Eaton Servo-Performance Proportional Directional Valve

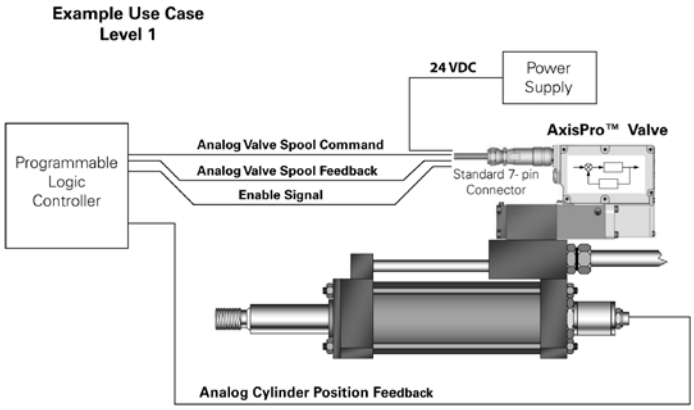
AxisPro™

KBS*-05 10 Series

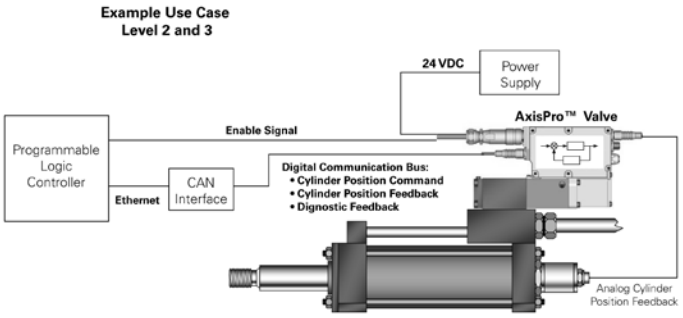
Powering Business Worldwide

Contents

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 valves, such as KBS1-05 (ISO size 5), 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 or level 3 valves, such as KBS2-05(or KBS3-05 with sensors), 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

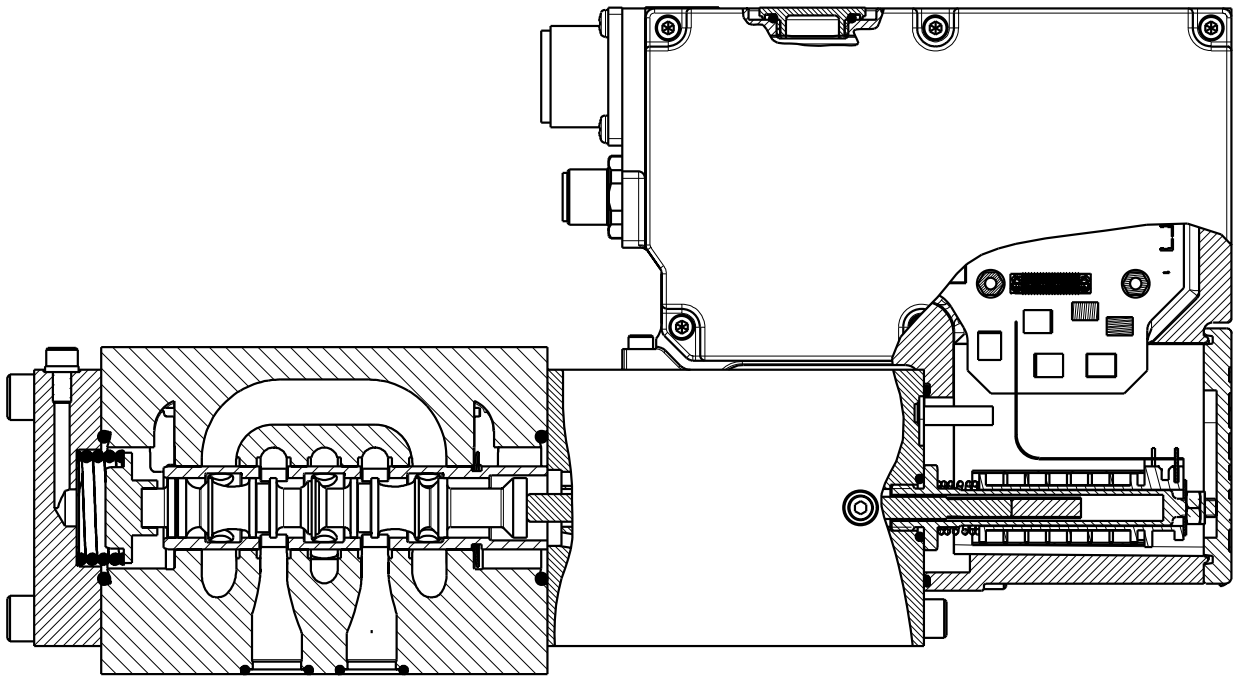
General Description

Built on the proven KBS servo Proportional Valve technology, Eaton' s new AxisPro™ Proportional Valve provides a range of controls capability in a modular design. These four-way solenoid operated proportional valves offer high dynamic performance which enables them to be used in closed-loop control applications previously only possible using servo valves. Best-in-class ingression protection rated to IP65 and IP 67, combined with up to 85C (185F) ambient temperature allows operation in demanding environments.

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, 2 and 3 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, or from integrated sensors on level-3 valves featuring pressure sensors in A, B, P and T ports along with temperature data sensed from the T-port.

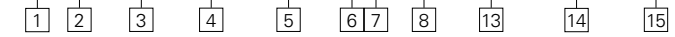
Leverage inventory of AxisPro valves by configuration through software. One valve SKU can serve multiple needs: Level-1 valves can be configured via Eaton's Pro-FX™ Configure software tool for optional command signal: Voltage or current, as well as activating the "enable"-pin. Level-2 and 3 valves can 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 and 3 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.



KBS1-05

Model Code

KBS1 - 05 - ** - NS - ** - * - NS - 001 - 10



1 **Valve Type**

KBS – Servo performance proportional valve with integral amplifier and electronic feedback

2 **1 –** Level 1

3 **Interface**

05 – ISO 4401, size 05-04-0-05 ANSI/B93.7M-D05

4 **Spool/Sleeve**

1 – Symmetric -100ℓ/min - At Failsafe -all ports blocked (legacy 92L100)
2 – Symmetric - 80ℓ/min - At Failsafe -all ports blocked (legacy 92L80)
3 – Symmetric - 50ℓ/min - At Failsafe -all ports blocked (legacy 92L50)
4 – Symmetric - 25ℓ/min - At Failsafe -all ports blocked (legacy 92L25)
5 – Symmetric -100ℓ/min - At Failsafe -P port blocked, A,B,T connected (legacy 96L100)
6 – Symmetric - 80ℓ/min - At Failsafe -P port blocked, A,B,T connected (legacy 96L80)
7 – Symmetric - 50ℓ/min - At Failsafe -P port blocked, A,B,T connected (legacy 96L50)
8 – Symmetric - 25ℓ/min - At Failsafe -P port blocked, A,B,T connected (legacy 96L25)
17 – Asymmetric -100ℓ/min A; 70ℓ/min B - At Failsafe -all ports blocked (legacy 92L100N70)
18 – Asymmetric -100ℓ/min A; 50ℓ/min B - At Failsafe -all ports blocked (legacy 92L100N50)
19 – Asymmetric -100ℓ/min A; 25ℓ/min B - At Failsafe -all ports blocked (legacy 92L100N25)
20 – Asymmetric - 50ℓ/min A; 25ℓ/min B - At Failsafe -all ports blocked (legacy 92L50N25)
21 – Asymmetric -100ℓ/min A; 70ℓ/min B - At Failsafe -P port blocked, A,B,T connected (legacy 96L100N70)
22 – Asymmetric -100ℓ/min A; 50ℓ/min B - At Failsafe -P port blocked, A,B,T connected (legacy 96L100N50)
23 – Asymmetric -100ℓ/min A; 25ℓ/min B - At Failsafe -P port blocked, A,B,T connected (legacy 96L100N25)
24 – Asymmetric - 50ℓ/min A; 25ℓ/min B - At Failsafe -P port blocked, A,B,T connected (legacy 96L50N25)
25 – 2-gain Symmetric –10ℓ/min @ 40% -100ℓ/min @100%-@Failsafe -all ports blocked (legacy 92L10T100)
26 – 2-gain Symmetric – 5ℓ/min @ 40% - 50ℓ/min @100%-@Failsafe -all ports blocked (legacy 92L05T50)
27 – 2-gain Symmetric –10ℓ/min @ 40% -100ℓ/min @100%-@Failsafe -P port blocked, A,B,T connected (legacy 96L10T100)
28 – 2-gain Symmetric – 5ℓ/min @ 40% - 50ℓ/min @100%-@Failsafe -P port blocked, A,B,T connected (legacy 96L05T50)

5 **Valve Special Feature**

NS – Not Selected

6 **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

7 **Monitor Output**

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

8 **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

13 **Electrical Special Feature**

NS – Not Selected

14 **Software Revision**

XXX – Software Revision

15 **Design Number**

10 series

To find available product configurations go to www.eaton.com/AxisPro

Model Code

KBS* - 05 - ** - NS - 11 - * - CO - * - NS - VSC - NS - 001 -10

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

2 **Control Level**

2 – Level 1 plus Network enabled and DS408 control modes

3 – Level 2 plus Integrated pressure and temperature sensors

6 **Command Signal**

1 – +/- 10V voltage command signal

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

2 – 4-20mA current command signal

3 – +/- 10mA current command signal

4 – +/- 15mA current command signal

9 – Command over Fieldbus

7 **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.

2 – 4-20mA current feedback signal

9 – Feedback over Fieldbus

8 **Electrical Connection**

C – 7 pin connector without plug

E – 7 pin connector with plug

Note: You may reconfigure pin "C" as the enable signal using Pro-FX configure software.

9 **Digital Communication Interface**

CO – CANOpen

10 **External Sensor**

A – 4 4-20mA external sensor analog inputs and 2 discrete inputs

D – 1 SSI external digital sensor input

11 **Customer Application Programming Space**

NS – Not Selected

CW – CODESYS White Space

12 **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 control mode options using Pro-FX: Configure software.

DPC - DS408 Drive Position Control Mode Enabled

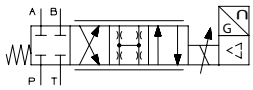
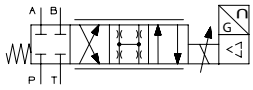
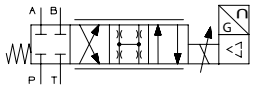
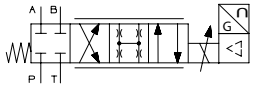
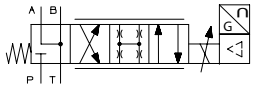
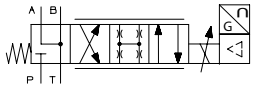
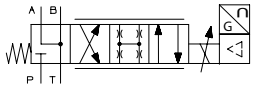
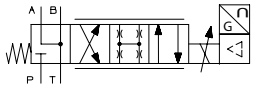
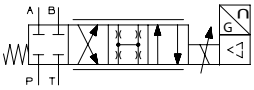
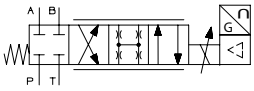
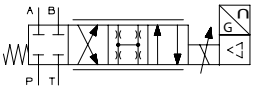
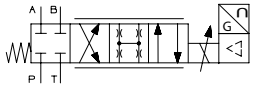
DSC – DS408 Drive Speed Control Mode Enabled

DFP – DS408 Drive Force/Pressure Control Mode Enabled

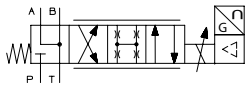
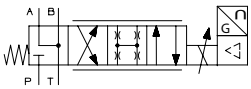
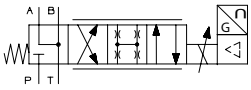
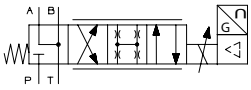
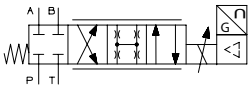
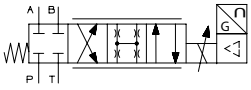
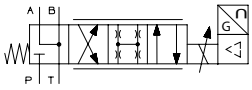
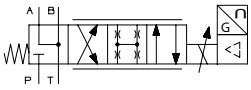
DPQ – Eaton Custom Drive Pressure / Flow Control Mode Enabled

To find available product configurations go to www.eaton.com/AxisPro

Spool Sleeve Details

Spool/Sleeve #	Symbol	Failsafe behavior	Flow ℓ/min@ Δ70 bar	Symmetric	Asymmetric	Single gain	Dual gain	Notes
1		All Ports blocked	100	√		√		
2		All Ports blocked	80	√		√		
3		All Ports blocked	50	√		√		
4		All Ports blocked	25	√		√		
5		P - Blocked A,B,T connected	100	√		√		
6		P - Blocked A,B,T connected	80	√		√		
7		P - Blocked A,B,T connected	50	√		√		
8		P - Blocked A,B,T connected	25	√		√		
17		All Ports blocked	100/70		√	√		
18		All Ports blocked	100/50		√	√		
19		All Ports blocked	100/25		√	√		
20		All Ports blocked	50/25		√	√		

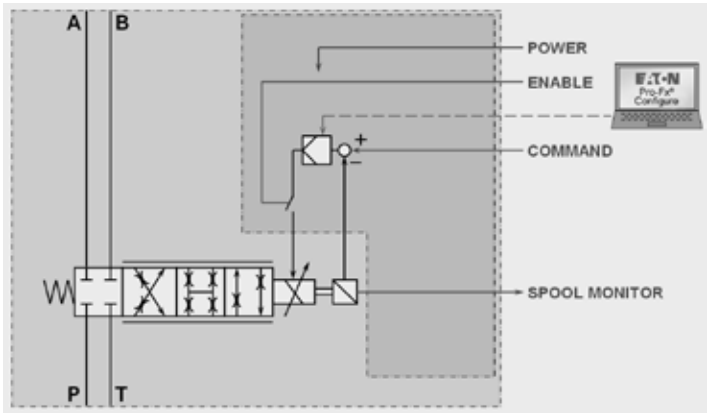
Spool Sleeve Details

Spool/Sleeve #	Symbol	Failsafe behavior	Flow ℓ/min@ Δ70 bar	Symmetric	Asymmetric	Single gain	Dual gain	Notes
21		P - Blocked A,B,T connected	100/70		√	√		
22		P - Blocked A,B,T connected	100/50		√	√		
23		P - Blocked A,B,T connected	100/25		√	√		
24		P - Blocked A,B,T connected	50/25		√	√		
25		All Ports blocked	10 @ 40% 100 @ 100%	√			√	
26		All Ports blocked	5 @ 40% 50 @ 100%	√			√	
27		P - Blocked A,B,T connected	10 @ 40% 100 @ 100%	√			√	
28		P - Blocked A,B,T connected	5 @ 40% 50 @ 100%	√			√	

Spool Data
Spool Symbols

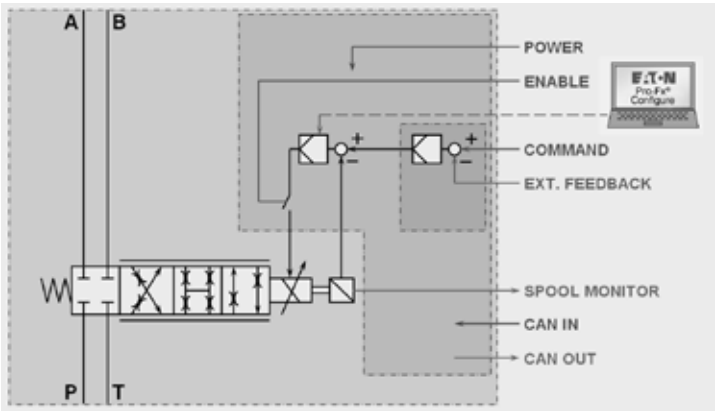
Functional Symbol

Model Type KBS1-05



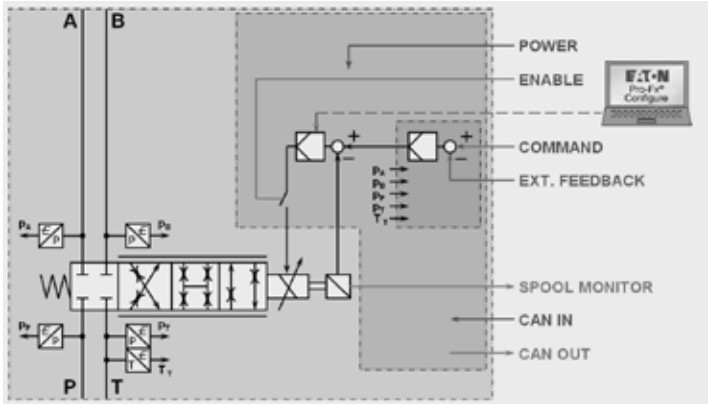
Centralized motion control, relying on external motion controller, not shown in the diagram

Model Type KBS2-05 w/Field 11 = NS



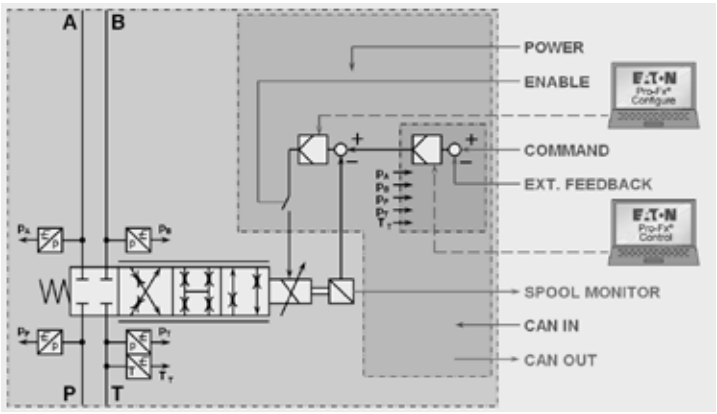
Distributed motion control, taking advantage of the available axis-control function embedded in the valve controller for AxisPro level 2 and 3.Command can be analog via the 7-pin connector or via CANopen using the M12 connections illustrated on page 12.

Model Type KBS3-05 w Field 11 = NS



Level 3 valve integrated pressure sensors can be used for machine health monitoring with data broadcast over the CANopen bus or employed for pressure control in addition to the external motion control illustrated for the level 2 valve.

Model Type KBS3-05 w/Field 11 = CW



Selecting the CW-option allows user specific applications to be developed in Eaton's Pro-FX Control software tool, which is based on the popular CODESYS development environment.

Spool Types and Flow Ratings

Symmetric Spools

Base line pressure drop Δp = 35 bar (500 psi) per metering flow path, e.g. B to T. For actual maximum flow refer to power capacity envelope curves.

Pressures and Flow Rates

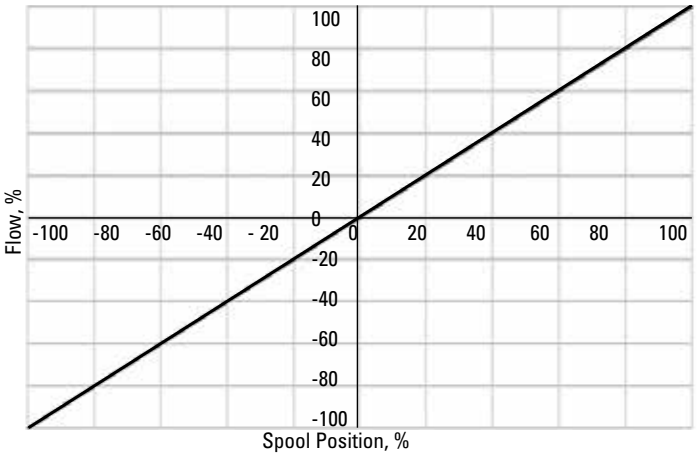
Operating Pressure:
bar (psi)

Ports	
P,A,B :	350 (5075)
T :	250 (3625)

Spool/Sleeve Combinations
Functional Representation

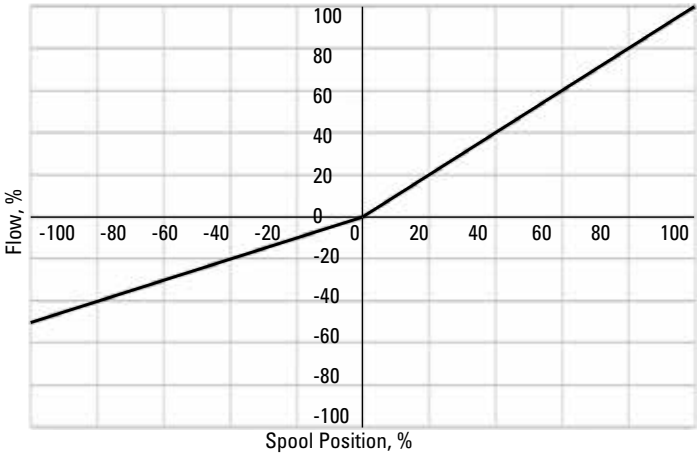
Spool/Sleeve#: 1, 2,3,4,5,6,7,8

Symmetric



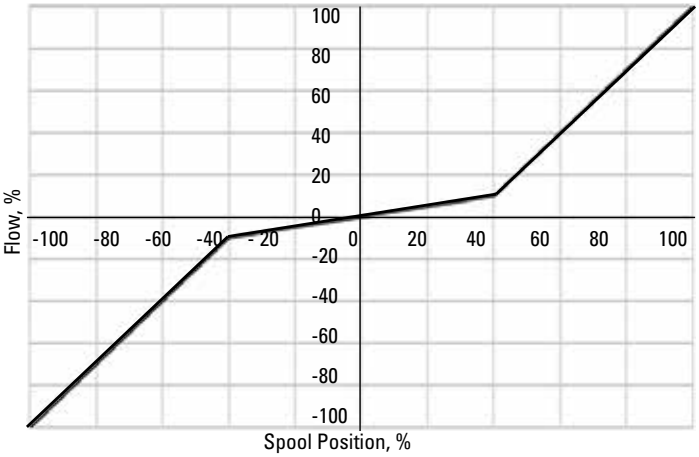
Spool/Sleeve#: 17,18,19,20,21,22,23,24

2:1 Asymmetric



Spool/Sleeve#: 25,26,27,28

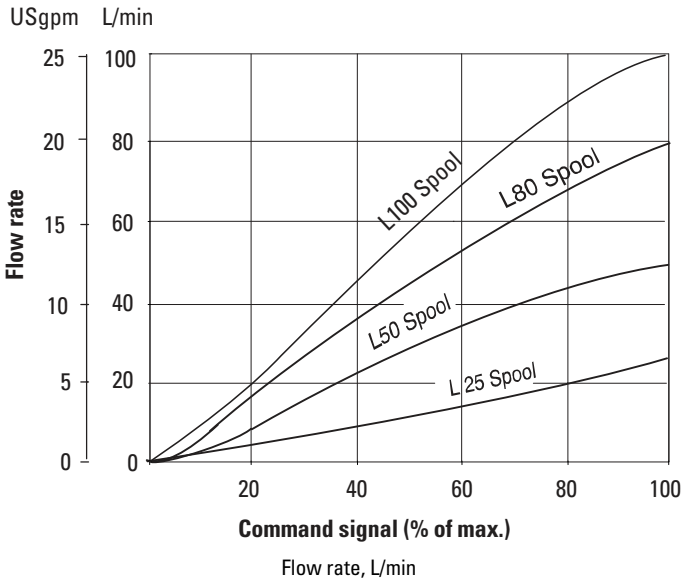
Kink at 40%



Performance Curves

Flow Gain

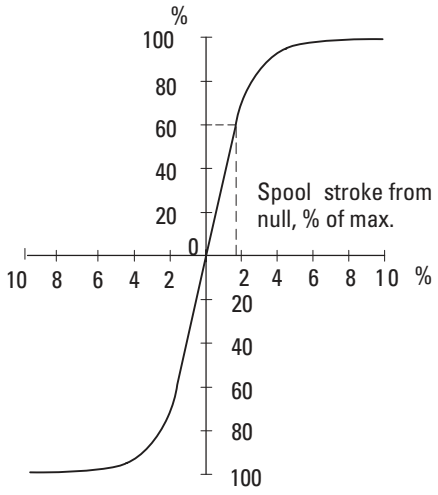
Flow from port P-A-B-T or P-B-A-T at 70 bar (1000 psi) total valve Δp, 35 bar (500 psi) per metering edge



Flow rate, L/min

Pressure Gain

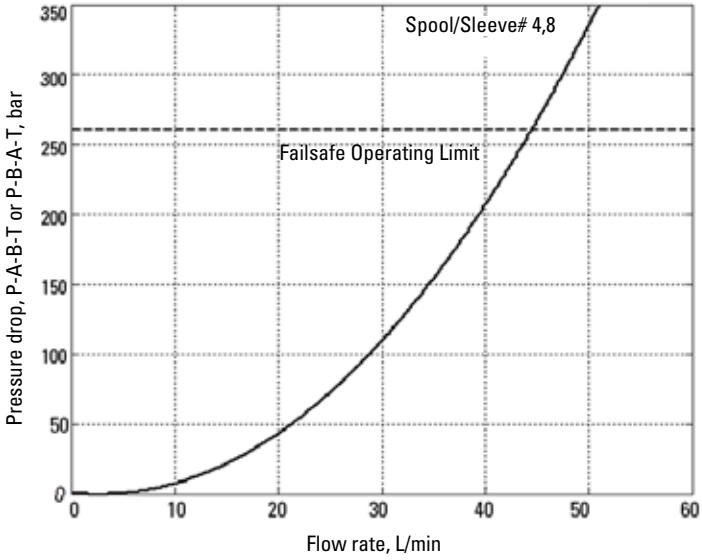
Δp between ports A and B or B and A, as % of port P pressure



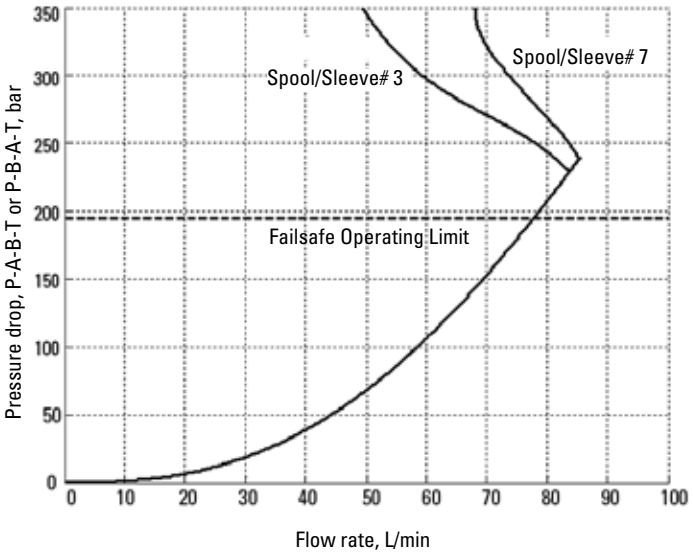
Flow rate, L/min

Power Capacity Envelopes

25 ℓ/min

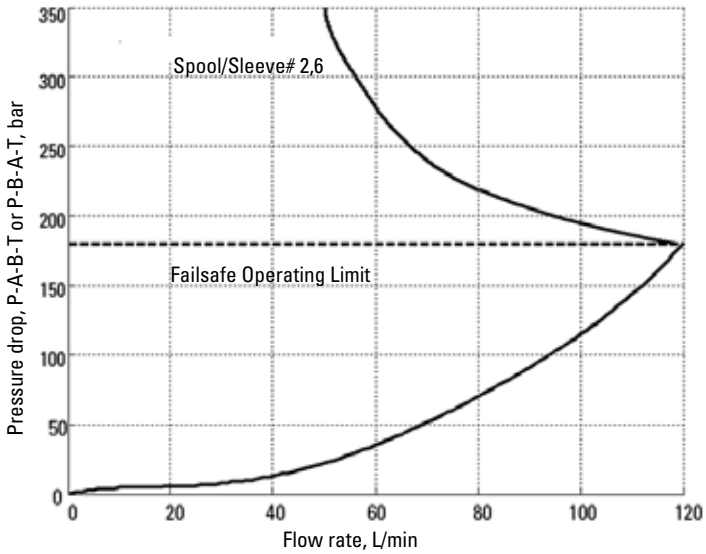


50 ℓ/min

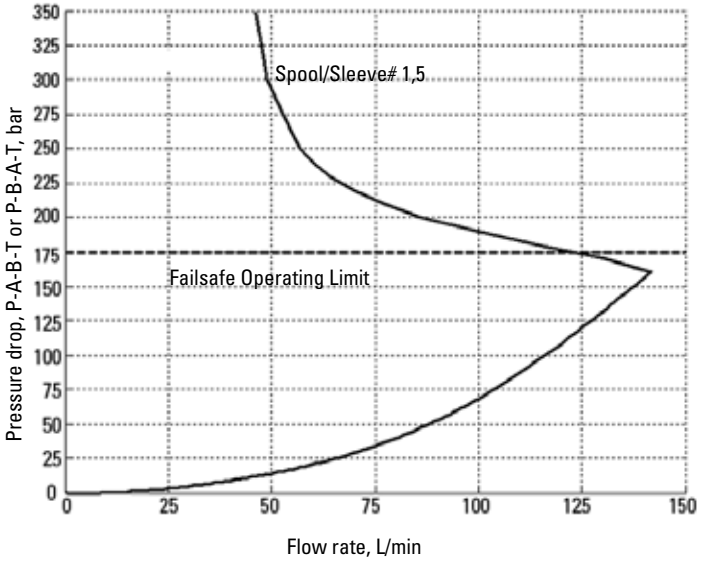


Performance Curves

80 ℓ/min

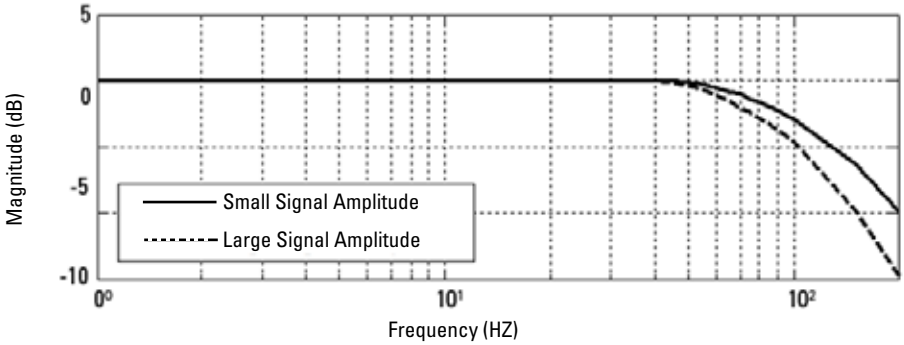


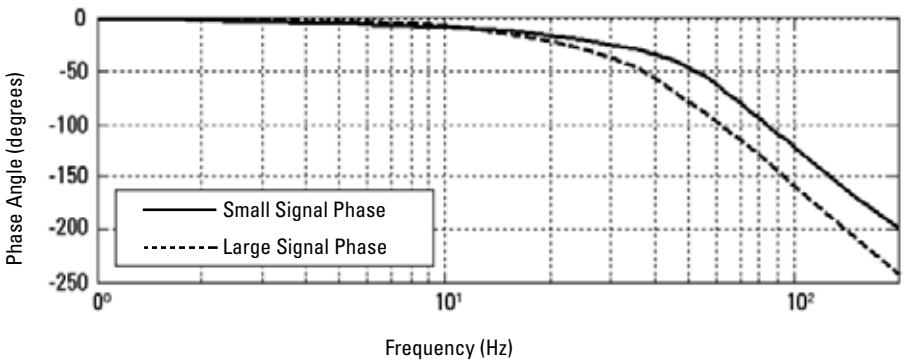
100 ℓ/min



Operating Limit: When operating the valve beyond the operating pressure limit,spool may not return to failsafe when power is removed

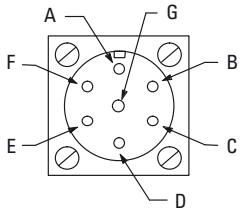
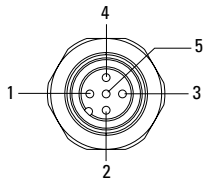
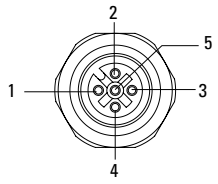
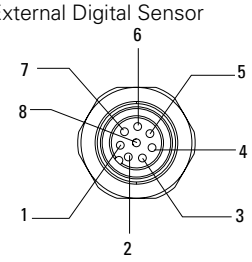
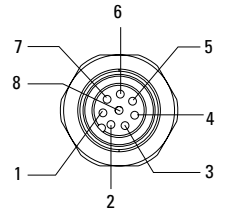
Frequency Response, typical
For amplitudes of +/- 5% with zero offset, +/- 25% with +/- 50% offsets.
Δp (P to T) = 70 bar (1000 psi)





Operating Data

Connector Details

7-pin plug connector 	Pin A B C C D E F G	Description Power supply positive (+) Power supply 0V and current command return Not connected (Field 8 = C,E) Valve enable (Field 8 = H,R) Command signal (+V or current in) Command signal (-V or current GND) Output monitor Protective earth	Note: Present at location 1 of the electronics enclosure (see figure 1 below). To ensure EMI protection use only metal shielded mating connectors. Mating 7-pin (connector) is Eaton part number 934939
M12 5-pin CAN Connector (Male) 	Pin 1 2 3 4 5	Description CAN shield Not Connected Power supply 0V CAN High CAN Low	Note: 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. To ensure EMI protection use only metal shielded mating connectors Use only shielded twisted pair (STP) cables for mating connection.
M12 5-pin CAN Connector (Female) 	Pin 1 2 3 4 5	Description CAN shield Not Connected Power supply 0V CAN High CAN Low	Note: 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. To ensure EMI protection use only metal shielded mating connectors Use only shielded twisted pair (STP) cables for mating connection.
M12 8-pin External Digital Sensor 	Pin 1 2 3 4 5 6 7 8	Description Power supply 0V +24V Supply CLK- DATA- DATA+ Not Connected CLK+ Not Connected	Note: Present at location 3 of the electronics enclosure (see figure 1 below). Selection based on model code field number 10, present when D option enabled. 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.
M12 8-pin External Analog Sensor Port 	Pin 1 2 3 4 5 6 7 8	Description Speed Sensor Input1 Speed Sensor Input2 4-20mA External Sensor Signal1 +15V Supply 4-20mA External Sensor Signal2 Power supply 0V 4-20mA External Sensor Signal3 4-20mA External Sensor Signal4	Note: Present at location 3 of the electronics enclosure (see figure 1 below). Selection based on model code field number 10, present when A option enabled. 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).

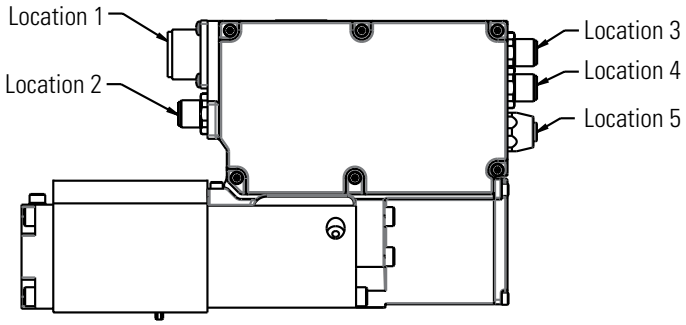
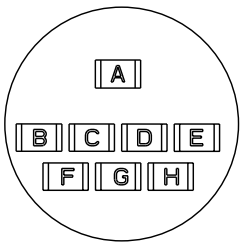


Figure 1

Note: See above for connector plugs specifications.

Operating Data

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

Diagnostic		Color A [Green] B [Red] C [Green] D [Red] E [Green]	Description Power CAN Error CAN Run Diagnostic Status
		Note: 1. Figure to the left references the clear plastic window on the top of the valve. 2. LED F will glow as part of general operation.	
Electromagnetic compatibility (EMC):		IEC61326-2-1	
Monitor Points Signal: Voltage mode Current mode Output impedance		 ±10V DC 4 to 20 mA 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 Oil temperature range for full performance		–25°C to +85°C (–13°F to +185°F) –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		24V DC (18V to 36V including 10% peak-to-peak max ripple) max current 3,7A	
Command Signal: Voltage mode Input impedance Voltage between Pin D and B Voltage between Pin E and B Current mode Max differential voltage to pin E to pin B		 –10V to +10V DC 13 bit resolution, ± 1% Field 6 = 1: 47kΩ, Field 6 = 2,3,4,5: 100Ω Field 6 = 1:18v (max) Field 6 = 1:18v (max) Field 6 = 2,3,4,5: 13 bit resolution based on ±20mA , ±1% Field 6 = 2,3,4,5: 100 mV	
Valve enable signal for model code field 8 = H or R Enable Disable Input impedance		 Disable <6.5V Enable Signal >8.5V (max 36V) 10 kΩ	
Sensor Resolution: External 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 Pressure and Temperature Sensors		Integrated PCB temperature sensor accuracy: ± 2°C For Level 3 valves: Integrated Pressure sensors on all ports Pressure sensors rated to 400bar Integrated Pressure sensors 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) undertemp 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*-05 Valves (all valves)				
Relative duty factor	Continuous rating (ED = 100%)			
Hysteresis	<0.1%			
Mass	5.9 kg (13 lb) approx.			
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			
Step response:	25 ℓ/min	50 ℓ/min	80 ℓ/min	100 ℓ/min
Step, % Flow	ms	ms	ms	ms
0% to 100%, 100% to 0%	16	16	16	22
10% to 90%, 90% to 10%	14	14	14	19
-10% to 10%, 10% to -10%	9	9	9	13
25% to 75%, 75% to 25%	11	11	11	18
Parts Information:				
Interface Seal Kits	02-414930			
Mating Electrical 7-pin Connector	934939			

Software Information

KBS1

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

KBS2/KBS3

- KBS1capability.
- 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.

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.

Block Diagram Voltage Input (Field 6 = 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:

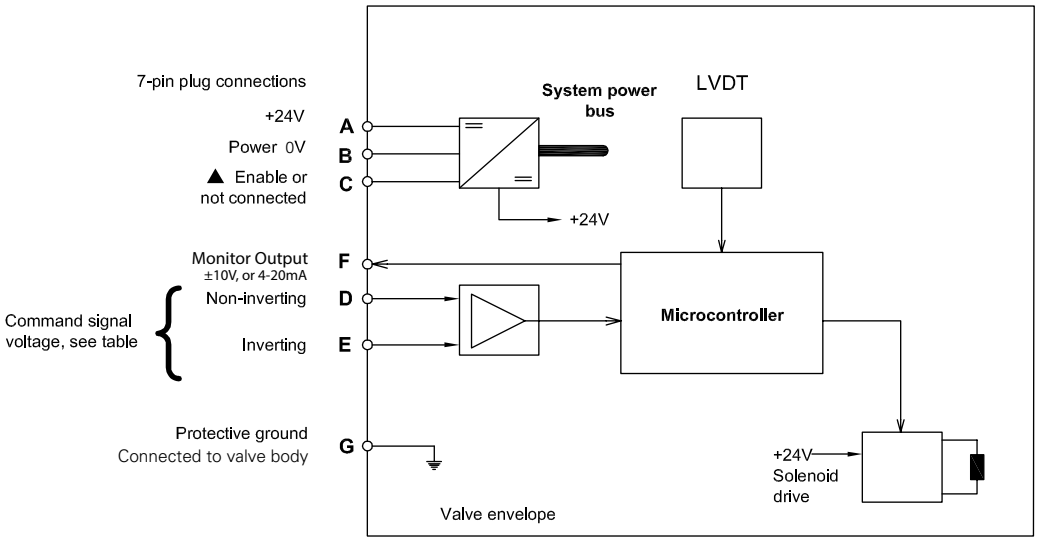
0.50 mm² (20 AWG)

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 - 0.41inches)

See connection diagram on page 18.



▲ Pin C is used for a valve enable signal with electrical connections Field 8 = H or R.

Command Signals and Outputs, Field 6 = 1

7-pin plug		Flow direction
Pin D	**Pin E**	
Positive OV $U_D - U_E$ = Positive	OV Negative	P to A
Negative OV $U_D - U_E$ = Negative	OV Positive	P to B

Warning

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

Block Diagram Current Input (Field 6 = 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 20m (65 ft)

1.00 mm² (16 AWG) up to 40m (130 ft)

Signal cables:

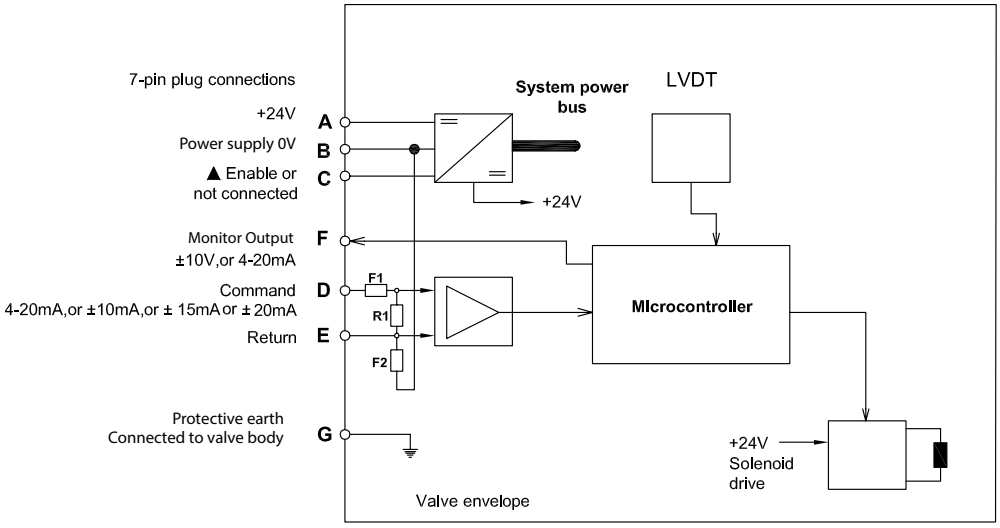
0.50 mm² (20 AWG)

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 19.



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

R1 shunt resistor 100R
F1, F2 resettable fuse

Command Signals and Outputs, Field 6 = 2

7-pin plug			
Pin D	**Pin E**	**Pin B**	**Flow direction**
More than 12 mA	Current return	Power ground	P to A
Less than 12 mA	Current return	Power ground	P to B

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

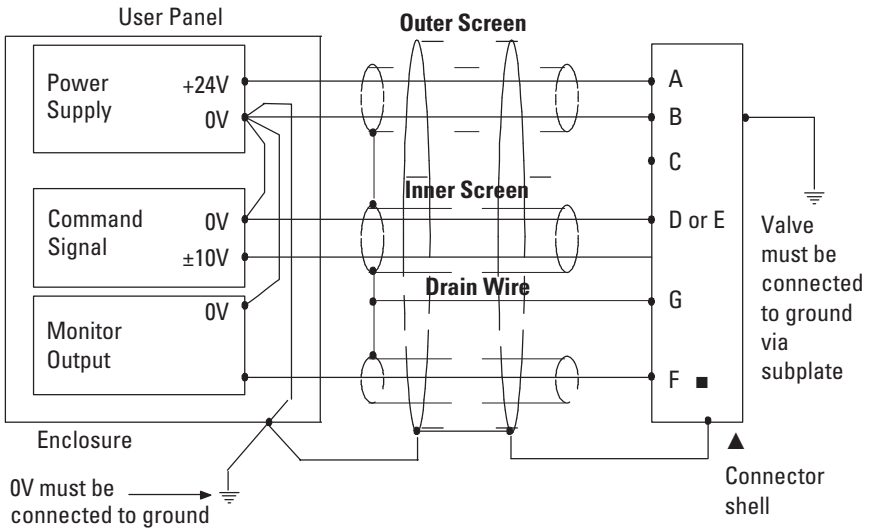
7-pin plug			
Pin D	**Pin E**	**Pin B**	**Flow direction**
More than 0 mA	Current return	Power ground	P to A
Less than 0 mA	Current return	Power ground	P to B

Warning

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

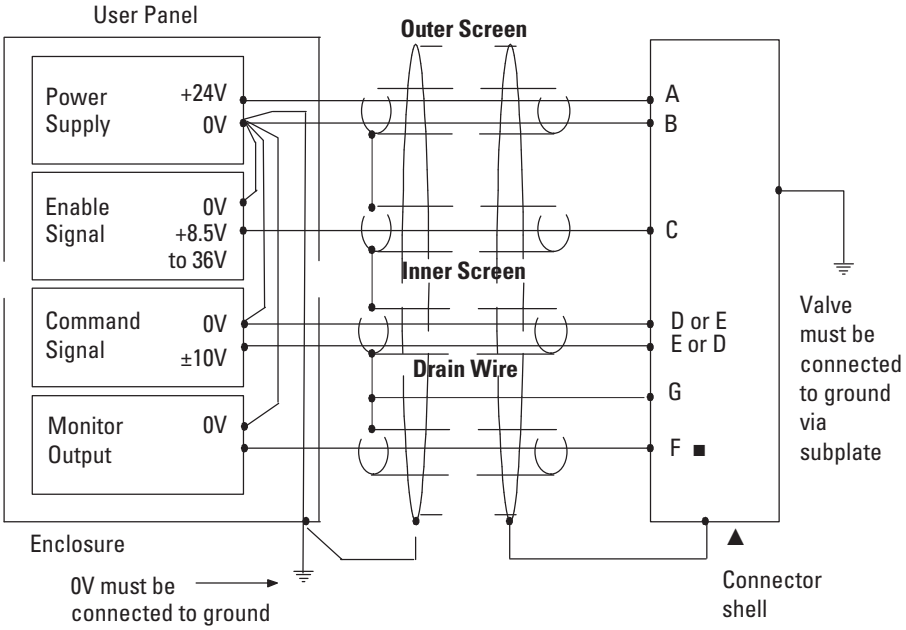
Wiring Connections Voltage Input (Field 6 = 1)

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



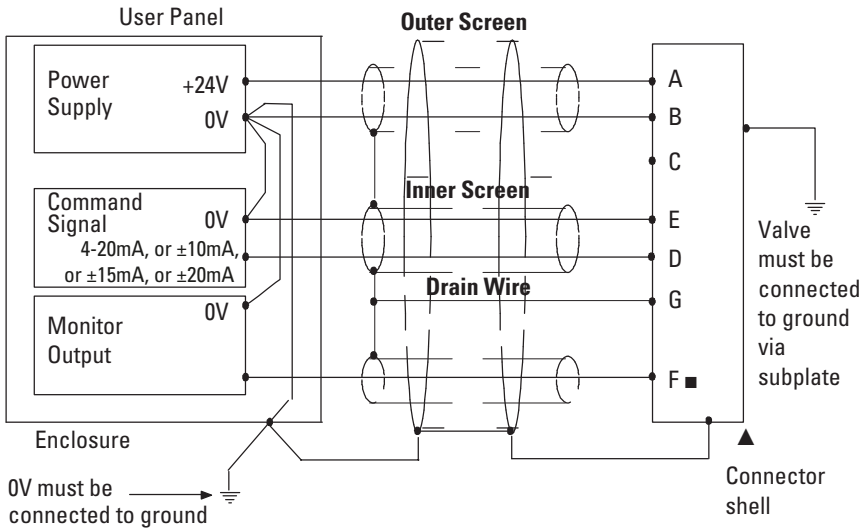
Wiring Connections for Voltage Mode (Field 6 = 1) Valves with Enable Feature

▲ 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.



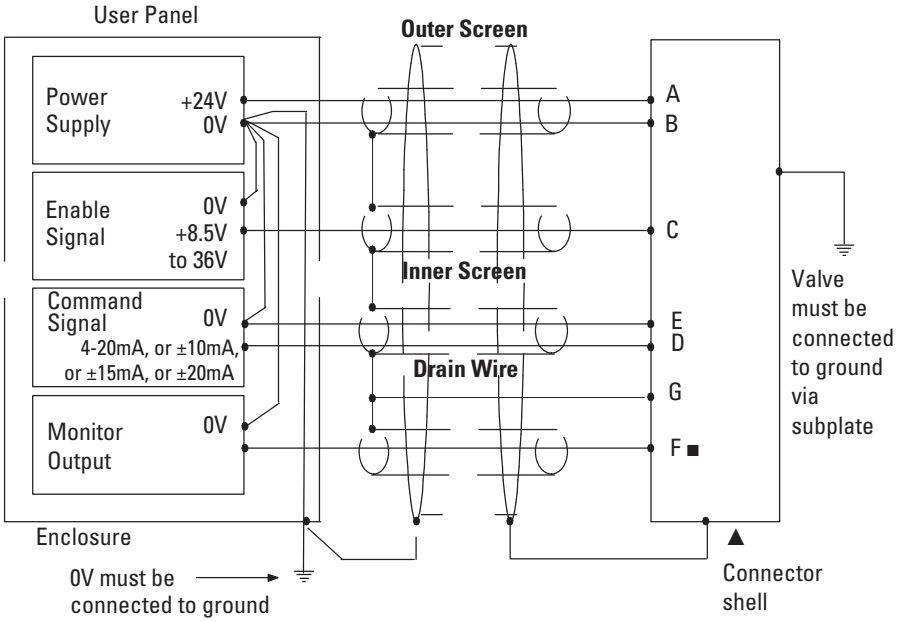
Wiring Connections Current Input (Field 6 = 2, 3, 4, 5)

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



Wiring Connections for Current Input (Field 6 = 2, 3, 4, 5) 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 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.

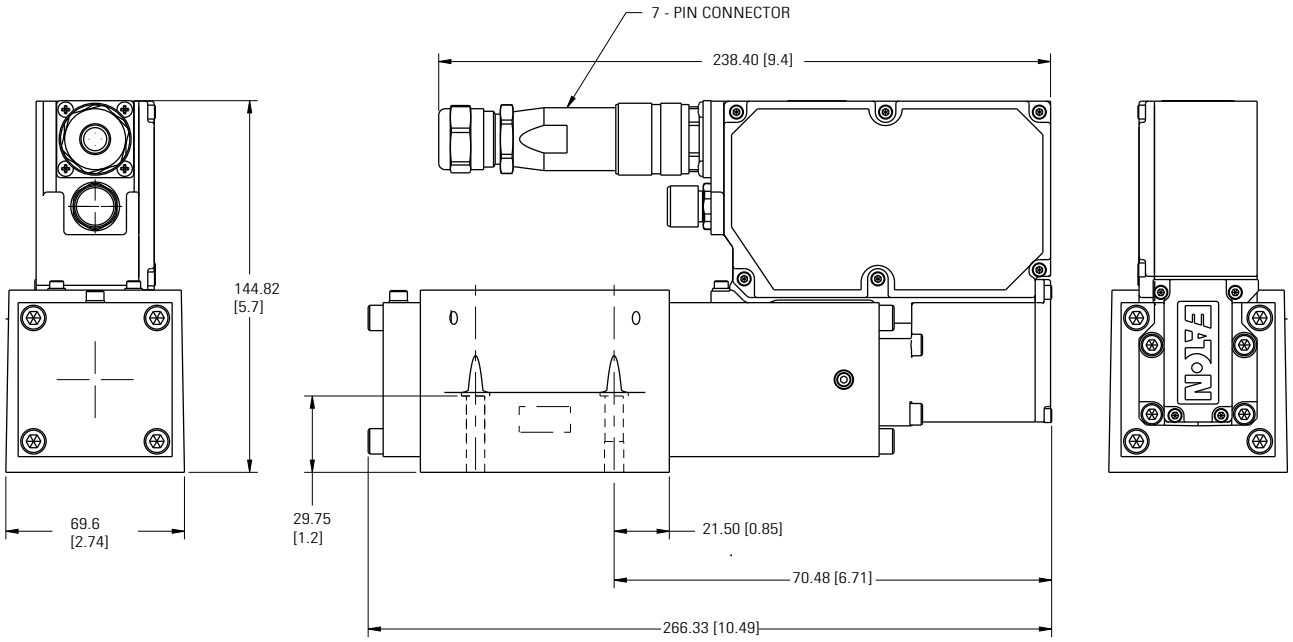
The enable line to pin C should be outside the screen which contains the demand signal cables.

To ensure EMI protection use only metal shielded mating connectors.

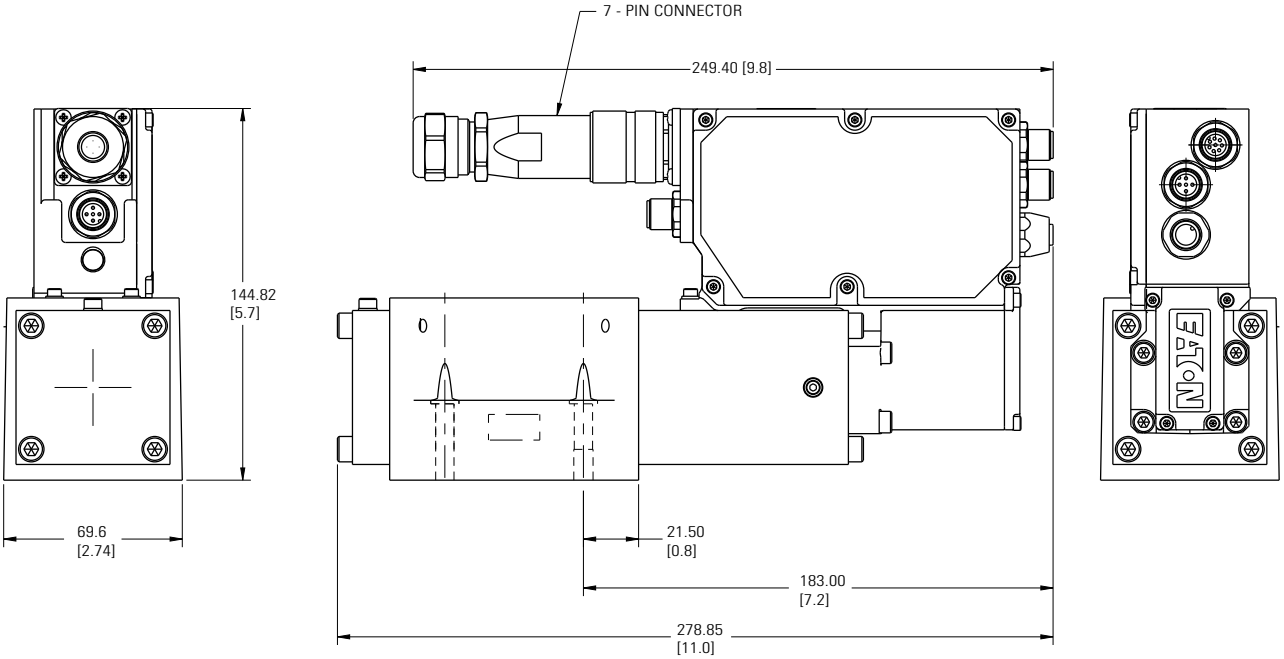
Installation Dimensions

mm (inch)

KBS1-05

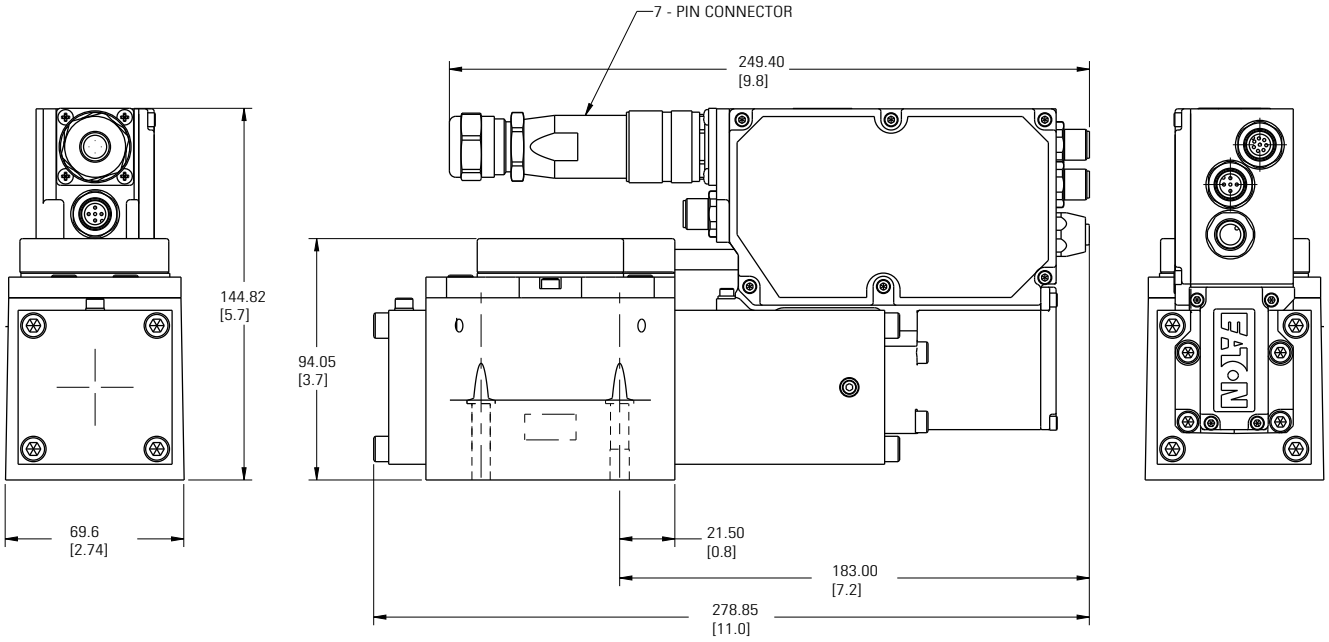


KBS2-05



Installation Dimensions
mm (inch)

KBS-3-05



Mounting Surfaces

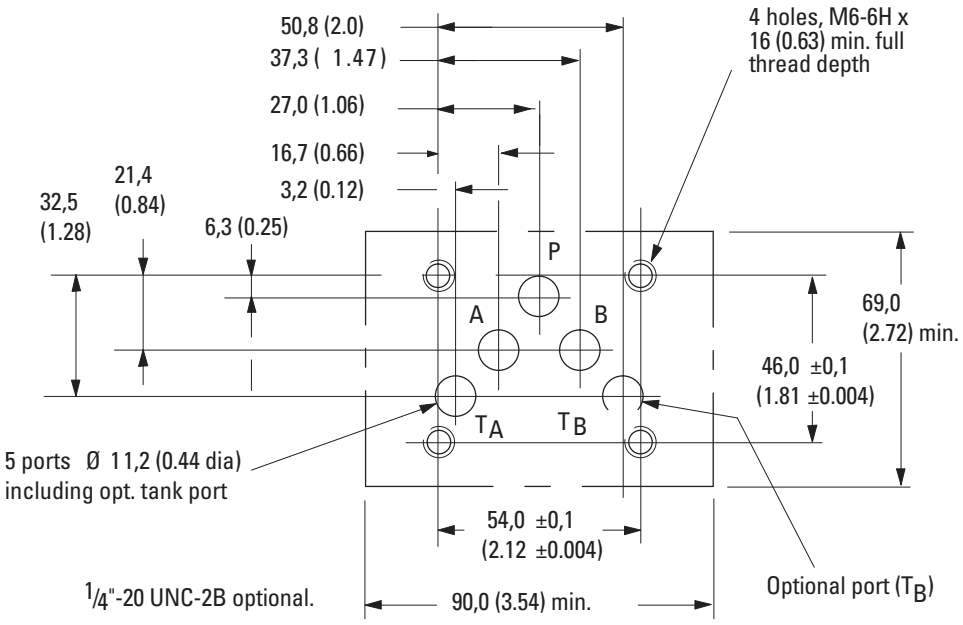
Mounting Surface Interface to ISO 4401 (Size 05)

This interface conforms to:
ISO 4401-05-04-0-05

ANSI/B93.7M (and NFPA) size 05

CETOP R35H4.2-05

DIN 24340 Form A10



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 level is:

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 ester. 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 interface seals.

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