AxisPro is a game changing machine control valve. Its embedded intelligence simplifies traditionally complex control practices. Plug and play design reduces machine build time, and its ability to predict potential maintenance issues increases machine reliability.

AxisPro level 1 KBH valves, can be used to control machine motions in open loop or closed loop control applications. The valve receives its analog command input on the 7-pin, main, connector from an external axis control device.

AxisPro level 2 KBH valves, can be used to control machine motion in open or closed loop control applications. The valve can receive its analog command input on the 7-pin connector from an external axis control device or, with the available on-board motion control feature activated (via Eaton Pro-FX Configure), can close the external control loop around the actuator on the valve (taking feedback signal from cylinder or motor) – eliminating the separate motion controller. In this case the AxisPro valve receives a position, speed or force command and will create its own valve command needed to comply with the requested machine motion. In addition, digital communications over the CANopen bus is available for machine control or monitoring purposes.
Introduction

General Description
Built on the proven KBH servo Proportional Valve technology, Eaton’s new AxisPro™ Proportional Valve provides a range of controls capability in a modular design. These solenoid operated proportional valves offer high dynamic performance which enables them to be used in closed-loop control applications.

Unique benefits from AxisPro
Reliable, extended uptime is enabled by valve and systems diagnostics capability. LED lens provides on-valve diagnostics information for level-1 valves. Access to systems and machine health data can be made available via CANopen networked valves and systems data collected from external sensors input to level-2 valves.

Leverage inventory of AxisPro valves by configuration through software. One valve SKU can serve multiple needs: Level-1 valves can be configured via Eaton’s Pro-FX™ Configure software tool for optional command signal: Voltage or current, as well as activating the “enable”-pin. Level-2 valves can also have CAN bus activated and control modes selected and configured: VSC for valve-spool control, or for axis-control drive modes: DPC Cylinder position control, DSC Speed control, DFP Force/Pressure control, DPQ Pressure/Flow control. User applications can be developed in Eaton’s Pro-FX Control software tool, which is based on the popular CODESYS development environment. This feature is available option on level-2 valves allowing the use of pre-developed motion control blocks from Eaton’s Pro-FX Control library or custom developed solutions that can be loaded into a “white space” reserved in the on-board controller memory.
Model Code

KBH1   -   08   -   **   -   NS   -   **   -   *   -   **   -   *   -  NS   -   XXX   -  10
1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16

1 Valve Type
KBH – Two stage servo performance proportional valve with integral amplifier and electronic feedback

2 1 – Level 1

3 Interface
08 – ISO 4401, Size 8

4 Spool/Sleeve
Size 8
01 – 2C375N - overlapped, P,A,B,T blocked
02 – 5C375N - zero lapped; P,A,B,T blocked
03 – 33C375N - P blocked, A & B to tank
04 – 2C375N250 - overlapped, P,A,B,T blocked, asymmetric
06 – 33C375N250 - P blocked, A & B to tank, asymmetric
07 – PQ375F - Pressure flow control spool

5 Valve Special Feature
NS – Not Selected

6 Pilot Supply
TS – Internal supply without pressure reducer
ES – External supply without pressure reducer
TX – Internal supply with pressure reducer
EX – External supply with pressure reducer

7 Pilot Drain
T – Internal Drain
D – External Drain

8 Command Signal
1 – +/- 10V voltage command signal
2 – +/- 4-20mA current command signal
3 – +/- 10mA current command signal
4 – +/- 15mA current command signal
5 – +/- 20mA current command signal

9 Monitor Output
1 – ±10V voltage feedback signal
2 – 4-20mA current feedback signal

10 Electrical Connection
C – 7 pin connector without plug
E – 7 pin connector with plug
H – As E but with pin “C” used for enable signal
R – As C but with pin “C” used for enable signal

16 Electronics Special Feature
NS – Not selected

17 Software Revision
XXX – Software revision

18 Design Number
10 series.

To find available product configurations go to www.eaton.com/AxisPro
### 2 Command Signal
1 – +/- 10V voltage command signal
2 – 4-20mA current command signal
3 – +/- 10mA current command signal
4 – +/- 15mA current command signal
5 – +/- 20mA current command signal
9 – Command over Fieldbus

#### Note:
Command signal is shipped with 1 configuration. You may configure to other command signal options using Pro-FX: Configure software.

### 3 Monitor Output
1 – ±10V voltage feedback signal

#### Note:
Monitor Output is shipped with 1 setting. You may configure to other monitor signal options using Pro-FX: Configure software.

### 8 Digital Communication Interface
CO – CANOpen

### 10 Pilot Valve Sensors
NS – Not Selected
PS – Pilot Pressure and Temperature Sensors

### 11 External Sensor
A – 4 4-20mA external sensor analog inputs and 2 discrete inputs
D – 1 SSI external digital sensor input

### 14 Custom Application Programming Space
NS – Not Selected
CW – Codesys White Space

### 15 Control Mode
VSC - Valve spool position control

#### Note:
Control Mode is shipped in valve spool closed loop position control (VSC) configuration. You may reconfigure to other command signal options using Pro-FX: Configure software.

### 12 Pilot Valve Sensors

### 13 External Sensor

### 14 Custom Application Programming Space

### 15 Control Mode

To find available product configurations go to [www.eaton.com/AxisPro](http://www.eaton.com/AxisPro)
## Spool Sleeve Details

<table>
<thead>
<tr>
<th>Main-stage spool</th>
<th>Hydraulic symbol</th>
<th>Description</th>
<th>Flow ℓ/min@ ∆10 bar</th>
<th>Symmetric</th>
<th>Asymmetric</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td><img src="#" alt="Diagram 1" /></td>
<td>Overlapped, all ports block</td>
<td>375</td>
<td>✓</td>
<td></td>
<td>Legacy 2C375N</td>
</tr>
<tr>
<td>2</td>
<td><img src="#" alt="Diagram 2" /></td>
<td>Critically lapped</td>
<td>375</td>
<td>✓</td>
<td></td>
<td>Legacy 5C375N</td>
</tr>
<tr>
<td>3</td>
<td><img src="#" alt="Diagram 3" /></td>
<td>Overlapped, A,B,T connected</td>
<td>375</td>
<td>✓</td>
<td></td>
<td>Legacy 33C375N</td>
</tr>
<tr>
<td>4</td>
<td><img src="#" alt="Diagram 4" /></td>
<td>Overlapped, all ports block</td>
<td>375/250</td>
<td>✓</td>
<td></td>
<td>Legacy 2C375N250</td>
</tr>
<tr>
<td>6</td>
<td><img src="#" alt="Diagram 6" /></td>
<td>Overlapped, A,B,T connected</td>
<td>375/250</td>
<td>✓</td>
<td></td>
<td>Legacy 33C375N250</td>
</tr>
<tr>
<td>7</td>
<td><img src="#" alt="Diagram 7" /></td>
<td>see flow curves</td>
<td></td>
<td></td>
<td></td>
<td>Legacy PQ375F</td>
</tr>
</tbody>
</table>
### Application Notes

1. **Main-Spool Options**
   Spools shown are meter-in/meter-out types. Center-condition options are type 5C.

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.

### Spool Types 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.

Note: Valves with critically lapped spool are designed so that with the valve disabled the pressure in port B is at least twice that in port A (blocked ports).

### 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>KBH*-08</td>
<td>External</td>
<td>External</td>
<td>350 (5000)</td>
<td>50 (5000)</td>
<td>350 (5000)</td>
<td>250 (5000)</td>
<td>50 (700)</td>
</tr>
<tr>
<td></td>
<td>Internal*</td>
<td>Internal*</td>
<td>350 (5000)</td>
<td>50 (5000)</td>
<td>350 (5000)</td>
<td>250 (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

#### 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>KBH*-08</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>
</tr>
<tr>
<td></td>
<td>Internal*</td>
<td>Internal*</td>
<td>350 (5000)</td>
<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

#### 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>KBH*-08</td>
<td>1,5</td>
<td>91</td>
</tr>
</tbody>
</table>
Performance Curves

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

**US gpm**

<table>
<thead>
<tr>
<th>Flow rate – lpm</th>
<th>0</th>
<th>80</th>
<th>160</th>
<th>240</th>
<th>320</th>
<th>400</th>
<th>480</th>
<th>560</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Pressure drop – bar</td>
<td>0</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
<td>600</td>
<td>700</td>
</tr>
</tbody>
</table>

**FLOW RATE – L/min**

<table>
<thead>
<tr>
<th>Flow rate – lpm</th>
<th>0</th>
<th>300</th>
<th>600</th>
<th>900</th>
<th>1200</th>
<th>1500</th>
<th>1800</th>
<th>2100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Pressure drop – bar</td>
<td>0</td>
<td>200</td>
<td>400</td>
<td>600</td>
<td>800</td>
<td>1000</td>
<td>1200</td>
<td>1400</td>
</tr>
</tbody>
</table>

**PRESSURE GAIN**
(“SC” SPOOLS ONLY)

Δ between ports A & B or B & A, as % of port P pressure

<table>
<thead>
<tr>
<th>%</th>
<th>0</th>
<th>20</th>
<th>40</th>
<th>60</th>
<th>80</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Spool stroke from null, % of max.

**FREQUENCY RESPONSE, TYPICAL**
For an amplitude of 50 ± 25% of rated flow (ISO 10770-1)
01 spool measured at \( \nu = 36 \text{ cSt (168 SUS)}, t = 50^\circ \text{C (122^\circ F)} \) and pilot pressure = 40 bar (with-reducer model)

Amplitudes

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amplitude ratio (dB)</td>
<td>+3</td>
<td>0</td>
<td>-3</td>
<td>-6</td>
<td>-9</td>
<td>-12</td>
<td>-15</td>
<td>-18</td>
</tr>
</tbody>
</table>

Phase lags

<table>
<thead>
<tr>
<th>Phase lag (degrees)</th>
<th>0</th>
<th>45</th>
<th>90</th>
<th>135</th>
<th>180</th>
<th>225</th>
<th>270</th>
<th>315</th>
</tr>
</thead>
</table>

**Flow again**
At \( \Delta p = 5 \text{ bar (72 psi)} \) per metering (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 \( \Delta p \) values, flow rates approximate to:

\[ Q = Q_0 \sqrt{\frac{\Delta p}{\Delta p_0}} \]

where \( Q = \) Datum flow rate

\( \Delta p = \) Pressure drop at datum flow rate

\( \Delta p_0 = \) Required \( \Delta p \)

Limited by valve power capacity.

Refer to curves on page 9
Performance Curves

Flow Gain

“04” and “06” Spool

Command signal (% of max.)

Flow rate – lpm
Flow rate – US gpm

“A-T”, “B-T”, “P-A”, “P-B”

“07” Spool

Command signal (% of max.)

Flow rate – lpm
Flow rate – US gpm

“A-T”, “B-T”, “P-A”, “P-B”
Operating Data

Connector Details

7-pin plug connector

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>Note:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Power supply positive (+)</td>
<td>Present at location 1 of the electronics enclosure (see figure 1 below).</td>
</tr>
<tr>
<td>B</td>
<td>Power supply 0V and current command return</td>
<td>To ensure EMI protection use only metal shielded mating connectors. Mating 7-pin (connector) is Eaton part number 934939</td>
</tr>
<tr>
<td>C</td>
<td>Not connected (Field 8 = C,E)</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Valve enable (Field 8 = H,R)</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Command signal (+V or current in)</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Command signal (-V or current GND)</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Output monitor</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Output monitor</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Protective earth</td>
<td></td>
</tr>
</tbody>
</table>

M12 5-pin CAN Connector (Male)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>Note:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CAN shield</td>
<td>Present at location 2 and 4 of the electronics enclosure (see figure 1 below). Selection based on model code field number 9, present when CO option enabled.</td>
</tr>
<tr>
<td>2</td>
<td>Not Connected</td>
<td>To ensure EMI protection use only metal shielded mating connectors. Use only shielded twisted pair (STP) cables for mating connection.</td>
</tr>
<tr>
<td>3</td>
<td>Power supply 0V</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>CAN High</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>CAN Low</td>
<td></td>
</tr>
</tbody>
</table>

M12 5-pin CAN Connector (Female)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>Note:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CAN shield</td>
<td>Present at location 5 of the electronics enclosure (see figure 1 below). Selection based on model code field number 9, present when CO option enabled.</td>
</tr>
<tr>
<td>2</td>
<td>Not Connected</td>
<td>To ensure EMI protection use only metal shielded mating connectors. Use only shielded twisted pair (STP) cables for mating connection.</td>
</tr>
<tr>
<td>3</td>
<td>Power supply 0V</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>CAN High</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>CAN Low</td>
<td></td>
</tr>
</tbody>
</table>

M12 8-pin External Digital Sensor

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>Note:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power supply 0V</td>
<td>Present at location 3 of the electronics enclosure (see figure 1 below). Selection based on model code field number 10, present when CO option enabled.</td>
</tr>
<tr>
<td>2</td>
<td>+24V Supply</td>
<td>To ensure EMI protection use only metal shielded mating connectors. 24V to Power supply 0V (pin 2, 1) short circuit protected (max current 1.5 A). Use only shielded twisted pair (STP) cables for mating connection.</td>
</tr>
<tr>
<td>3</td>
<td>CLK-</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>DATA-</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>DATA+</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Not Connected</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>CLK+</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Not Connected</td>
<td></td>
</tr>
</tbody>
</table>

M12 8-pin External Analog Sensor Port

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>Note:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Speed Sensor Input1</td>
<td>Present at location 3 of the electronics enclosure (see figure 1 below). Selection based on model code field number 10, present when CO option enabled.</td>
</tr>
<tr>
<td>2</td>
<td>Speed Sensor Input2</td>
<td>To ensure EMI protection use only metal shielded mating connectors. 15V to Power supply 0V (pin 4, 6) short circuit protected (max current 500 mA).</td>
</tr>
<tr>
<td>3</td>
<td>4-20mA External Sensor Signal1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>+15V Supply</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4-20mA External Sensor Signal2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Power supply 0V</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>4-20mA External Sensor Signal3</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>4-20mA External Sensor Signal4</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1

Note: See above for connector plugs specifications.
Operating Data

Data is typical, with fluid at 32 cST (150 SUS) and 40°C (104°F)

<table>
<thead>
<tr>
<th>Diagnostic</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A [Green]</td>
<td></td>
<td>Power</td>
</tr>
<tr>
<td>B [Red]</td>
<td></td>
<td>CAN Error</td>
</tr>
<tr>
<td>C [Green]</td>
<td></td>
<td>CAN Run</td>
</tr>
<tr>
<td>D [Red]</td>
<td></td>
<td>Diagnostic</td>
</tr>
<tr>
<td>E [Green]</td>
<td></td>
<td>Status</td>
</tr>
</tbody>
</table>

Note:
1. Figure to the left references the clear plastic window on the top of the valve.
2. LED F (amber) will glow as a part of normal operation.

Electromagnetic compatibility (EMC): IEC61326-2-1

Monitor Points Signal:
- Voltage mode: ±10V DC
- Current mode: 4 to 20 mA
- Output impedance: 10 kΩ

Power stage PWM frequency: 20 kHz nominal

Reproducibility, valve-to-valve (at factory settings):
- Flow gain at 100% command signal: ≤5%

Protection:
- Electrical: Reverse polarity protected between pin A and B of the 7 pin plug connector

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)

Power supply:
- Voltage: 24V DC (18V to 36V including 10% peak-to-peak max ripple) max current 3.7A

Command Signal:
- Voltage mode: -10V to +10V DC 13 bit resolution, ± 1%
- Field 8 = 1: 47kΩ, Field 6 = 2,3,4,5: 100Ω
- Voltage between Pin D and B Field 8 = 1: 18v (max)
- Voltage between Pin E and B Field 8 = 1: 18v (max)
- Current mode Field 8 = 2,3,4,5: 13 bit resolution based on ± 20mA, ± 1%
- Max differential voltage to pin E to pin B Field 8 = 2,3,4,5: 100 mV

Valve enable signal for model code H & R
- Enable Disable: Disable <6.5V; Enable Signal >8.5V (max 36V)
- Input impedance: 10 kΩ

Sensor Resolution:
- Ext. Sensor Port:
  - 4-20 mA: 0-20mA 12 bit resolution ± 1%, 3mA cable break detect, 22mA overcurrent detect.
  - Speed, independent frequency mode: 10Hz to 100 kHz.
  - Speed, incremental count and direction + frequency mode: signed 32bit count, 0 to 100 kHz.
  - Speed, quadrature phase A&B + frequency mode: signed 32 bit count, 0 to 100 kHz.
  - SSI: binary or gray code, 32bits max, adjustable resolution and zero offset.

Integrated Pilot Pressure and Temperature Sensors
- Integrated PCB temperature sensor accuracy: ± 2°C
- For valves with “PS” Pressure Sensor option
- Integrated pressure sensors on all ports
- Pressure sensor rated to 400bar
- Integrated pressure sensor accuracy: ± 0.5% of full scale
- Bandwidth: >100 Hz
- Integrated temperature sensor on tank port Accuracy: ± 5°C
- Bandwidth: ~1 Hz

Amplifier Temperature Sensing
- 1°C (1.8°F) resolution, -25°C (-13°F) underramp detect, 125°C (257°F) overtemp detect

Power Supply Detect
- 18-36Vdc, 0.01 V resolution ± 1%, 19V under voltage detect, 36V overvoltage
## Operating Data

### KBS*-08 Valves (all valves)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Continuous rating (ED = 100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative duty factor</td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>&lt;0.4%</td>
</tr>
</tbody>
</table>

Mass: kg (lb) approx.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Approximate Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valves with pressure reducer</td>
<td>17 kg (37 lb)</td>
</tr>
<tr>
<td>Valves without pressure reducer</td>
<td>16 kg (35 lb)</td>
</tr>
</tbody>
</table>

Environmental

- IP65 and IP67 rated when using a similarly rated connector
- Location 2, 3, 4 and 5 connectors have IP65 and IP67 rated shipping covers

<table>
<thead>
<tr>
<th>Step Response</th>
<th>KBS*-08</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step, % Flow</td>
<td>ms</td>
</tr>
<tr>
<td>0% to 100%, 100% to 0%</td>
<td>33</td>
</tr>
<tr>
<td>10% to 90%, 90% to 10%</td>
<td>25</td>
</tr>
<tr>
<td>-10% to 10%, 10% to -10%</td>
<td>16</td>
</tr>
<tr>
<td>25% to 75%, 75% to 25%</td>
<td>18</td>
</tr>
</tbody>
</table>

**Parts Information:**

- Interface Seal Kits: 02-350686
- Mating Electrical 7-pin Connector: 934939
Software Information

KBH1
- Analog commanded spool control.
- Analog command source configuration options.
- Monitor output signal configuration options.
- Enable input signal enable/disable option.

KBH2
- KBH1 capability.
- Sensor port configuration options. Configurable position, Speed, Pressure, Force and SSI Sensors.
- CANopen DS408 compliant control modes (device options vary per available hardware options).
  - valve spool position control (VPOC/VSC).
  - drive speed control (DSC).
  - drive force/pressure control (DFPC/DFP).
  - drive position control (DPC).
  - drive pressure/flow control (Eaton DPQ).
- CANopen DSP306 compliant electronic data sheet (EDS).
- Diagnostic configuration options.
- Optional White Space
- Optional Pilot Pressure Sensors

All levels and models are compatible with the Eaton Pro-Fx:
For the latest revision, please visit www.eaton.com/AxisPro

Download Pro-Fx™, Technical Information and Support Materials from Eaton’s Website:
http://www.eaton.com/AxisPro
Install the Eaton Pro-Fx™ Configure PC application tool. Installation is supported on a wide range of Windows based operating systems including Windows 7 32 bit and 64 bit.
The Pro-Fx™ configure installation provides several options for PC USB peripheral CANbus adapters supported by the software. During installation the user can choose to install drivers for an available CANbus adapter.
The adapters supported by Pro-Fx™: Configure are:
- PCAN-USB* PEAK-System Technik GmbH (http://www.peak-system.com)
- ValueCAN Intrepid Control Systems, Inc. (http://www.intrepidcs.com)
- Leaf-Light Kvaser AB (http://www.kvaser.com)
* The PCAN-USB adapter is recommended for compatibility with Eaton Pro-Fx: Control development environment used with KBS4DGV-xxx and other Eaton Pro-Fx products.
Electrical Information

Block Diagram Voltage
Input (Field 8 = 1)

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 8.0 - 10.5 mm (0.31 - 0.41 inches)

See connection diagram on page 16.

---

<table>
<thead>
<tr>
<th>Pin D</th>
<th>Pin E</th>
<th>Flow direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>OV</td>
<td>P to A</td>
</tr>
<tr>
<td>OV</td>
<td>Negative</td>
<td>P to B</td>
</tr>
<tr>
<td>( U_D - U_E = ) Positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>OV</td>
<td>P to B</td>
</tr>
<tr>
<td>OV</td>
<td>Positive</td>
<td>P to B</td>
</tr>
<tr>
<td>( U_D - U_E = ) Negative</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Electrical Information

Block Diagram Current Input (Field 8 = 2,3,4,5)

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 24V 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 page 17.

<table>
<thead>
<tr>
<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 return</td>
<td>Power ground</td>
<td>P to A</td>
</tr>
<tr>
<td>Less than 12 mA</td>
<td>Current return</td>
<td>Power ground</td>
<td>P to B</td>
</tr>
</tbody>
</table>

**Command Signals and Outputs, Field 6 = 2**

- Pin C is used for a valve enable signal with electrical connections Field = H or R

R1 shunt resistor 100Ω
F1, F2 resettable fuse

**Command Signals and Outputs, Field 6 = 3,4,5**

<table>
<thead>
<tr>
<th>Pin D</th>
<th>Pin E</th>
<th>Pin B</th>
<th>Flow direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 0 mA</td>
<td>Current return</td>
<td>Power ground</td>
<td>P to A</td>
</tr>
<tr>
<td>Less than 0 mA</td>
<td>Current return</td>
<td>Power ground</td>
<td>P to B</td>
</tr>
</tbody>
</table>

**Warning**

All power must be switched off before connecting/disconnecting any plugs.
Electrical Information

Wiring Connections
Voltage Output (Field 9 = 1)
- Spool position monitor voltage (pin F) will be referenced to the KB valve local ground (pin B).

Wiring Connections for Voltage Mode (Field 10 = R/H) 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.
Electrical Information

Wiring Connections
Current Output (Field 9 = 2)
- Spool position monitor voltage (pin F) will be referenced to the KB valve local ground (pin B).

Wiring Connections for Current mode (Field 10 = R/H) 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.

Electromagnetic Compatibility (EMC) It is necessary to ensure that the valve is wired up as above. For effective protection of 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.
To ensure EMI protection use only metal shielded mating connectors.

Warning
All power must be switched off before connecting/disconnecting any plugs.
Installation Dimensions

**KBH1-08 with Pressure Reducer**

**KBH1-08 without Pressure Reducer**
Installation Dimensions

mm (inch)

KBH2-08 with Reducer and Pilot Sensors

[Diagram showing installation dimensions with measurements in millimeters and inches]
Mounting Surfaces Interface to ISO 4401 (Size 08)

This interface conforms to ISO 4401-08-08-05
ANSI/B93.7M (and NFPA)
size 08 CETOP R35H4.3-08
DIN 24340 Form A25

◆ 1/2 -13 UNC optional.

Mounting Surfaces

Dimensions shown in mm (in).

Mounting Surface Interface to ISO 4401 (Size 08)

This interface conforms to ISO 4401-08-08-05
ANSI/B93.7M (and NFPA)
size 08 CETOP R35H4.3-08
DIN 24340 Form A25

◆ 1/2 -13 UNC optional.
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.

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:

17/15/12

Eaton 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. 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 aryl 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.

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 Eaton 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.