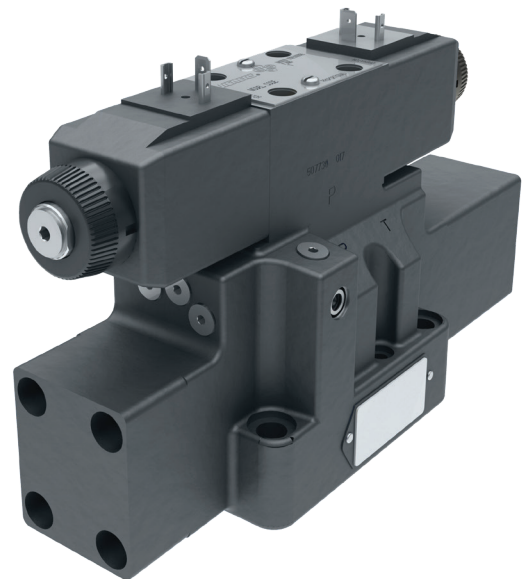
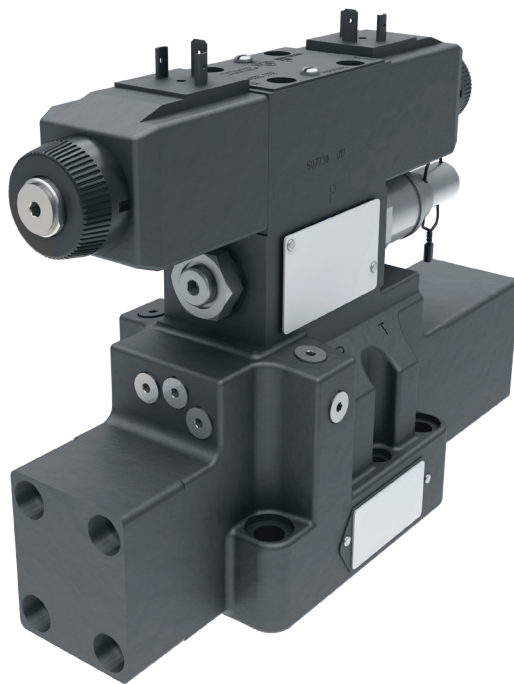


Technical Catalog

Vickers by Danfoss

Proportional Two Stage Directional Valves without Electrical Feedback

KDG5V-5-*-10
KDG5V-7-*-20
KDG5V-8-*-20
KDG5V-10-*-11



Introduction

Vickers KDG5V-5/7/8/10 are solenoid operated directional control non-feedback type proportional valves.

Two-stage proportional directional control valves in which the main-stage spool is positioned according to the output from an integrally mounted proportional, solenoid-operated, pressure-reducing valve. Direction of main-spool travel depends upon which of the two solenoids of the pilot valve is energized and the amount of travel is dependent upon the current input to the solenoid.

At any intermediate position of the main spool, a force balance exists between the controlled, reduced pilot pressure acting on the spool end and the opposing centering spring, plus the action of flow forces. There is no electrical feedback of the main-stage spool position.

This range of valves offers effective and economic solutions for applications having repetitive load conditions throughout each operating cycle, e.g. mold closure/opening in plastics molding machinery.

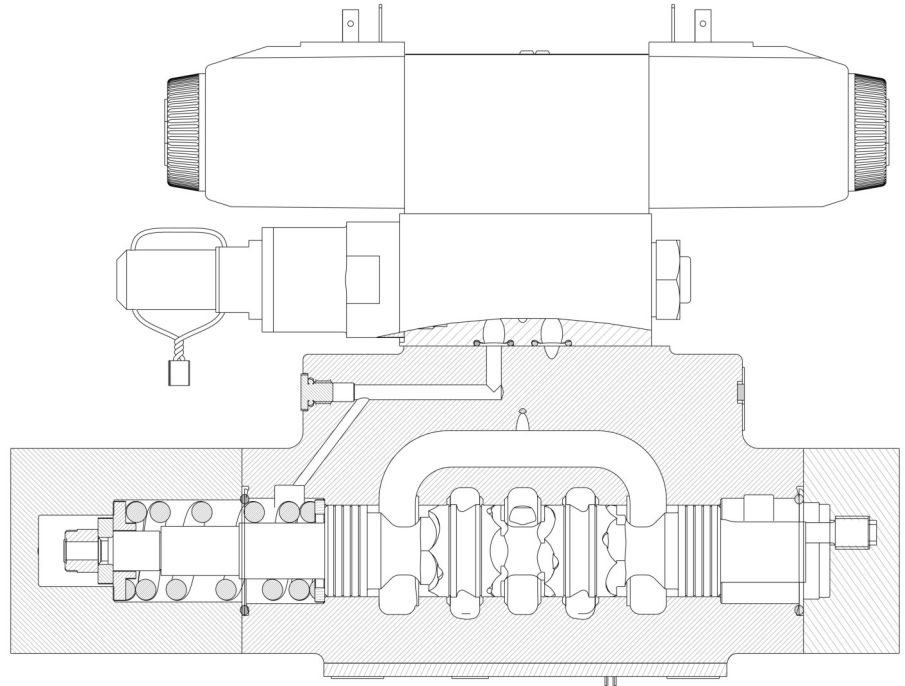
Valve sizes 5,7 & 8 are available with integral amplifiers.

Features and Benefits

- These global products, manufactured to world-class quality standards, are sold and serviced throughout the world.
- These valves open up expanded application opportunities as a cost effective alternative to feedback-type proportional and servo valves.
- Vickers flexible design approach provides a wide variety of matching electronic amplifiers, valve options, and spool ratings.

Typical Section Views

KDG5V-7 shown with "EX" or "X" (With integral pilot pressure reducer)



KDG5V-7 shown without "EX" or "X" (Without integral pilot pressure reducer)

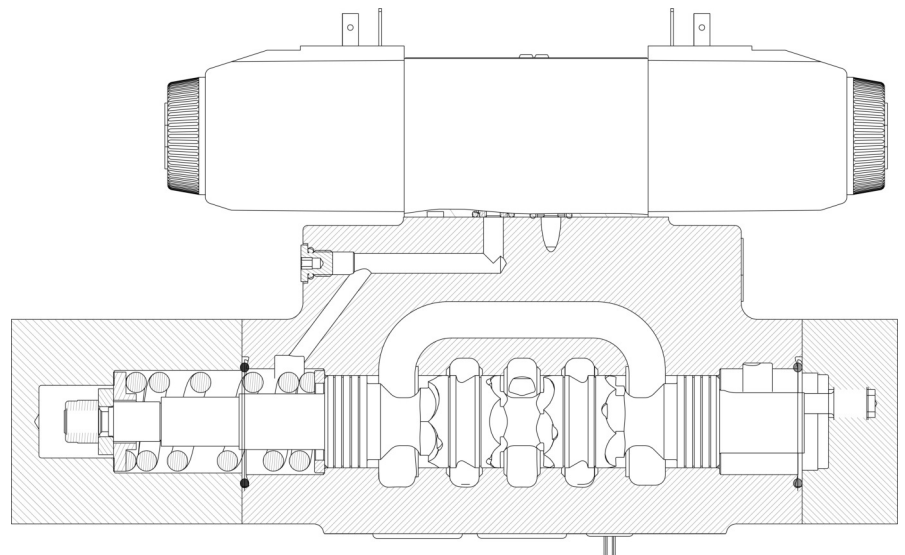
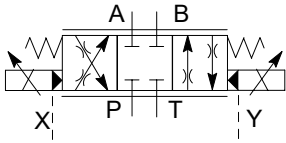


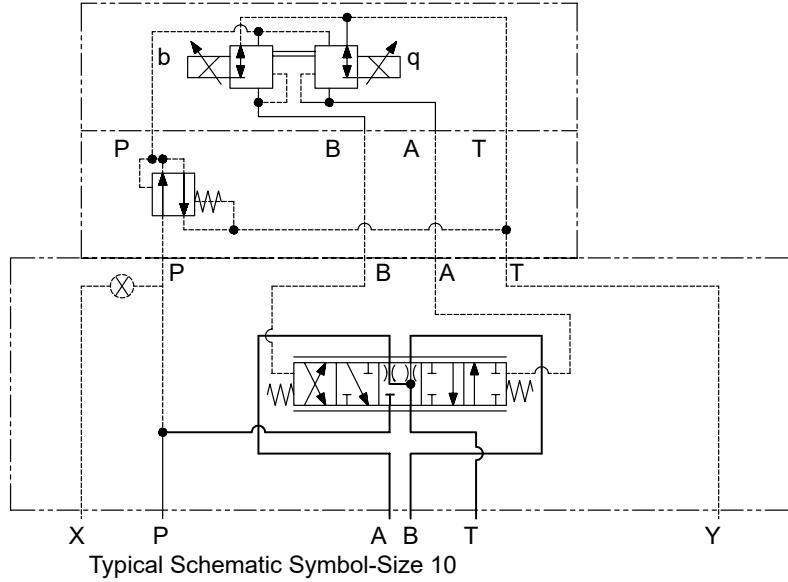
Table of Contents

Introduction	B.2
Features and benefits	B.2
Typical section	B.2
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Spool Data	B.7
Operating Data	B.8
Performance Characteristics	B.9
Installation Dimensions	B.13
Mounting Surfaces	B.16
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Application Data	B.18

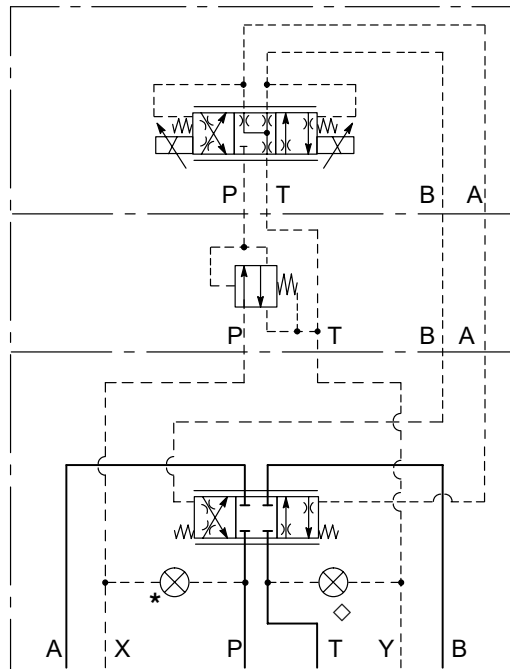
Functional Symbols



Simplified symbol
KDG5V models
(Spool type "2" shown)



Typical Schematic Symbol-Size 10



Typical Schematic Symbol-Sizes 5/7/8

Pilot stage.
Solenoids identified
"A"/"B" according to
"Model Code"
designation.

Pressure reducer
module, see "Model
Code"

Main-stage.
Spool type "2C" shown

- * Internal plug shown, for external pilot supply (via port X).
For internal pilot supply (from port P) plug is not fitted. Port X should be blocked at mounting interface, or otherwise plugged at subplate or manifold block. See "Model Code".
 - ◇ Internal plug shown, for external pilot drain (via port Y).
For internal pilot drain (via port T) plug is not fitted. Port Y should be blocked at mounting interface, or otherwise plugged at subplate or manifold block.
- See "Model Code".
See also "Pilot Drain Application" notes.

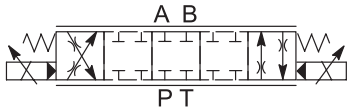
- 8 **Pilot Supply**
Models without integral, fixed pilot pressure reducer module
- | | |
|-------|-----------------------|
| E | External pilot supply |
| Blank | Internal pilot supply |
- Models with integral, fixed pilot pressure reducer module
- | | |
|----|-----------------------|
| X | Internal pilot supply |
| EX | External pilot supply |
- For system pressures less than 200 bar (2900 psi) the pilot pressure reducing module is optional.
For system pressures above 200 bar (2900 psi) the pilot pressure reducing module must be fitted.
- 9 **Pilot drain**
- | | |
|-------|----------------------|
| T | Internal pilot drain |
| Blank | External pilot drain |
- 10 **Manual Override**
- | | |
|-------|---------------------------|
| Blank | Plain overrides |
| H | Water-resistant overrides |
| Z | No overrides |
- 11 **Solenoid identity**
- | | |
|-------|---|
| V | Solenoid "A" at port A end of pilot valve, solenoid "B" at B end. (Energizing "A" gives main-stage flow from port B; energizing "B" gives flow from port A): German practice. |
| Blank | Solenoid "A" energized for main-stage flow from port A; solenoid "B" energized for main-stage flow from port B: USA ANSI B93./NFPA standard. |
- 12 **Heading electrical flag symbol**
- | | |
|---|--------------------------------------|
| M | Features and options for pilot valve |
|---|--------------------------------------|
- 13 **Electrical data and connection type**
Plug connector type to ISO 4400 (DIN 43650). For coil characteristics see "Operating Data" table (page B.8):
- | | |
|------|---|
| U-G | For use with amplifier with 12V DC supply |
| U-GP | For use with 12V power |
| U-H | For use with amplifier with 24V DC |
| U-HA | supply For use with 24V power plug |
| U-HR | For use with 800 mA power supply |
- 14 **Pilot drain pressure**
- | | |
|---|----------|
| 1 | Standard |
|---|----------|
- (See Pilot Drain Application Notes, page B.9)
- 15 **Design number, ** series**
Subject to change. Installation dimensions unaltered for design numbers 10 to 19 respectively. 20 design only for size 7.

Spool Data

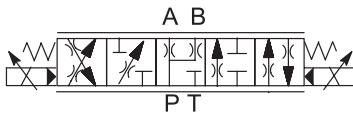
Spool Symbols

Simplified symbols including transient flow conditions (dotted line).

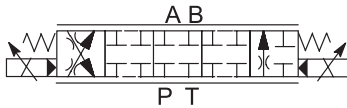
Spool type 2C



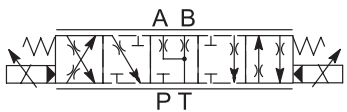
Spool type 7C



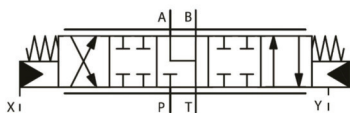
Spool type 12C



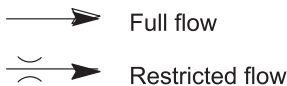
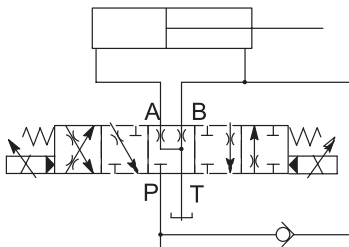
Spool type 33C



Spool type 36C



Spool type 133C, with typical regenerative circuit



Spool Types and Flow Ratings

Symmetric Spools

Flow ratings for flow through P-A-B-T at $\Delta p = 5$ bar (72 psi) per flow path, e.g. P-A, or B-T. For other pressure drop values see "Flow Gain" curves on page B.10.

Spool code	Main stage spool symbol	Flow rating
For KDG5V-5 valves:		
2C90N	2C	90 L/min (24 USgpm)
33C80N	33C	80 L/min (21 USgpm)
For KDG5V-7 valves:		
2C230N	2C	230 L/min (61.3 USgpm)
33C230N	33C	230 L/min (61.3 USgpm)
36C185N	36C	185 L/min (48.9 USgpm)
For KDG5V-8 valves:		
2C330N	2C	330 L/min (87.2 USgpm)
33C330N	33C	330 L/min (87.2 USgpm)
For KDG5V-10 valves:		
2C550N	2C	550 L/min (145 USgpm)
12C550N	12C	550 L/min (145 USgpm)
33C550N	33C	550 L/min (145 USgpm)
133C550N	133C	550 L/min (145 USgpm)

Asymmetric Spools

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

Spool code	Main stage spool symbol	Flow rating
For KDG5V-5 valves:		
2C70N45	2C	70 L/min (18.5 USgpm), "A" port flow 45 L/min (12 USgpm), "B" port flow
33C60N40	33C	60 L/min (15.85 USgpm), "A" port flow 40 L/min (10.56 USgpm), "B" port flow
For KDG5V-7 valves:		
2C230N140	2C	230L/min (61.3 USgpm), "A" port flow 140 L/min (37.3 USgpm), "B" port flow
33C230N140	33C	230L/min (61.3 USgpm), "A" port flow 140 L/min (37.3 USgpm), "B" port flow
For KDG5V-8 valves:		
33C330N200	33C	330 L/min (87.2 USgpm), "A" port flow 200 L/min (52.8 USgpm), "B" port flow
133C330N200	133C	330 L/min (87.2 USgpm), "A" port flow 200 L/min (52.8 USgpm), "B" port flow
2C330N200	2C	330 L/min (87.2 USgpm), "A" port flow 200 L/min (52.8 USgpm), "B" port flow
For KDG5V-10 valves:		
2C310N550	2C	310 L/min (82 USgpm), "A" port flow 550 L/min (145 USgpm), "B" port flow
2C550N310	2C	550 L/min (145 USgpm), "A" port flow 310 L/min (82 USgpm), "B" port flow
33C310N550	33C	310 L/min (82 USgpm), "A" port flow 550 L/min (145 USgpm), "B" port flow
33C550N310	33C	550 L/min (145 USgpm), "A" port flow 310 L/min (82 USgpm), "B" port flow
133C550N310	133C	550 L/min (145.3 USgpm), "A" port flow 310 L/min (82 USgpm), "B" port flow
733C550N310	733C	550 L/min (145.3 USgpm), "A" port flow 310 L/min (82 USgpm), "B" port flow

Operating Data

Data is typical:
 With fluid at 36 cSt (168 SUS) and 50°C (122°F).
 Using recommended Vickers by Danfoss amplifier to drive
 KDG5V models.

KDG5V valves

Installation and Start-up Guidelines	ML-B-9044	
Max. solenoid current Coil type:		
U-G	3.5A	
U-GP	3.0A	
U-H	1.6A	
U-HA	0.94A	
U-HR	0.8A	
Coil resistance Coil type:	At 20°C (68°F)	Max. operating
U-G	1.65Ω	2.66Ω
U-GP	2.0Ω	3.1Ω
U-H	7.3 Ω	11.3 Ω
U-HA	22.1Ω	34.6Ω
U-HR	19.1Ω	29.9Ω
		Shift under max. operating
Coil inductance measured at 1000 Hz and 150 mV Coil type:		
U-G	4 mH	
U-GP	6 mH	
U-H	19 mH	
U-HA	55 mH	
U-HR	51 mH	
Hysteresis Size 5/7/8 Size 10	±4% of rated max. flow	Size 5/7/8
	<6% of rated max. flow	Size 10
Repeatability: Size 5/7/8 Size 10	<3%	
	8%	
Relative duty factor	Continuous rating (ED = 100%)	
Type of electrical protection, with electrical plugs fitted correctly	IEC 144 Class IP65	
Electrical connection	ISO 4400 (DIN 43650)	
Recommended drive amplifier	Vickers Eurocard type: EEA-PAM-523-A-33	

Performance Characteristics

Data is typical with fluid at 36 cSt (168 SUS) and 50°C (122°F), using Vickers by Danfoss recommended amplifier to drive KDG5V models.

Minimum Pressure

For full flow performance pilot pressure ≥ 45 bar (650 psi), i.e.:
 Pressure at port P for internal pilot supply ("X" or omit in model code).
 Pressure at port X for external pilot supply ("E" or "EX" in model code).

Pilot Drain Application Notes

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



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

Maximum Pressures, bar (psi)

For models without integral pilot pressure reducer

Model	Pilot Pressure Source	Model code <input type="checkbox"/>	P,A,B	Ports		
				T	X	Y-
KDG5V-5	External	E	315 (4500)	210 (3000)	200 (2900)	8 (116)
	Internal	Omit	200● (2900)	210 (3000)	◆	8 (116)
KDG5V-7/8	External	E	350 (5000)	350 (5000)	200 (2900)	8 (116)
	Internal	Omit	200● (2900)	350 (5000)	◆	8 (116)
KDG5V-10	External	E	350 (5000)	350 (5000)	210 (3000)	8 (116)
	Internal	Omit	200 (2900)	350* (5000)	◆	8 (116)

For models with integral pilot pressure reducer

KDG5V-5	External	EX	315 (4500)	210 (3000)	315 (4500)	8 (116)
	Internal	X	315 (4500)	210 (3000)	◆	8 (116)
KDG5V-7/8	External	EX	350 (5000)	350 (5000)	315 (4500)	8 (116)
	Internal	X	315● (4500)	350 (5000)	◆	8 (116)
KDG5V-10	External	EX	350 (5000)	350* (5000)	315 (4500)	8 (116)
	Internal	X	315 (4500)	350 (5000)	◆	8 (116)

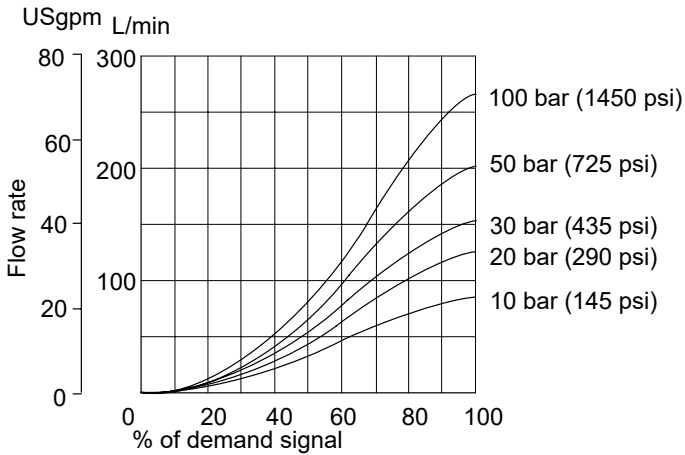
- ◆ When using internal pilot pressure, port X should be plugged at the subplate or manifold face (e.g. manifold not drilled for connection to port X).
- The maximum pressure for ports A and B is: 315 bar (4500 psi) for size 5; 350 bar (5000 psi) for sizes 7, 8 and 10.
- See "Pilot Drain Application" note.
- *—Pilot must be externally drained, otherwise "Y" port pressure applies.

Performance Curves

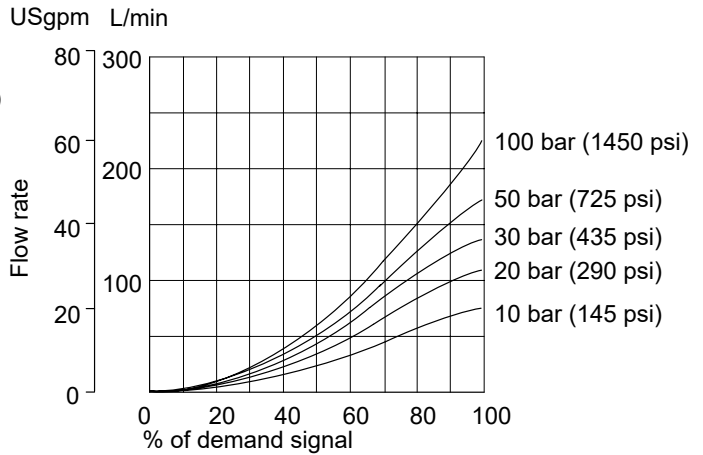
Flow Gain

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

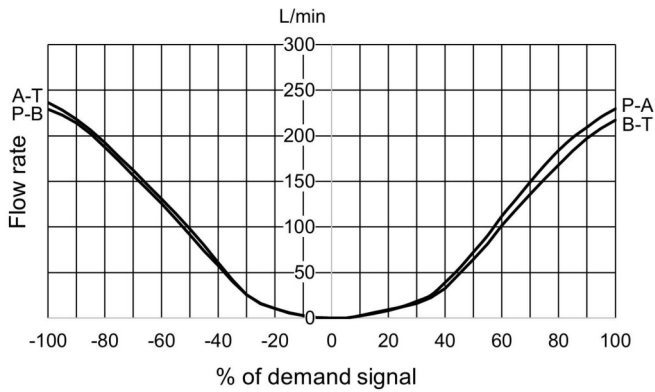
KDG5V-5-2C90N



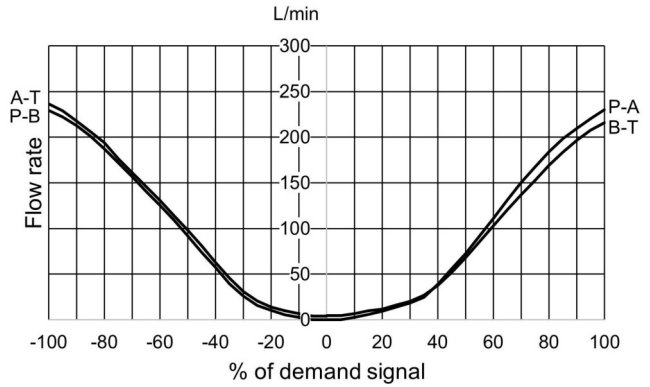
KDG5V-5-33C80N



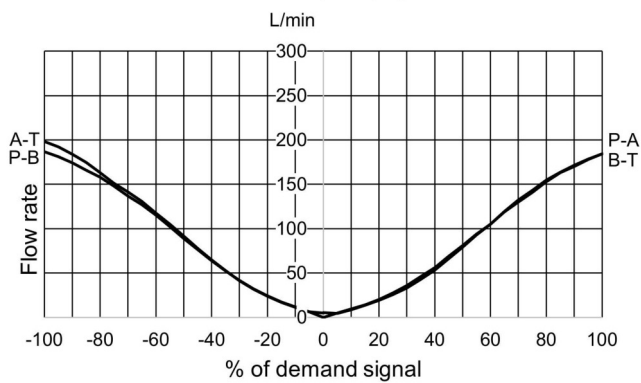
KDG5V-7-2C230N @ 10 bar (145 psi)



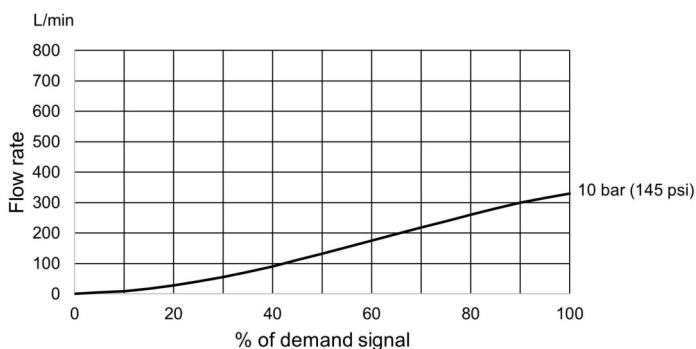
KDG5V-7-33C230N @ 10 bar (145 psi)



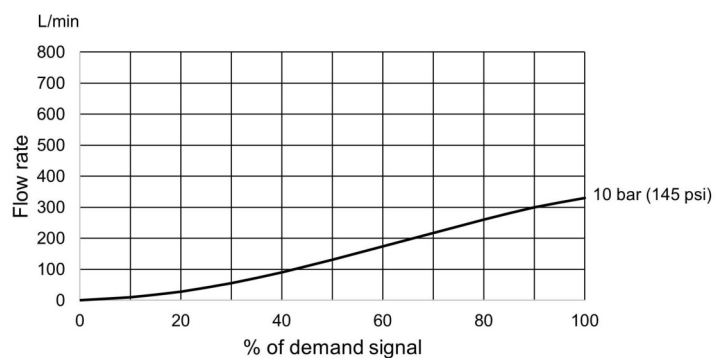
KDG5V-7-36C185N @ 10 bar (145 psi)



KDG5V-8-2C330N



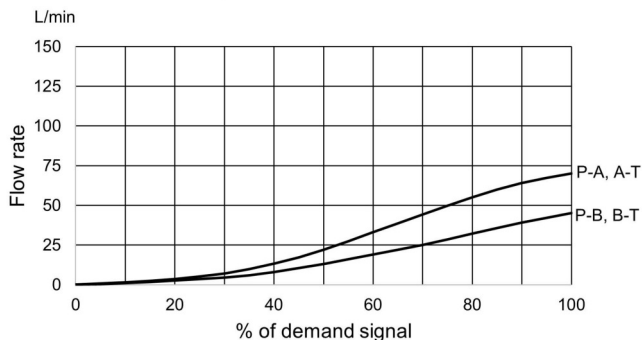
KDG5V-8-33C330N



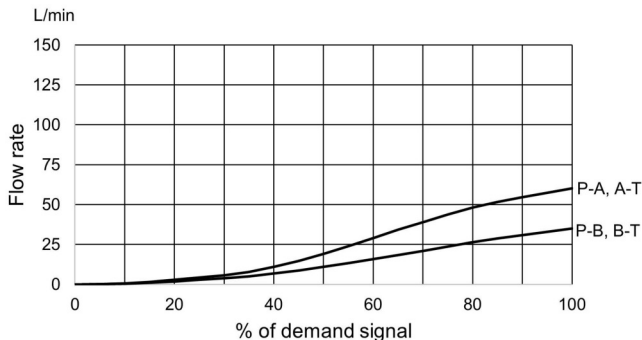
Performance Curves

Asymmetric Spools

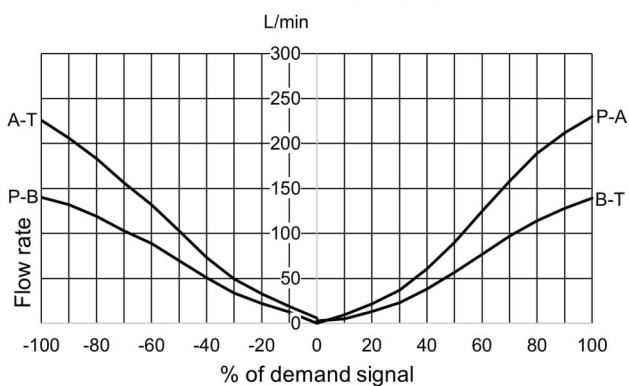
KDG5V-5-2C70N45 @ 5 bar Δ P



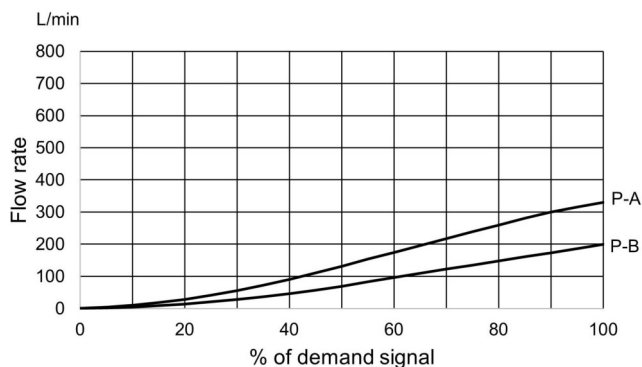
KDG5V-5-33C60N35 @ 5 bar Δ P



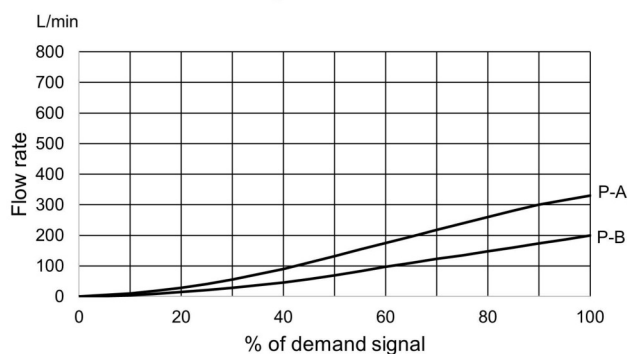
KDG5V-7-33C230N140 @ 10 bar (145 psi)



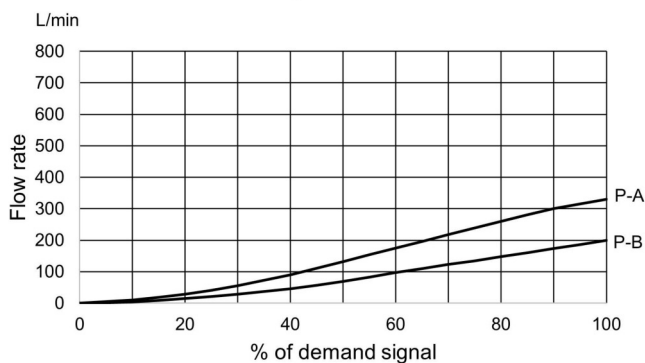
KDG5V-8-2C330N200 @ 5 bar delta P



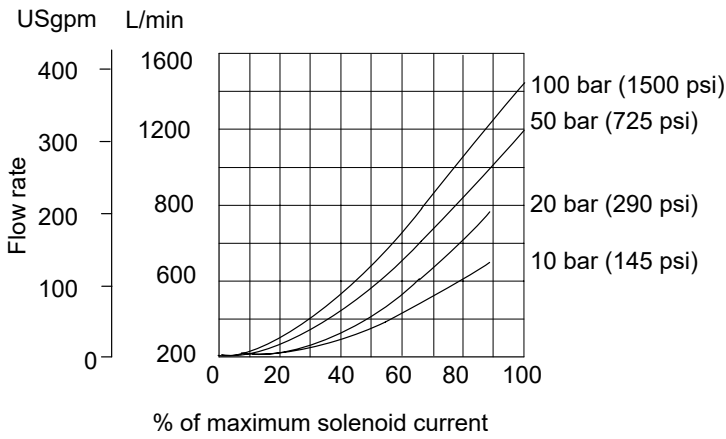
KDG5V-8-33C330N200 @ 5 bar delta P



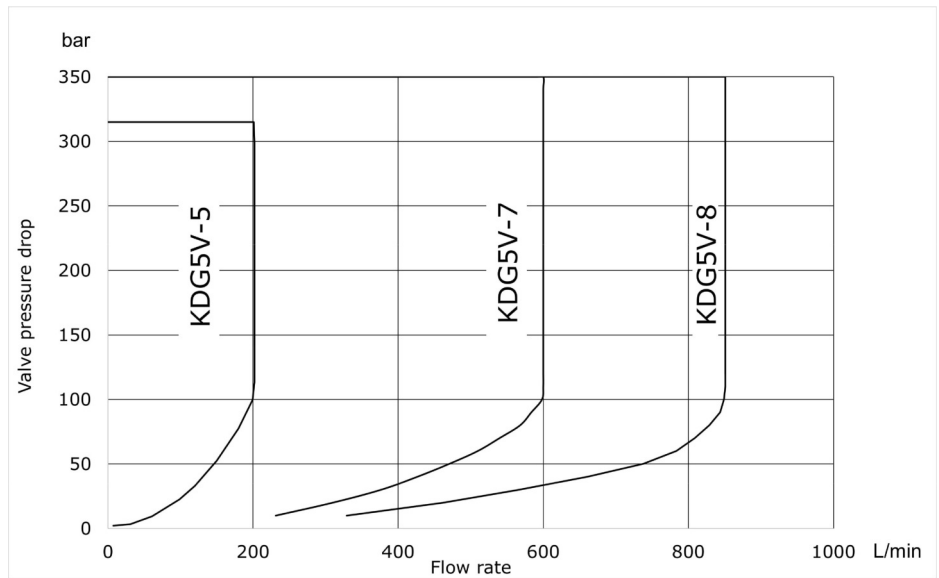
KDG5V-8-133C330N200 @ 5 bar delta P



KDG5V-10



Power Capacity Envelopes
Flow through P-A-B-T or P-B-A-T



Subject to maximum pressure limitations according to model type; see "Maximum Pressures".

Typical Step Response

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

Input signal step change

Spool response times (ms)

	Spool response times (ms)			
	KDG5V-5	KDG5V-7	KDG5V-8	KDG5V-10
0 to 100%	48	61	80	206
100% to 0	38	43	40	182
10% to 90%	42	58	66	
90% to 10%	50	58	54	
25% to 75%	30	47	49	
75% to 25%	50	58	66	
90% to 90%	70	87	98	
0% to 75%				170
75% to 0%				175
0% to 50%				160
50% to 0%				160
0% to 25%				124
25% to 0%				124

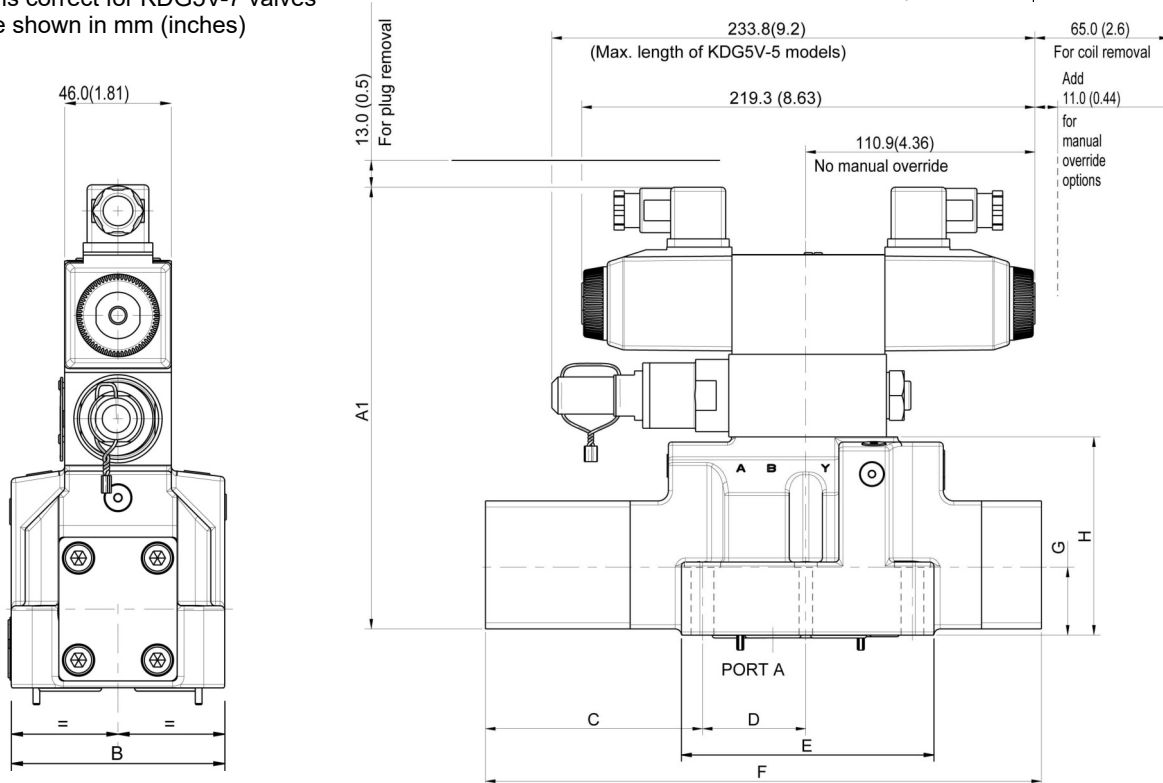
Pilot flow required to achieve above response times:

KDG5V-5	KDG5V-7	KDG5V-8	KDG5V-10
2,7 L/min (0.7 USgpm)	4,2 L/min (1.1 USgpm)	7,5 L/min (2.0 USgpm)	18,75 L/min (5.0 USgpm)

Installation Dimensions

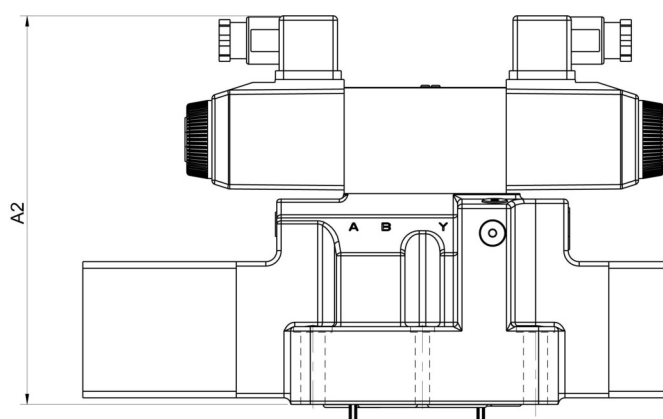
KDG5V Models with “EX” or “X”
 (With integral pilot pressure reducer)
 The illustration is correct for KDG5V-7 valves
 Dimensions are shown in mm (inches)

3rd angle projection 



▼ “G” dimension is depth of bolt holes.
 (On KDG5V-7 only, this coincides with the height to the center line of the main-stage spool).

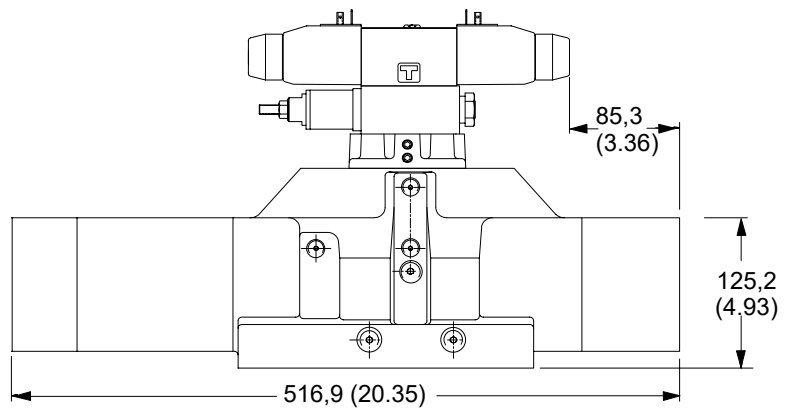
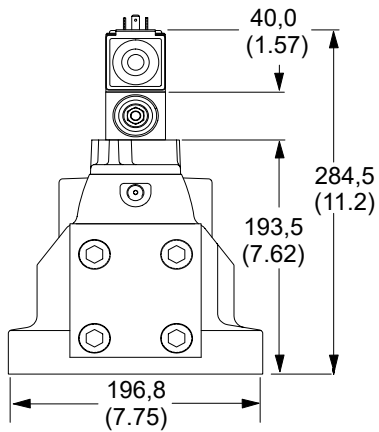
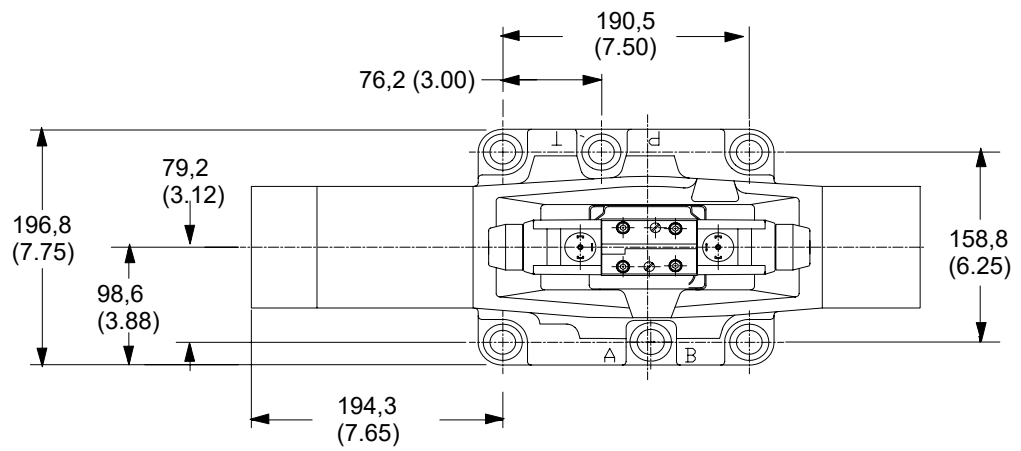
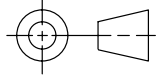
KDG5V Models with “E” or No Symbol
 (Without integral pilot pressure reducer)



Model	A1	A2	B	C	D	E	F	G	H
KDG5V-5	215,0 (8.47)	175,0 (6.9)	70, (2.77)	94,4 (3.72)	27,0 (1.06)	98, (3.86)	217,0 (8.54)	30,0 (1.18)	87,3 (3.4)
KDG5V-7	215,4 (8.48)	176,9 (6.9)	92 (3.62)	105 (4.13)	50,0 (1.97)	122,2 (4.8)	269,0 (10.6)	33,0 (1.3)	95,0 (3.7)
KDG5V-8	255,0 (10.1)	215,0 (8.47)	114,8 (4.52)	118,4 (4.66)	77,0 (3.03)	185,0 (7.28)	332,0 (13.1)	59,0 (2.32)	127,2 (5.0)

KDG5V-10 Models with "EX" or "X"
 (With integral pilot pressure reducer)
 Dimensions are shown in mm (inches)

3rd angle
 projection



Pilot Supply and Drain Plugs

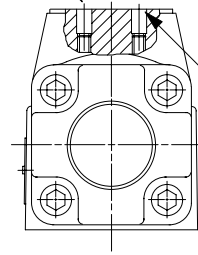
KDG5V-5 models

Viewed from port B end of main-stage

M5 plug, part no. 471119. Remove for internal pilot supply

Pilot connections
P T

M5 plug, part no. 471119. Remove for internal pilot drain

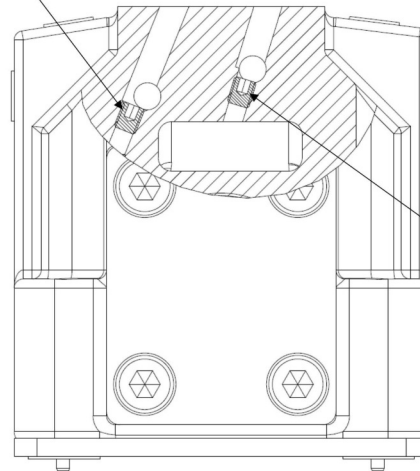


KBDG5V-7 Models

Viewed from port A end of main stage

M5 plug, part no. 471119. Remove for internal Pilot supply

M5 plug, part no. 471119. Remove for internal Pilot drain



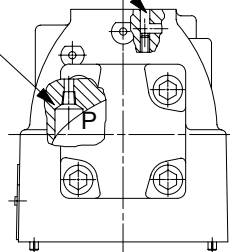
- * Internal plug shown, for external pilot supply (via port X). For internal pilot supply (from port P) plug is not fitted. Port X should be blocked at mounting interface, or otherwise plugged at subplate of manifold block. See "Model Code".

KDG5V-8 models

Section through port P of main-stage

M5 plug, part no. 471119. Remove for internal pilot drain

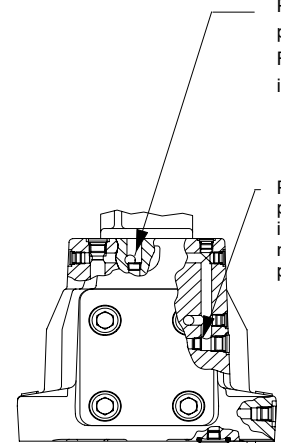
1/16 NPT plug, part no. 113000. Remove for internal pilot supply



KDG5V-10 models

Plug, part no. 7074. Remove for internal pilot drain

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

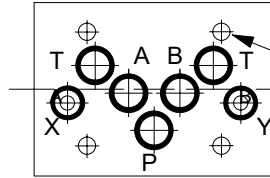


Plug, part no. 30560. Remove for internal pilot drain

Views on Mounting Faces

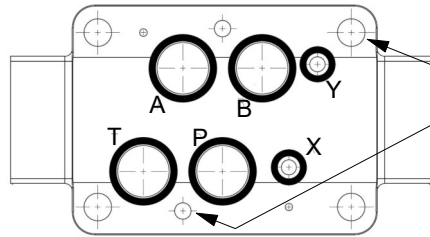
All O-seals supplied

KDG5V-5 mounting face



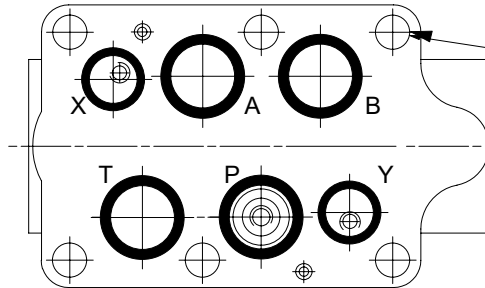
4 holes for mounting bolts
 $\varnothing 7,02 (0.27\varnothing)$ spotfaced to
 $\varnothing 11,0 (0.43\varnothing)$

KDG5V-7 mounting face



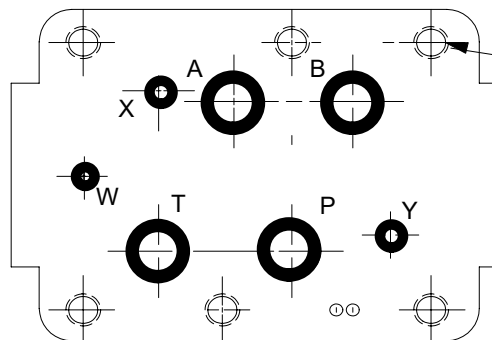
6 holes for mounting bolts
4 x $\varnothing 11,0 (0.43\varnothing)$ c'bored
 $\varnothing 17,5 (0.68\varnothing)$
2 x $\varnothing 6,4 (0.25\varnothing)$ c'bored
 $\varnothing 11,0 (0.43\text{ dia})$

KDG5V-8 mounting face



6 holes for mounting bolts
 $\varnothing 13,5 (0.53\varnothing)$
spotfaced to
 $\varnothing 20,0 (0.78\varnothing)$

KDG5V-10 mounting face



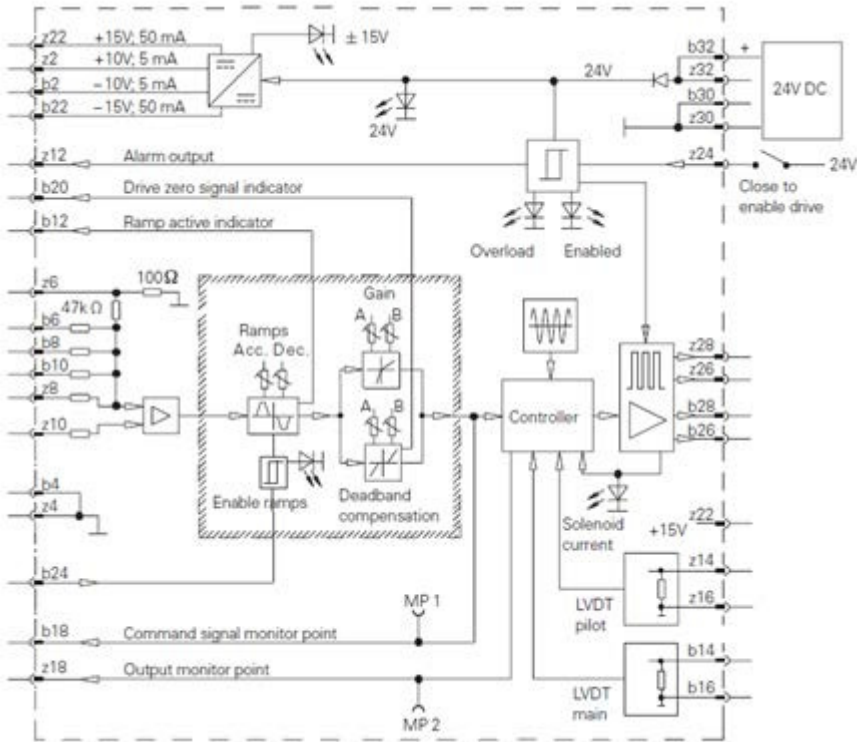
6 holes for mounting bolts

Electrical information

Eurocard Power Amplifier

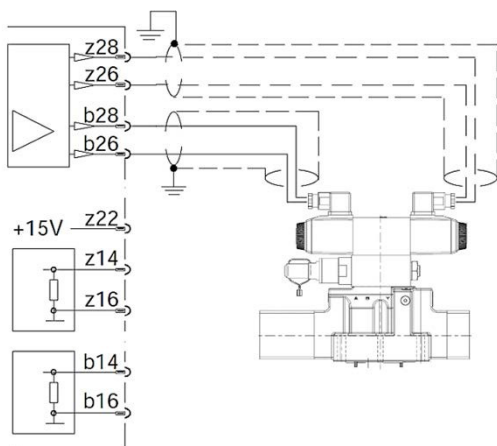
Recommended to use Vickers by Danfoss Eurocard amplifiers with KDG5V valves.

Electrical Block Diagram
EEA-PAM-523-A-33



Wiring Connections

Amplifier model 523 for KDG5V-5,7,8,10



⏏ Customer's protective ground connection

Application Data

Hydraulic fluids and fluid cleanliness

Recommendations on contamination control methods and the selection of products to control fluid condition are included in Hydraulic Fluid Recommendations. 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

Hydraulic fluids

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

Mounting bolt kits

Pilot with reducer

metric inch
BK464125M BK870017

KDG5V-5 Mainstage

metric inch
BKDG01633M BKDG01633

KDG5V-7 Mainstage

metric inch
BKDG7858918 BK590724

KDG5V-8 Mainstage

metric inch
BKDG8-655M BKDG06-635

KDG5V-10 Mainstage

metric inch
BKDG10636M BKDG10636

If not using Vickers recommended bolt kits, bolts used should be to ISO 898, 12.9 or better.

Mounting bolt torques

Recommended torques with threads lubricated

For KDG5V-5

M6 or 1/4 " -20 UNC bolts:
To 210 bar (3000 psi) 14 Nm (10.3 lbf ft)
To 315 bar (4500 psi) 20 Nm (14.75 lbf ft)

For KDG5V-7

M10 or 3/8" -16 UNC bolts:
49 to 59 Nm (36 to 43 lbf ft) plus

M6 or 1/4" -20 UNC bolts:
9 to 14 Nm (6.6 to 10.3 lbf ft)

For KDG5V-8

M12 or 1/2"-13 UNC bolts:
103 to 127 Nm (76 to 93 lbf ft)

For KDG5V-10

M20 or 3/4"-10 UNC-2B bolts:
185-220 Nm (250-300 lbf ft)

Seal Kits

Pilot including M8 cap
5986617-001

Reducer

870739

KDG5V-5

Mainstage Complete valve
565143 5986818-001

KDG5V-7

Mainstage Complete valve
565144 5986819-001

KDG5V-8

Mainstage Complete valve
5986821-001 5986820-001

KDG5V-10 Mainstage

Mainstage Complete valve
02-441686 02-441691

Mass (Weight)

Approx. for models with integral pilot pressure reducing module ("X" or "EX" see mode code).

KDG5V-5 9,5 kg (21 lb)

KDG5V-7 11,8 kg (26.0 lb)

KDG5V-8 20,2 kg (44.5 lb)

KDG5V10 54,5 kg (120.0 lb)

For models without integral pressure reducing module (No symbol, or "E", see model code), deduct 1,2 kg (2.6 lb).

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 Danfoss repair center. The products will be refurbished as necessary and retested to specification before return.

ENGINEERING
TOMORROW

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VICKERS
by Danfoss

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