

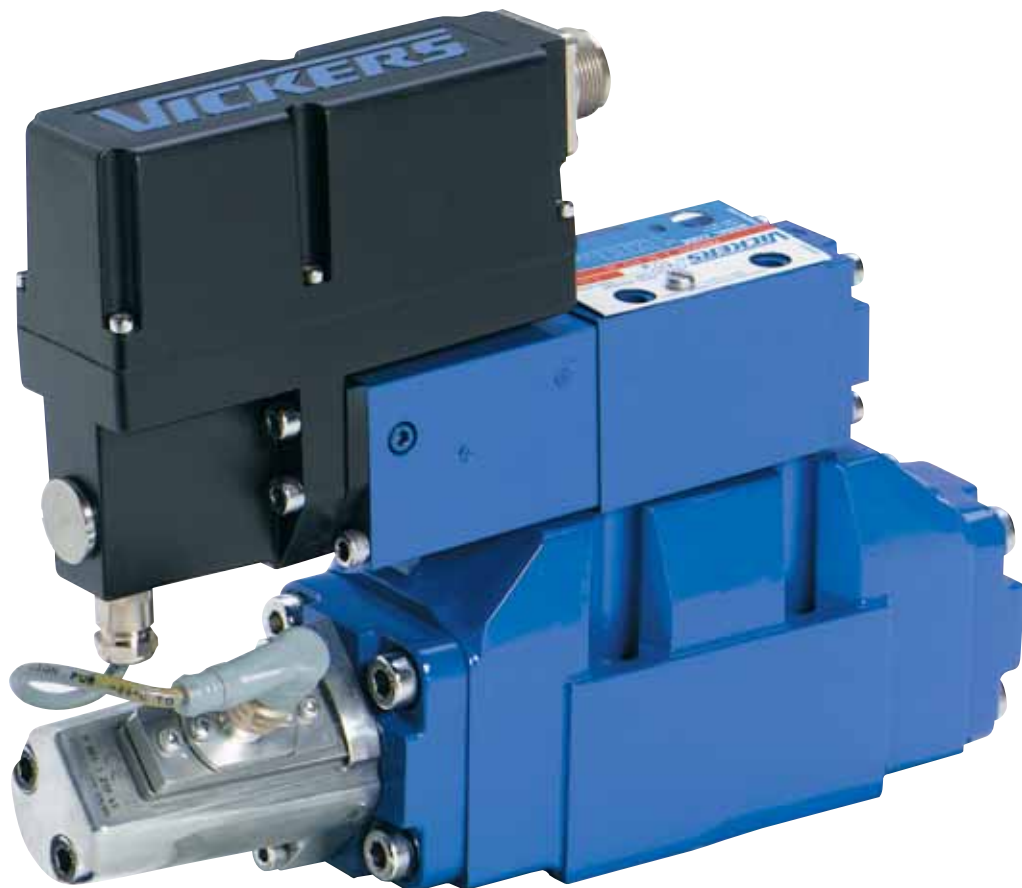
EATON

Vickers

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.

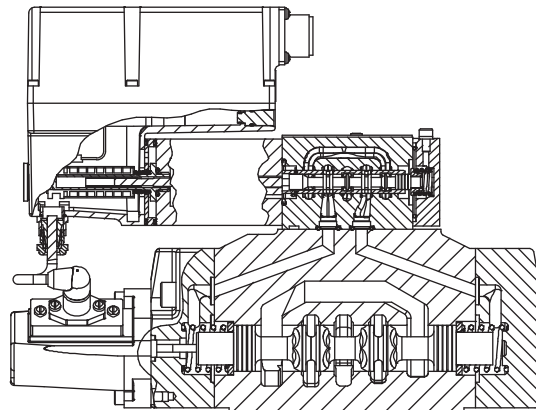
The only electrical inputs required are power supply (24V) and a voltage command signal of $\pm 10V$. The amplifier is housed in a robust metal enclosure, sealed against ingress of water and other fluids. Electrical connections are via a standard 7-pin plug.

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 $\pm 10V$ 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



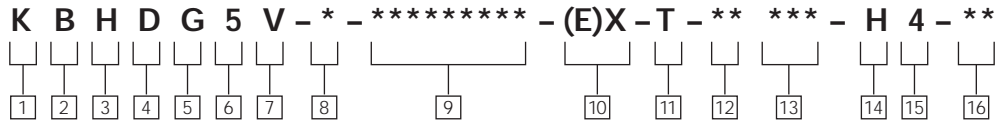
KBHDG5V-7, 10 design



WARNING

Valves with integral amplifiers are supplied with or without the metal 7-pin plug. The Vickers plug, part no. 934939, must

be correctly fitted to ensure that the EMC rating and IP67 rating are achieved. The plug retaining nut must be tightened with a torque of 2-2,5 Nm (1.5-2.0 lbf ft) to effect a proper seal.



1 Valve type

K – Proportional valve

2 Integral amplifier

B – Integral amplifier “B” series

3 Feed back arrangement

H – From pilot and main stages

4 Control type

D - Directional valve

5 Mounting

G – Subplate mounted

6 Operation

5 – Solenoid controlled, pilot operated

7 Pressure rating

V – 310 bar (4500 psi) Size 05
 – 350 bar (5000 psi) Size 07
 – 350 bar (5000 psi) Size 08
 – 350 bar (5000 psi) Size 10

8 Interface

ISO 4401
5 – Size 05
7 – Size 07
8 – Size 08
10 – Size 10

9 Spool type, flow rating and metering

See “Functional Symbol” on page 5. p = 5 bar (72 psi) per metering flow path, e.g. B to T.

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-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)

ASYMMETRIC SPOOLS

First figure (**N) is flow rating P-A, or A-T (“A” port flow); last figure (N**) is flow rating P-B, or B-T (“B” port flow)

For KBHDG5V-5 valves:

2C70N45 – 70 L/min (18.5 US gpm), “A” port flow
 45 L/min (11.9 US gpm), “B” port flow

33C60N40 – 60 L/min (17.2 US gpm), “A” port flow
 40 L/min (10.6 US gpm), “B” port flow

PQ87F - See flow charts (p.9)

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

5C200N115 – 200 L/min (52.8 US gpm), “A” port flow; 115 L/min (30.8 US gpm), “B” port flow

PQ190F - See flow charts (p.9)

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

33C375N250 – 375 L/min (99 US gpm), “A” 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

733C375N250 – 375 L/min (99 US gpm), “A” port flow;
 250 L/min (66 US gpm), “B” port flow

72C375N250 – 375 L/min (99 US gpm), “A” port flow;
 250 L/min (66 US gpm), “B” port flow

PQ375F - See flow charts (p.10)

For KBHDG5V-10 valves:

2C700N420 – 700 L/min (185 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

12C700N420 – 700 L/min (185 US gpm), “A” port flow;
 420 L/min (110 US gpm), “B” port flow

133C700N420 – 700 L/min (185 US gpm), “A” port flow;
 420 L/min (110 US gpm), “B” port flow

72C700N420 – 700 L/min (185 US gpm), “A” port flow;
 420 L/min (110 US gpm), “B” port flow

733C700N420 – 700 L/min (185 US gpm), “A” port flow;
 420 L/min (110 US gpm), “B” port flow

PQ680 F - See flow charts (p.11)

For actual maximum flows refer to power capacity envelopes, page 8.

10 Pilot supply

Blank–Internal (without reducer)

E – External (without reducer)

X – Internal (with reducer)

EX– External (with reducer)

See section on maximum pressures (page 7) for when pilot reducer must be used.

11 Pilot drain

T – Internal

Omit for external drain

12 Electrical Control Signal

M1 – ±10 demand signal, ±10V monitor signal

M2 – 4-20mA demand signal, ±10V monitor signal

M3 – ±10V demand signal, 4-20mA monitor signal

M4 – 4-20mA demand signal, 4-20mA monitor signal

13 Electrical connection

PC7 – 7 pin connector without plug

PE7 – 7 pin connector with plug

PH7 – As PE7 but with pin “C” used for enable signal

PR7 – As PC7 but with pin “C” used for enable signal

14 Coil rating

H – 24 VDC amplifier supply

15 Port T pressure limit rating

4 – 50 bar (700 psi) (for internal pilot drain option only, item 11 above)

16 Design number

11 – 11 series

Spool Data

Spool Symbols

Spool Type and Flow Ratings

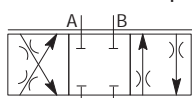
Note:

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).

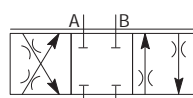
Symmetric

Spool code	Spool symbol	Flow rating
For KBHGD5V-5 valves:		
2C100N	2C	100 L/min (26 USgpm)
33C80N	33C	80 L/min (21 USgpm)
5C85N	5C	85 L/min (22 USgpm)
For KBHGD5V-7 valves:		
2C200N	2C	200 L/min (52 USgpm)
33C160N	33C	160 L/min (42 USgpm)
5C200N	5C	200 L/min (52 USgpm)
For KBHGD5V-8 valves:		
2C375N	2C	375 L/min (99 USgpm)
33C375N	33C	375 L/min (99 USgpm)
5C375N	5C	375 L/min (99 USgpm)
For KBHGD5V-10 valves:		
2C700N	2C	700 L/min (185 USgpm)
33C700N	33C	700 L/min (185 USgpm)
5C720N	5C	720 L/min (190 USgpm)

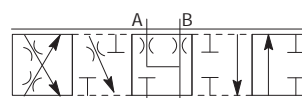
Available Spools for KBHGD5V



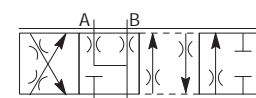
Spool type 2C



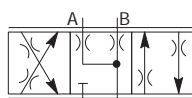
Spool type 5C (zero lapped)



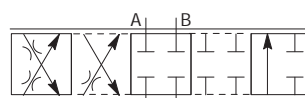
Spool type 133C



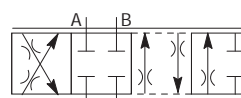
Spool type 733C



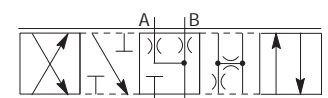
Spool type 33C



Spool type 12C



Spool type 72C



Spool type PQ

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.

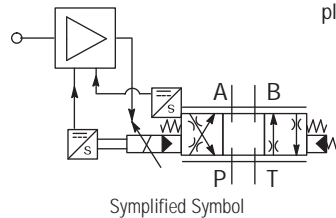
2. Internally Piloted Models

Differ from detailed symbols above by omission of plug A and the blocking of port X by the mating surface.

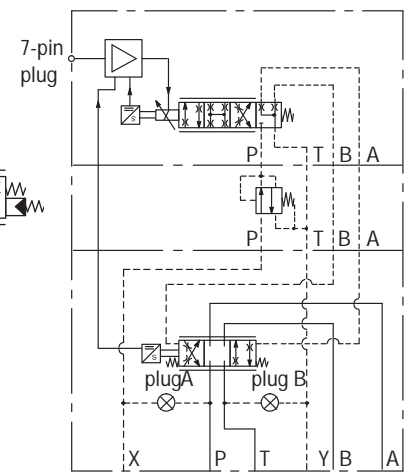
3. Internally Pilot Drain Models

Differ from detailed symbols above by omission of plug B and blocking of port Y by the mating surface.

Functional Symbol



Simplified Symbol



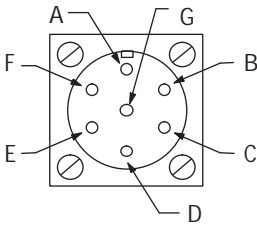
Detailed Symbol

Asymmetric

Spool code	Spool symbol	Flow rating
For KBHGD5V-5 valves:		
2C70N45	2C	70 L/min (18.5 USgpm) "A" port flow 45 L/min (11.9 USgpm) "B" port flow
33C60N40	33C	60 L/min (17.2 USgpm) "A" port flow 40 L/min (10.6 USgpm) "B" port flow
PQ87F	PQ	See flow chart (p. 9)
For KBHGD5V-7 valves:		
2C150N85	2C	150 L/min (40 USgpm) "A" port flow 85 L/min (22.4 USgpm) "B" port flow
33C130N65	33C	130 L/min (33.3 USgpm) "A" port flow 65 L/min (17.2 USgpm) "B" port flow
5C200N115	5C	200 L/min (52.8 USgpm) "A" port flow, 115 L/min (30.8 USgpm) "B" port flow
PQ190F	PQ	See flow chart (p. 9)
For KBHGD5V-8 valves:		
2C375N250	2C	375 L/min (99 USgpm) "A" port flow 250 L/min (66 USgpm) "B" port flow
33C375N250	33C	375 L/min (99 USgpm) "A" port flow 250 L/min (66 USgpm) "B" port flow
12C375N250	12C	375 L/min (99 USgpm) "A" port flow 250 L/min (66 USgpm) "B" port flow
133C375N250	133C	375 L/min (99 USgpm) "A" port flow 250 L/min (66 USgpm) "B" port flow
72C375N250	72C	375 L/min (99 USgpm) "A" port flow 250 L/min (66 USgpm) "B" port flow
733C375N250	733C	375 L/min (99 USgpm) "A" port flow 250 L/min (66 USgpm) "B" port flow
PQ375F	PQ	See flow chart (p. 10)
For KBHGD5V-10 valves:		
2C700N420	2C	700 L/min (185 USgpm) "A" port flow 420 L/min (110 USgpm) "B" port flow
33C700N420	33C	700 L/min (185 USgpm) "A" port flow 420 L/min (110 USgpm) "B" port flow
12C700N420	12C	700 L/min (185 USgpm) "A" port flow 420 L/min (110 USgpm) "B" port flow
133C700N420	133C	700 L/min (185 USgpm) "A" port flow 420 L/min (110 USgpm) "B" port flow
72C700N420	72C	700 L/min (185 USgpm) "A" port flow 420 L/min (110 USgpm) "B" port flow
733C700N420	733C	700 L/min (185 USgpm) "A" port flow 420 L/min (110 USgpm) "B" port flow
PQ680F	PQ	See flow chart (p. 11)

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	0 to 10V DC, or 0 to -10V DC, or -10V to + 10V DC			
Voltage mode	M1: 47 kΩ - M2: 100R			
Input impedance	18V (max)			
Common mode voltage to pin D	4-20 mA			
Current mode	100 mV			
Max differential voltage to pin E to pin B				
Valve enable signal for model codes PH7 & PR7				
Enable	>8.5V (36V max)			
Disable	<6.5V			
Input impedance	10 kΩ			
7-pin plug connector				
	Pin	Description		
	A	Power supply positive (+)		
	B	Power supply 0V and current command return		
	C	Not connected (PE7 & PC7)		
	C	Valve enable (PH7 & PR7)		
	D	Command signal (+V or current in)		
	E	Command signal (-V or current GND)		
	F	Output monitor		
	G	Protective ground		
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)	±10V DC for full spool stroke			
Output impedance	10k			
Power stage PWM frequency	10 kHz nominal			
Step input response, with flow through P-A-B-T, $\Delta p=5$ bar (72 psi) per metering path, e.g. P-A, pilot pressure = 40 bar Required flow step:	Time to reach 90% of required step:			
	KBHDG5V-5	KBHDG5V-7	KBHDG5V-8	KBHDG5V-10
0 to 100%	24 ms	24 ms	33 ms	64 ms
100% to 0	23 ms	23 ms	33 ms	60 ms
+90 to -90%	35 ms	36 ms	49 ms	84 ms
Reproducibility, valve-to-valve (at factory settings): Flow at 100% command signal	≤5%			
Hysteresis with flow through P-A-B-T $\Delta p=5$ bar (72 psi) per metering path (P-A or B-T)	<1%			
Protection:				
Electrical	Reverse polarity protected			
Environmental	IEC 60529, Class IP65 & IP67			
Ambient air temperature range for full performance	0° C to 70° C (32° F to 158° F)			
Oil temperature range for full performance	0° C to 70° C (32° F to 158° F)			
Minimum temperature at which valves will work at reduced performance	-20° C (-4° F)			
Storage temperature range	-25° C to +85° C (-13° F to +185° F)			
Relative duty factor	Continuous rating (ED = 100%)			
Mass: kg (lb) approx.	KBHDG5V-5	KBHDG5V-7	KBHDG5V-8	KBHDG5V-10
Valves with pressure reducer	10,15 (22.4)	11,4 (25.1)	17,05 (37.54)	44,3 (97.7)
Valves without pressure reducer	8,85 (19.5)	10,1 (22.2)	15,85 (34.84)	43,1 (95.1)
Supporting products:				
Auxiliary electronic modules (DIN -rail mounting):				
EHA-CON-201-A2* signal converter	See catalog GB 2410B			
EHD-DSG-201-A-1* command signal generator	See catalog GB 2470			
EHA-RMP-201-A-2* Ramp generator	See catalog GB 2410A			
EHA-PSU-201-A-10 Power supply	See catalog GB 2410A			
EHA-PID-201-A-20 PID controller	See catalog GB 2427			

Pressure and Minimum Flow Rates

MAXIMUM PRESSURES, BAR (PSI) VALVES WITH PRESSURE REDUCER

Model	Pilot pressure source †	Pilot drain connection	P Port	A&B Ports	T Port	X Port ◆	Y Port
KBHDG5V-5	External	External	315 (4500)	315 (4500)	210 (3000)	315 (4500)	50 (700)
		Internal*	315 (4500)	315 (4500)	50 (700)	315 (4500)	50 (700)
	Internal	External	315 (4500)	315 (4500)	210 (3000)	315 (4500)	50 (700)
		Internal*	315 (4500)	315 (4500)	50 (700)	315 (4500)	50 (700)
KBHDG5V-7/8/10	External	External	350 (5000)	350 (5000)	350 (5000)	350 (5000)	50 (700)
		Internal*	350 (5000)	350 (5000)	50 (700)	350 (5000)	50 (700)
	Internal	External	350 (5000)	350 (5000)	350 (5000)	350 (5000)	50 (700)
		Internal*	350 (5000)	350 (5000)	50 (700)	350 (5000)	50 (700)

† 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

Model	Pilot pressure source †	Pilot drain connection	P Port	A&B Ports	T Port	X Port ◆	Y Port
KBHDG5V-5	External	External	315 (4500)	315 (4500)	210 (3000)	210 (3000)	50 (700)
		Internal*	315 (4500)	315 (4500)	50 (700)	210 (3000)	50 (700)
	Internal	External	210 (3000)	315 (4500)	210 (3000)	210 (3000)	50 (700)
		Internal*	210 (3000)	315 (4500)	50 (700)	210 (3000)	50 (700)
KBHDG5V-7/8/10	External	External	350 (5000)	350 (5000)	350 (5000)	210 (3000)	50 (700)
		Internal*	350 (5000)	350 (5000)	50 (700)	210 (3000)	50 (700)
	Internal	External	210 (3000)	350 (5000)	350 (5000)	210 (3000)	50 (700)
		Internal*	210 (3000)	350 (5000)	50 (700)	210 (3000)	50 (700)

† 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

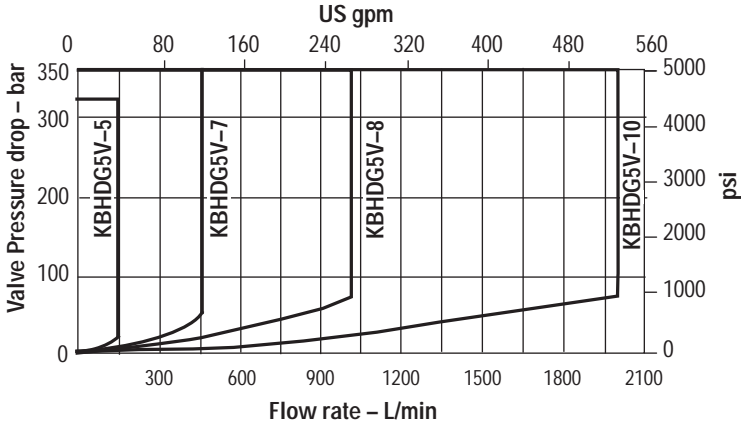
Valve Size/Spool Code	Min. Flow Rate L/min	In ³ /min
KBHDG5V-5	0,5	30
KBHDG5V-7	1,0	60
KBHDG5V-8	1,5	91
KBHDG5V-10	3,0	180

Performance Curves

KBHDG5V-5/7/8/10

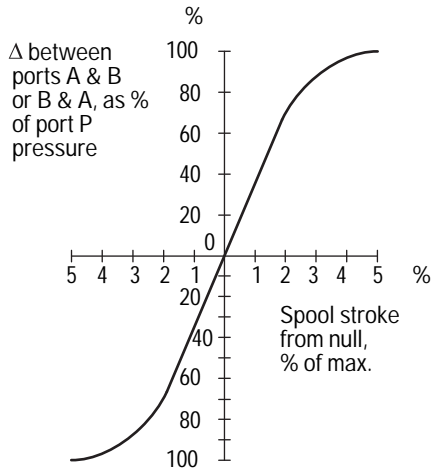
POWER CAPACITY ENVELOPE

Flow through P-A-B-T or P-B-A-T



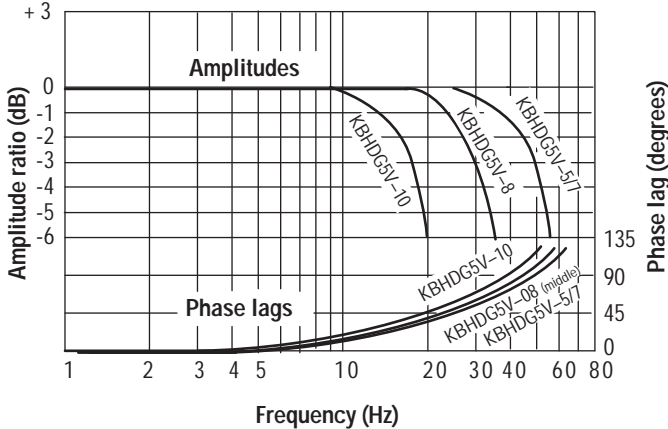
PRESSURE GAIN

("5C" spools only)



FREQUENCY RESPONSE, TYPICAL

For an amplitude of 50 ± 25% of rated flow (ISO 10770-1)
 2C spool measured at $\nu = 36$ cSt (168 SUS),
 $t = 50^\circ\text{C}$ (122°F) and pilot pressure = 40 bar (with-reducer model)



FLOW GAIN

At $\varnothing p = 5$ 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.

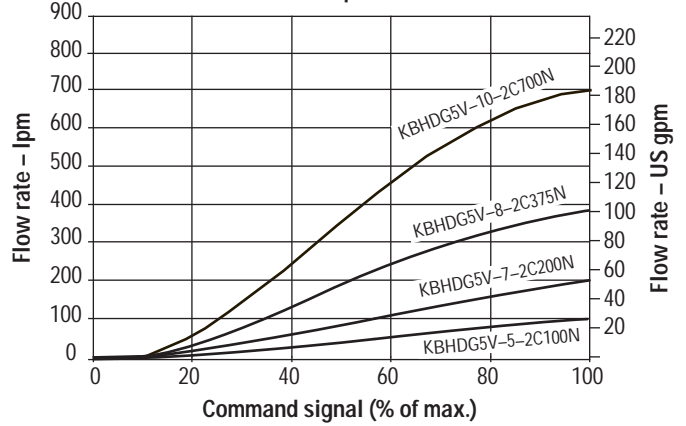
At other $\varnothing p$ values, flow rates approximate to: $Q_x = Q_D \sqrt{\frac{\varnothing p_x}{\varnothing p_D}}$
 where $Q_D =$ Datum flow rate

$\varnothing p_D =$ Pressure drop at datum flow rate

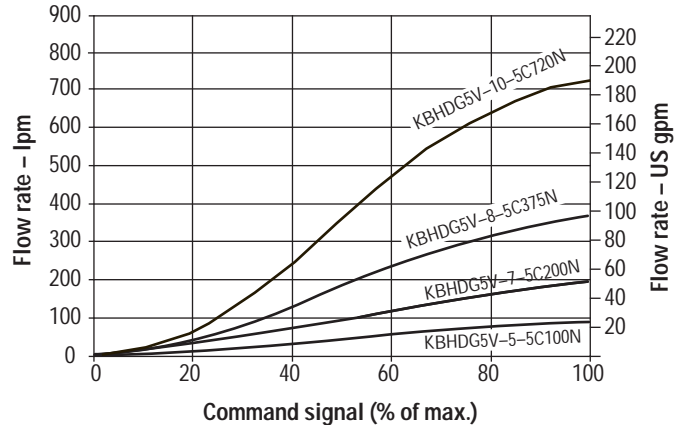
$\varnothing p_x =$ Required p

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

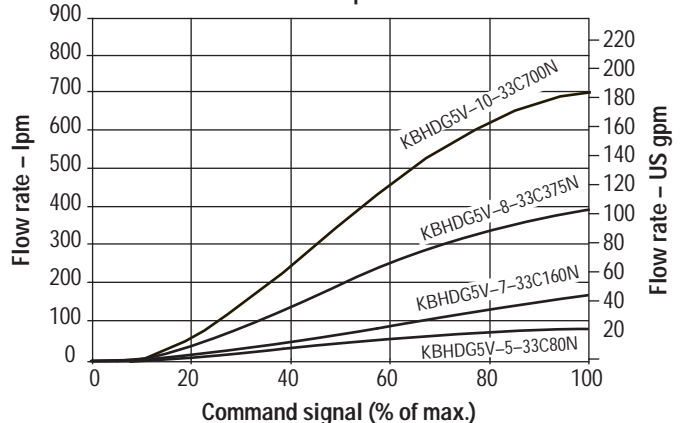
"2C" Spools



"5C" Spools



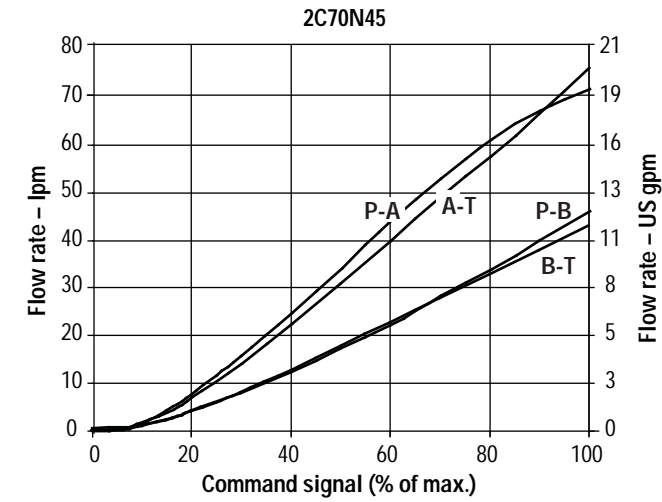
"33C" Spools



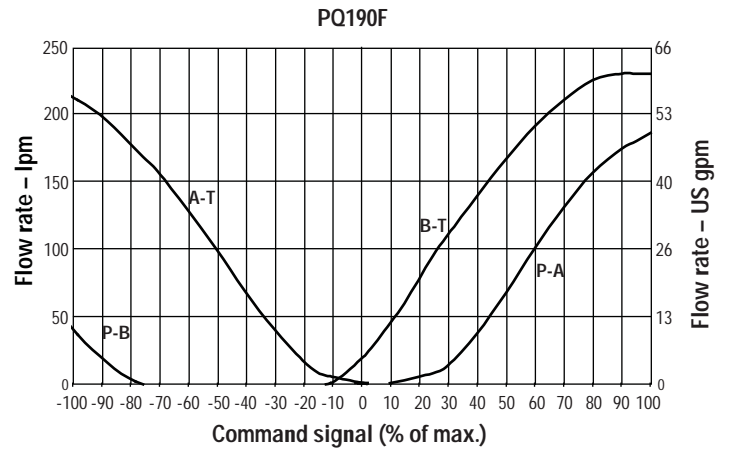
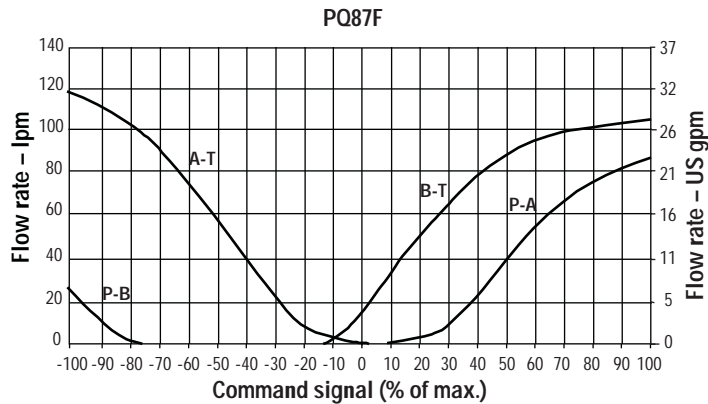
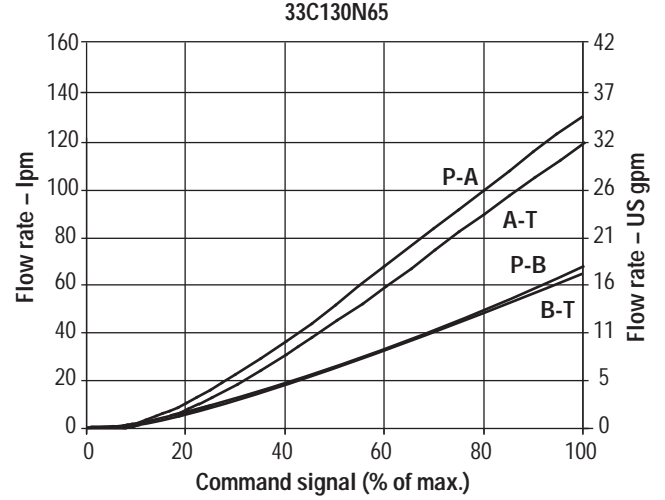
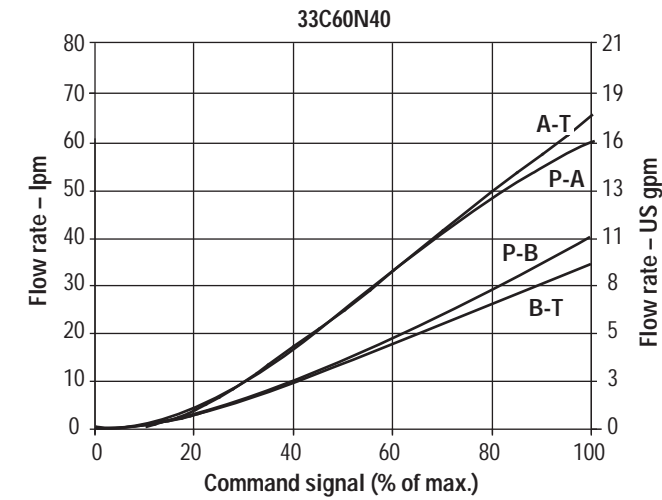
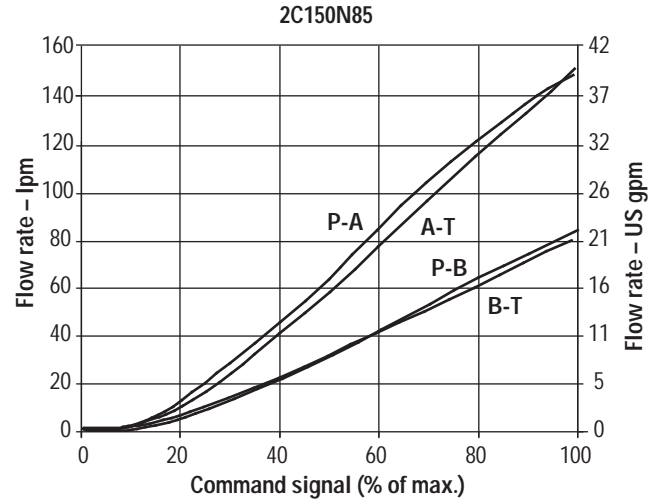
Performance Curves

Flow Gain

KBHDG5V-5



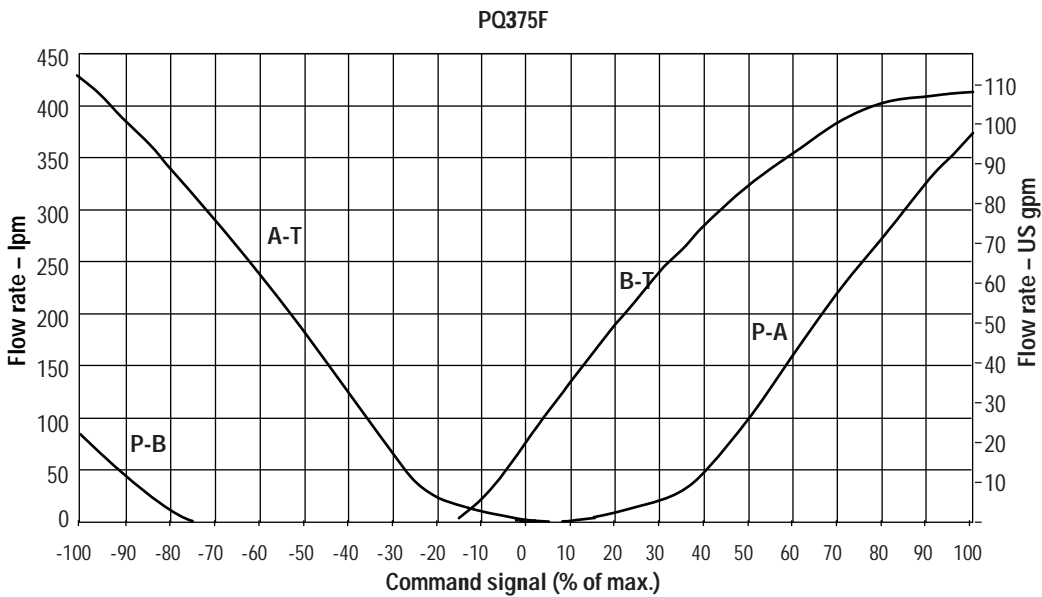
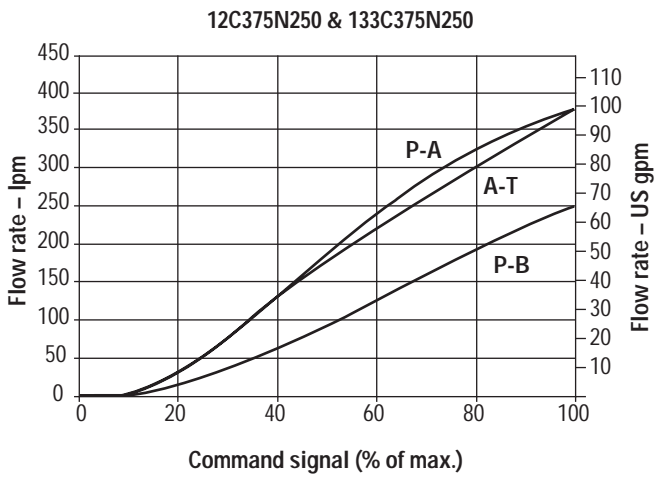
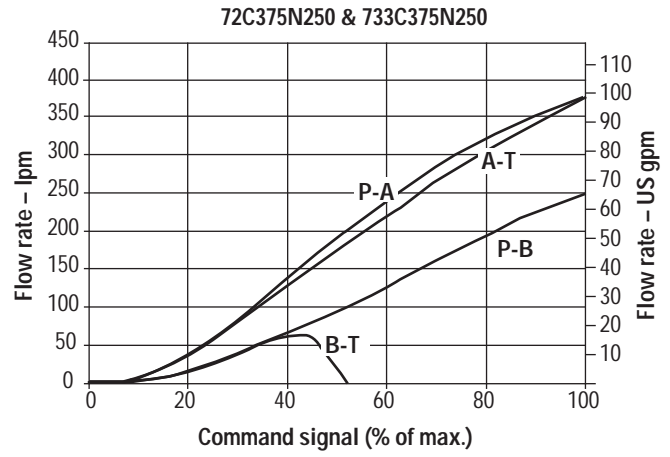
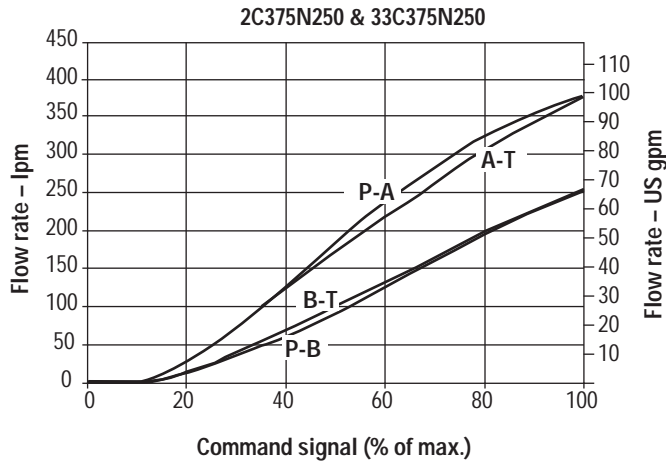
KBHDG5V-7



Performance Curves

Flow Gain

KBHDG5V-8

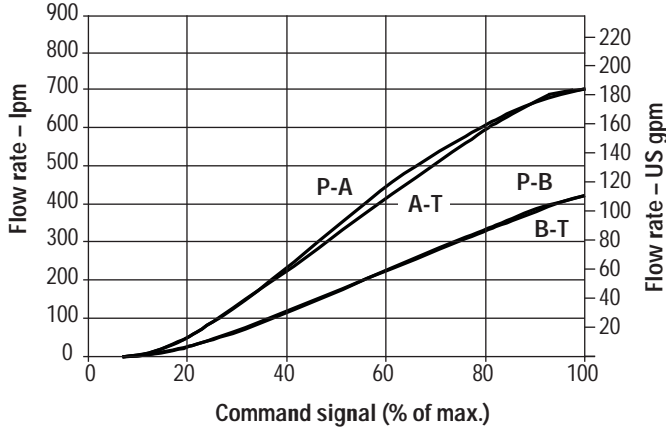


Performance Curves

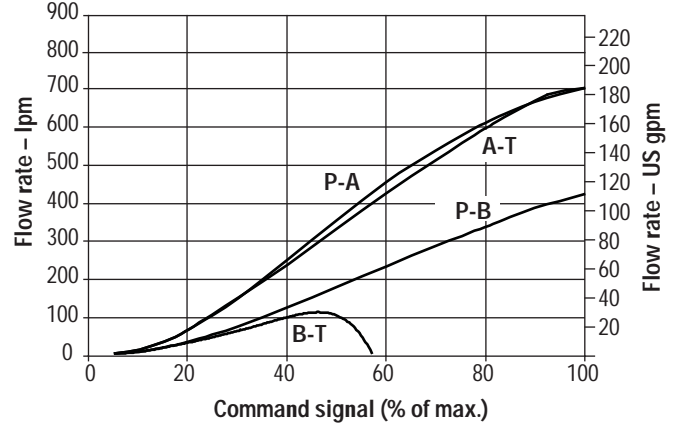
Flow Gain

KBHDG5V-10

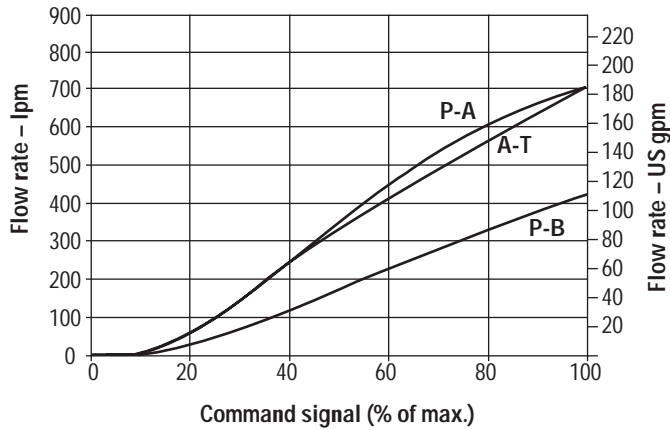
2C700N420 & 33C700N420



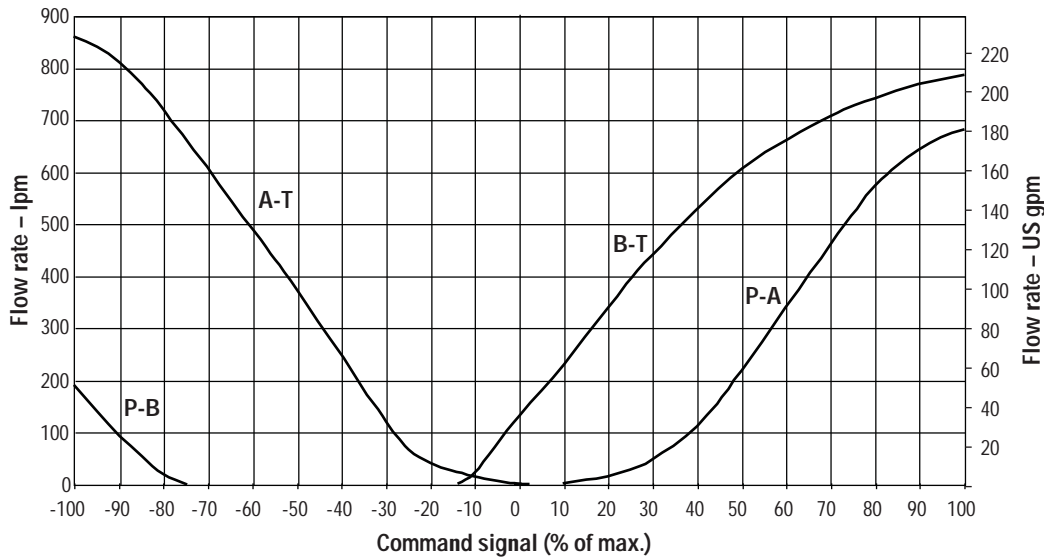
72C700N420 & 733C700N420



12C700N420 & 133C700N420



PQ680



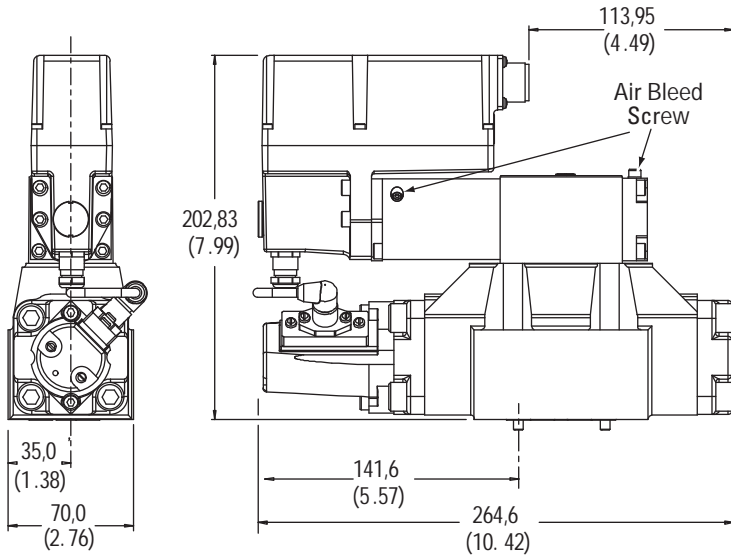
Installation Dimensions

KBHDG5V-5/7

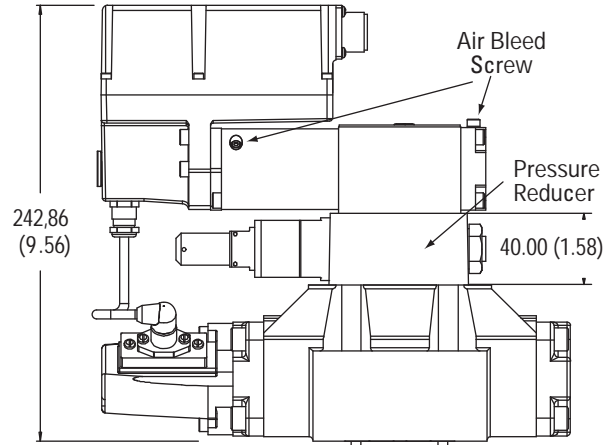
Dimensions shown in mm (in).

KBHDG5V-5

Valve without pressure reducer



Valve with pressure reducer



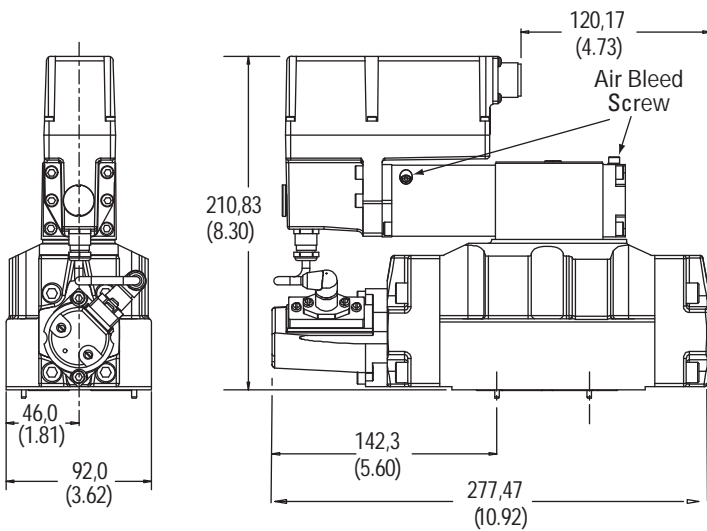
Mounting surface, seals supplied.

For mating surface dimensions, see page 14.

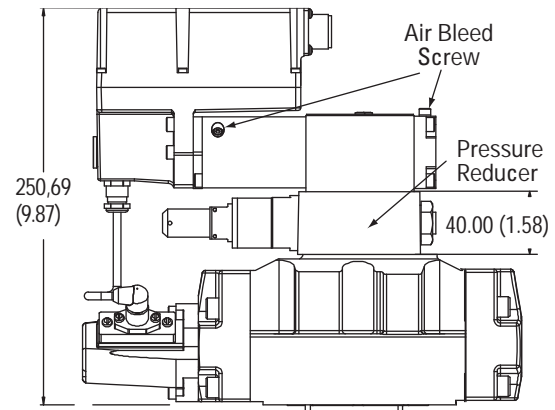
For mounting subplate options and bolt options, see catalog GB-2425.

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.

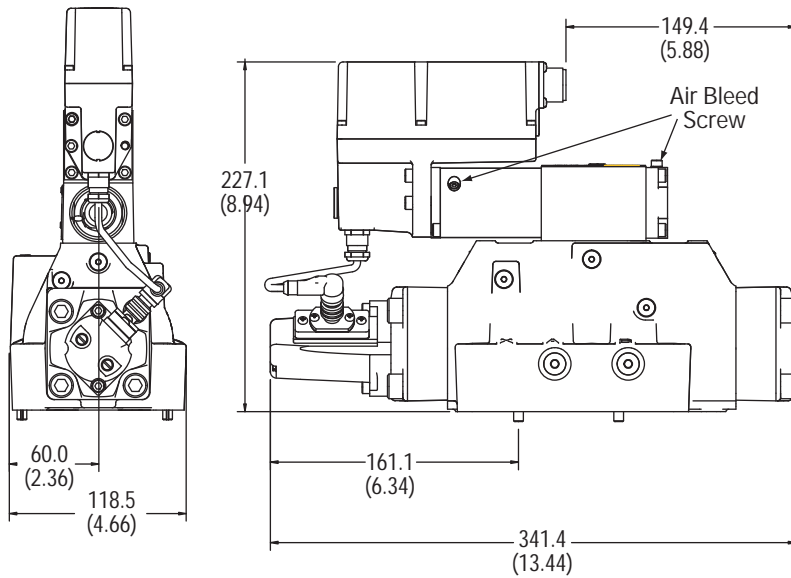
Installation Dimensions

KBHDG5V-8/10

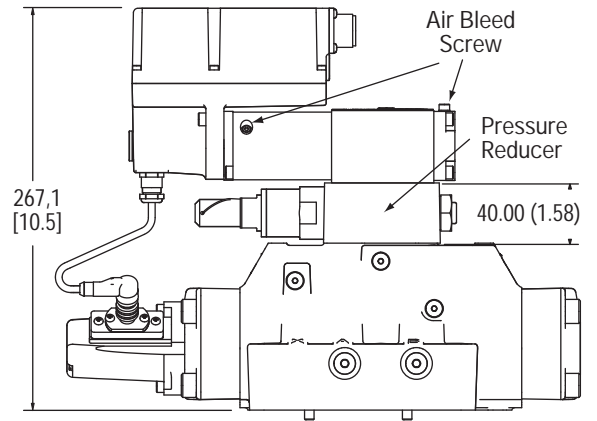
Dimensions shown in mm (in).

KBHDG5V-8

Valve without pressure reducer



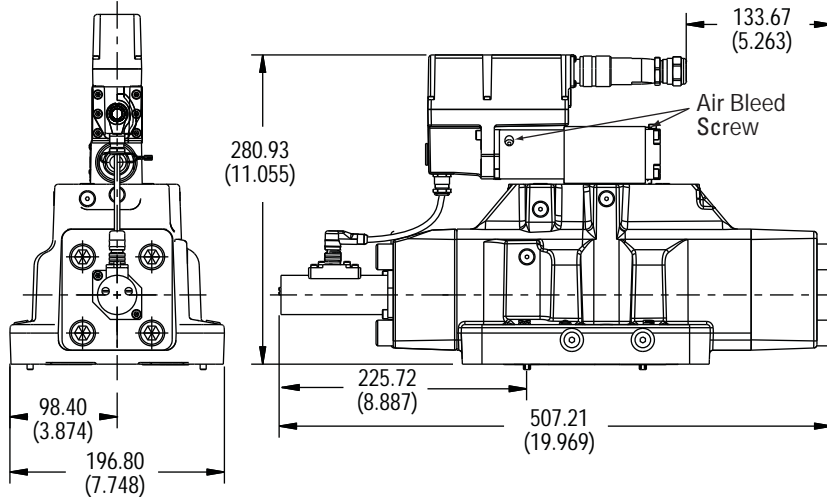
Valve with pressure reducer



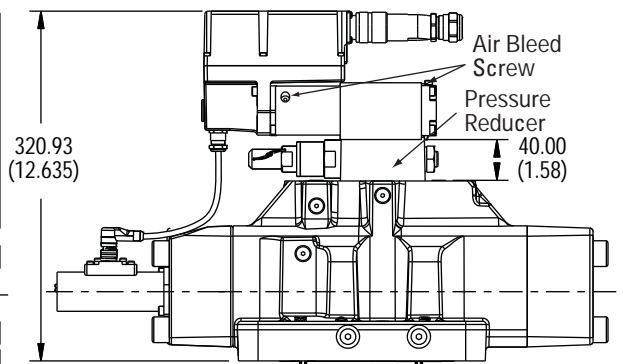
Mounting surface, seals supplied.
 For mating surface dimensions, see page 15.
 For mounting subplate options and bolt options, see catalog GB-2425.

KBHDG5V-10

Valve without pressure reducer



Valve with pressure reducer



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

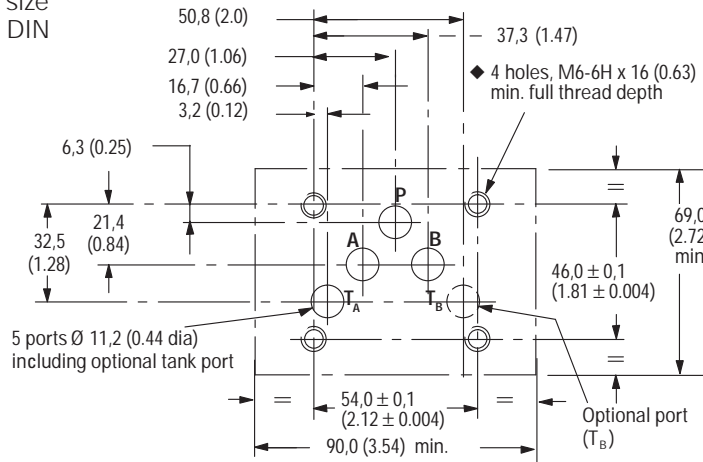
ISO 4401 gives metric thread tappings. Alternate UNC tappings are Vickers recommendations that allow these

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.

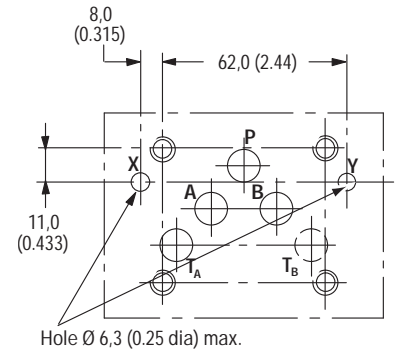
ISO Standard Size 05 without Ports X and Y

This interface conforms to ISO 4401-05-04-0-05, ANSI/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

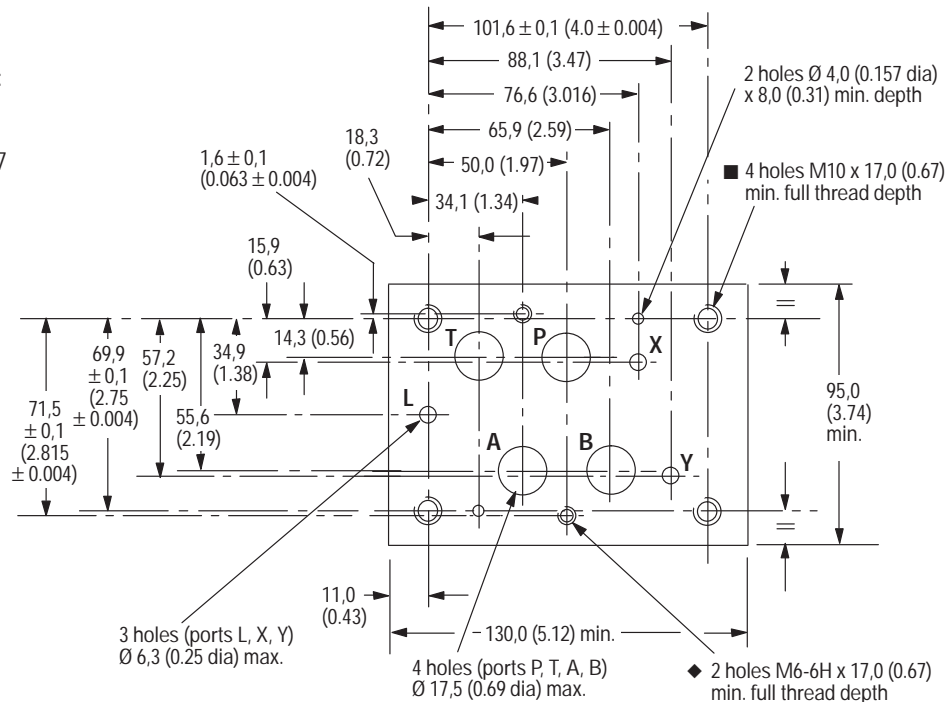


ISO Standard Size 07 Interface

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.



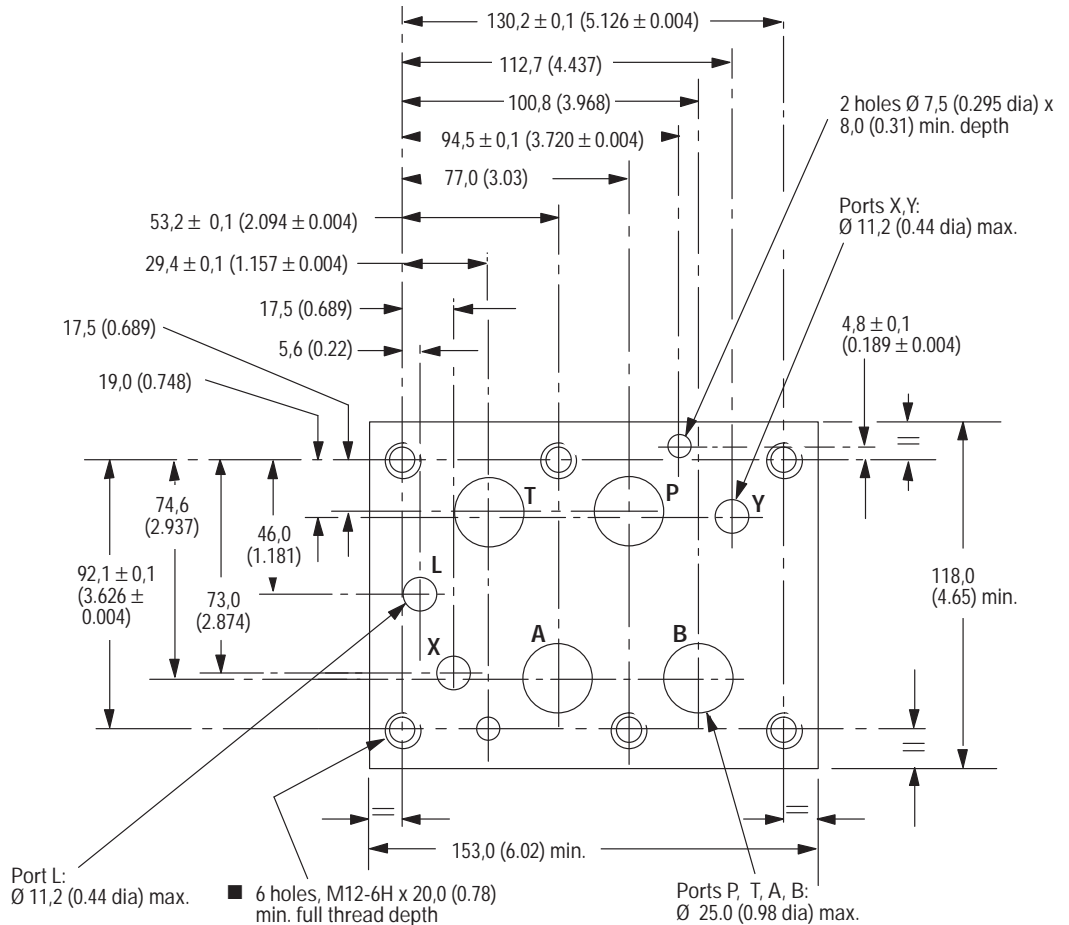
Mounting Surfaces

Dimensions shown in mm (in).

ISO Standard Size 08 Interface

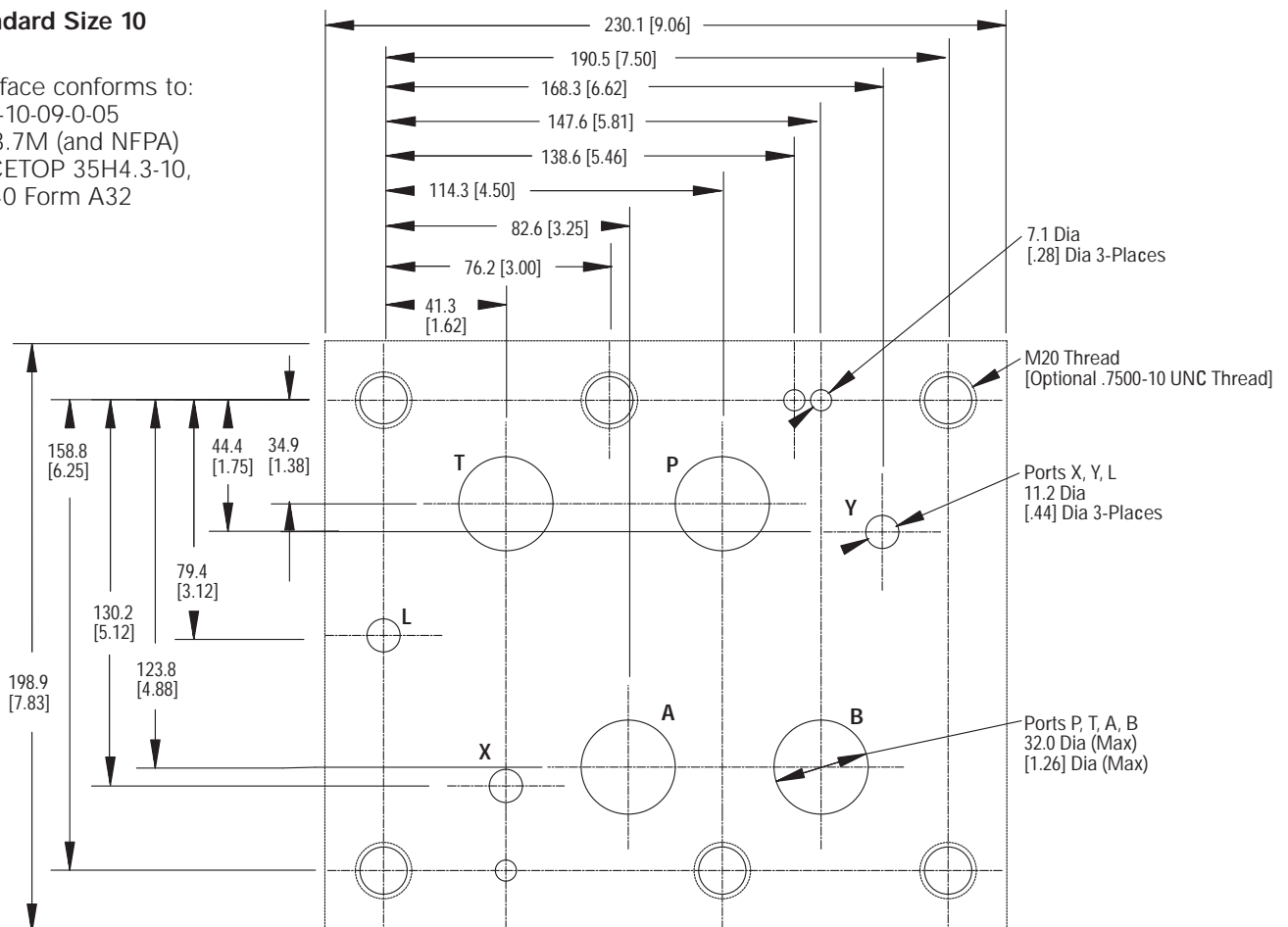
This interface conforms to:
 ISO 4401-08-08-0-05
 ANSI/B93.7M (and NFPA)
 size 08 CETOP R35H4.3-08
 DIN 24340 Form A25

■ 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



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):

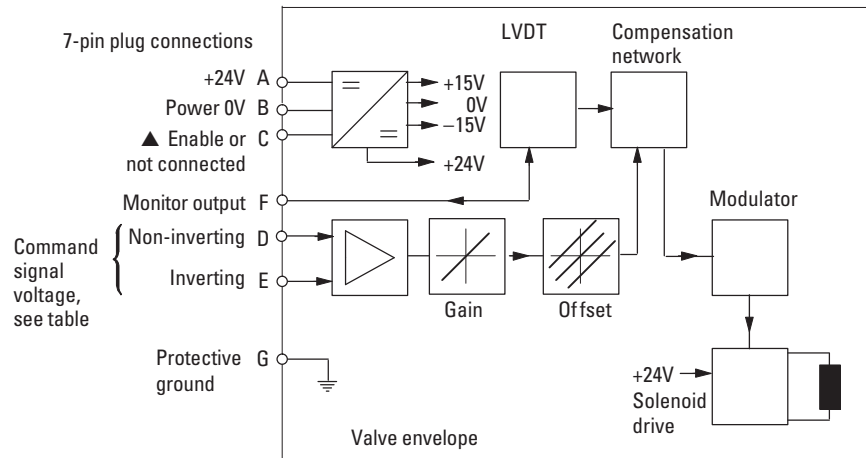
A suitable cable would have 7 cores, a separate screen for the signal wires and an overall screen.

Cable outside diameter 8,0–10,5 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 the Installation Wiring Practices for Vickers Electronic Products leaflet 2468.



▲ Pin C is used for a valve enable signal with electrical connections PH7 and PR7.

Command Signals and Outputs, M1

7-pin plug	Pin D	Pin E	Flow direction
Positive 0V	0V	Negative	P to A
$U_D - U_E = \text{Positive}$			
Negative 0V	0V	Positive	P to B
$U_D - U_E = \text{Negative}$			



WARNING

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

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 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):

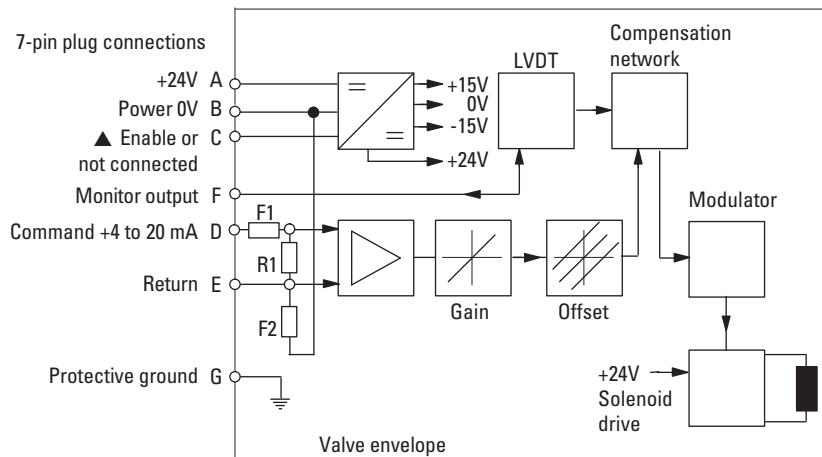
A suitable cable would have 7 cores, a separate screen for the signal wires and an overall screen.

Cable outside diameter 8,0–10,5 mm (0.31–0.41 inches)

See connection diagram on 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.



▲ Pin C is used for a valve enable signal with electrical connections PH7 and PR7.

R1 shunt resistor 100R

F1, F2 resettable fuse

Command Signals and Outputs, M2

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



WARNING

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

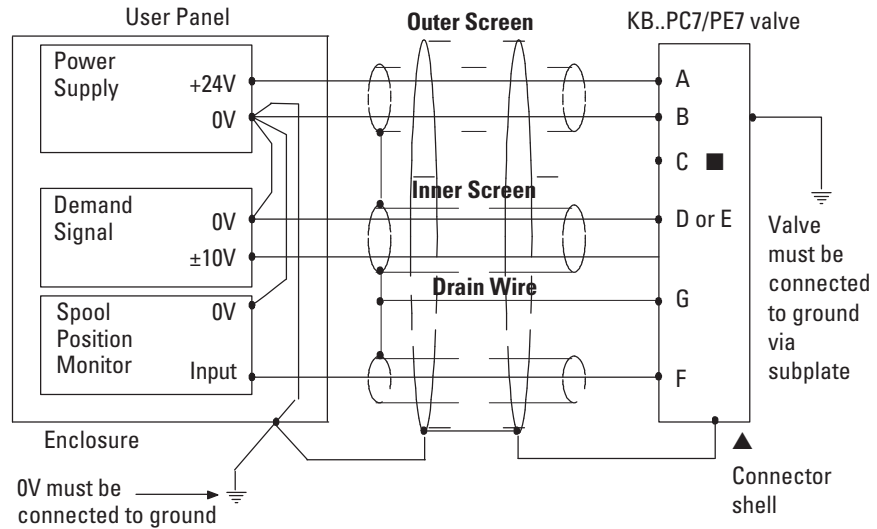
Wiring Connections Voltage Input (M1)

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



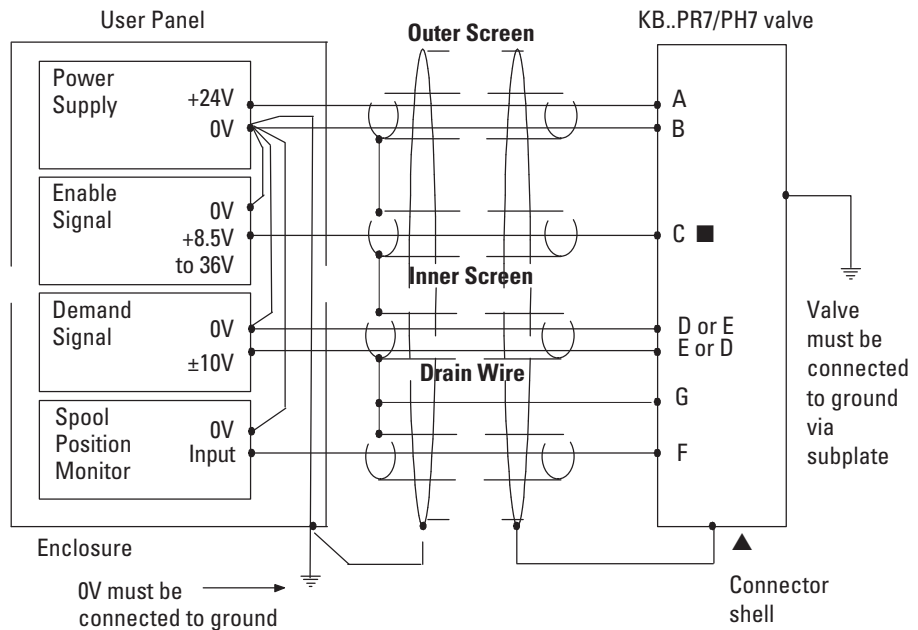
WARNING

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.



Electrical Information

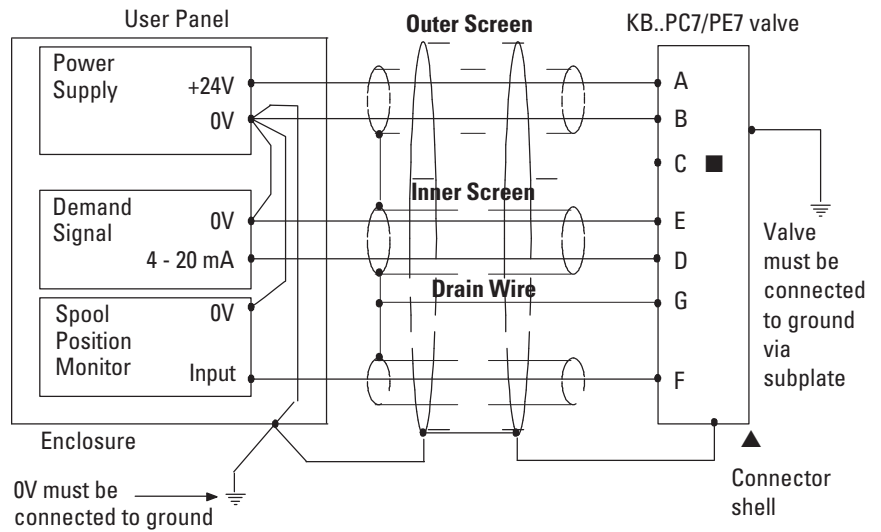
Wiring Connections Current Input (M2)

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



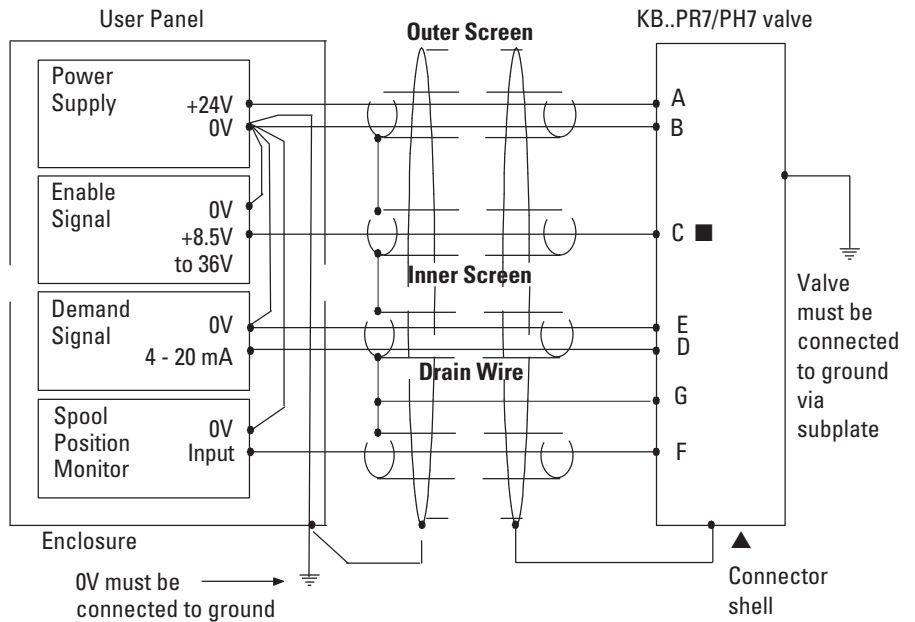
WARNING

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.

Application Data

Fluid Cleanliness

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, 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. 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 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

Mounting Bolt Kits

PILOT WITH REDUCER	
metric	inch
BK464125M	BK870017

PILOT WITHOUT REDUCER	
metric	inch
BK616452M	BK590716

KBHDG5V-5 MAINSTAGE	
metric	inch
BKDG01633M	BKDG01633

KBHDG5V-7 MAINSTAGE	
metric	inch
BKDG7858918	BKD590724

KBHDG5V-8 MAINSTAGE	
metric	inch
BKDG8-655M	BKDG06-635

KBHDG5V-10 MAINSTAGE	
metric	inch
BKDG10636M	BKDG10636

If not using Vickers recommended bolt kits, bolts used should be to ISO898, 12.9 or better.

Seal Kits

PILOT VALVE	
02-332693	

REDUCER	
859316	

KBHDG5V-5	
Complete valve	02-3505018

KBHDG5V-7	
Complete valve	02-3505019

KBHDG5V-8	
Complete valve	02-350686

KBHDG5V-10	
Complete valve	02-411687

Electrical Connection

7-PIN CONNECTOR	
metric	plastic
934939	694534

(Metal connector must be used for full EMC protection)

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

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.

Released Model Codes

Size D05/NG10

ASSEMBLY NUMBER	MODEL CODE
5996502-001	KBHDG5V-5-2C90N60-E-X-M1-PE7-H4-11
5996507-001	KBHDG5V-5-2C90N60-E-X-M2-PE7-H4-11
5996485-001	KBHDG5V-5-2C95N-E-M1-PC7-H4-11
5996486-001	KBHDG5V-5-2C95N-E-M1-PE7-H4-11
5996504-001	KBHDG5V-5-2C95N-E-M2-PE7-H4-11
5996487-001	KBHDG5V-5-2C95N-E-X-M1-PE7-H4-11
5996505-001	KBHDG5V-5-2C95N-E-X-M2-PC7-H4-11
5996508-001	KBHDG5V-5-2C95N-E-X-M4-PE7-H4-11
5996488-001	KBHDG5V-5-2C95N-M1-PC7-H4-11
5996484-001	KBHDG5V-5-2C95N-T-M1-PE7-H4-11
5996491-001	KBHDG5V-5-2C95N-T-X-M1-PE7-H4-11
5996489-001	KBHDG5V-5-2C95N-X-M1-PC7-H4-11
5996490-001	KBHDG5V-5-2C95N-X-M1-PE7-H4-11
5996499-001	KBHDG5V-5-33C60N40-X-M1-PE7-H4-11
02-412501	KBHDG5V-5-33C80N-E-M2-PE7-H4-11
5996493-001	KBHDG5V-5-33C80N-E-X-M1-PC7-H4-11
5996494-001	KBHDG5V-5-33C80N-E-X-M1-PE7-H4-11
5996501-001	KBHDG5V-5-33C80N-T-X-M1-PE7-H4-11
5996500-001	KBHDG5V-5-33C80N-X-M1-PE7-H4-11
5996492-001	KBHDG5V-5-33C80N-X-M1-PH7-H4-11
5996506-001	KBHDG5V-5-33C80N-X-M2-PH7-H4-11
5996497-001	KBHDG5V-5-5C85N-E-X-M1-PC7-H4-11
5996495-001	KBHDG5V-5-5C85N-E-X-M1-PE7-H4-11
5996498-001	KBHDG5V-5-5C85N-T-X-M1-PE7-H4-11
5996496-001	KBHDG5V-5-5C85N-X-M1-PE7-H4-11
5996503-001	KBHDG5V-5-PQ87F-E-X-M1-PE7-H4-11

Size D07/NG16

ASSEMBLY NUMBER	MODEL CODE
5996588-001	KBHDG5V-7-133C150N80N20-E-X-M1-PE7-H4-11
5996603-001	KBHDG5V-7-2C150N85-E-X-M1-PC7-H4-11
5996604-001	KBHDG5V-7-2C150N85-X-M1-PC7-H4-11
5996602-001	KBHDG5V-7-2C150N85-X-M1-PE7-H4-11
5996589-001	KBHDG5V-7-2C150N85-X-M1-PH7-H4-11
5996614-001	KBHDG5V-7-2C150N85-X-M2-PE7-H4-11
5996605-001	KBHDG5V-7-2C200N-E-X-M1-PE7-H4-11
5996590-001	KBHDG5V-7-2C200N-T-M1-PE7-H4-11
5996593-001	KBHDG5V-7-2C200N-T-X-M1-PE7-H4-11
5996591-001	KBHDG5V-7-2C200N-X-M1-PC7-H4-11
5996592-001	KBHDG5V-7-2C200N-X-M1-PE7-H4-11
5996611-001	KBHDG5V-7-2C200N-X-M2-PC7-H4-11
5996615-001	KBHDG5V-7-2C200N-X-M4-PC7-H4-11
5996606-001	KBHDG5V-7-33C130N65-X-M1-PE7-H4-11
5996595-001	KBHDG5V-7-33C160N-E-M1-PC7-H4-11
5996607-001	KBHDG5V-7-33C160N-E-M1-PE7-H4-11
5996601-001	KBHDG5V-7-33C160N-E-X-M1-PC7-H4-11
5996594-001	KBHDG5V-7-33C160N-T-X-M1-PE7-H4-11
5996596-001	KBHDG5V-7-33C160N-X-M1-PC7-H4-11
5996597-001	KBHDG5V-7-33C160N-X-M1-PE7-H4-11
5996612-001	KBHDG5V-7-33C160N-X-M2-PE7-H4-11

ASSEMBLY NUMBER	MODEL CODE
02-412331	KBHDG5V-7-33C160N-X-T-M2-PE7-H4-11
5994273-001	KBHDG5V-7-5C200N115-M1-PE7-H4-11
5996608-001	KBHDG5V-7-5C200N-E-M1-PE7-H4-11
5996609-001	KBHDG5V-7-5C200N-E-X-M1-PE7-H4-11
5996613-001	KBHDG5V-7-5C200N-E-X-M2-PE7-H4-11
5996598-001	KBHDG5V-7-5C200N-M1-PE7-H4-11
5996599-001	KBHDG5V-7-5C200N-T-M1-PE7-H4-11
5996600-001	KBHDG5V-7-5C200N-X-M1-PE7-H4-11
5996610-001	KBHDG5V-7-PQ190F-E-X-M1-PE7-H4-11

Size D08/NG25

ASSEMBLY NUMBER	MODEL CODE
5996650-001	KBHDG5V-8-2C375N250-X-M1-PE7-H4-11
5996647-001	KBHDG5V-8-2C375N-E-X-M1-PE7-H4-11
5996656-001	KBHDG5V-8-2C375N-E-X-M2-PE7-H4-11
5996658-001	KBHDG5V-8-2C375N-E-X-M4-PE7-H4-11
5996648-001	KBHDG5V-8-2C375N-X-M1-PC7-H4-11
5996649-001	KBHDG5V-8-2C375N-X-M1-PE7-H4-11
5996651-001	KBHDG5V-8-33C375N-E-X-M1-PE7-H4-11
5996657-001	KBHDG5V-8-33C375N-E-X-M2-PE7-H4-11
5996652-001	KBHDG5V-8-33C375N-X-M1-PE7-H4-11
5996654-001	KBHDG5V-8-5C375N-E-X-M1-PC7-H4-11
5996653-001	KBHDG5V-8-72C375N250-E-X-M1-PH7-H4-11
5996655-001	KBHDG5V-8-PQ375F-E-M1-PC7-H4-11
02-412742	KBHDG5V-8-PQ375F-E-X-M1-PE7-H4-11

Size D10/NG32

ASSEMBLY NUMBER	MODEL CODE
5996664-001	KBHDG5V-10-12C700N420-E-X-M1-PE7-H4-11
5996665-001	KBHDG5V-10-133C700N420-E-X-M1-PE7-H4-11
5996672-001	KBHDG5V-10-2C700N420-E-M1-PE7-H4-11
5996661-001	KBHDG5V-10-2C700N420-E-X-M1-PE7-H4-11
5996670-001	KBHDG5V-10-2C700N-E-M1-PE7-H4-11
5996659-001	KBHDG5V-10-2C700N-E-X-M1-PE7-H4-11
5996674-001	KBHDG5V-10-2C700N-E-X-M1-PR7-H4-11
5996678-001	KBHDG5V-10-2C700N-E-X-M2-PE7-H4-11
5996681-001	KBHDG5V-10-2C700N-E-X-M4-PE7-H4-11
5996676-001	KBHDG5V-10-2C700N-X-M1-PE7-H4-11
5996673-001	KBHDG5V-10-33C700N420-E-M1-PE7-H4-11
5996662-001	KBHDG5V-10-33C700N420-E-X-M1-PE7-H4-11
5996671-001	KBHDG5V-10-33C700N-E-M1-PE7-H4-11
5996660-001	KBHDG5V-10-33C700N-E-X-M1-PE7-H4-11
5996675-001	KBHDG5V-10-33C700N-E-X-M1-PR7-H4-11
5996679-001	KBHDG5V-10-33C700N-E-X-M2-PE7-H4-11
5996677-001	KBHDG5V-10-33C700N-X-M1-PE7-H4-11
5996663-001	KBHDG5V-10-5C720N-E-X-M1-PE7-H4-11
5996680-001	KBHDG5V-10-5C720N-E-X-M2-PE7-H4-11
5996666-001	KBHDG5V-10-72C700N420-E-X-M1-PE7-H4-11
5996667-001	KBHDG5V-10-733C700N420-E-X-M1-PE7-H4-11
5996668-001	KBHDG5V-10-PQ680F-E-X-M1-PE7-H4-11

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