Proportional Two-Stage Directional Valves
Servo Performance with Double Spool Feedback
Pressures to 350 bar (5000 psi)

KBHDG5V-5/7/8/10
11 Design
## Contents

**Introduction**  
- General Description 3  
- Features and Benefits 3  
- Typical Section 3  

**Model Code**  
4  

**Spool Data**  
5  

**Functional Symbol**  
5  

**Operating Data**  
6  

**Pressures and Minimum Flow Rates**  
7  

**Performance Curves**  
- Power Capacity Envelope 8  
- Pressure Gain 8  
- Frequency Response 8  
- Flow Gain 9  

**Dimension KBHDG5V-5/7/8/10**  
12  

**Mounting Surface Interface KBHDG5V-5/7/8/10**  
14  

**Electrical Information**  
- Block Diagram 16  
- Typical Connection Arrangements 18  

**Application Data**  
- Fluid Cleanliness 20  
- Hydraulic Fluids 20  
- Installation 20  
- Mounting Bolt Kits 20  
- Seal Kits 20  
- Electrical Connectors 20  
- Extension Cable 20  
- Service Information 20  

**Released Model Codes**  
21
Introduction

General Description

Vickers proportional valves shown in this catalog are suitable for working pressures up to 350 bar (5000 psi) and flow rates to 720 l/min (190 USgpm).

They are designed to provide a controlled oil flow in proportion to a command signal, with spool position feedback to provide accurate control. Zero lapped spools are available for closed loop control applications and hydrostats are available for load compensation.

KBHDG5V-5/7/8/10

A range of proportional directional valves with control amplifiers built directly on, and prewired to the valves. Factory-set adjustments of gain, spool deadband compensation, and offset ensure high valve-to-valve reproducibility.

The only electrical inputs required are power supply (24V) and a voltage command signal of ±10V. The amplifier is housed in a robust metal enclosure, sealed against ingress of water and other fluids. Electrical connections are via a standard 7-pin plug.

A spool position monitor point allows the function of the valve to be electrically monitored. Ramp functions, if required, can be generated externally.

Features and Benefits

- Factory-sealed adjustments increase valve-to-valve reproducibility.
- Valve with integrated amplifier selected, ordered, delivered and installed as one performance-tested package.
- Electronic feedback LVDT ensures accurate spool position control.
- Vibration and shock tested.
- Standard 24V DC supply with wide tolerance band.
- Wide range of spool and flow rate options.
- Standard ± 10 V DC and 4-20mA command signals.
- Installation wiring reduced and simplified.
- Standard 7-pin connector.
- Simple valve removal and replacement for service.
- Supported by auxiliary function modules.
- Full CE electromagnetic compatibility.
- IP65 and IP67 environmental protection rating.
- Optional valve enable function.
- Optional pilot pressure reducer.

Typical Section View

KBHDG5V-7, 10 design
For KBHDG5V-7 valves:
2C200N – 200 L/min (52 US gpm)
33C160N – 160 L/min (42 US gpm)
5C200N – 200 L/min (52 US gpm)
For KBHDG5V-8 valves:
2C375N – 375 L/min (99 US gpm)
33C375N – 375 L/min (99 US gpm)
5C375N – 375 L/min (99 US gpm)
For KBHDG5V-10 valves:
2C700N – 700 L/min (185 US gpm)
33C700N – 700 L/min (185 US gpm)
5C720N – 720 L/min (190 US gpm)
For KBHDG5V-5 valves:
2C70N45 – 70 L/min (18.5 US gpm), “A” port flow
33C60N40 – 60 L/min (17.2 US gpm), “A” port flow
420 L/min (110 US gpm), “B” port flow
33C700N420 – 700 L/min (185 US gpm), “A” port flow
420 L/min (110 US gpm), “B” port flow

For KBHDG5V-7 valves:
2C150N85 – 150 L/min (40 US gpm), “A” port flow;
85 L/min (22.4 US gpm), “B” port flow
33C130N65 – 130 L/min (33.3 US gpm), “A” port flow;
65 L/min (17.2 US gpm), “B” port flow
For KBHDG5V-8 valves:
2C375N250 – 375 L/min (99 US gpm), “A” port flow;
250 L/min (66 US gpm), “B” port flow
12C375N250 – 375 L/min (99 US gpm), “A” port flow;
250 L/min (66 US gpm), “B” port flow
250 L/min (66 US gpm), “B” port flow
133C375N250 – 375 L/min (99 US gpm), “A” port flow;
250 L/min (66 US gpm), “B” port flow

SYMMETRIC SPOOLS

For KBHDG5V-5 valves:
2C100N – 100 L/min (26 US gpm)
33C80N – 80 L/min (21 US gpm)
5C85N – 85 L/min (22 US gpm)
For KBHDG5V-8 valves:
2C375N250 – 375 L/min (99 US gpm), “A” port flow;
250 L/min (66 US gpm), “B” port flow
12C375N250 – 375 L/min (99 US gpm), “A” port flow;
250 L/min (66 US gpm), “B” port flow
250 L/min (66 US gpm), “B” port flow
133C375N250 – 375 L/min (99 US gpm), “A” port flow;
250 L/min (66 US gpm), “B” port flow

PQ680 F - See flow charts (p.11)
For actual maximum flows refer to power capacity envelopes, page 8.
### Spool Data

#### Spool Symbols

1. **Spool Data**
2. **Spool Symbols**

#### Spool Type and Flow Ratings

**Symmetric Spools**
Base line pressure drop $\Delta p = 5$ bar (72 psi) per metering flow path, e.g. B to T. For actual maximum flow refer to power capacity envelope curves.

**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).

**Note:**
Valves with 5C spools are designed so that with the valve disabled the pressure in port B is at least twice that in port A (blocked ports).

#### Symmetric Spools

<table>
<thead>
<tr>
<th>Spool code</th>
<th>Spool symbol</th>
<th>Flow rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>For KBHDG5-5 valves:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2C100N</td>
<td>2C</td>
<td>100 L/min (26 USgpm)</td>
</tr>
<tr>
<td>33C80N</td>
<td>33C</td>
<td>80 L/min (21 USgpm)</td>
</tr>
<tr>
<td>5C85N</td>
<td>5C</td>
<td>85 L/min (22 USgpm)</td>
</tr>
<tr>
<td>For KBHDG5-7 valves:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2C200N</td>
<td>2C</td>
<td>200 L/min (52 USgpm)</td>
</tr>
<tr>
<td>33C160N</td>
<td>33C</td>
<td>160 L/min (42 USgpm)</td>
</tr>
<tr>
<td>5C200N</td>
<td>5C</td>
<td>200 L/min (52 USgpm)</td>
</tr>
<tr>
<td>For KBHDG5-8 valves:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2C375N</td>
<td>2C</td>
<td>375 L/min (99 USgpm)</td>
</tr>
<tr>
<td>33C375N</td>
<td>33C</td>
<td>375 L/min (99 USgpm)</td>
</tr>
<tr>
<td>5C375N</td>
<td>5C</td>
<td>375 L/min (99 USgpm)</td>
</tr>
<tr>
<td>For KBHDG5-10 valves:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2C700N</td>
<td>2C</td>
<td>700 L/min (185 USgpm)</td>
</tr>
<tr>
<td>33C700N</td>
<td>33C</td>
<td>700 L/min (185 USgpm)</td>
</tr>
<tr>
<td>5C720N</td>
<td>5C</td>
<td>720 L/min (190 USgpm)</td>
</tr>
</tbody>
</table>

#### Asymmetric Spools

<table>
<thead>
<tr>
<th>Spool code</th>
<th>Spool symbol</th>
<th>Flow rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>For KBHDG5-5 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 (17.2 USgpm) “A” port flow</td>
</tr>
<tr>
<td>PQ87F</td>
<td>PQ</td>
<td>See flow chart (p. 9)</td>
</tr>
<tr>
<td>For KBHDG5-7 valves:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2C150N85</td>
<td>2C</td>
<td>150 L/min (40 USgpm) “A” port flow</td>
</tr>
<tr>
<td>33C130N65</td>
<td>33C</td>
<td>130 L/min (33.3 USgpm) “A” port flow</td>
</tr>
<tr>
<td>5C200N115</td>
<td>5C</td>
<td>200 L/min (52.8 USgpm) “A” port flow, 115 L/min (30.8 USgpm) “B” port flow</td>
</tr>
<tr>
<td>PQ190F</td>
<td>PQ</td>
<td>See flow chart (p. 9)</td>
</tr>
<tr>
<td>For KBHDG5-8 valves:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2C375N250</td>
<td>2C</td>
<td>375 L/min (99 USgpm) “A” port flow</td>
</tr>
<tr>
<td>33C375N250</td>
<td>33C</td>
<td>375 L/min (99 USgpm) “A” port flow</td>
</tr>
<tr>
<td>12C375N250</td>
<td>12C</td>
<td>250 L/min (66 USgpm) “B” port flow</td>
</tr>
<tr>
<td>133C375N250</td>
<td>133C</td>
<td>250 L/min (66 USgpm) “B” port flow</td>
</tr>
<tr>
<td>PQ375F</td>
<td>PQ</td>
<td>See flow chart (p. 10)</td>
</tr>
<tr>
<td>For KBHDG5-10 valves:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2C700N420</td>
<td>2C</td>
<td>700 L/min (185 USgpm) “A” port flow</td>
</tr>
<tr>
<td>33C700N420</td>
<td>33C</td>
<td>700 L/min (185 USgpm) “A” port flow</td>
</tr>
<tr>
<td>12C700N420</td>
<td>12C</td>
<td>700 L/min (185 USgpm) “A” port flow</td>
</tr>
<tr>
<td>133C700N420</td>
<td>133C</td>
<td>700 L/min (185 USgpm) “A” port flow</td>
</tr>
<tr>
<td>72C700N420</td>
<td>72C</td>
<td>700 L/min (185 USgpm) “A” port flow</td>
</tr>
<tr>
<td>733C700N420</td>
<td>733C</td>
<td>700 L/min (185 USgpm) “A” port flow</td>
</tr>
<tr>
<td>PQ680F</td>
<td>PQ</td>
<td>See flow chart (p. 11)</td>
</tr>
</tbody>
</table>

### Application Notes

1. **Main-Spool Options**
   Spools shown are meter-in/meter-out types. Center-condition options are types 2, 33, 5, 12, 133, 72, 733 and PQ.

2. **Internally Piloted Models**
   Differ from detailed symbols above by omission of plug A and the blocking of port X by the mating surface.

3. **Internally Pilot Drain Models**
   Differ from detailed symbols above by omission of plug B and blocking of port Y by the mating surface.

### Available Spools for KBHDG5V

- **Spool type 2C**
- **Spool type 33C (zero lapped)**
- **Spool type 5C**
- **Spool type PQ**
- **Spool type 12C**
- **Spool type 133C**
- **Spool type 72C**
- **Spool type 733C**

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**Functional Symbol**

![Simplified Symbol](image)

![Detailed Symbol](image)

**PQ87F**

**PQ190F**

**PQ375F**

**PQ680F**

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**EATON Vickers**

KBHDGV Proportional Two-Stage Directional Valves V-VLDI-MC001-E2 February 2008
Operating Data

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

Power supply: 24V DC (21V to 36V including 10% peak-to-peak max. ripple) max current 3A

Command signal:
- Voltage mode: 0 to 10V DC, or 0 to −10V DC, or −10V to + 10V DC
- Input impedance: M1: 47 kΩ - M2: 100R
- Common mode voltage to pin D: 18V (max)
- Current mode: 4-20 mA
- Max differential voltage to pin E to pin B: 100 mV

Valve enable signal for model codes PH7 & PR7:
- Enable: >8.5V (36V max)
- Disable: <6.5V
- Input impedance: 10 kΩ

7-pin plug connector:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Power supply positive (+)</td>
<td>Power supply 0V and current command return</td>
<td>Not connected (PE7 &amp; PC7)</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Valve enable (PH7 &amp; PR7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Command signal (+V or current in)</td>
<td>Command signal (-V or current GND)</td>
<td>Command signal (-V or current GND)</td>
</tr>
<tr>
<td>E</td>
<td>Output monitor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Protective ground</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

View of pins of fixed half.

Electromagnetic compatibility (EMC): IEC61326-2-1

Threshold command voltage (minimum voltage for minimum flow):
- 0V – 5C Spools
- 0.25V – 2C & 33C Spools

Monitor signal (pin F)
- Output impedance: ±10V DC for full spool stroke
- Power stage PWM frequency: 10 kHz nominal

Step input response, with flow through P–A–B–T, Øp=5 bar (72 psi) per metering path, e.g. P–A, pilot pressure = 40 bar

<table>
<thead>
<tr>
<th>Required flow step:</th>
<th>Time to reach 90% of required step:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 100%</td>
<td>KBHDG5V–5: 24 ms, KBHDG5V–7: 24 ms, KBHDG5V–8: 33 ms, KBHDG5V–10: 64 ms</td>
</tr>
<tr>
<td>100% to 0</td>
<td>KBHDG5V–5: 23 ms, KBHDG5V–7: 23 ms, KBHDG5V–8: 33 ms, KBHDG5V–10: 60 ms</td>
</tr>
<tr>
<td>&gt;90 to -90%</td>
<td>KBHDG5V–5: 35 ms, KBHDG5V–7: 36 ms, KBHDG5V–8: 49 ms, KBHDG5V–10: 84 ms</td>
</tr>
</tbody>
</table>

Reproducibility, valve-to-valve (at factory settings):
- ≤5%

Flow at 100% command signal:
- <1%

Protection:
- Electrical: Reverse polarity protected
- Environmental: IEC 60529, Class IP65 & IP67

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

Oil temperature range for full performance:
- 0°C to 70°C 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 +45°C (-13°F to +113°F)

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

Mass: kg (lb) approx.:
- KBHDG5V–5: 10.15 (22.4), KBHDG5V–7: 11.4 (25.1), KBHDG5V–8: 17.05 (37.54), KBHDG5V–10: 44.3 (97.7)

Valves with pressure reducer:
- KBHDG5V–5: 10.15 (22.4), KBHDG5V–7: 11.4 (25.1), KBHDG5V–8: 17.05 (37.54), KBHDG5V–10: 44.3 (97.7)

Valves without pressure reducer:
- KBHDG5V–5: 8.85 (19.5), KBHDG5V–7: 10.1 (22.2), KBHDG5V–8: 15.85 (34.84), KBHDG5V–10: 43.1 (95.1)

Supporting products:

<table>
<thead>
<tr>
<th>Auxiliary electronic modules (DIN -rail mounting):</th>
</tr>
</thead>
<tbody>
<tr>
<td>EHA-CON-201-A2* signal converter</td>
</tr>
<tr>
<td>EHD-DSG-201-A-1* command signal generator</td>
</tr>
<tr>
<td>EHA-RM 201-A-2* Ramp generator</td>
</tr>
<tr>
<td>EHA-PSU-201-A-10 Power supply</td>
</tr>
<tr>
<td>EHA-PID-201-A-20 PID controller</td>
</tr>
<tr>
<td>See catalog GB 2410B</td>
</tr>
<tr>
<td>See catalog GB 2470</td>
</tr>
<tr>
<td>See catalog GB 2410A</td>
</tr>
<tr>
<td>See catalog GB 2410A</td>
</tr>
<tr>
<td>See catalog GB 2427</td>
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</table>
## Pressure and Minimum Flow Rates

### MAXIMUM PRESSURES, BAR (PSI) VALVES WITH PRESSURE REDUCER

<table>
<thead>
<tr>
<th>Model</th>
<th>Pilot pressure source</th>
<th>Pilot drain connection</th>
<th>P Port</th>
<th>A&amp;B Ports</th>
<th>T Port</th>
<th>X Port</th>
<th>Y Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>KBHDG5V-5</td>
<td>External</td>
<td>External</td>
<td>315 (4500)</td>
<td>315 (4500)</td>
<td>210 (3000)</td>
<td>315 (4500)</td>
<td>50 (700)</td>
</tr>
<tr>
<td></td>
<td>Internal*</td>
<td>Internal</td>
<td>315 (4500)</td>
<td>315 (4500)</td>
<td>50 (700)</td>
<td>315 (4500)</td>
<td>50 (700)</td>
</tr>
<tr>
<td>KBHDG5V-7/8/10</td>
<td>External</td>
<td>External</td>
<td>350 (5000)</td>
<td>350 (5000)</td>
<td>350 (5000)</td>
<td>350 (5000)</td>
<td>50 (700)</td>
</tr>
<tr>
<td></td>
<td>Internal*</td>
<td>Internal</td>
<td>350 (5000)</td>
<td>350 (5000)</td>
<td>50 (700)</td>
<td>350 (5000)</td>
<td>50 (700)</td>
</tr>
</tbody>
</table>

† Minimum recommended pilot operating pressure = 50 bar (700 psi)
* Internal drain is a non-preferred option
◆ For pilot pressures ≤ 210 bar (3000 psi) a pilot pressure reducer is optional
For pilot pressures > 210 bar (3000 psi) a pilot pressure reducer must be used

Unused pilot port: Maximum pressure as shown

### MAXIMUM PRESSURES, BAR (PSI) VALVES WITHOUT PRESSURE REDUCER

<table>
<thead>
<tr>
<th>Model</th>
<th>Pilot pressure source</th>
<th>Pilot drain connection</th>
<th>P Port</th>
<th>A&amp;B Ports</th>
<th>T Port</th>
<th>X Port</th>
<th>Y Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>KBHDG5V-5</td>
<td>External</td>
<td>External</td>
<td>315 (4500)</td>
<td>315 (4500)</td>
<td>210 (3000)</td>
<td>210 (3000)</td>
<td>50 (700)</td>
</tr>
<tr>
<td></td>
<td>Internal</td>
<td>Internal</td>
<td>315 (4500)</td>
<td>315 (4500)</td>
<td>50 (700)</td>
<td>210 (3000)</td>
<td>50 (700)</td>
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<tr>
<td>KBHDG5V-7/8/10</td>
<td>External</td>
<td>External</td>
<td>350 (5000)</td>
<td>350 (5000)</td>
<td>350 (5000)</td>
<td>210 (3000)</td>
<td>50 (700)</td>
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<td>350 (5000)</td>
<td>50 (700)</td>
<td>210 (3000)</td>
<td>50 (700)</td>
</tr>
</tbody>
</table>

† Minimum recommended pilot operating pressure = 50 bar (700 psi)
* Internal drain is a non-preferred option
◆ For pilot pressures ≤ 210 bar (3000 psi) a pilot pressure reducer is optional
For pilot pressures > 210 bar (3000 psi) a pilot pressure reducer must be used

Unused pilot port: Maximum pressure as shown

### MINIMUM RECOMMENDED FLOW RATES

<table>
<thead>
<tr>
<th>Valve Size/Spool Code</th>
<th>Min. Flow Rate L/min</th>
<th>In³/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>KBHDG5V-5</td>
<td>0.5</td>
<td>30</td>
</tr>
<tr>
<td>KBHDG5V-7</td>
<td>1.0</td>
<td>60</td>
</tr>
<tr>
<td>KBHDG5V-8</td>
<td>1.5</td>
<td>91</td>
</tr>
<tr>
<td>KBHDG5V-10</td>
<td>3.0</td>
<td>180</td>
</tr>
</tbody>
</table>

EATON Vickers  KBHDG5V Proportional Two-Stage Directional Valves  V-VLDI-MC001-E2  February 2008 7
**Performance Curves**

**KBHDG5V-5/7/8/10**

**FLOW GAIN**
At Øp = 5 bar (72 psi) per metering path (e.g. P-A), with flow through P-A-B-T or P-B-A-T. Percentage command signals applicable for positive and negative values of command signal.

At other Øp values, flow rates approximate to:

\[ Q_x = Q_d \sqrt{\frac{\Omega_p}{\Omega_{p_d}}} \]

where:
- \( Q_d \): Datum flow rate
- \( \Omega_p \): Pressure drop at datum flow rate
- \( \Omega_{p_d} \): Required \( \Omega \)

Limited by valve power capacity. Refer to curves on page 8.

**FLOW RATES**

<table>
<thead>
<tr>
<th>Spool Type</th>
<th>Flow Rate (L/min)</th>
<th>Flow Rate (US gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KBHDG5V–5–2C100N</td>
<td>20</td>
<td>0.81</td>
</tr>
<tr>
<td>KBHDG5V–7–2C200N</td>
<td>40</td>
<td>1.63</td>
</tr>
<tr>
<td>KBHDG5V–8–2C375N</td>
<td>60</td>
<td>2.46</td>
</tr>
<tr>
<td>KBHDG5V–10–2C700N</td>
<td>80</td>
<td>3.29</td>
</tr>
</tbody>
</table>

**POWERS CAPACITY ENVELOPE**
Flow through P-A-B-T or P-B-A-T

**PRESSURE GAIN**

(“5C” spools only)

\[ \Delta \text{ between ports A & B or B & A, as % of port P pressure} \]

Spool stroke from null, % of max.

**FREQUENCY RESPONSE, TYPICAL**
For an amplitude of 50 ± 25% of rated flow (ISO 10770-1)
2C spool measured at ν = 36 cSt (168 SUS),
t = 50°C (122°F) and pilot pressure = 40 bar (with-reducer model)
Performance Curves

Flow Gain

KBHDG5V-5

2C70N45

Flow rate – lpm
Flow rate – US gpm
Command signal (% of max.)

KBHDG5V-7

2C150N85

Flow rate – lpm
Flow rate – US gpm
Command signal (% of max.)

KBHDG5V-5

33C60N40

A-T
P-A
P-B
B-T

KBHDG5V-7

33C130N65

A-T
P-A
P-B
B-T

KBHDG5V-5

PQ87F

A-T
P-B
B-T
P-A

KBHDG5V-7

PQ190F

A-T
P-B
B-T
P-A
Performance Curves

Flow Gain

KBHDG5V-8

2C375N250 & 33C375N250

Command signal (% of max.)

72C375N250 & 733C375N250

Command signal (% of max.)

12C375N250 & 133C375N250

Command signal (% of max.)

PQ375F

Command signal (% of max.)
Performance Curves

Flow Gain

KBHDG5V-10

2C700N420 & 33C700N420

72C700N420 & 733C700N420

12C700N420 & 133C700N420

PQ680
Installation
Dimensions

KBHDG5V-5/7
Dimensions shown in mm (in).

KBHDG5V-5

Valve without pressure reducer

Valve with pressure reducer

KBHDG5V-7

Valve without pressure reducer

Valve with pressure reducer

Mounting surface, seals supplied.
For mating surface dimensions, see page 14.
For mounting subplate options and bolt options,
see catalog GB-2425.
**KBHDG5V-8/10**

Dimensions shown in mm (in).

**KBHDG5V-8**

**Valve without pressure reducer**

<table>
<thead>
<tr>
<th>Component</th>
<th>KBHDG5V-8 (mm)</th>
<th>KBHDG5V-8 (in)</th>
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<td>149.4</td>
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<td>118.5</td>
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**Valve with pressure reducer**

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<td>Pressure Reducer</td>
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Mounting surface, seals supplied.
For mating surface dimensions, see page 15.
For mounting subplate options and bolt options, see catalog GB-2425.

**KBHDG5V-10**

**Valve without pressure reducer**

<table>
<thead>
<tr>
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<th>KBHDG5V-10 (mm)</th>
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**Valve with pressure reducer**

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<th>Component</th>
<th>KBHDG5V-10 (mm)</th>
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<td>Air Bleed Screw</td>
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<td>Pressure Reducer</td>
<td>507.21</td>
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Mounting surface, seals supplied.
For mating surface dimensions, see page 15.
For mounting subplate options and bolt options, see catalog GB-2425.
Mounting Surfaces

Dimensions shown in mm (in).

General Description
When a subplate is not used, a machined pad must be provided for valve mounting. Pad must be flat within ±0.0127 mm (.0005 inch) and smooth within 1.6 mm (63 microinch). Mounting bolts, when provided by customer, should be ISO 898 class 12.9 or better. Bolt Kits See page 18.

Dimensional Tolerances
Dimensional tolerance on interface drawings is ±0.2 mm (0.008”) except where otherwise stated. ISO 4401 specifies inch conversion to ±0.01”.

Conversion from Metric
ISO 4401 gives dimensions in mm. Inch conversions are accurate to ±0.01” unless otherwise stated.

Mounting Bolt Tappings
ISO 4401 gives metric thread tappings. Alternate UNC tappings are Vickers recommendations that allow these plates and associated valves to be used up to their maximum pressures, when using Vickers recommended bolt kits, or bolts of an equivalent strength. It is recommended that Customer’s own manifold blocks for UNC bolts should be tapped to the minimum depths given in the footnotes.

ISO Standard Size 05 without Ports X and Y
This interface conforms to ISO 4401-05-04-0-05, NSI/B93.7M (and NFPA) size 05, CETOP R35H4 2-05, DIN 24340 Form A10.

- 1/4”-20 UNC-2B optional.

ISO Standard Size 05 with Ports X and Y

ISO Standard Size 07 Interface
This interface conforms to:
ISO 4401-07-07-0-05
ANSI/B93.7M (and NFPA) size 07 CETOP R35H4.3-07 DIN 24340 Form A16

- 3/8-16 UNC optional.
- 1/4”-20 UNC optional.
Mounting Surfaces

Dimensions shown in mm (in).

**ISO Standard Size 08 Interface**
This interface conforms to:
ISO 4401-08-08-08
ANSI/B93.7M (and NFPA)
size 08 CETOP R35H4.3-08
DIN 24340 Form A25

- 1/2 -13 UNC optional.

**ISO Standard Size 10 Interface**
This interface conforms to:
ISO 4401-10-09-0-05
ANSI/B93.7M (and NFPA)
size 10, CETOP 35H4.3-10,
DIN 24340 Form A32

M 20 Thread
(Optional: .7500-10 UNC Thread)
Electrical Information

Block Diagram
Voltage Input (M1)

KBHDG5V Wiring
Connections must be made via the 7-pin plug mounted on the amplifier. See page 18 of this leaflet and Eaton’s 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 8,6–10,5 mm (0.31–0.41 inches)
See connection diagram on next page.

KBHDG5V Wiring
Wiring details for these valves are contained in the appropriate Eurocard literature and the Installation Wiring Practices for Vickers Electronic Products leaflet 2468.

---

**WARNING**
All power must be switched off before connecting or disconnecting any plugs.
Electrical Information

Block Diagram
Current Input (M2)
KBHDG5V

KBHDG5V Wiring
Connections must be made via the 7-pin plug mounted on the amplifier. See page 19 of this leaflet and Eaton’s Installation Wiring Practices for Vickers™ Electronic Products, leaflet 2468. Recommended cable sizes are:

**Power cables:**
For 24 V supply
- 0,75 mm² (18 AWG) up to 20 m (65 ft)
- 1,00 mm² (16 AWG) up to 40 m (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 diagram on next page.

KBHDG5V Wiring
Wiring details for these valves are contained in the appropriate Eurocard literature and Eaton’s Installation Wiring Practices for Vickers™ Electronic Products leaflet 2468.

---

**WARNING**
All power must be switched off before connecting/disconnecting any plugs.
Wiring Connections
Voltage Input (M1)

- Spool position monitor voltage (pin F) will be referenced to the KB valve local ground.

**WARNING**
Do not ground pin C.

---

Wiring Connections for M1 Valves with Enable Feature

▲ 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.
**Wiring Connections Current Input (M2)**

- Spool position monitor voltage (pin F) will be referenced to the KB valve local ground.

> **WARNING**
> Do not ground pin C.

**Wiring Connections for M2 Valves with Enable Feature**

▲ 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.

> **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.
**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 Vickers publication 9132 or 561, “Vickers Guide to Systemic Contamination Control”. The book also includes information on the Vickers 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) – 18/16/13
- 70 + bar (1000 + psi) – 17/15/12

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 components is shortened in fluids with higher cleanliness codes than those listed above.

**Hydraulic Fluids**

Materials and seals used in these valves are compatible with antiwear hydraulic oils, and 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). For further technical information about fluids see “Technical Information” leaflet B-920 or I-286S.

**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.

**Extension Cable**

Extension Cable: Adapter for extending 7 core cable when changing from KA to KB valve and existing wiring is not long enough. Consists of a 7 pin plug, a 7 pin socket and a length of cable, fully assembled for ease of use. Extension Cable 944450

**Service Information**

The products from this range are preset at the factory for optimum performance; disassembling critical items would destroy these settings. It is therefore recommended that should any mechanical or electronic repair be necessary they should be returned to the nearest Vickers 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.

Note: The feedback/solenoid assembly installed in this valve should not be disassembled.
### Size D05/NG10

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