommendations.