

Technical Catalog

Proportional Directional Valve KBDG4V-3 EN162 with CANopen



Proportional Directional Valve, KBDG4V-3 EN162 with CANopen

Revision

Date	Description and Reason	Rev.
SEP 2023	First Release	001

Proportional Directional Valve, KBDG4V-3 EN162 with CANopen

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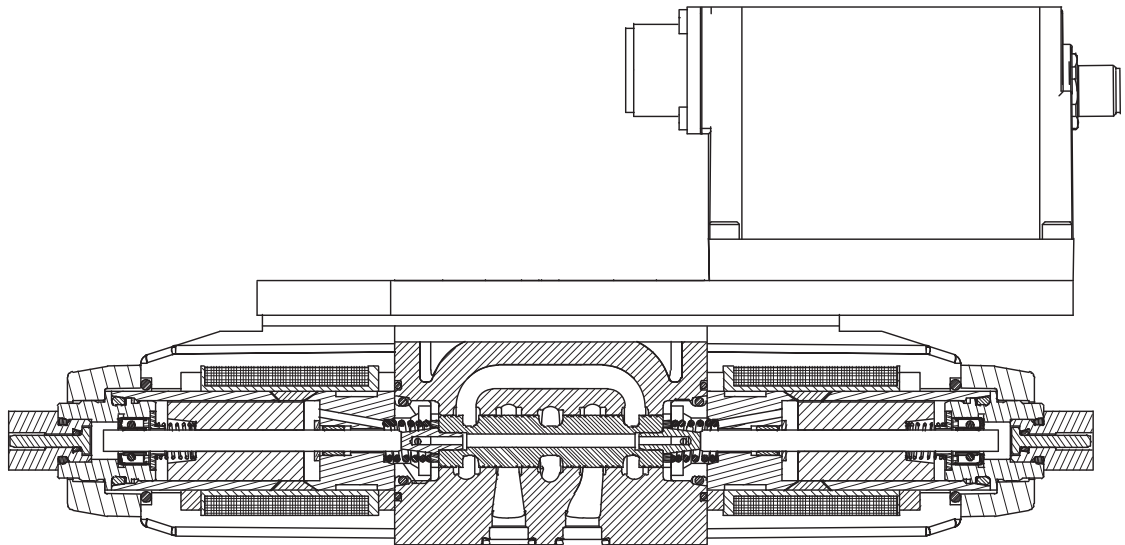
Proportional Directional Valve, KBDG4V-3 EN162 with CANopen

General Description

Function and Features

- Proportional directional valve, designed to provide controlled oil flow in proportion to an electric command signal.
- Integrated amplifier with factory set adjustment for gain, spool deadband compensation and dither to ensure excellent reproducibility valve to valve.
- Command source configurable analog or CANopen.
- Parameter configuration and trouble shooting via engineering software ProFX-Configure.
- Adjustable ramp time 0-9s.
- Optional external enable feature.
- IP65/67 environment protection.
- CE electromagnetic capability to EN61326-1.
- Optional mechanical hand lever override.
- Operating pressure up to 350 bar.

Typical Section View



Proportional Directional Valve, KBDG4V-3 EN162 with CANopen

Model Codes

Model Codes

1	2	3	4	5	6	7	8	9	10	11	12
KBDG4V	3	*C	*	*	*	*	P*7	H	7	11	EN162

1 Valve Type

KBDG4V	Proportional Directional Valve with integrated amplifier, without electrical position feedback, P/A/B rated pressure 350 bar.
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2 Interface

3	CETOP 03 / NG 6
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3 Spool Symbol

2C	Closed center
33C	P port closed, A & B to tank

4 Flow Rating - at 5 bar per metering flow path

03	3 L/min
07	7 L/min
13	13 L/min
20	20 L/min (asymmetric spool 20N10)
28	28 L/min

* More flow rating options please consult Danfoss.

5 Metering Type

N	Meter-in/meter-out
F	Fine meter-in/meter-out
S	Meter-in only

6 Override

Blank	Plain overrides
H	Water resistant overrides
L	Mechanical hand lever overrides
Z	No overrides

7 Electrical Command Option

M1	+/- 10V
M2	4-20 mA
M9	CANopen

8 Electrical Connection

PC7	No external enable (mating connector is supplied separately, see page 14)
PR7	Pin "C" used for enable signal (mating connector is supplied separately, see page 14)

9 Coil Rating

H	24V DC
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10 T Port pressure

7	210 bar
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11 Design Number

11	11 series
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12 Special Design

EN162	CANopen
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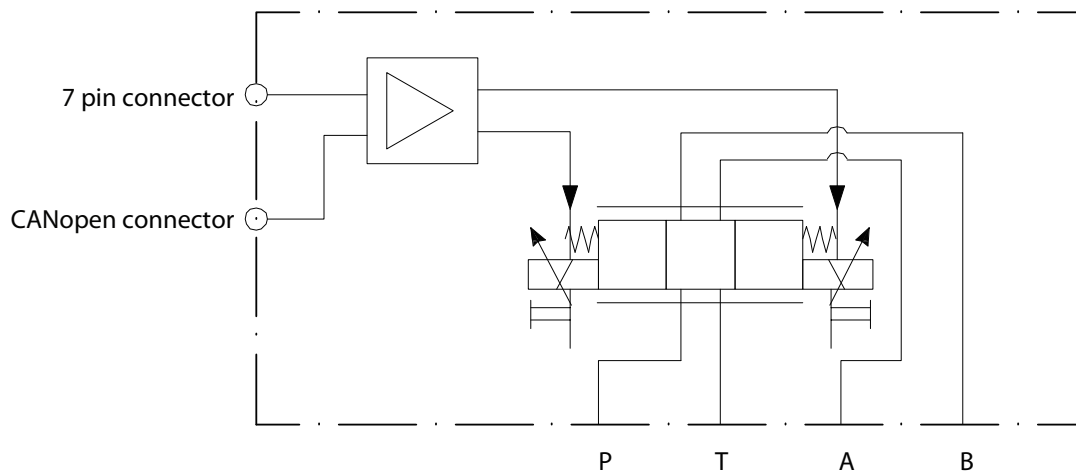
Proportional Directional Valve, KBDG4V-3 EN162 with CANopen

Model Codes

Spool Data

Available Spools	Symetric / Asymetric	Metering Type	Symbol
2C**N/F	Symetric flow	Meter-in /meter-out	
33C**N	Symetric flow	Meter-in /meter-out	
2C**N**	Asymetric flow	Meter-in /meter-out	
33C**N**	Asymetric flow	Meter-in /meter-out	
2C**S	Symetric flow	Meter-in only	

Function Symbols



Mechanical hand lever override optional

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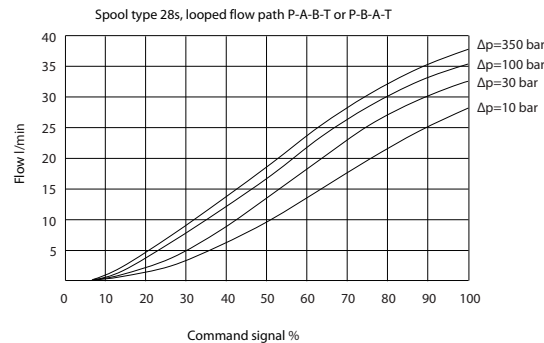
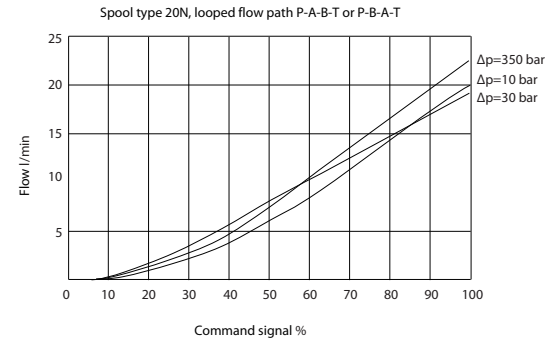
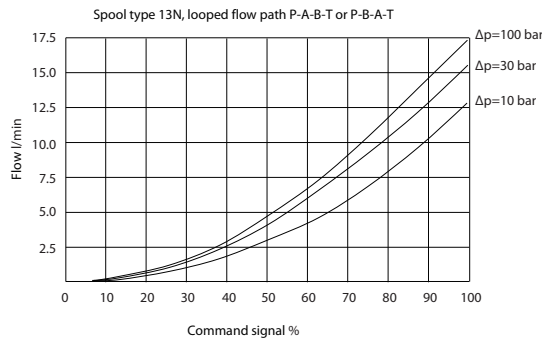
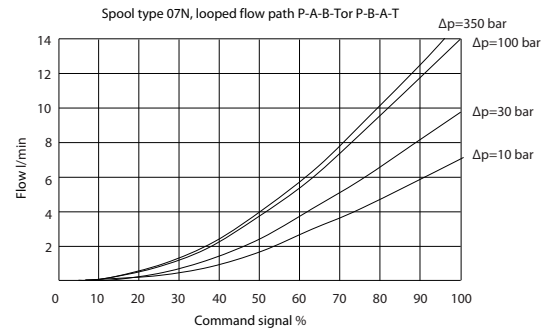
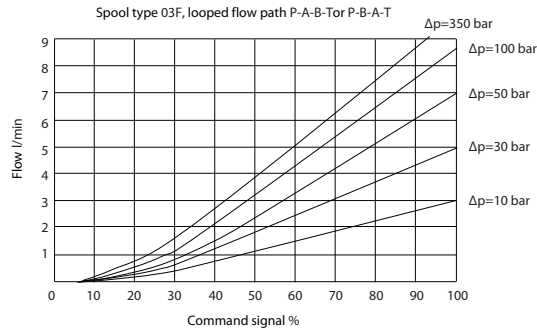
Technical Data

Operating Data		
Maximum operating pressure	A,B,P port	350bar
	T port	210bar
Mounting surface		ISO 4401-03-02-0-05, NFPA D03, CETOP 03
Environment temperature for full performance		-20°C ~ 70°C
Oil temperature for full performance		-20°C ~ 70°C
Storage temperature range		-25°C ~ 85°C
Mass	Without lever override	2.7kg
	With lever override	3.5kg
Performance		
Hysteresis		≤ 5%
Repeatability valve to valve		≤ 3%
Repeatability		< 1%
Step response (single flow path $\Delta p = 5$ bar)		Time to reach 90% of required step
0 to 100%		45ms
100% to 0		22ms
Solenoid Specifications		
Maximum current @50 °C		1.6A
Coil resistance @20 °C		7.3Ω
Coil inductance @1000Hz		20mH
Relative duty factor		ED=100%
Amplifier		
Power supply	Rated voltage	24V DC
	Voltage range	21-36V DC (including 10% peak to peak ripple)
	Maximum output current	3.0A
Command option	M1	+/-10V
	M2	4~20mA
	M9	CANopen
Enable signal	Enabled	>9.0V (Maximum 36V)
	Disabled	<2.0V
Pin F monitor output (solenoid current)		1 V/A
Ramp signal (0-100% step response)		0-9 seconds, 4 quadrant adjustable
Protection Class		
IP level according IEC529		IP65/67

Proportional Directional Valve, KBDG4V-3 EN162 with CANopen

Technical Data

Flow Characteristics

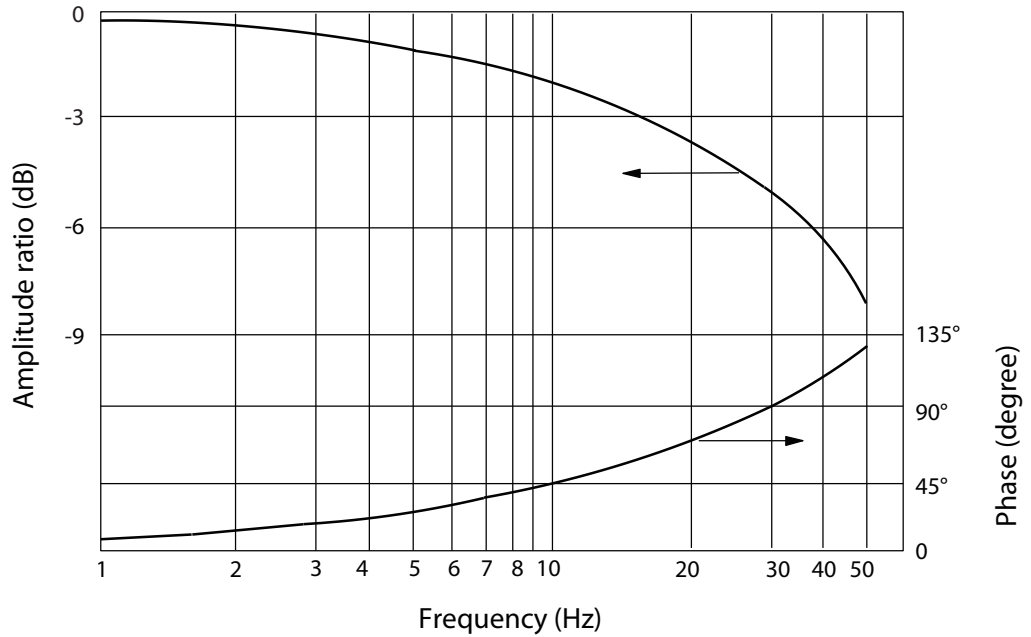


Proportional Directional Valve, KBDG4V-3 EN162 with CANopen

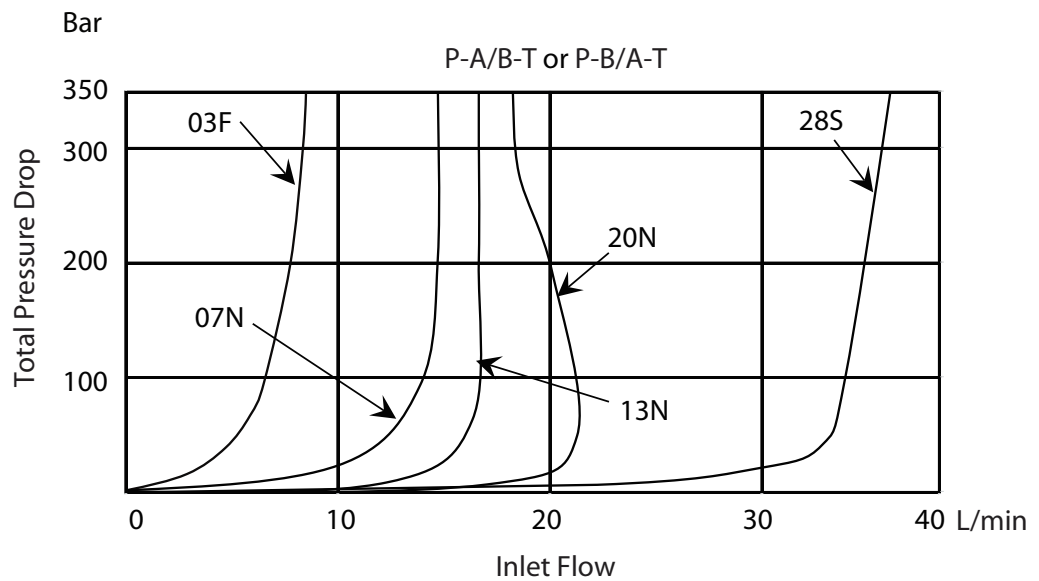
Technical Data

Frequency Response

For an amplitude of $\pm 25\%$ max. Stroke about 50% position, at ΔP (P-A or P-B) = 5 bar



Power Capacity Envelopes

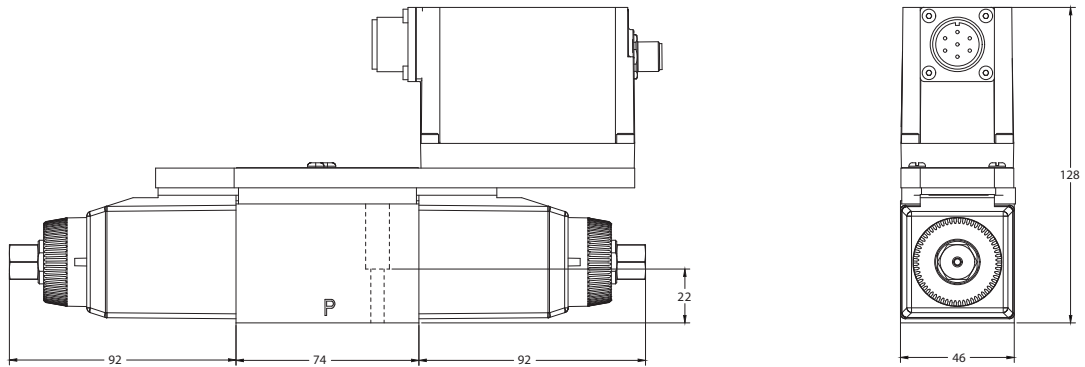


Proportional Directional Valve, KBDG4V-3 EN162 with CANopen

Dimensions

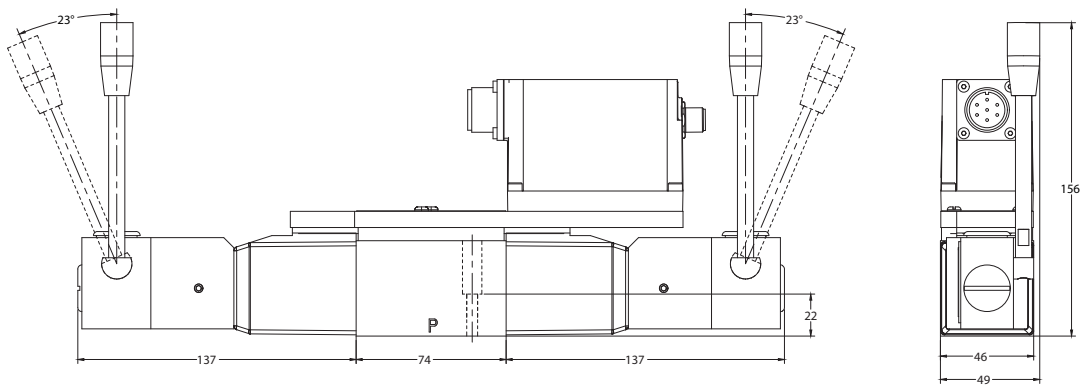
Installation Dimensions

Without Hand Lever Override



With Hand Lever Override

Maximum pulling force 12N



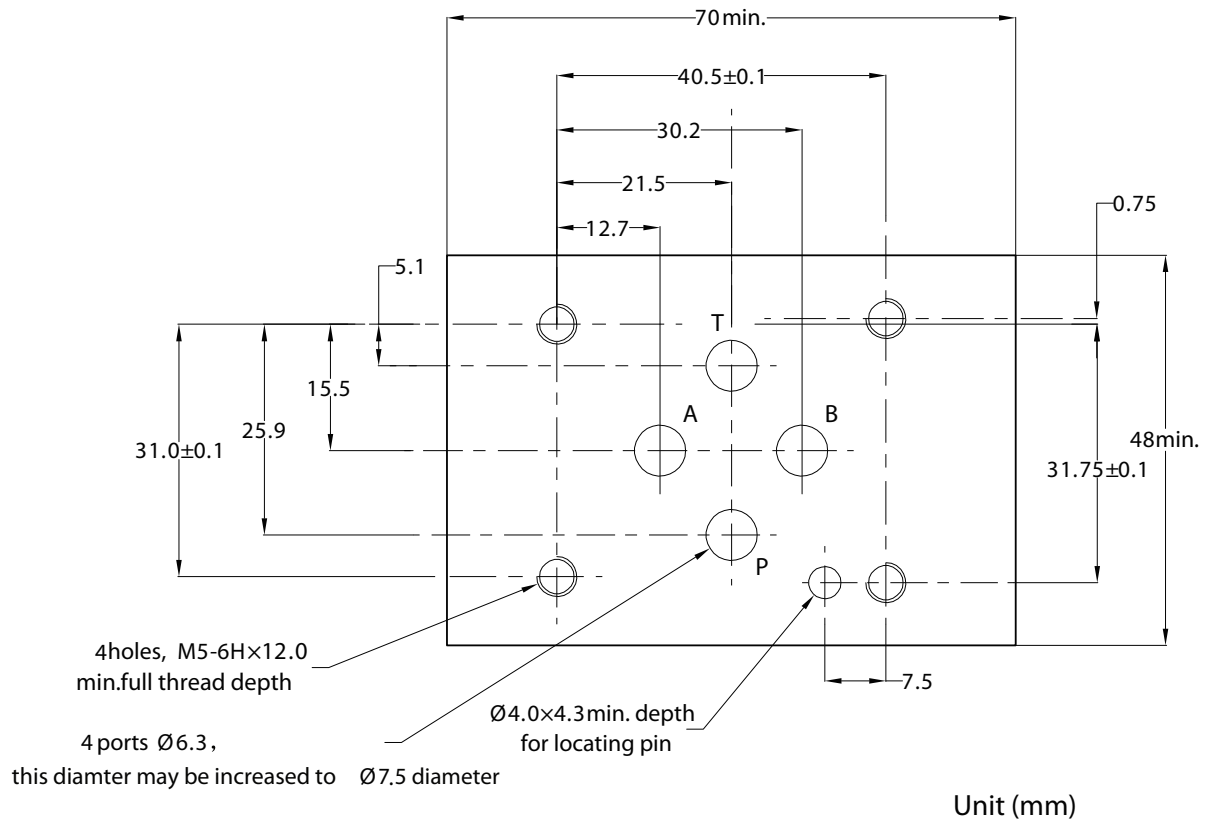
Unit (mm)

Proportional Directional Valve, KBDG4V-3 EN162 with CANopen

Dimensions

Mounting Surfaces

This interface conforms to
 ISO 4401-03-02-0-05, plus location pin hole
 ANSI/B93.7M (and NFPA) size 03 CETOP R35H4. 2-4-03, plus location pin hole
 DIN 24340 A6, plus location pin hole.



Proportional Directional Valve, KBDG4V-3 EN162 with CANopen

Electrical Information

Command Signals

Analog				
Command $\pm 10V$	Pin D	Pin E		Flow direction
	Position	0V		P to A
	0V	Negative		
	$V_D - V_E = \text{Position}$			
	Negative	0V		P to B
		0V	Position	
$V_D - V_E = \text{Negative}$				
Command 4-20mA	Pin D	Pin E	Pin B	Flow direction
	>12mA	Current GND	Current return	P to A
	<12mA	Current GND	Current return	P to B
Bus				
CANopen	6300sub1	0 ~ +16384		P to A
		-16384 ~ 0		P to B

Cables

Cable specifications:

Power cables (For 24V supply):

0.75 mm² up to 20m

1.00 mm² up to 40m

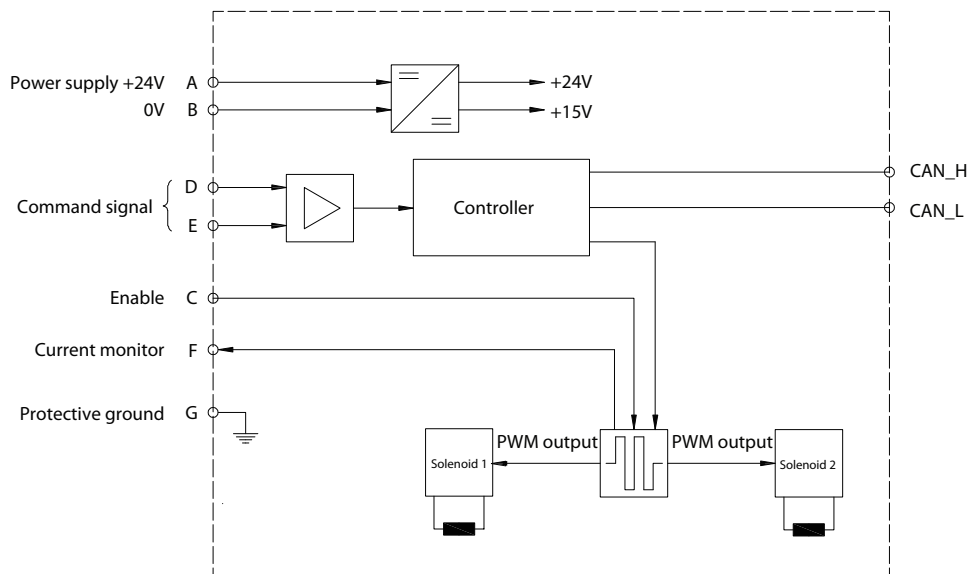
signal cables : 0.50 mm²

Screen (Shield):

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

CANopen bus cable requirement please refer to CAN protocol.

Block Diagram



Proportional Directional Valve, KBDG4V-3 EN162 with CANopen

Other Information

Fluid Cleanliness

The following recommendations are based on ISO cleanliness level at 2µm, 5µm and 15µm.

For products in this catalog the recommendation level is:

0 to 70 bar 18/16/13 or NAS 1638 7

70+ bar 17/15/12 or NAS 1638 6

Hydraulic Fluids and viscosity

Material 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, but recommended running range is 54 to 13 cSt.

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 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.

Accessories

Accessories	Description
Mounting bolt kits	Mounting bolts are not in the scope of supply, it is recommended to use ISO898, 12.9 or better M5 bolts, tightening torque is 5-7 Nm.
Seal kit	Seal kit ordering number is 02-351111.
Electrical plug	7 pin metal plug (ordering number 934939) and CANopen connector are not in the scope of supply.

Configuration Software

To download or upgrade Pro-FX™ Configure PC application tool, please contact danfoss sales or technical support engineers.

Proportional Directional Valve, KBDG4V-3 EN162 with CANopen

Order Information

Preferred Types

Ordering Number	Model Code
6047970-001	KBDG4V-3-5C05N-M9-PC7-H7-11-EN162
6048135-001	KBDG4V-3-33C20N-L-M9-PC7-H7-11-EN162
6049276-001	KBDG4V-3-33C20N-L-M2-PC7-H7-11-EN162
6049404-001	KBDG4V-3-2C07N-M1-PC7-H7-11-EN162
6049405-001	KBDG4V-3-2C07N-M2-PC7-H7-11-EN162
6049406-001	KBDG4V-3-2C07N-M9-PC7-H7-11-EN162
6049407-001	KBDG4V-3-2C13N-M1-PC7-H7-11-EN162
6049408-001	KBDG4V-3-2C13N-M2-PC7-H7-11-EN162
6049409-001	KBDG4V-3-2C13N-M9-PC7-H7-11-EN162
6049410-001	KBDG4V-3-2C20N-M1-PC7-H7-11-EN162
6049411-001	KBDG4V-3-2C20N-M2-PC7-H7-11-EN162
6049412-001	KBDG4V-3-2C20N-M9-PC7-H7-11-EN162
6049413-001	KBDG4V-3-2C28N-M1-PC7-H7-11-EN162
6049414-001	KBDG4V-3-2C28N-M2-PC7-H7-11-EN162
6049415-001	KBDG4V-3-2C28N-M9-PC7-H7-11-EN162
6049416-001	KBDG4V-3-33C07N-M1-PC7-H7-11-EN162
6049417-001	KBDG4V-3-33C07N-M2-PC7-H7-11-EN162
6049418-001	KBDG4V-3-33C07N-M9-PC7-H7-11-EN162
6049419-001	KBDG4V-3-33C13N-M1-PC7-H7-11-EN162
6049420-001	KBDG4V-3-33C13N-M2-PC7-H7-11-EN162
6049421-001	KBDG4V-3-33C13N-M9-PC7-H7-11-EN162
6049422-001	KBDG4V-3-33C20N-M9-PC7-H7-11-EN162
6048113-001	KBDG4V-3-33C20N-M1-PC7-H7-11-EN162
6049275-001	KBDG4V-3-33C20N-M2-PC7-H7-11-EN162
6049423-001	KBDG4V-3-33C03F-M1-PC7-H7-11-EN162
6049424-001	KBDG4V-3-33C03F-M2-PC7-H7-11-EN162
6049425-001	KBDG4V-3-33C03F-M9-PC7-H7-11-EN162
6049426-001	KBDG4V-3-2C03F-M1-PC7-H7-11-EN162
6049427-001	KBDG4V-3-2C03F-M2-PC7-H7-11-EN162
6049428-001	KBDG4V-3-2C03F-M9-PC7-H7-11-EN162
6049429-001	KBDG4V-3-2C20N10-M1-PC7-H7-11-EN162
6049430-001	KBDG4V-3-2C20N10-M2-PC7-H7-11-EN162
6049431-001	KBDG4V-3-2C20N10-M9-PC7-H7-11-EN162
6049432-001	KBDG4V-3-33C20N10-M1-PC7-H7-11-EN162
6049433-001	KBDG4V-3-33C20N10-M2-PC7-H7-11-EN162
6049434-001	KBDG4V-3-33C20N10-M9-PC7-H7-11-EN162

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