Proportional Directional Control Valves
Two-Stage Models Without Electrical Feedback

KBDG5V-5-1*
KBDG5V-7-1*
KBDG5V-8-1*
KBDG5V-10-1*
This product has been designed and tested to meet specific standards outlined in the European Electromagnetic Compatibility Directive (EMC) 89/336/EEC, amended by 91/286/EEC, 92/18/EEC and 93/68/EEC, article 5. For instructions on installation requirements to achieve effective protection levels, see this leaflet and the Installation Wiring Practices for Vickers™ Electronic Products leaflet 2488. Wiring practices relevant to this Directive are indicated by Electromagnetic Compatibility (EMC).
Vickers™ KBDG5V-5/7/8/10 are solenoid operated directional control, non-feedback type proportional valves. These are two-stage proportional directional control valves in which the main-stage spool is positioned according to the output from an integrally mounted proportional, solenoid-operated, pressure-reducing valve. Direction of main-spool travel depends upon which of the two solenoids of the pilot valve is energized and the amount of travel is dependent upon the current input to the solenoid. At any intermediate position of the main spool, a force balance exists between the controlled, reduced pilot pressure acting on the spool end and the opposing centering spring, plus the action of flow forces. There is no electrical feedback of the main-stage spool position. This range of valves offers effective and economic solutions for applications having repetitive load conditions throughout each operating cycle, e.g. mold closure /opening in plastics molding machinery.

**Standard Features and Benefits**

- These global products, manufactured to world-class quality standards, are sold and serviced throughout the world.
- These valves open up expanded application opportunities as a cost effective alternative to feedback-type proportional and servo valves.
- Auxiliary DIN-rail mounted function modules available.

**Typical Section**

**KBDG5V-7**
Without Integral Pilot Pressure Reducer
<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
<th>Column 5</th>
<th>Column 6</th>
<th>Column 7</th>
<th>Column 8</th>
<th>Column 9</th>
<th>Column 10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model Series</strong></td>
<td><strong>KB</strong> – Proportional valve with integral amplifier, B series</td>
<td><strong>D</strong> – Directional valve</td>
<td><strong>G</strong> – Subplate mounted</td>
<td><strong>5</strong> – Solenoid controlled/pilot operated</td>
<td><strong>V</strong> – Pressure rating on P, A &amp; B ports</td>
<td><strong>Sizes 7, 8 and 10</strong>: 350 bar (5000 psi)</td>
<td><strong>Size 5</strong>: 315 bar (4500 psi)</td>
<td><strong>Spool Type</strong></td>
<td><strong>See “Spool Data”, page 5</strong></td>
</tr>
<tr>
<td><strong>Mounting Interface Size</strong> (ISO 4401)</td>
<td><strong>5</strong> – NFPA D05, CETOP 5</td>
<td><strong>7</strong> – NFPA D07, CETOP 7</td>
<td><strong>8</strong> – NFPA D08, CETOP 8</td>
<td><strong>10</strong> – NFPA D10, CETOP 10</td>
<td><strong>Flow Rating</strong></td>
<td><strong>See “Spool Data”, page 5</strong></td>
<td><strong>“A” port flow rating (L/min) for symmetric spools</strong></td>
<td><strong>“B” port flow rating (L/min) for asymmetric spools</strong></td>
<td><strong>Pilot Supply</strong></td>
</tr>
<tr>
<td><strong>Spool / Spring Arrangement</strong></td>
<td><strong>C</strong> – Spool spring centered</td>
<td><strong>Flow Rating</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Models without integral, fixed pilot pressure reducing module</strong></td>
</tr>
<tr>
<td><strong>Manual Override</strong></td>
<td><strong>Blank</strong> – Plain overrides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Internal pilot supply</strong></td>
</tr>
<tr>
<td><strong>Electrical Command Option</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Z</strong> – No overrides</td>
</tr>
<tr>
<td><strong>Electrical Connection</strong></td>
<td><strong>PC7</strong> – 7 pin connector without plug supplied</td>
<td><strong>PE7</strong> – 7 pin connector with plug supplied</td>
<td><strong>PH7</strong> – As PE7 but with pin “C” used for sense signal</td>
<td><strong>PR7</strong> – As PC7 but with pin “C” used for sense signal</td>
<td><strong>Coil Identification</strong></td>
<td><strong>H</strong> – 24V</td>
<td></td>
<td></td>
<td><strong>Design Number, 10 Series</strong></td>
</tr>
<tr>
<td><strong>Warning</strong></td>
<td><strong>Valves with integral amplifiers are supplied with or without the metal 7-pin plug. The Vickers™ plug, part no. 934939, must be correctly fitted to ensure that the EMC rating and IP67 rating are achieved. The plug retaining nut must be tightened to 2-2.5 Nm (1.5-2.0 lbf ft) to effect a proper seal.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Subject to change. Installation dimensions unaltered for design numbers 10 to 19 respectively</strong></td>
</tr>
</tbody>
</table>
### Spool Symbols
Simplified symbols including transient flow conditions (dotted line).

**Spool type 2C**

```
A B
P T
```

**Spool type 7C**

```
A B
P T
```

**Spool type 12C**

```
A B
P T
```

**Spool type 33C**

```
A B
P T
```

**Spool type 133C**

with typical regenerative circuit

### Spool Types and Flow Ratings

#### Symmetric Spools
Flow ratings for flow through P-A-B-T at $\Delta p = 5$ bar (72 psi) per flow path, e.g. P-A, or B-T. For other pressure drop values see “Flow Gain” curves on pages 10 and 11.

### Spool Symbols
Simplified symbols including transient flow conditions (dotted line).

**Spool type 2C**

```
A B
P T
```

**Spool type 7C**

```
A B
P T
```

**Spool type 12C**

```
A B
P T
```

**Spool type 33C**

```
A B
P T
```

### Spool Types and Flow Ratings

#### Symmetric Spools
Flow ratings for flow through P-A-B-T at $\Delta p = 5$ bar (72 psi) per flow path, e.g. P-A, or B-T. For other pressure drop values see “Flow Gain” curves on pages 10 and 11.

<table>
<thead>
<tr>
<th>SPOOL CODE</th>
<th>MAIN STAGE SPool SYMBOL</th>
<th>FLOW RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>For KBDG5V-5 valves:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2C30N</td>
<td>2C</td>
<td>90 L/min (24 USgpm)</td>
</tr>
<tr>
<td>33C80</td>
<td>33C</td>
<td>80 L/min (21 USgpm)</td>
</tr>
<tr>
<td>For KBDG5V-7 valves:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2C180N</td>
<td>2C</td>
<td>180 L/min (48 USgpm)</td>
</tr>
<tr>
<td>33C65N</td>
<td>33C</td>
<td>85 L/min (22.6 USgpm)</td>
</tr>
<tr>
<td>33C170N</td>
<td>33C</td>
<td>170 L/min (45 USgpm)</td>
</tr>
<tr>
<td>For KBDG5V-8 valves:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2C330N</td>
<td>2C</td>
<td>330 L/min (88 USgpm)</td>
</tr>
<tr>
<td>33C330N</td>
<td>33C</td>
<td>330 L/min (88 USgpm)</td>
</tr>
<tr>
<td>For KBDG5V-10 valves:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2C550N</td>
<td>2C</td>
<td>550 L/min (145 USgpm)</td>
</tr>
<tr>
<td>7C550N</td>
<td>7C</td>
<td>550 L/min (145 USgpm)</td>
</tr>
<tr>
<td>12C550N</td>
<td>12C</td>
<td>550 L/min (145 USgpm)</td>
</tr>
<tr>
<td>33C550N</td>
<td>33C</td>
<td>550 L/min (145 USgpm)</td>
</tr>
</tbody>
</table>

### Asymmetric Spools
Figure preceding metering type designator, ”N” (e.g. 2C***N) is flow rating P-A, or A-T (“A” port flow); figure after “N” (N***) is flow rating P-B, or B-T (“B” port flow).

<table>
<thead>
<tr>
<th>SPOOL CODE</th>
<th>MAIN STAGE SPool SYMBOL</th>
<th>FLOW RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>For KBDG5V-5 valves:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2C70N45</td>
<td>2C</td>
<td>70 L/min (18.5 USgpm), “A” port flow</td>
</tr>
<tr>
<td>33C60N40</td>
<td>33C</td>
<td>60 L/min (16.0 USgpm), “B” port flow</td>
</tr>
<tr>
<td>For KBDG5V-7 valves:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2C180N100</td>
<td>2C</td>
<td>180 L/min (48.0 USgpm), “A” port flow</td>
</tr>
<tr>
<td>33C130N65</td>
<td>33C</td>
<td>130 L/min (34.6 USgpm), “B” port flow</td>
</tr>
<tr>
<td>For KBDG5V-8 valves:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2C330N200</td>
<td>2C</td>
<td>330 L/min (88.0 USgpm), “A” port flow</td>
</tr>
<tr>
<td>33C330N200</td>
<td>33C</td>
<td>330 L/min (88.0 USgpm), “B” port flow</td>
</tr>
<tr>
<td>12C330N200</td>
<td>12C</td>
<td>330 L/min (88.0 USgpm), “A” port flow</td>
</tr>
<tr>
<td>133C330N200</td>
<td>133C</td>
<td>330 L/min (88.0 USgpm), “B” port flow</td>
</tr>
<tr>
<td>For KBDG5V-10 valves:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2C310N550</td>
<td>2C</td>
<td>310 L/min (82.6 USgpm), “A” port flow</td>
</tr>
<tr>
<td>33C310N550</td>
<td>33C</td>
<td>310 L/min (82.6 USgpm), “B” port flow</td>
</tr>
<tr>
<td>33C550N310</td>
<td>33C</td>
<td>550 L/min (145 USgpm), “A” port flow</td>
</tr>
</tbody>
</table>
Functional Symbols

Simplified symbol
KBDG5V models
(Spool type "2" shown)

7-pin plug
Pilot stage with integral amplifier.

Pressure reducer module, see "Model Code".

Main-stage.
Spool type "2C" shown.

Typical schematic symbol

* Internal plug shown, for external pilot supply (via port X). For internal pilot supply (from port P) plug is not fitted. Port X should be blocked at mounting interface, or otherwise plugged at subplate or manifold block. See "Model Code".

▲ Internal plug shown, for external pilot drain (via port Y). For internal pilot drain (via port T) plug is not fitted. Port Y should be blocked at mounting interface, or otherwise plugged at subplate or manifold block. See "Model Code".
See also "Pilot Drain Application" notes.
Data is typical with fluid at 36 cSt (168 SUS) and 50°C (122°F).

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply (24V)</td>
<td>(Model code [12] H) 24V DC (21V to 36V including 10% peak-to-peak ripple) maximum current - 1.2A</td>
</tr>
<tr>
<td>Command signal (Volts)</td>
<td>0 to +10V DC, or 0 to -10V DC, or -10V to +10V DC</td>
</tr>
<tr>
<td>Input impedance</td>
<td>47 kΩ</td>
</tr>
<tr>
<td>Common mode voltage to pin B (Model code [11] 1)</td>
<td>4V</td>
</tr>
<tr>
<td>Command signal (Current)</td>
<td>(Model code [11] 2) 4 to 20 mA</td>
</tr>
<tr>
<td>Input impedance</td>
<td>100Ω</td>
</tr>
<tr>
<td>Valve enable signal:</td>
<td></td>
</tr>
<tr>
<td>Enable</td>
<td>&gt;9.0V (36V max)</td>
</tr>
<tr>
<td>Disable</td>
<td>&lt;2.0V</td>
</tr>
<tr>
<td>Input impedance</td>
<td>36 kΩ</td>
</tr>
</tbody>
</table>

7-pin plug connector:

- **A**: Power supply positive (+)
- **B**: Power supply 0V and current command return
- **C**: Valve enable (PH7 & PR7)
- **D**: Command signal (+V or current in)
- **E**: Command signal (-V or current GND)
- **F**: Output monitor
- **G**: Protective ground

Electromagnetic compatibility (EMC):

- Emission (10 V/m): EN 50081-2
- Immunity (10 V/m): EN 50082-2

Monitor signal (pin F) 0 to +5V (0.39 V/A)

Output impedance 10 kΩ

Reproducibility, valve-to-valve (at factory settings):

Flow at 100% command signal ≤5%

Protection:

- Electrical: Reverse polarity protected
- Environmental: IEC 529, Class IP67

Ambient air temperature range for full performance 0°C to 70°C (32°F to 158°F)

Oil temperature range for full performance 0°C to 70°C (32°F to 158°F)

Minimum temperature at which valves will work at reduced performance: -20°C (-4°F)

Storage temperature range: -25°C to +85°C (-13°F to +185°F)

Mass:

- Valves with integral pressure reducing module:
  - KBDG5V-5: 9.8 kg (21.2 lb)
  - KBDG5V-7: 11.9 kg (25.8 lb)
  - KBDG5V-8: 20.6 kg (44.6 lb)
  - KBDG5V-10: 54.9 kg (118.9 lb)

For models without reducing module, deduct 1.2 kg (2.6 lb)

Supporting products:

- **EHA-CON-201-A-2** Signal converter: See catalog 2410A
- **EHD-DGS-201-A-1** Command signal generator: See catalog 2470
- **EHA-RMP-201-A-2** Ramp generator: See catalog 2410A
- **EHA-PID-201-A-2** PID controller: See catalog 2427
- **EHA-PSU-201-A-10** Power supply: See catalog 2410A

Ramp time: 0-12 sec for full step input (0-100%)

Relative duty factor: Continuous rating (ED = 100%)

Hysteresis with flow through P-A-T: <8% of rated flow
When using internal pilot pressure, port X should be plugged at the subplate or manifold face (e.g. manifold not drilled for connection to port X).

§ The maximum pressure for ports A and B is: 310 bar (4500 psi) for size 5; 350 bar (5000 psi) for sizes 7 and 8.

† See "Pilot Drain Application" note.

♣ Pilot must be externally drained, otherwise "Y" port pressure applies.

◆ Pilot must be externally drained, otherwise "T" port pressure limited to 210 bar (3000 psi).

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**Performance Characteristics**

Data is typical with fluid at 36 cSt (168 SUS) and 50 °C (122 °F).

### Minimum Pressure

**KBDG5V-5/7/8**  
For full flow performance, pilot pressure ≥45 bar (650 psi).

**KBDG5V-10**  
For full flow performance, pilot pressure ≥28 bar (405 psi).

i.e. Pressure at port P for internal pilot supply.

or Pressure at port X for external pilot supply.

### Pilot Drain Application Notes

External pilot drain is the recommended configuration.

Internal pilot drain is possible where a stable "T" port pressure, not exceeding 8 bar (116 psi), can be guaranteed.

Any pressure surges at the "T" port (drain) will cause the main spool to move and change the valve output. This possibility is eliminated by the use of an external drain.

---

### Maximum Pressures, bar (psi)

**For models without integral pilot pressure reducer**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>PILOT PRESSURE SOURCE</th>
<th>MODEL CODE 7</th>
<th>PORTS P, A, B</th>
<th>T</th>
<th>X</th>
<th>Y †</th>
</tr>
</thead>
<tbody>
<tr>
<td>KBDG5V-5</td>
<td>External E</td>
<td>E</td>
<td>315</td>
<td>210</td>
<td>200</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(4500)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Internal Omit</td>
<td></td>
<td>200</td>
<td>210</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(2900)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KBDG5V-7/8</td>
<td>External E</td>
<td>E</td>
<td>350</td>
<td>350</td>
<td>200</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(5000)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Internal Omit</td>
<td></td>
<td>350</td>
<td>200</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(2900)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KBDG5V-10</td>
<td>External E</td>
<td>E</td>
<td>350</td>
<td>350</td>
<td>40</td>
<td>8</td>
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<td></td>
<td>(5000)</td>
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</tr>
<tr>
<td></td>
<td>Internal Omit</td>
<td></td>
<td>40</td>
<td>350</td>
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<td>8</td>
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<tr>
<td></td>
<td></td>
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<td>(580)</td>
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</table>

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**For models with integral pilot pressure reducer**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>PILOT PRESSURE SOURCE</th>
<th>MODEL CODE 7</th>
<th>PORTS P, A, B</th>
<th>T</th>
<th>X</th>
<th>Y †</th>
</tr>
</thead>
<tbody>
<tr>
<td>KBDG5V-5</td>
<td>External EX</td>
<td>EX</td>
<td>315</td>
<td>210</td>
<td>315</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(4500)</td>
<td></td>
<td>(4500)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Internal X</td>
<td>X</td>
<td>315</td>
<td>210</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(4500)</td>
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</tr>
<tr>
<td>KBDG5V-7/8</td>
<td>External EX</td>
<td>EX</td>
<td>350</td>
<td>350</td>
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</tr>
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<td>(4500)</td>
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<tr>
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<td>Internal X</td>
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<td>350</td>
<td>350</td>
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<tr>
<td>KBDG5V-10</td>
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<td>350</td>
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<td>(5000)</td>
<td></td>
<td>(4500)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Internal X</td>
<td>X</td>
<td>350</td>
<td>350</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(5000)</td>
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</tbody>
</table>
Power Capacity Envelopes
Flow through P-A-B-T or P-B-A-T

Power Capacity Looped Flow

<table>
<thead>
<tr>
<th>USgpm</th>
<th>L/min</th>
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<tbody>
<tr>
<td>0</td>
<td>0</td>
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<tr>
<td>200</td>
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<tr>
<td>400</td>
<td>0</td>
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<td>600</td>
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<td>800</td>
<td>0</td>
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<td>1000</td>
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<tr>
<td>1200</td>
<td>0</td>
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<tr>
<td>1400</td>
<td>0</td>
</tr>
<tr>
<td>1600</td>
<td>0</td>
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</tbody>
</table>

Pressure drop

<table>
<thead>
<tr>
<th>psi</th>
<th>bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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</tr>
<tr>
<td>50</td>
<td>3.5</td>
</tr>
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<td>100</td>
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<tr>
<td>350</td>
<td>25</td>
</tr>
<tr>
<td>400</td>
<td>28</td>
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</tbody>
</table>

Flow rate

- 2C550N
- 2C330N
- 2C180N
- 2C90N
Flow Characteristics

Flow gain curves at stated values of total valve pressure drop, for flow P-A-B-T, or P-B-A-T.
Flow Characteristics (continued)

Flow gain curves at 10 bar (145) psi valve pressure drop, for flow P-A-B-T, or P-B-A-T.

KBDG5V-10-2C550N

KBDG5V-10-33C550N

Asymmetric Spools

At 5 bar (72 psi) valve pressure drop

KBDG5V-10-33C550N310
Step Response
(Typical)

Test conditions:
No pressure reducer module
Flow P-A-B-T
Total valve $\Delta p = 10$ bar (145 psi)
External pilot pressure $= 50$ bar (725 psi)
"Response" = Time, from step response signal, until output reaches 90% of step change value

<table>
<thead>
<tr>
<th>INPUT SIGNAL STEP CHANGE</th>
<th>SPOOL RESPONSE TIMES (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>KBDG5V-5</td>
</tr>
<tr>
<td>0 to 100%</td>
<td>42</td>
</tr>
<tr>
<td>100% to 0</td>
<td>33</td>
</tr>
<tr>
<td>10% to 90%</td>
<td>43</td>
</tr>
<tr>
<td>90% to 10%</td>
<td>40</td>
</tr>
<tr>
<td>25% to 75%</td>
<td>34</td>
</tr>
<tr>
<td>75% to 25%</td>
<td>30</td>
</tr>
<tr>
<td>90% to 90%</td>
<td>78</td>
</tr>
</tbody>
</table>

Pilot flow required to achieve above response times:

<table>
<thead>
<tr>
<th></th>
<th>KBDG5V-5</th>
<th>KBDG5V-7</th>
<th>KBDG5V-8</th>
<th>KBDG5V-10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.8 L/min</td>
<td>6.2 L/min</td>
<td>6.2 L/min</td>
<td>23.0 L/min</td>
</tr>
<tr>
<td></td>
<td>(0.98 USgpm)</td>
<td>(1.6 USgpm)</td>
<td>(1.6 USgpm)</td>
<td>(5.96 USgpm)</td>
</tr>
</tbody>
</table>
Installation
Dimensions

KBDG5V Models with “EX” or “X”
(With integral pilot pressure reducer)
The illustration is correct for KBDG5V-8 valves
Dimensions are shown in mm (inches)

Add 11.0 (0.44) for manual override

KBDG5V Models with “E” or No Symbol
(Without integral pilot pressure reducer)

Overall installed length of KBD valves is X1 with connector fitted, and X2 without.
Pilot Supply and Drain Plugs

**KBDG5V-7 models** only *
- Remove this plug for access to pilot drain plug

**KBDG5V-7 models** only *
- M6 x 8 mm plug, part no. 471131:
  - fitted for external pilot drain.
  - Not fitted for internal pilot drain.

**KBDG5V-7 models** only *
- M6 x 8 mm plug, part no. 471131:
  - fitted for external pilot supply models; not fitted for internal pilot supply models. See “Model Code”.

* Internal plug shown, for external pilot supply (via port X).
For internal pilot supply (from port P) plug is not fitted. Port X should be blocked at mounting interface, or otherwise plugged at subplate of manifold block. See “Model Code”.

**KBDG5V-8 models**
Section through port P of main-stage

**KBDG5V-10 models**
Plug, part no. 7074:
- Remove for internal pilot drain

Plug, part no. 30560 for internal pilot drain, part no. 7074 for external pilot drain.

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For more information about Eaton Vickers Proportional Directional Control Valves, visit the official Eaton website.
Views on Mounting Faces

All O-seals supplied

KBDG5V-5

4 holes for mounting bolts
Ø 7.02 (0.27 Ø) spotfaced to Ø 11.0 (0.43 Ø)

KBDG5V-7

6 holes for mounting bolts
4 x Ø 11.0 (0.43 Ø) c’bored
Ø 17.5 (0.68 Ø)
2 x Ø 6.4 (0.25 Ø) c’bored
Ø 11.0 (0.43 Ø)

KBDG5V-8

6 holes for mounting bolts
Ø 13.5 (0.53 Ø) spotfaced to Ø 20.0 (0.78 Ø)

KBDG5V-10

6 holes for mounting bolts
**Electrical Information**

---

**Block Diagram**

**KBDG5V-**

**COMMAND SIGNALS AND OUTPUTS**

<table>
<thead>
<tr>
<th>7-pin plug</th>
<th>Flow direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command = Volts (±10V)</td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>0V</td>
</tr>
<tr>
<td>0V</td>
<td>Negative</td>
</tr>
<tr>
<td>Negative</td>
<td>0V</td>
</tr>
<tr>
<td>0V</td>
<td>Positive</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Command = Current (4-20 mA)</th>
<th>Pin D</th>
<th>Pin E</th>
<th>Pin B</th>
<th>Flow direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 12 mA</td>
<td>Current</td>
<td>GND</td>
<td>Current return</td>
<td>P to A</td>
</tr>
<tr>
<td>Less than 12 mA</td>
<td>Current</td>
<td>GND</td>
<td>Current return</td>
<td>P to B</td>
</tr>
</tbody>
</table>

**Wiring**

Connections must be made via the 7-pin plug mounted on the amplifier. See this leaflet and Installation Wiring Practices for Vickers™ Electronic Products leaflet 2468. Recommended cable sizes are:

**Power Cables**

- For 24V supply: 0.75 mm² (18 AWG) up to 20m (65 ft)
- 1.00 mm² (16 AWG) up to 40m (130 ft)

**Signal Cables**

- 0.50 mm² (20 AWG)

**Screen (Shield)**

A suitable cable would have 7 cores, a separate screen for the signal wires and an overall screen. Cable outside diameter 8.0-10.5 mm (0.31-0.41 inches). See connection diagrams on next page.

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**7-pin plug connections**

- +24V
- Power 0V
- Enable ▲
- Non-inverting Inverting
- Current monitor
- Protective ground

▲ In valves with PH7 or PR7 type electrical connection.

**Warning**

All power must be switched off before connecting or disconnecting any plugs.

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**Diagram**

- Solenoid drive 2
- PWM modulator
- Ramp
- Gain
- Deadband
- Solenoid drive 1

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Typical Connection Arrangements

Wiring Connections

Wiring Connections for Valves with “Enable” Feature

Warning
Electromagnetic Compatibility (EMC)

It is necessary to ensure that the valve is wired up as above. For effective protection the user electrical cabinet, the valve subplate or manifold and the cable screens should be connected to efficient ground points. The metal 7-pin connector part no. 934939 should be used for the integral amplifier.

In all cases both valve and cable should be kept as far away as possible from any sources of electromagnetic radiation such as cables carrying heavy current, relays and certain kinds of portable radio transmitters, etc. Difficult environments could mean that extra screening may be necessary to avoid the interference.

It is important to connect the 0V lines as shown above. The multi-core cable should have at least two screens to separate the demand signal and monitor output from the power lines.

The enable line to pin C should be outside the screen which contains the demand signal cables.

Note:
In applications where the valve must conform to European RFI/EMC regulations, the outer screen (shield) must be connected to the outer shell of the 7-pin connector, and the valve body must be fastened to the earth ground. Proper earth grounding practices must be observed in this case, as any differences in command source and valve ground potentials will result in a screen (shield) ground loop.
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.

Recommendations on contamination control methods and the selection of products to control fluid condition are included in publication 9132 or 561, “Guide to Systemic Contamination Control”. The book also includes information on the concept of “ProActive Maintenance”. The following recommendations are based on ISO cleanliness levels at 2 µm, 5 µm and 15 µm.

For products in this catalog the recommended levels are: 0 to 70 bar (1000 psi)...18/
70+ bar (1000+ psi)...17/
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 above. These codes have been proven to provide a long trouble-free service life for the products shown, regardless of the manufacturer.

Hydraulic Fluids
Materials and seals used in these valves are compatible with antiwear hydraulic oils, and with non-alkyl-based phosphate esters. The extreme operating viscosity range is 500 to 13 cSt (2270 to 70 SUS) but the recommended running range is 54 to 13 cSt (245 to 70 SUS).

Installation
The proportional valves in this catalog can be mounted in any attitude, but it may be necessary in certain demanding applications, to ensure that the solenoids are kept full of hydraulic fluid. Good installation practice dictates that the tank port and any drain port are piped so as to keep the valves full of fluid once the system start-up has been completed.

Mounting Bolt Kits
For KBDG5V-5
BK02-156493M (metric)
BK590720 (inch)
For KBDG5V-7
BKDG7M (metric)
BK590724 (inch)
For KBDG5V-8
BKDG8-655M (metric)
BKGO6-635 (inch)
For KBDG5V-10
BKDG10636M (metric)
BKDG10636 (inch)
If not using recommended Vickers™ bolt kits, bolts used should be to ISO 898, 12.9 or better.

Mounting Bolt Torques
Recommended torques with threads lubricated
For KBDG5V-5
M6 or 1/4"-20 UNC bolts:
To 210 bar (3000 psi) 14 Nm (10.3 lbf ft)
To 310 bar (4500 psi) 20 Nm (14.75 lbf ft)
For KBDG5V-7
M10 or 5/8"-16 UNC bolts:
49 to 59 Nm (36 to 43 lbf ft) plus
M6 or 1/4"-20 UNC bolts
9 to 14 Nm (6.6 to 10.3 lbf ft)
For KBDG5V-8
M12 or 1/2"-13 UNC bolts
103 to 127 Nm (76 to 93 lbf ft)
For KBDG5V-10
M20 or 3/4"-10 UNC-2B bolts
185-220 Nm (250-300 lbf ft)

Seal Kits (Mainstage Only)
KBDG5V-5.................565143
KBDG5V-7.................02-351175
KBDG5V-8.................02-352520
KBDG5V-10...............02-329888

Plugs
7-pin plug (metal) 934939
7-pin plug (plastic) 694534
(Metal plug must be used for full EMC protection)

Note: An alternative metal connector which gives EMC protection but not IP67 rating is available from ITT-Cannon, part number CA06-COM-E-14S-A7-P.

Service Information
The products from this range are preset at the factory for optimum performance; disassembling critical items would destroy these settings. It is recommended that if any mechanical or electronic repair is necessary, valves should be returned to the nearest Eaton Hydraulics repair center. The products will be refurbished as necessary and retested to specification before return.

Field repair is restricted to the replacement of the seals.