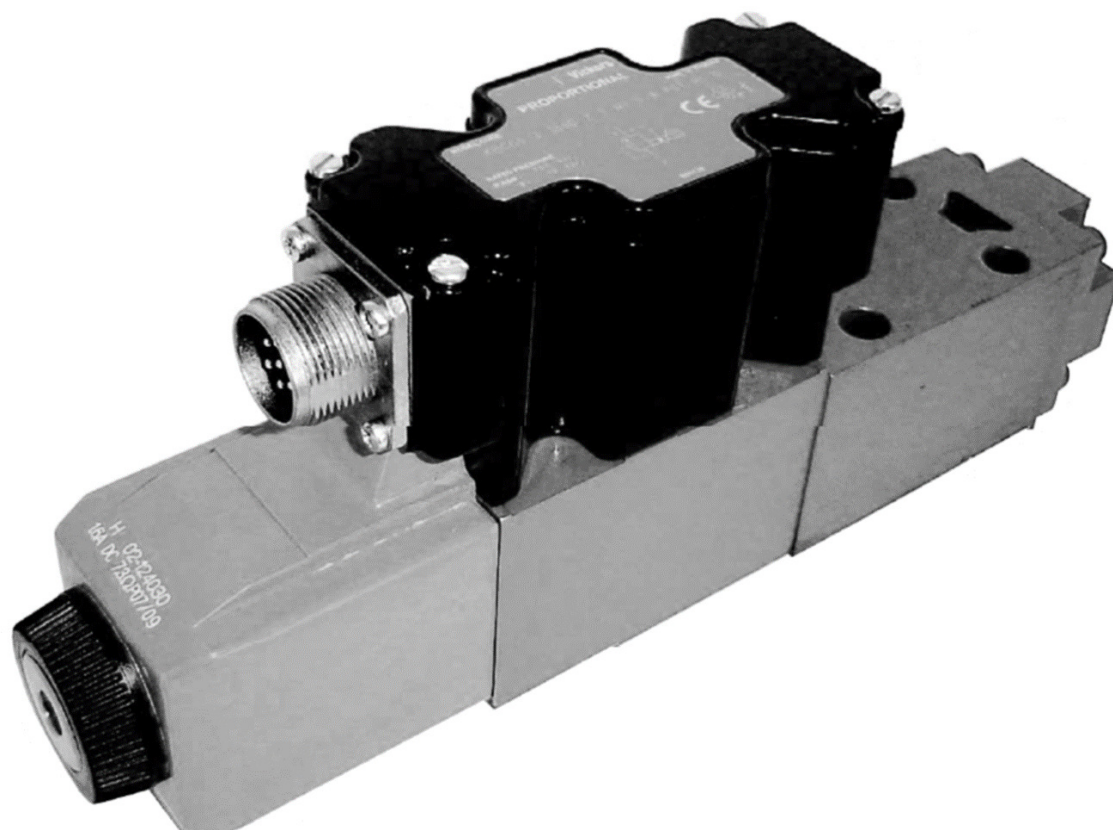




Introduction

General Description	3
Basic Characteristics	3
Features and Benefits	3
Typical Section	3
Functional Symbols	3
Model Code	4
Operating Data	5
Performance Data	6
Installation Dimensions	9
Electrical Information	10
Application Data	13



This product has been designed and tested to meet specific standards outlined in the European Electromagnetic Compatibility Directive (EMC). For instructions on installation requirements to achieve effective protection levels, see this leaflet and the Installation Wiring Practices for Vickers™ by Danfoss Electronic Products leaflet 2468. Wiring practices relevant to this Directive are indicated by  Electromagnetic Compatibility (EMC).

Introduction

General Description

These compact two-stage pressure relief valves offer extensive application possibilities through their ability to control the pressure setting in proportion to an applied electrical input.

The integral amplifier allows the pressure to be controlled from a low power command signal: either a voltage or current command.

The amplifier is mounted in a robust metal housing and electrical connections are via an industry standard 7-pin plug. Factory-set adjustments ensure high reproducibility valve-to-valve.

Basic Characteristics

Max. pressure
350 bar (5000 psi)

Max. flow rate
40 L/min (10.6 USgpm)

Mounting face to
ISO 6264-03-04

Note: Port B must be blocked by the mounting interface - see installation diagram for port positions.

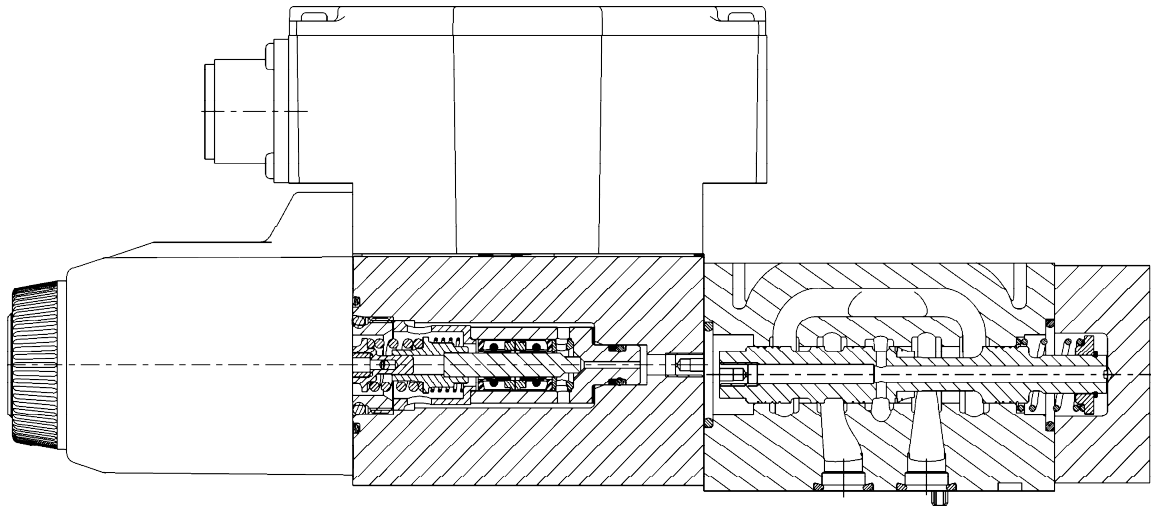
Port A is used for pilot drain flow on external drain models.

External drain models should be selected for applications where a high T port pressure is required (up to 210 bar) or where T port pressure disturbances are present..

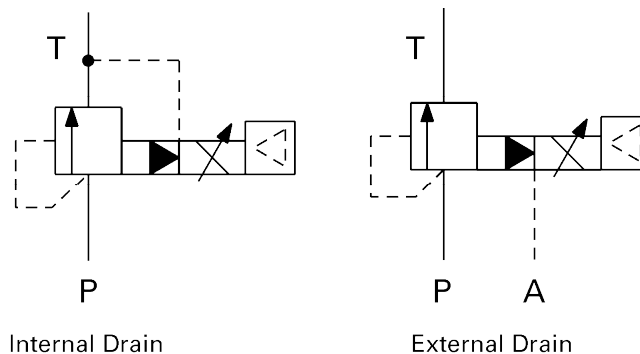
Features and Benefits

- Remote electrical proportional control of pressure from a choice of five pressure ranges.
- Excellent repeatability and stable performance.
- Low installed cost and space requirement from high power/size ratios.
- On-board ramp adjustment.
- Model code selectable ramp times.

Typical Section



Functional Symbols



KB C G 5 - 3 *** D Z * M* * * P*7 H * 10

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1 Valve Type	6 Pressure Rating	10 Amplifier Control Signal	14 Coil Identification
KB – Proportional valve with integral amplifier, B series	40 – 40 bar	M1 – ±10 V control signal	H – 24VDC
	100 – 100 bar	M2 – 4 to 20 mA control signal	
2 Control Type	160 – 160 bar	11 Ramp Option	15 T port pressure
C – Pressure Relief Valve	250 – 250 bar	4 – Fast ▼	1 – 10 bar. Internal drain (T models)
	350 – 350 bar	5 – Damped ▲	7 – 210 bar. External drain (non-T models)
3 Mounting	7 Damper	12 Amplifier Type	16 Design Number
G – Subplate mounted	D – Standard Damper	A – Standard	1* series. Subject to change
4 Operation	8 Manual Override	13 Electrical Connection	
5 – Pilot operated	Z – No manual override	PC7 – 7 pin connector, without plug supplied	
5 Mounting Interface	9 Drain Option	PE7 – 7 pin connector, with plug supplied	▼ Typically 160 ms for 0-100%/100-0% signal (system dependent)
3 – ISO 6264-03-04	T – Internal drain	PH7 – As PE7 but with pin 'C' used for enable signal	▲ Typically 420 ms for 0-100%/100-0% signal (system dependent)
	Blank – External drain	PR7 – As PC7 but with pin 'C' used for enable signal	



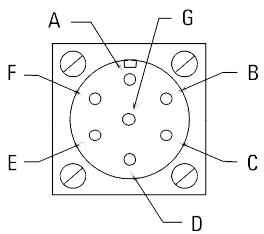
WARNING

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

correctly fitted to ensure that EMC and IP67 ratings 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.

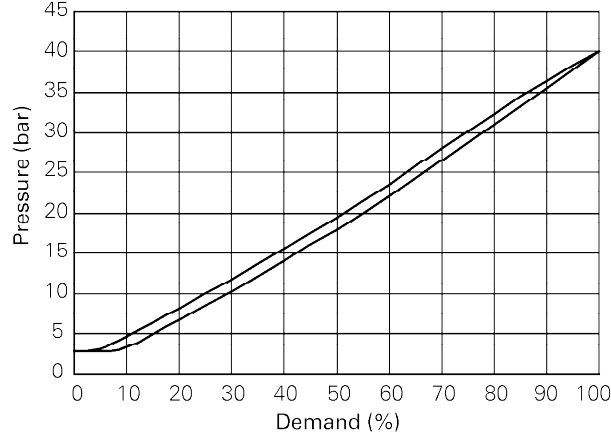
Standard test conditions are with antiwear hydraulic oil at 36 cSt (168 SUS) and 50°C (122°F)

Maximum pressures:

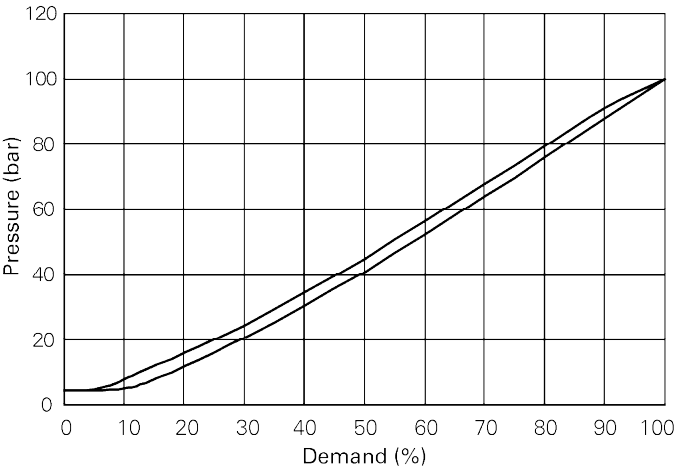
	Internal drain Model code [9] = T	External drain Model code [9] = blank																
Port P	350 bar (5000 psi)	350 bar (5000 psi)																
Port T	10 bar (145 psi)	210 bar (3000 psi)																
Port A*	—	10 bar (145 psi)																
*External drain port																		
Rated flow at $\Delta p = 5$ bar (73 psi): KBCG5V-3		40 L/min (10.6 USgpm)																
Pilot flow		0,4 - 1,0 L/min (0.1 - 0.26 USgpm)																
Coil or amplifier rating		24V x 36W max. (22 to 34V including 10% peak-to-peak max. ripple)																
Command signal:																		
Volts (see model code - [10] M1)		0 to +10V or 0 to -10V																
Input impedance		47 k Ω																
Common mode voltage to pin B		4V																
Current (see model code - [10] M2)		4 to 20 mA																
Input impedance		100 Ω																
Valve enable signal:																		
Enable		>9.0V (36V max)																
Disable		<2.0V																
Input impedance		36 k Ω																
7-pin plug connector		<table><tr><th>Pin</th><th>Description</th></tr><tr><td>A</td><td>Power supply positive (+)</td></tr><tr><td>B</td><td>Power supply 0V and current command return</td></tr><tr><td>C</td><td>Valve enable (PH7 & PR7)</td></tr><tr><td>D</td><td>Command signal (+V or current in)</td></tr><tr><td>E</td><td>Command signal (-V or current GND)</td></tr><tr><td>F</td><td>Output monitor</td></tr><tr><td>G</td><td>Protective ground</td></tr></table>	Pin	Description	A	Power supply positive (+)	B	Power supply 0V and current command return	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
Pin	Description																	
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E	Command signal (-V or current GND)																	
F	Output monitor																	
G	Protective ground																	
																		
View of pins of fixed half																		
Electromagnetic compatibility (EMC):																		
Emission		EN 50081-2																
Immunity (10 V/m)		EN 50082-2																
Monitor signal (pin F)		1.52 V/amp solenoid current																
Output impedance		10 k Ω																
Pressure gain		See graphs																
Factory setting: maximum with 100% command signal																		
Pressure override when relieving and when off-load		See graphs																
Linearity, between 10% and 100% of rated pressure		<5%																
Hysteresis		<5% (with factory-set dither)																
Repeatability		+/- 2% of rated pressure																
Reproducibility, valve-to-valve (at factory settings):																		
Pressure at 100% command signal		+/- 3% of rated pressure																
Protection:																		
Electrical		Reverse polarity protected																
Environmental		IE C60529, Class IP67																
Mass (weight)		3,45 kg (7.61lb)																
Mounting attitude		No restriction, provided that the valve is kept full of fluid through port T.																

Data is typical with oil
at 36 cSt (168 SUS) and
at 50°C (122°F)

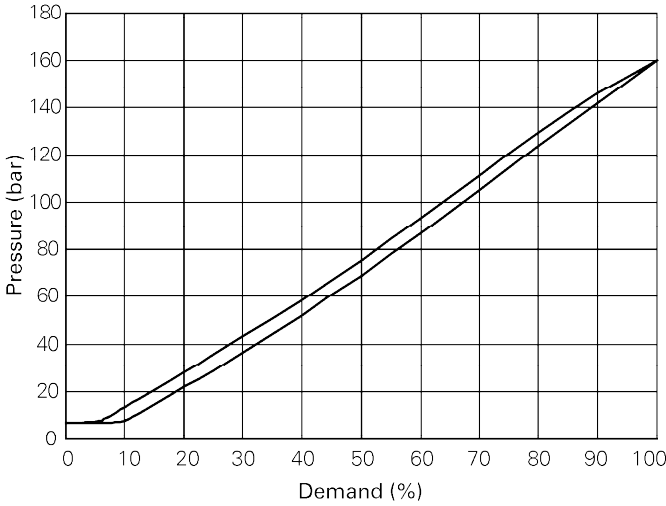
Pressure/Demand characteristic at 4 l/min
40 bar version



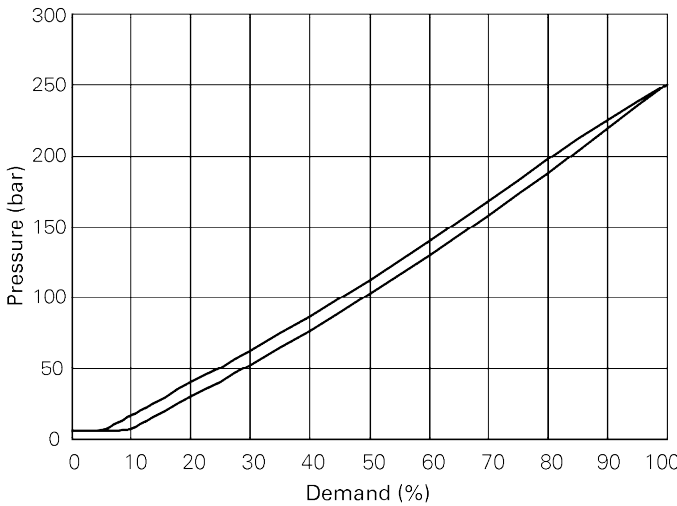
Pressure/Demand characteristic at 4 l/min
100 bar version



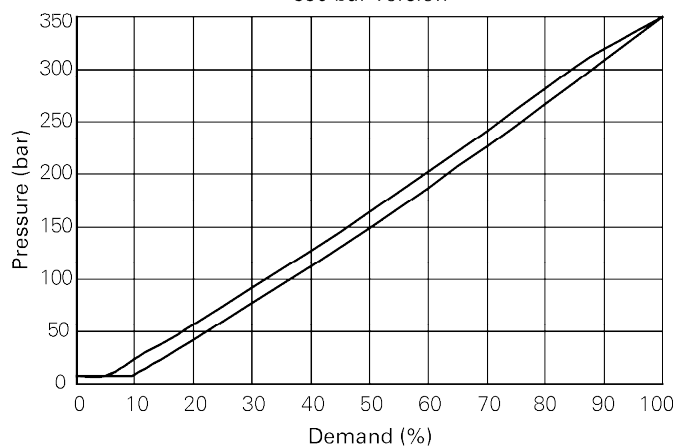
Pressure/Demand characteristic at 4 l/min
160 bar version



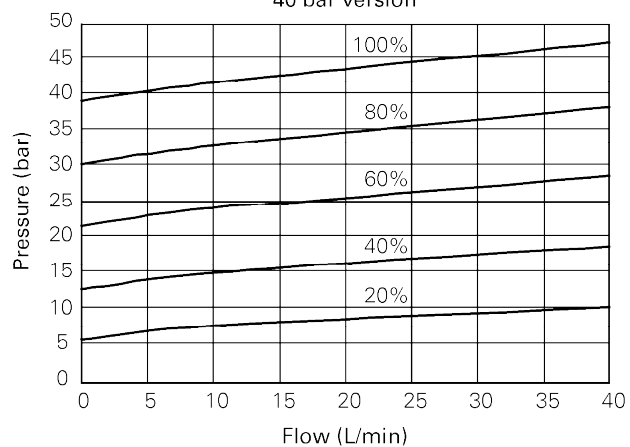
Pressure/Demand characteristic at 4 l/min
250 bar version



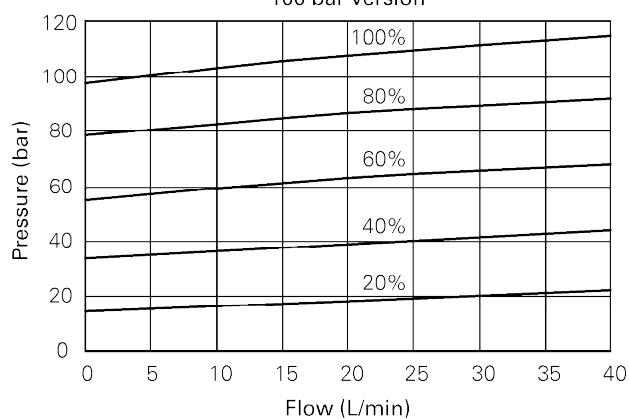
Pressure/Demand characteristic at 4 l/min
350 bar version



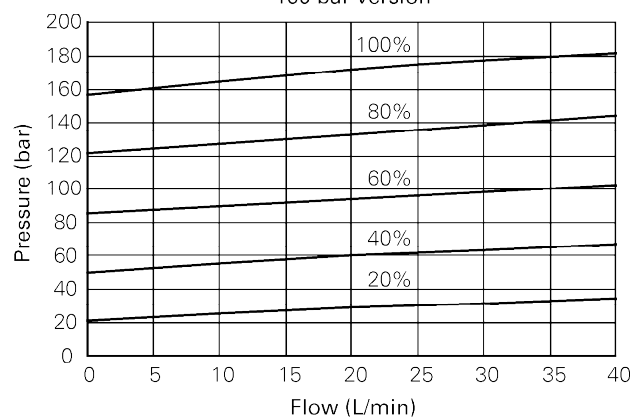
Pressure/Flow characteristic
40 bar version

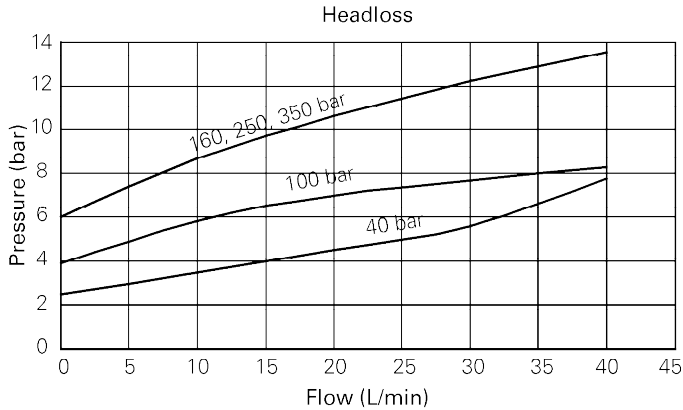
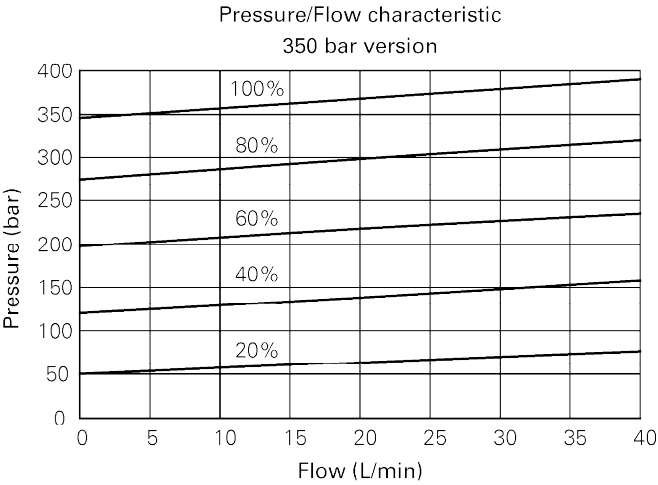
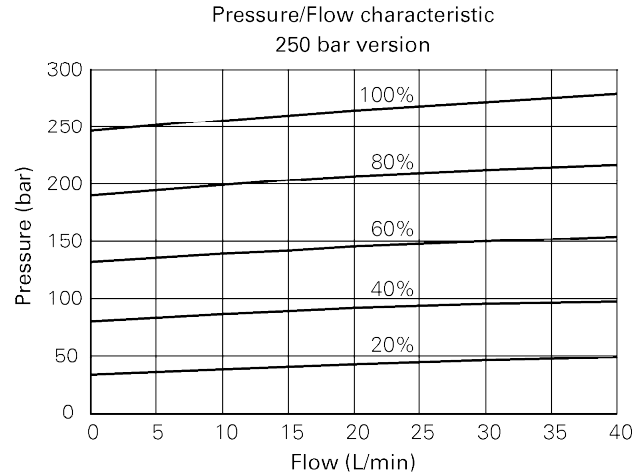


Pressure/Flow characteristic
100 bar version



Pressure/Flow characteristic
160 bar version





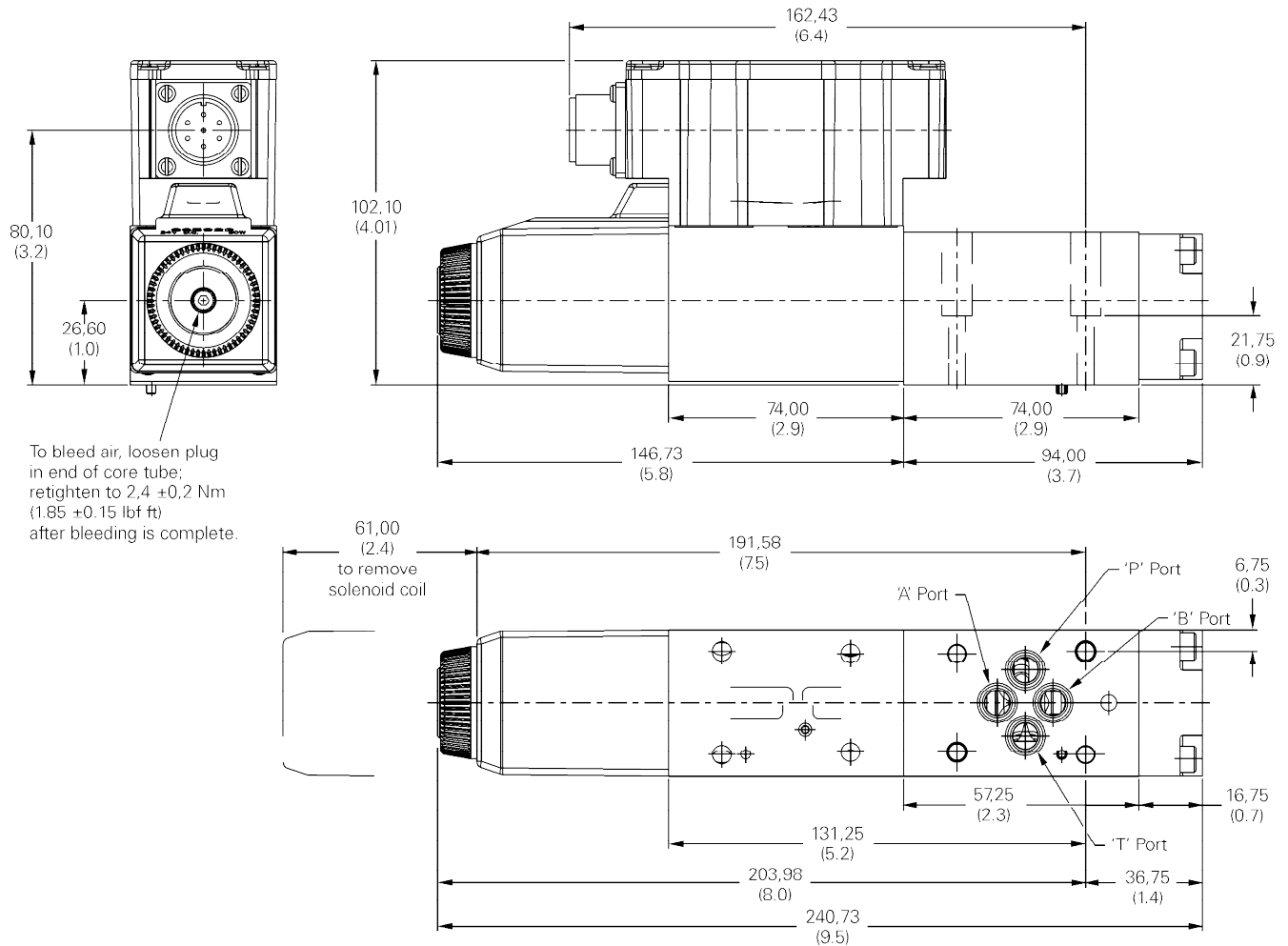
Step Response

The step response data in the attached table should be used as a guideline only as response time in any application will be system dependant.

The response will be significantly influenced by the valve operating flow rate as well as the volume of oil being controlled.

MODEL CODE	STEP SIZE: PRESSURE DEMAND	RESPONSETIME (ms)
M*-4	0-100%/100-0%	160
	25 - 75%/75-25%	100
	10-90%/90-10%	140
M*-5	0-100%/100-0%	420
	25-75%/75-25%	260
	10-90%/90-10%	360

Installation Dimensions



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

correctly fitted to ensure that EMC and IP67 ratings 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.

Block Diagram

Wiring

Connections must be made via the 7-pin plug mounted on the amplifier. See this leaflet and Installation Wiring Practices for Vickers™ by Danfoss 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:

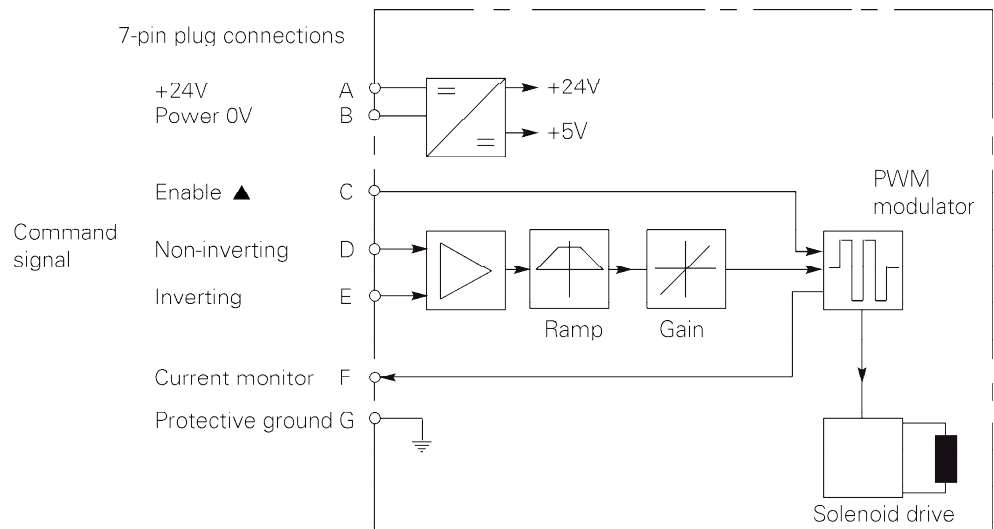
0,50 mm² (20 AWG)

Screen (Shield):

A suitable cable should have at least 6 cores with pairs of conductors individually screened and an overall screen.

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

See connection diagrams on next page.



▲ In valves with PH7 or PR7 type electrical connection.



WARNING

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

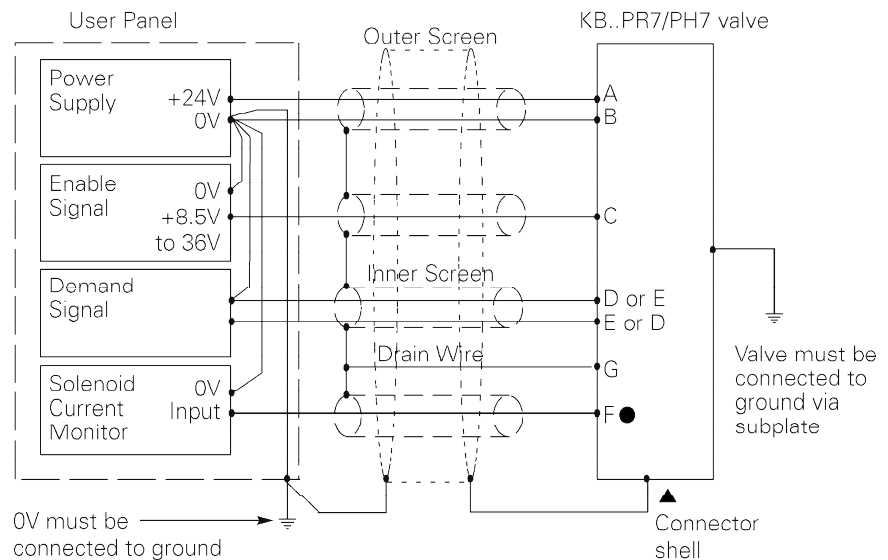
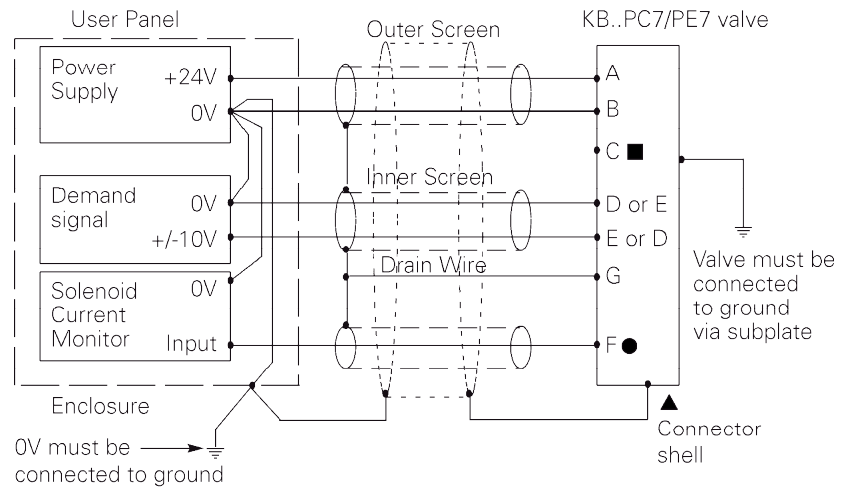
Typical Connection Arrangements

■ Pin C may be connected to ground or left unconnected.

● Output monitor voltage pin F) will be referenced to the power 0 volts (pin B).

▲ 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

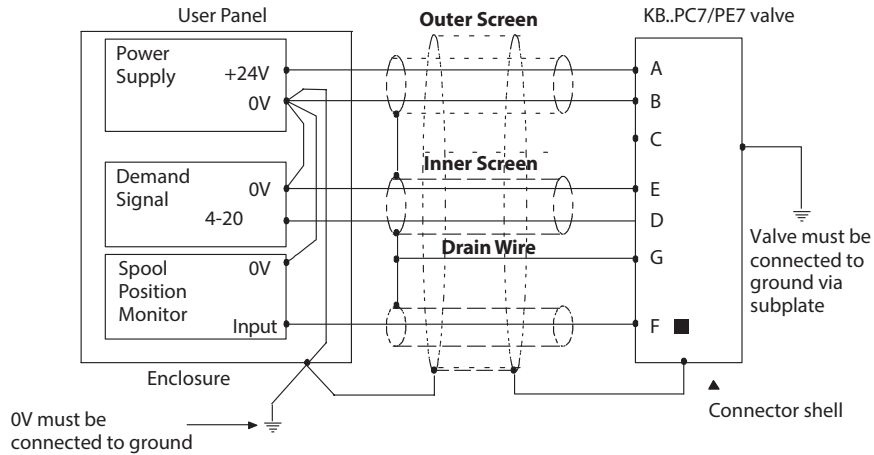
electromagnetic radiation such as cables carrying heavy current, relays and certain kinds of portable radio transmitters, etc. Difficult environments could mean that extra screening may be necessary to avoid the interference.

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.

Electrical Information

Current input (M2) wiring

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



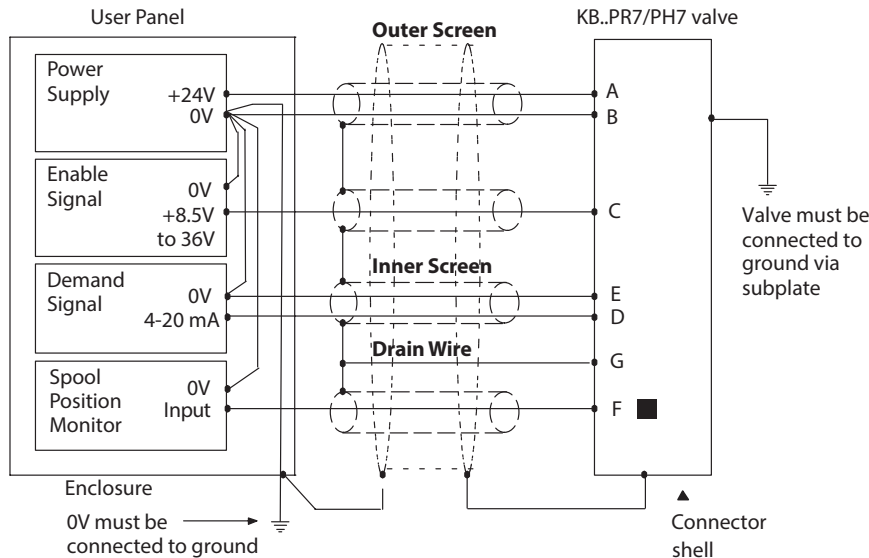
Warning

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.

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.



Hydraulic Fluids

Materials and seals used in these valves are compatible with:

Anti-wear petroleum oilsLHM

Non-alkyl based phosphate estersLHFD

The extreme operating range is 500 to 13 cSt (270 to 70 SUS) but the recommended running range is 54 to 13 cSt (245 to 70 SUS). For further technical information about fluids see 694.

Contamination Control

Requirements
Recommendations on contamination control methods and the selection of products to control fluid condition are included in publication 9132 or 561, "Guide to Systemic Contamination Control".

The book also includes information on the 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:

Up to 210 bar (3000 psi)
18/16/13

Above 210 bar (3000 psi)
17/15/12

Installation and Start-up Guidelines

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.

If this proves to be the case any accumulated air can be bled from the solenoid bleed screw. This task is easier if the valve has been mounted base downwards. Good installation practice dictates that the tank port, and any drain port, are piped so as to keep the valve full of fluid once the system start-up has been completed.

Temperatures

For petroleum oil:
Min.....-20°C (-4°F)
Max+70°C (158°F)

For fluids where limits are outside those of petroleum oil, consult fluid manufacturer or Danfoss representative. Whatever the actual temperature range, ensure that viscosities stay within those specified under "Hydraulic Fluids" .

Ambient for:
Valves at full performance specification:

-20 to +70°C (-4 to +158°F).

Valves, as above, will operate at temperatures of 0 to -20°C (32 to -4°F) but with a reduced dynamic response.

Storage:
-25 to +85°C (-13 to +185°F)

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