Industrial Valves

Powering Business Worldwide

Industrial valves

For over years, Eaton brands have provided its customers with quality products and innovative solutions for all their power and motion control needs. The products featured in this catalog represent the very best in Industrial Valves technology. Eaton is committed to maintaining this position by offering the most comprehensive range of Industrial Valves for stationary and on/off highway equipment. This catalog gives detailed specifications for the entire line of Eaton's Industrial Valves. Its purpose is to provide a quick, convenient reference tool when choosing Industrial Valves or designing a system using these components. It is divided into sections according to valve function.

Global support

Eaton's world-wide distribution and service network is quick, reliable, and responsive to the customer's needs. Our customers can rest assured that no matter where they're located, Eaton will be there with unrivaled products and technical expertise.

Technical support

Quality products are only part of Eaton's commitment to our customers. We also provide advisory, planning and design services specifically geared to your application and backed by on-time delivery.

Content

Directional control valves

Eaton DG valves mount on industry standard surfaces and provide 3- or 4-way control in a broad range of applications, industrial and mobile. Their primary function is to direct fluid flow to a cylinder or to control the direction of rotation of a hydraulic motor. These valves can be actuated by solenoid, hydraulic or pneumatic pilot, lever, or mechanically. A full range of complementary pressure, flow and check valve functions are available in the Eaton SystemStak™ family of sandwich mounted valves. Eaton DG valves are available in 10 different frame sizes.

Specifications:

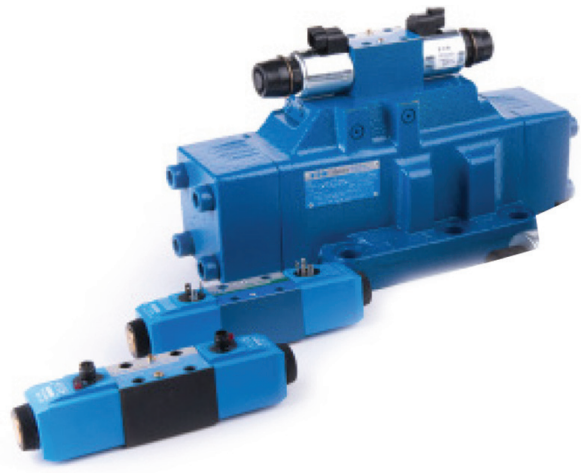
Rated Flow: Up to 1,100 lpm (290 gpm).
Rated Pressure: Up to 350 bar (5,000 psi).
Size: NG4-32 (D02-10).

Benefits & costumer values

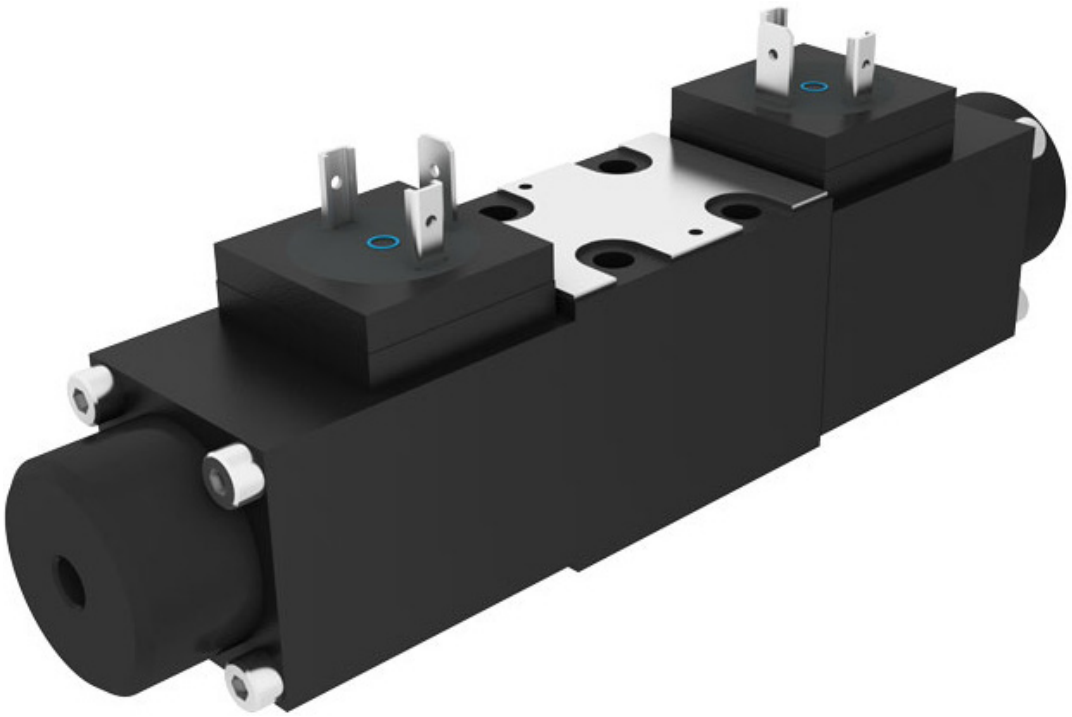
Complete function (type of actuation)
Complete size range
Wide variety of voltage & wattage
Various electrical connections

Directional control valve product portfolio.

	Cam plunger	Oil pilot	Solenoid	Lever	Air pilot	Cam lever	Plunger
D02/NG4			DG4V2				
D03/NG6	DG2V3	DG3V3 DG3VP3	DG4V3 DG4V3M DG4VP3	DG17V3	DG18V3	DG20V3	DG21V3
D05/NG10			DG4V4 DG4V5 DG4V5M	DG17V4	DG18V4		
D05/NG10		DG3V5	DG5V5				
D07/NG16		DG3V7	DG5V7				
D08/NG20		DG3V8	DG5V8	DG17V8	DG19V8		
D10/NG32		DG3V10	DG5V10	DG17V10			



ISO4401 Size D02; ANSI/B93. 7M-D02
DG4V2
Solenoid operated directional valves



I-A

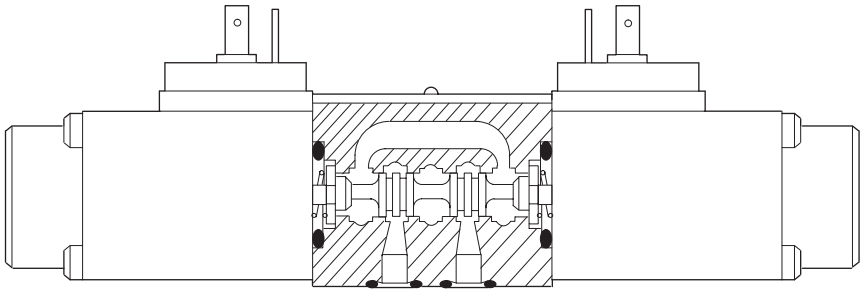
General description and application benefits

These solenoid operated directional control valves are for directing and stopping flow at any point in a hydraulic system. The features being released with this range are based on Eaton experience with size 3 valves.

- Efficient control of high hydraulic powers with low solenoid power consumption.
- Low internal leakage reduces power losses, increases system efficiency - the result of improved manufacturing techniques for spools and bores.
- Viton® seals with multifluid capability without need to change seals.
- High sustained machine productivity and higher uptime because of proven fatigue and endurance life-tested over 10 million cycles.
- Compact and costeffective system design when used with Eaton SystemStak™ valves and multi-station subplates.

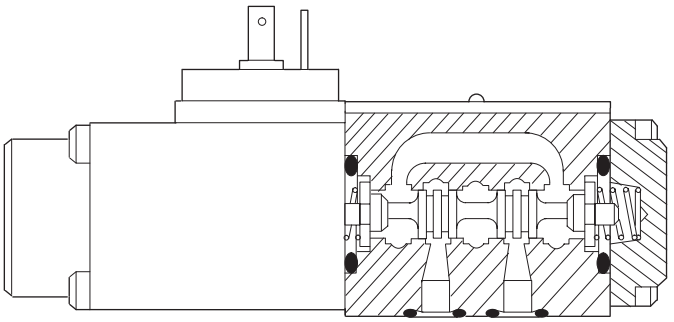
DG4V-2-2C

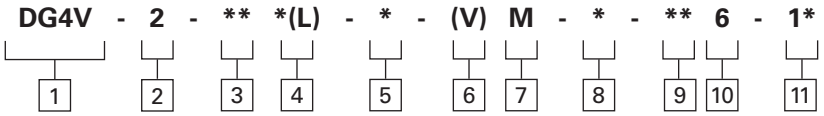
Double solenoid model



DG4V-2-2B

Single solenoid model





1 **Model series**

D	Directional valve
G	Subplate/manifold mounted
4	Solenoid operated
V	Pressure rating 250 bar (3600 psi)

2 **Interface**

2	ISO/DIS 4401-02-02

3 **Spool type**

Refer page 8 for spool type

4 **Spool spring arrangement**

A	Spring offset, end-to-end
AL	Same as "A" but left hand build
B	Spring offset, end to center
BL	Same as "B" but left hand build
C	Spring centered
N	No-spring detented

5 **Manual override.**

Blank	Plain Overrides
Z	No Overrides

6 **Solenoid energization identity**

Blank	None
V	Solenoid "A" is at port "A" end and/or solenoid "B" is at port "B" end, independent of spool type
NOTE	Type "8" spool valves conform to both U.S. and European solenoid designations. When ordering an "8" spool, designate a "V" in the model code.

7 **Flag symbol**

M	Electrical options and features

8 **Coil type**

U	ISO4400, DIN43650 connector
U1	ISO4400 with fitted DIN plug
KU	Flying leads from top of the solenoid
KUP4	Junior timer (amp) connector
KUP6	Flying lead with deutsch connector

9 **Coil rating**

G	12V DC 38 watt
H	24V DC 38 watt
HL	24V DC 32 watts

10 **Tank port rating**

6	160 bar tank pressure rating

11 **Design**

Subject to change. Installation dimensions same for designs 10 thru 19.

Functional symbols

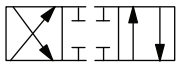
Spool options for DG4V-2

I-A

The schematics of the valve function applies to both U.S. and European valves.

DG4V-2-*N(V) valves

2



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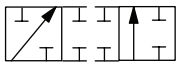

DG4V-2-*A(V) valves

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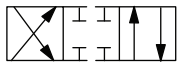

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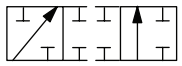

DG4V-2-*AL(V) valves

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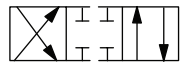

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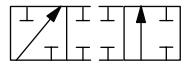

DG4V -2-8 CV valves

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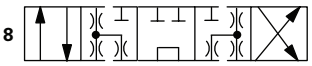

DG4V -2-*C (V) valves

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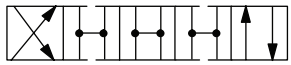

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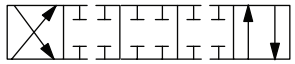

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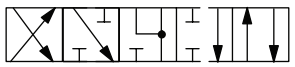

DG4V -2-*B(V) valves

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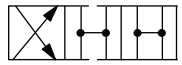

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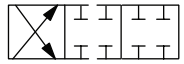

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DG4V -2-*BL(V) valves

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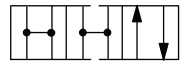

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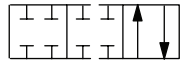

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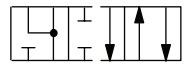

DG4V -2-8 BLV valves

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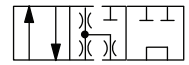

DG4 V-2-8 BV valves

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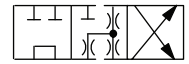
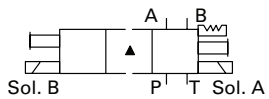
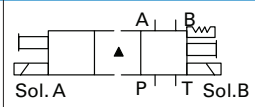
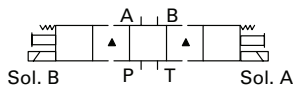
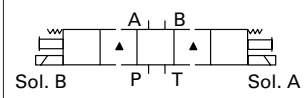
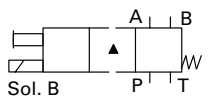
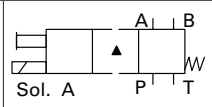
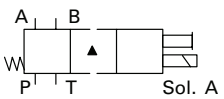
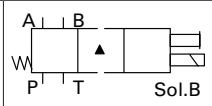


Solenoid identified to US and European standards

	U.S. Solenoid standard	European solenoid standard (specify "V" in the model code)
Double solenoid valves, two position, detented		
Double solenoid valves, spring centered		
Single solenoid valves, solenoid at port A end		
Single solenoid valves, solenoid at port B end		

▼ Transient condition only.

DG4V-2	
Pressure limits: **P, A and B ports:**	
Using 25W solenoid coils	250 bar (3600 psi)
Using 12W solenoid coil type HL	165 bar (2400 psi)
T port	160 bar (2300 psi)
Flow rating:	
Full power (25W) coil	30 l/min (7.9 USgpm)
Low power (12W) coil, type HL	20 l/min (5.3 USgpm)
Relative duty factor	Continuous; ED = 100%
Type of protection	
Coils with ISO 4400 connector fitted correctly IEC 947 class IP65	IEC 947 class IP65
Coil winding Class H	Class H
Coil encapsulation Class F	Class F
Permissible voltage fluctuation:	
Maximum	110% rated
Minimum	90% rated
Typical response times at 100% rated volts measured from application/removal of voltage at conditions:	
Flow rate P-A, B-T	30 l/min (7.9 USgpm)
Pressure	125 bar (1800 psi)
Spool type 2C full stroke:	
Energizing	45 ms
De-energizing, no suppression	30 ms
De-energizing, diode suppression	110 ms
Spool type 2C to flow opening/closing point:	
Energizing	25 ms
De-energizing, no suppression	25 ms
De-energizing, diode suppression	100 ms
Power consumption, DC solenoids at rated voltage and 20˚C (68˚F):	
Type G, 12V	25W
Type H, 24V	25W
Type HL, 24V, low power	12W
Hydraulic fluids Filtration requirements Temperature limits	Refer to appendix
Mass, approximate	
Single solenoid valve	0,93 kg (2.1 lb.)
Double solenoid valve	1,3 kg (2.9 lb.)
Installation data: Mounting attitude	No restrictions except for no-spring detented model DG4V-2-*N. It should be mounted with the spool axis horizontal. This model type may be affected by severe vibration or shock, especially if a solenoid is not held energized.

Operating considerations

a. Dependent on the application and system filtration, any sliding spool valve if held shifted under pressure for long periods of time, may stick and not move readily due to fluid residue formation. It may need to be cycled periodically to prevent this from happening.

b. Surges of fluid in a common tank line serving two or more valves can be of sufficient magnitude to cause inadvertent shifting of these valves. This is particularly critical in no-spring detented models. Separate drain lines are recommended.

Performance data

DG4V-2

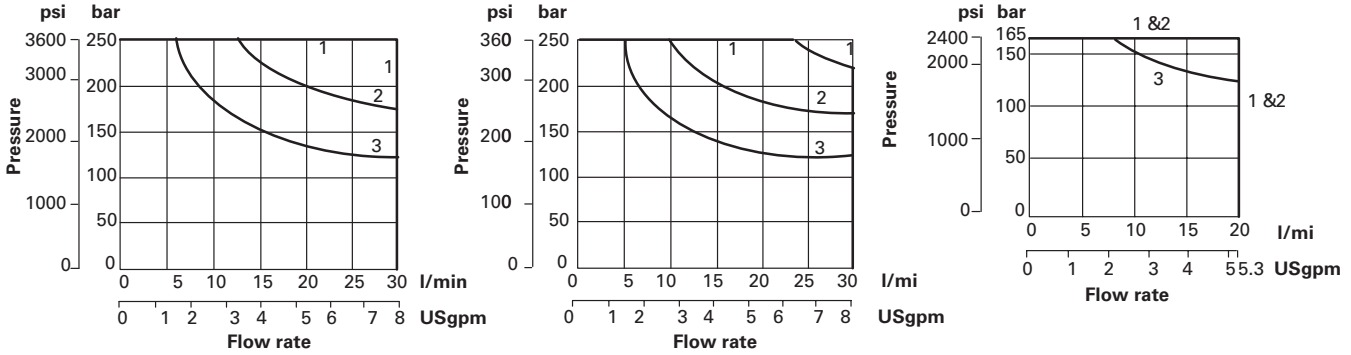
I-A

Typical with mineral oil at 36 cSt (168 SUS) and a specific gravity of 0.87.

Maximum flow rates

Performance conditions:

Looped flow P-A plus B-T (or P-B plus A-T). Solenoid coil warm and operating at 90% rated voltage.



Spool type	Curve number
0, 2	1
7, 8	2
33, 6	3

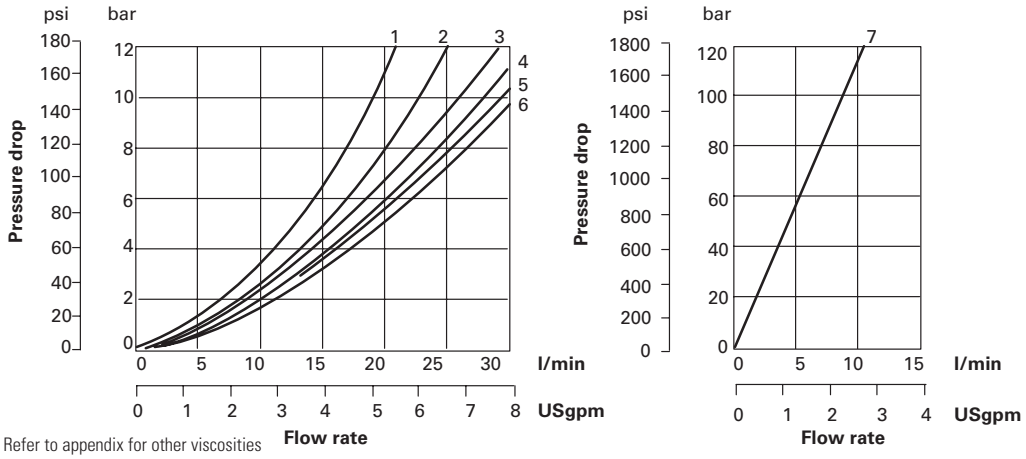
Asymmetrical flow rates

Consult Eaton with applications details if either of the following usages are required:

c) Single flow path, i.e. P-A, P-B, A-T or B-T.

d) When flow rates between P-A, B-T (or P-B, A-T) are significantly different, e.g. A and B connected to a cylinder having a large differential area.

Pressure drops



Refer to appendix for other viscosities

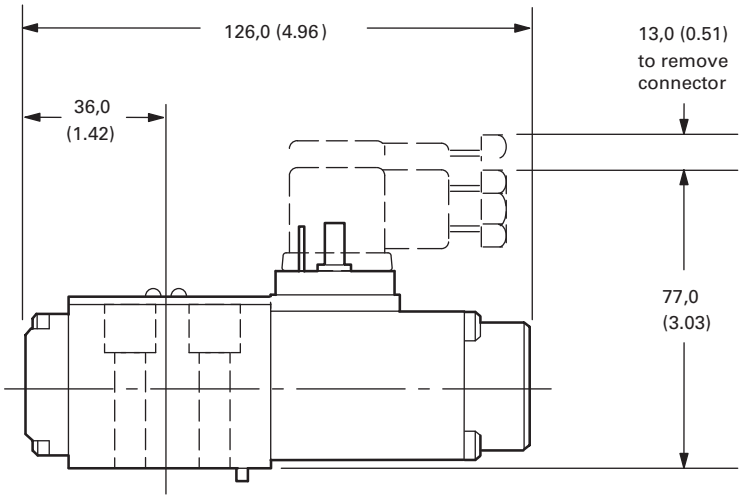
Pressure drops in offset positions except where otherwise indicated

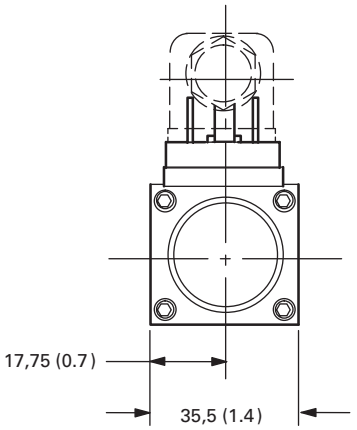
Spool/spring arrangement	Spool positions covered	P to A	P to B	A to T	B to T	P to T	B to A or A to B
0A(L)	Both	6	6	3	3	–	–
0B(L) & 0C	De-energized	–	–	–	–	6	–
	Energized	6	6	3	3	–	–
2A(L)	Both	3	3	4	4	–	–
2B(L) & 2C	Energized	4	4	5	5	–	–
2N	Both	4	4	5	5	–	–
6B(L) & 6C	De-energized	–	–	4	4	–	–
	Energized	3	3	5	5	–	–
8B(L) & 8C	All	1	1	1	1	2	–

Dimensions shown in mm (inches)

Single solenoid models

DG4V-2-A(L)
DG4V-2-B(L) **Spring offset**

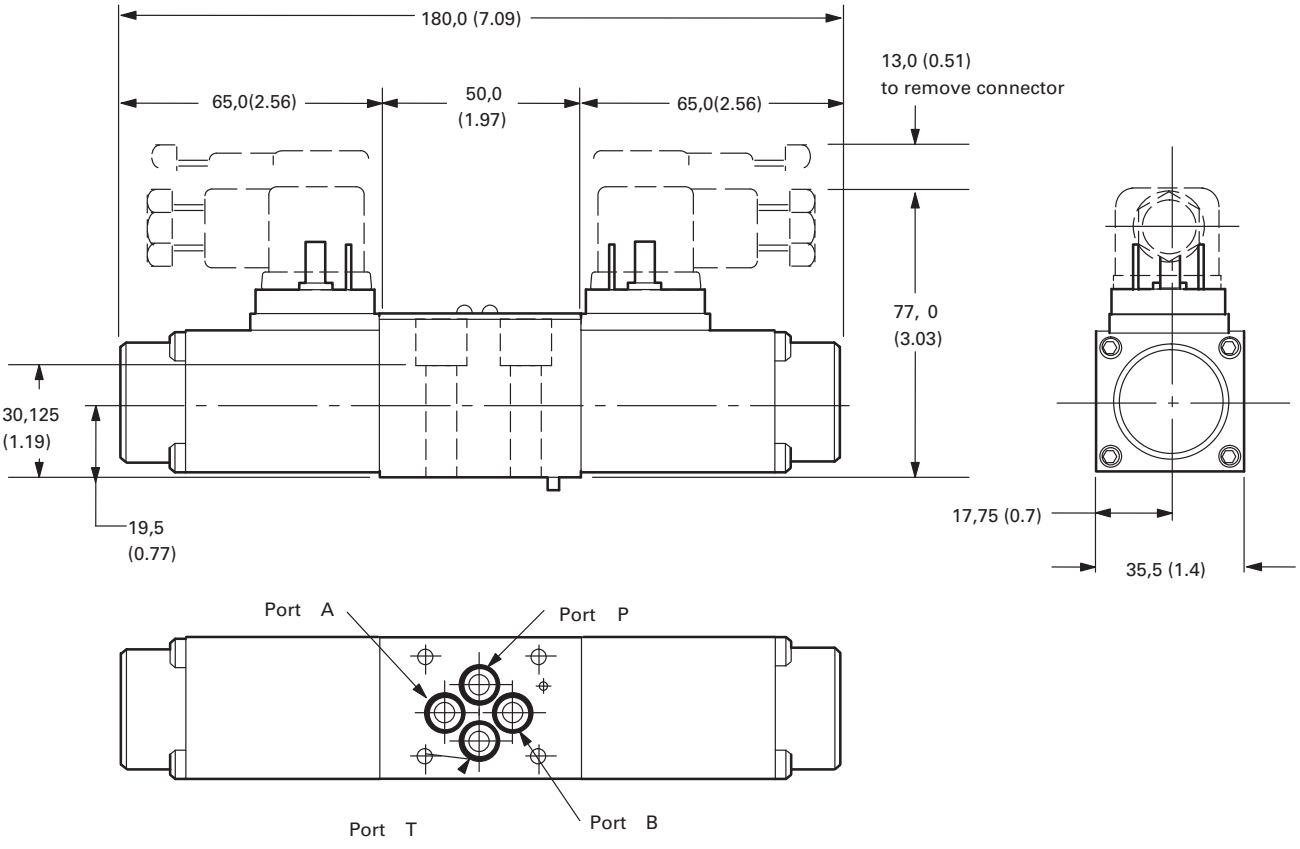




Dimensions are shown for standard connectors. For connectors with rectifiers and/ or LED this dimension varies up to 84,0 (3.31) maximum. Refer to double solenoid models below for port designations.

Double solenoid models

DG4V-2-C Spring centered
DG4V-2-N No-spring detented



Electrical plugs and connectors

ISO 4400 (DIN 43650)

I-A

Order separately by part number. A flying lead connector and an Amp Jr Timer connector are also available. Contact your Eaton representative for details.

The cable entry on these plugs can be repositioned to 900 intervals by reassembly of the contact holder relative to the plug housing. The cable entry is PG 11 for cable 6-10 mm (0.24″ to 0.39″ dia).

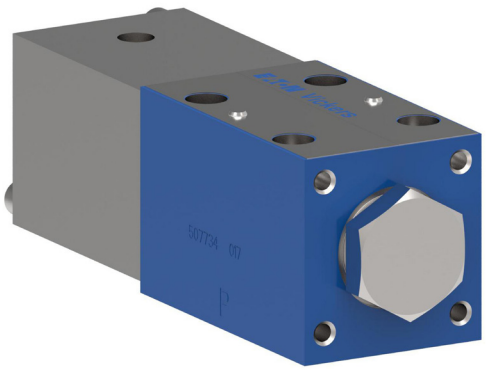
Connectors w/o indicator lights

Part No.	Color	Used on solenoid coil
710775	Black	Solenoid B
710776	Gray	Solenoid A

Connectors with LED

Voltage	Part Number Gray (sol. A)	Black (sol. B)
12-24V	977467	977466

ISO4401 Size D03; ANSI/893.7M-D03
Manual lever/Cam/Plunger operated directional valve
DG3/17/18/20/21-3 60 Design



Manual lever/Cam/Plunger operated directional valve

DG3/17/18/20/21-3 60 Design

II-B

Eaton directional valves offer versatility of application for the many directional control requirements of hydraulic machinery. Ruggedness of design, manufacturing quality, and worldwide parts and service availability maximize uptime, resulting in greater profits for your company.

Manual lever/Cam/Plunger valves

These valves are available in an NFPA D03 interface. These valves are rated at flows to 75 l/min (20 USgpm) and 350 bar (5000 psi) maximum pressure. Roller cam, plunger, spring offset, detented, spring centered, knob or lever operated models are available.

Air operated

Available in an NFPA D03 interface with rated flows to 75 l/min (20 USgpm) and maximum pressure of 350 bar (5000 psi).

Hydraulic pilot operated

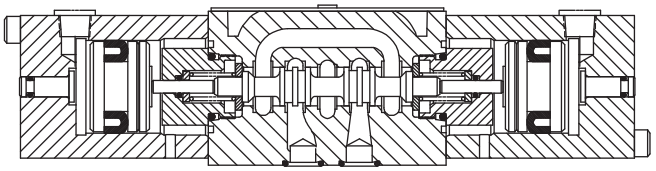
Available in an NFPA D03 interface. Valves are rated at flows to 151 l/min (40 USgpm) and maximum pressure of 350 bar (5000 psi)

Feature and benefits

- High pressure and flow capability for maximum cost–effectiveness
- Low head loss to minimize power loss
- Low–shock characteristics to maximize machine life
- Choice of five types of control to satisfy applications where electrical control is not appropriate

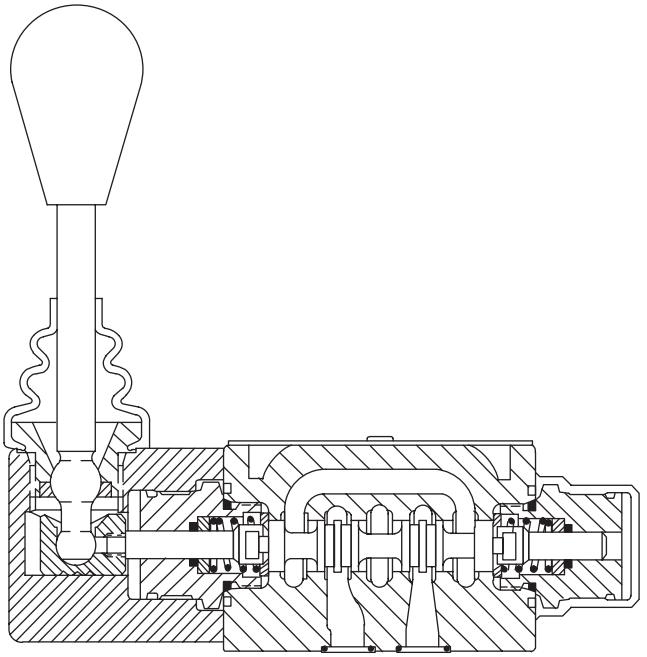
DG18V–3–*–60

Air operator



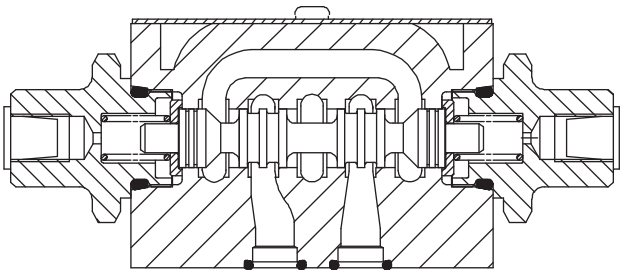
DG17V–3–* – 60

Lever operator



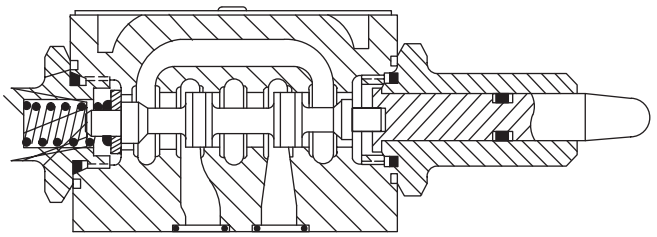
DG3V–3–*–60

Hydraulic operator



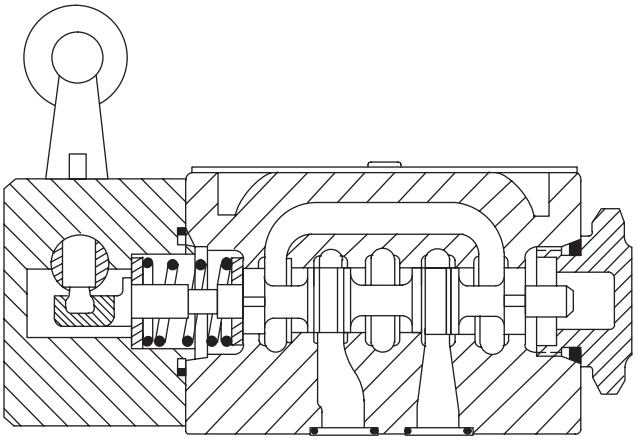
DG21V–3–* – 60

Plunger operator



DG20V–3–* – 60

Cam operator



General description

Five types of valve are available with different controls primarily for controlling the starting, stopping and direction of fluid flow in a system.

The valves are developed from the well-known series of DG4V-3-60 series solenoid operated valves (see Eaton literature # GB-C-2015). These manual valves are available with a choice of up to nine different spool types, depending on valve configuration. All spools have been designed to provide good low-shock characteristics. External regulation of the control input by hydraulic, lever, pneumatic, cam or plunger operation allows matching to virtually any requirement where electrical control is not appropriate. Models include no-spring, spring offset, spring centered and detented versions.

DG3V-3-*-60 Hydraulic operated

The hydraulic operated DG3V- 3-*-60 directional valves are used to control the direction of flow in a hydraulic circuit, which would control the movement of a work cylinder or the rotation of a fluid motor.

DG**V-3-*-60 Lever/Cam/ Plunger operated

Operating information

The DG21V-3 plunger operator valves are internally drained to port T. They may be used only when surges or back pressure in the tank line cannot overcome the force applied to depress the plunger.

DG17/20/21 models must be released from actuated positions, without restriction to ensure proper spring return.

Manual lever and cam operations must be released from their actuated positions, without any restrictions to spring return. Cam operated directional control valve installation recommendations:

- Maximum cam angle 35°
- Cam travel for dead band of 9° 30′ on either side of center for closed center spools for 35° cam.
- This dead band should be taken into consideration when designing cam and system circuits.
- Cam should not drive roller at its vertical centerline to avoid any side loading on roller lever mechanism.

Actuation force

Under rated conditions*, the approximate actuation force will be as shown in the chart below:

Valve type	Force Nm (lbf.)*
DG17V-3-*A	22 - 31 (5 to 7)
DG17V-3-*C	13 - 22 (3 to 5)
DG17V-3-*N	22 - 31 (5 to 7)
DG17V-3-*A	53 - 62 (12 to 14)
DG17V-3-*C	45 - 53 (10 to 12)
DG17V-3-*A	100- 250 (22 to 56)

*Tank return must be designed so that transient tank line pressure peake do not exceed 6,9 bar (100 psi). For tank return line pressure in excess of 6,9 bar (100 psi) lever movement must be assisted.

Note: In right hand assembly, operator "A" is always removed. In left hand assembly, operator "B" is always removed. Please note that European designations are the opposite. See diagram on the nameplate of the valve for operator (port) identification.

DG18V-3-**-60 Air operated

Eaton air operated DG18V-3-**-60 directional control valves come in four basic versions: 3 position spring centered; 2 position detent; 2 position spring offset to port A, B operator; 2 position spring offset to port B, A operator.

Note: Manual actuator in end cap feature (P2) available on single operator models only. In right hand assembly, operator "A" is always removed. In left hand assembly, operator "B" is always removed. See identification plate on top of valve for operator (port) identification.

For every 3,3 bar (50 psi) increase in tank line pressure the air pilot pressure must be increased 0.07 bar (1 psi). Maximum tank line pressure is 100 bar (1450 psi).

Nameplate identification label is asymmetrical and fixes the "A" and "B" operators in relation to the "P" port. Designers should note for installation on vertical panels.

On all right hand models, when operator "A" is pressurized, flow is always P to A. When operator "B" is pressurized, flow is always P to B. Operators "A" and "B" are identified on the identification plate on top of the valve. For left hand assembly this is reversed (P to B when the "A" operator is pressurized).

Shift time

Shift time is essentially dependent upon pilot pressure, line length and diameter, and speed of control mechanism. Spring return time from the offset to center position is approximately 45 msec. at rated flow and pressure assuming minimal back pressure in the pilot line.

Shifting action

Spring centered and spring offset types will be spring positioned unless sufficient pilot pressure is maintained at pilot port to shift and hold the valve spool. No-spring (offered as pilot valves for no-spring detented models only) require only momentary pressurization of pilot port to shift spool (approx. 0.1 seconds). When pilot pressure is relieved, spool will remain in last position attained provided there is no severe shock, vibration or unusual pressure transients.

Note: Surges of oil in a common tank line serving these and other valves can be of sufficient magnitude to cause inadvertent shifting of these valves. This is particularly critical in the no-spring and no-spring detented type valves. Separate tank lines or a vented manifold with a continuous downward path to tank is preferred.

Any sliding spool, if held shifted under pressure for long periods of time, may stick and not spring return due to fluid residue formation (silting) and therefore, should be cycled periodically to prevent this from happening. If this valve is used for purposes other than a 4-way valve or as shown in the graphical symbol on the valve, consult your distributor or sales engineer.

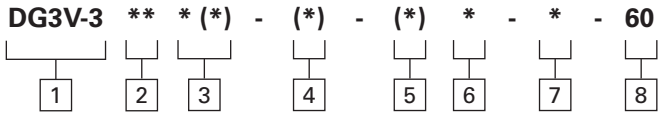
Mounting position

There is no restriction on mounting of spring centered or spring offset models. Detented models must be mounted with the spool bore horizontal to reduce the possibility of accidental spool shift due to shock and/or vibration.

Port connections

Port connections are made by mounting the valve on a manifold or subplate having mounting dimensions which conform to NFPA–D03 (ISO-4401-03) configurations.

Model code



1 Valve type

3	Hydraulically operated
V	350 bar (5000 psi) on P, A & B ports
3	ISO 4401-03 (CETOP 3,NFPA D03) ISO 4401-AB-03-4-B

2 Spool type

Refer page 18 for spool type

3 Spool spring arrangement

A	Spring offset, end-toend
AL	Same as "A" but left hand build
B	Spring offset, end to center
BL	Same as "B" but left hand build
C	Spring centered
N	No-spring detent

4 Internal drain

(omit if not required) A, B & F models only for designs (F models must have internal drain)

T	Internal drain

5 Manual override option

A, B & F models in non-operator end

P1	Manual override

6 Tank pressure limit

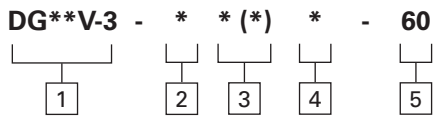
7	210 bar (3000 psi)

7 Thread for pilot/drain connection

B	G1⁄8 BSP threads
S	SAE threads

8 Design

Installation dimensions remain as shown for design numbers 60 thru 69.



1 Valve type

*	Operator 17 - Lever operated 20 - Roller cam operated 21 - Plunger operater
V	350 bar (5000 psi) on P, A & B ports
3	ISO 4401-03 (CETOP 3,NFPA D03) ISO 4401-AB-03-4-B

2 Spool type

Refer page 19 for spool type

3 Spool spring arrangement

A	Spring offset, end-to-end
AL	Same as "A" but left hand build
B	Spring offset, end to center
BL	Same as "B" but left hand build
C	Spring centered
N	No-spring detent

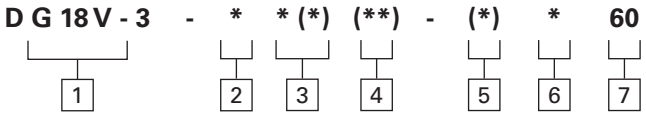
4 Tank port rating

Omit if not required

2	10 bar max for DG21V only

5 Design

Installation dimensions remain as shown for design



1 Valve type

18	Air Operated
V	350 bar (5000 psi) on P, A & B ports
3	ISO 4401-03 (CETOP 3,NFPA D03) ISO 4401-AB-03-4-B

2 Spool type (center condition)

Refer page 19 for spool type

3 Spool spring arrangement

A	Spring offset to A, (single operator)
AL	Spring offset to B, L.H. build (single operator)
B	Spring centered, operator A removed (single operator)
BL	Spring centered, operator B removed (single operator
C	Spring centered (dual operator)
N	No-spring detented

4 Manual override option

(Applicable for A(L), B(L) & F(L) models only)

Blank	Overrides in operator end only
P2	Override in both ends of single operators

5 Actuator identity

Blank	Standard arrangement (i.e. apply air to operator A to give flow P to A) (Ref. US ANSI B93.9)
V	Operator identification determined by position of operator (i.e. operator A at A port end of valve operator B at B port end of valve) Note: Type 8 spool conforms to both methods. All type 8 spools must designate V in model code.

6 Pilot source thread connections

B	1⁄8" BSP threads

7 Design

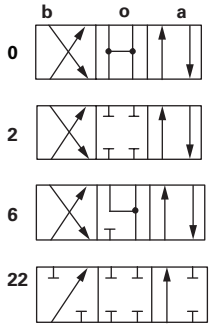
Installation dimensions remain as shown for design numbers 60 thru 69.

Functional symbols

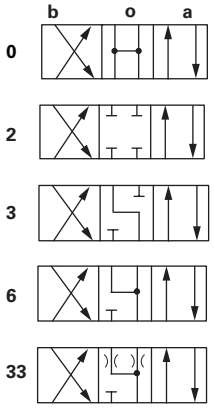
Spool options for DG3V-3-60

Solenoid identified to US and European standards

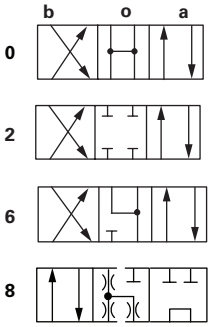
DG3V-3-A♦**



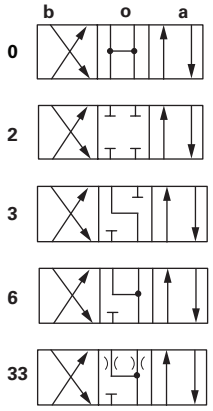
DG3V-3-B♦**



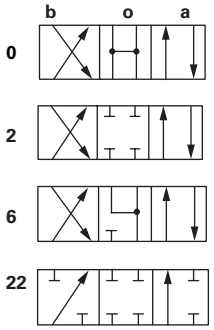
DG3V-3-C**



DG3V-3-F-T♦**



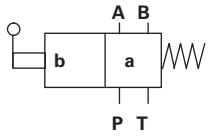
DG3V-3-N**



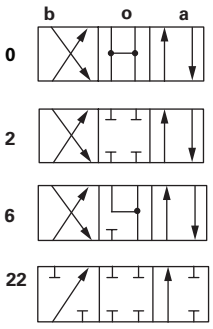
II-B

DG17V-3-**A, DG20V-3-**A

Basic valve symbol

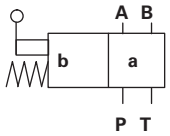


Usable spool options

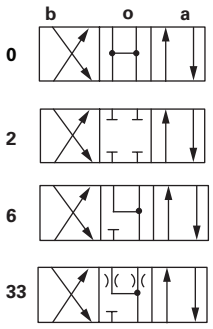


DG20V-3-**A2

Basic valve symbol

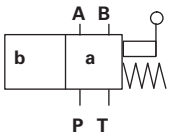


Usable spool options

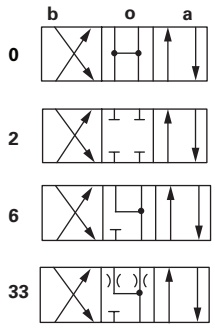


DG20V-3-**A2L

Basic valve symbol

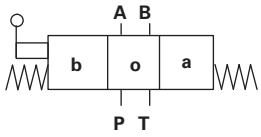


Usable spool options

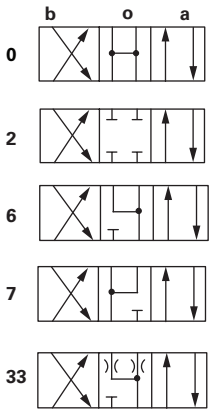


DG17V-3-**C

Basic valve symbol

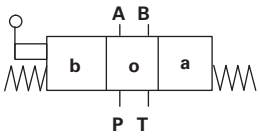


Usable spool options

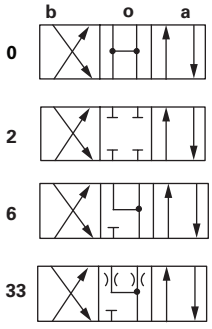


DG20V-3-**C

Basic valve symbol

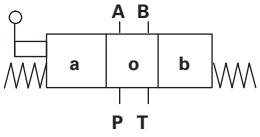


Usable spool options

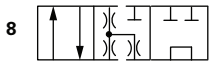


DG17V-3-**8C

Basic valve symbol

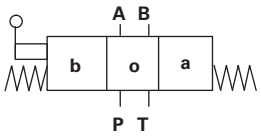


Usable spool options

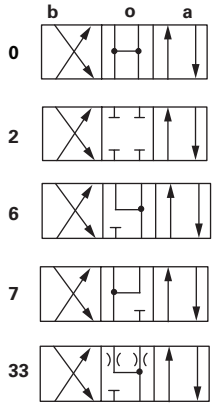


DG17V-3-**N

Basic valve symbol

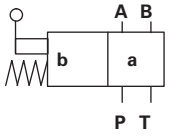


Usable spool options

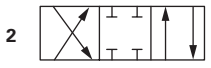


DG21V-3-2A

Basic valve symbol

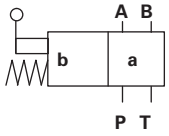


Usable spool options

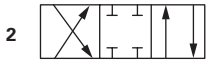


DG21V-3-2AL

Basic valve symbol



Usable spool options

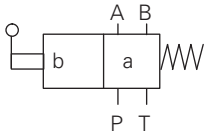


Functional symbols

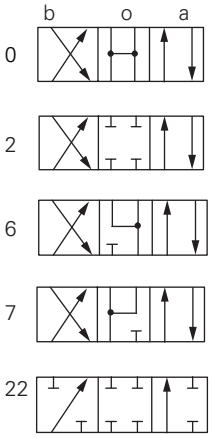
Spool options for DG18V-3-*-60

DG18V-3-**A♦

Basic valve symbol

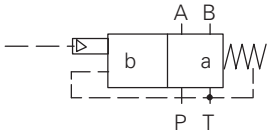


Usable spool options

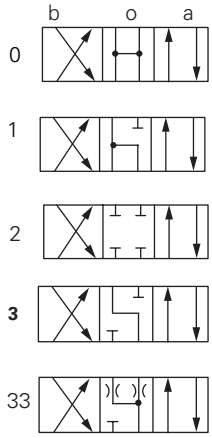


DG18V-3-**B♦

Basic valve symbol

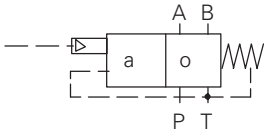


Usable spool options

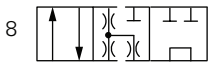


DG18V-3-**8B♦

Basic valve symbol

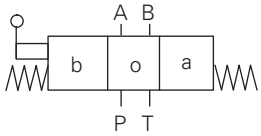


Usable spool options

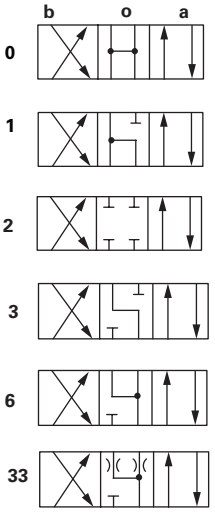


DG18V-3-**C

Basic valve symbol

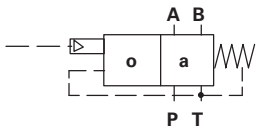


Usable spool options

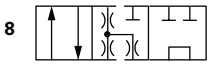


DG18V-3-**8C

Basic valve symbol

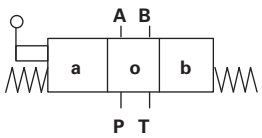


Usable spool options

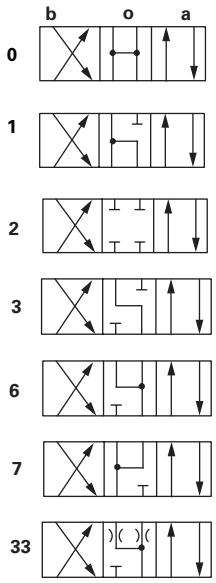


DG18V-3-**F♦

Basic valve symbol

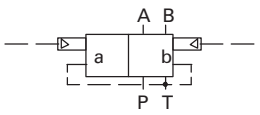


Usable spool options

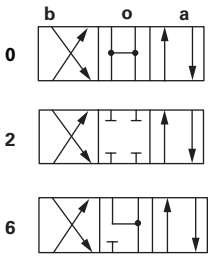


DG18V-3-**N

Basic valve symbol



Usable spool options



DG3V-3-*-60 hydraulic operator	
Maximum flow:	See chart on page 21.
Maximum operating pressure:	350 bar (5000 psi)
Maximum tank line pressure:	210 bar (3000 psi)
Minimum pilot pressure:	See chart on page 21.
Recommended fluid viscosity range:	13-54 cSt
Weight:	1,2 kg (2.5 lbs.)
Operating data	
Control (swept) volume(s):	
DG3V-3A(L) models, end-to-end:**	0,8 cm^3 (0.050 in^3)
DG3V3-B(L)/F(L) models:**	
Center-to-end	0,4 cm^3 (0.025 in^3)
DG3V-3-C/N models:**	
Center-to-end	0,4 cm^3 (0.025 in^3)
End-to-end	0,8 cm^3 (0.050 in^3)
DG3V-3-**(N) no-spring and detented valves require only momentary pilot pressurization to shift spool (in approx. 0.1 seconds). All other models require pilot pressure to be maintained to shift and hold the spool.	

DG17/20/21-3-**-60 Lever/Cam/Plunger operator	
Maximum flow:	75 l/min (20 USgpm)
Maximum operating pressure:	(A, B & P ports) 350 bar (5000 psi)
Maximum tank line operating pressure:	6,9 bar (100 psi)
Minimum pilot pressure:	100 bar (1450 psi) 10 bar (145 psi) DG21 model only
Recommended viscosity range	14 - 86 cSt (75 - 400 SUS) @ 18°C to 66°C (0°F to 150°F
Weights:	
DG17V Lever operated	1,8 kg (4.0 lbs)
DG20V Cam operated	1,2 kg (2.5 lbs)
DG21V Plunger operated	1,2 kg (2.5 lbs)

DG18V-3-*-60 air operator	
Maximum flow:	75 l/min (20 USgpm)
Maximum operating pressure:	(A, B & P ports) 350 bar (5000 psi)
Maximum tank line operating pressure*:	100 bar (1450 psi)
Maximum air pilot pressure:	10 bar (150 psi)
Minimum air pilot pressure:	1,7 bar (25 psi)
Operating temperature range:	-18°C to 66°C (-0°F to 150°F)
Mounting interface:	ISO 4401-03, CETOP 3 (NFPA D03)
Recommended viscosity range:	14 - 86 cSt (75 - 400 SUS)
Weights:	
Dual operator models	1,5 kg (3.4 lbs.)
Single operator models	1,2 kg (2.7lbs.)
*For every 3,3 bar (50 psi) increase in tank line pressure, the air pilot pressure must be increased 0,07 bar (1 psi).	
Operating data	
Control (swept) volume(s):	
DG18V-3"A(L) end-to-end	3,6 cm^3 (0.219 in^3)
DG 18V3"'B(L)/F(L) center -to-end	1,8 cm^3 (0.109 in^3)
DG3V-3"'C/N center-to-end	1,8 cm^3 (0.109 in^3)
End-to-end	3,6 cm^3 (0.219 in^3)

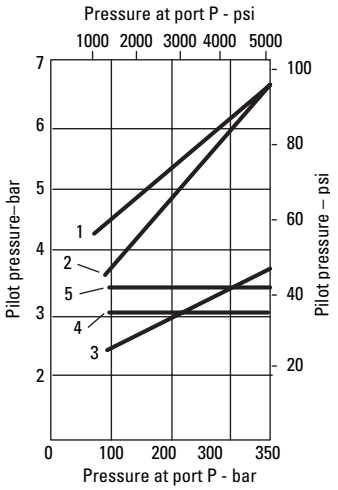
Performance data

DG3V-3-*A(L)

II-B

Pilot pressure requirements

The spools require the minimum pilot pressures shown in the graph below to overcome the spring force and any flow forces. Some spools are limited by the ability to spring return the valve. Minimum pilot pressure required at a flow rate of 20 l/min (5.5 USgpm):

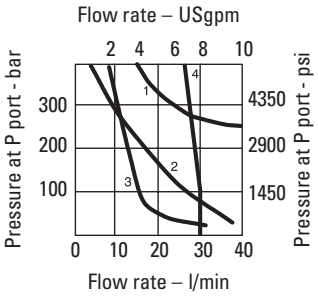


Spool/Spring	Curve
0A(L)	1
0C	3
0F(L)	3
2A(L)	1
2C	1
2F(L)	4
6A(L)	1
6C	1
6F(L)	4
22A	5
33C	2

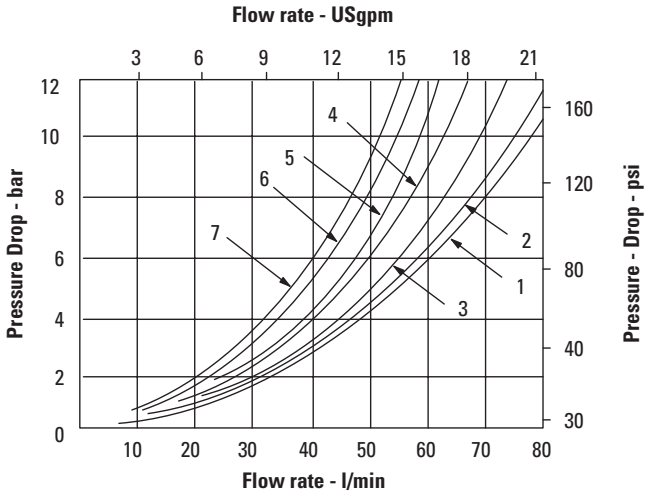
Maximum flow rates

Some spools are limited in the conditions they will operate without reliability problems. These are the single ended spools which must operate within limits outlined in the graph below.

Spool malfunction limits



Pressure drop curves



Pressure drop characteristics

The pressure drop curves give approximate pressure drop ΔP when passing 21 cSt (100 SUS) fluid(s) having .87 specific gravity. For any other viscosity the pressure drop ΔP will change as follows:

cSt (SUS)	14 (75)	32 (150)	43 (200)	54 (250)	65 (300)	76 (350)	86 (400)
% of ΔP (Approx.)	93	111	119	126	132	137	141

For any other specific gravity (G1)* the pressure drop P will be approximately: ΔP1 = ΔP(G1/G)

* Specific gravity of fluid may be obtained from its producer. Fire-resistant fluids have higher specific ravities than oil.

Spool/spring	Curve
0A(L)	1
2A(L)	2
6A(L)	3
22A(L)	4

Note: For spool types 3 and 6; not recommended for flows in excess of 60 l/min (15.8 USgpm).

Spool/ Spring	P to A	A to T	P to B	A to T	P to T	Max flow l/min (USgpm) @ 350 bar (5000 psi)
0	4	2	4	2	4 ▼	38 (10)
0A	5	2	5	2	4 ▼	■
0B, 0C, 0F	4	2	4	2	4	38 (10)
0N	3	7	3	7	4 ▼	38 (10)
2	5	2	5	2	–	38 (10)
2A	6	5	6	5	–	■
2B, 2C, 2F	5	2	5	2	–	38 (10)
2N	6	3	6	3	–	38 (10)
3B, 3C, 3F	6	3	6	1	–	38 (10)
6	6	1	6	1	–	38 (10)
6A	5	7	5	7	–	■
6B, 6C, 6F	6	1	6	1	–	38 (10)
6N	7	1	7	1	–	38 (10)
22A	6	–	6	–	–	■
33B, 33C, 33F	5	2	5	2	▲	38 (10)

▲ Type "33" spool at center will pass approx. 20 l/min (5.3 USgpm) at 124 bar (1800 psi) pressure drop from port A or B (the other being plugged) to T.

▼ Transient condition.

■ See graph above, Max. Flow Rates.

The pressure drop curves give approximate pressure drop ΔP when passing 36 cSt (100 SUS) fluid(s) having .87 specific gravity.

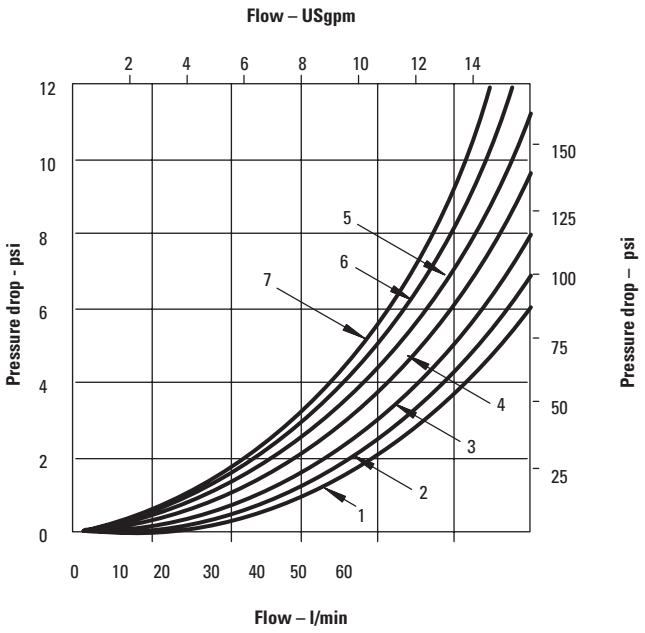
For any other viscosity the pressure drop ΔP will change as follows:

Viscosity

cSt (SUS)	14 (75)	32 (150)	43 (200)	54 (250)	65 (300)	76 (350)	86 (400)
% of ΔP (Approx.)	93	111	119	126	132	137	141

For any other specific gravity (G_1)* the pressure drop ΔP will be approximately: $\Delta P_1 = \Delta P\ (G_1 / G)$

* Specific gravity of fluid may be obtained from its producer.



DG17V-3-**-60		Pressure drop curve reference chart P→A	B→T	P→B	A→T	P→T @center	Maximum flow @ 350 bar (5000 psi)
	"0C"	4	2	4	2	4	75 l/min (20 USgpm)
	"2C"	5	2	5	2	—	
	"6C"	6	1	6	1	—	
	"7C"	4	3	4	3	—	
	"33C"	5	2	5	2	**	
	"0A"	5	2	5	2	—	
	"2A"	6	5	6	5	—	
	"6A"	5	7	5	7	—	
	"22A"	6	—	6	—	—	55 l/min (15 USgpm)
	"0N"	4	2	4	2	4	75 l/min (20 USgpm)
	"2N"	5	2	5	2	—	
	"6N"	6	1	6	1	—	55 l/min (15 USgpm)
	"7N"	4	3	4	3	—	38 l/min (10 USgpm)
	"33N"	5	2	5	2	**	

**Note type "33" spool at center will pass approximately 20 l/min. (5.3 USgpm) at 124 bar (1798 psi) inlet pressure.

Performance data

DG20/21V-3

II-B

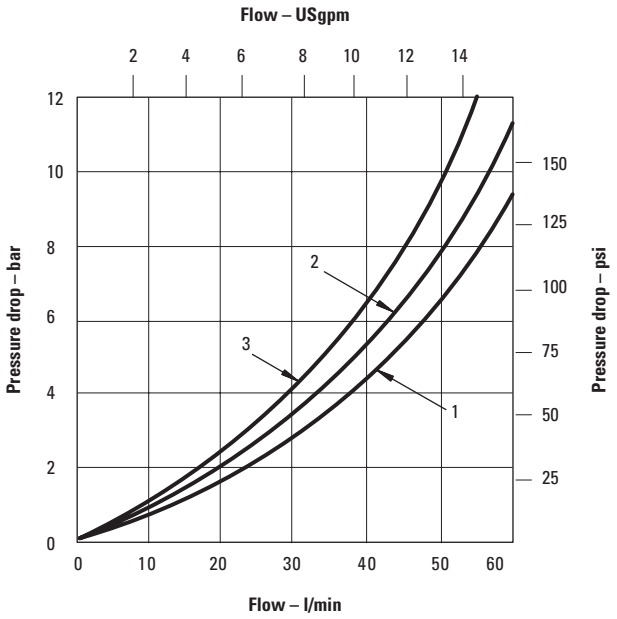
The pressure drop curves give approximate pressure drop ΔP when passing 36 cSt (100 SUS) fluid(s) having .87 specific gravity.

For any other viscosity the pressure drop ΔP will change as follows:

cSt (SUS)	14 (75)	32 (150)	43 (200)	54 (250)	65 (300)	76 (350)	86 (400)
% of ΔP (Approx.)	93	111	119	126	132	137	141

For any other specific gravity (G_1)* the pressure drop ΔP will be approximately: $\Delta P_1 = \Delta P (G_1 / G)$)

* Specific gravity of fluid may be obtained from its producer.



		Pressure drop curve – reference chart					
DG20/21V-3-**-60		P→A	B→T	P→B	A→T	P→T @center	Maximum flow @ 350 bar (5000 psi)
	"0C"	2	2	2	2	2	75 l/min (20 USgpm)
	"2C"	2	3	2	3	—	
	"6C"	3	1	3	1	—	
	"33C"	2	2	2	2	**	38 l/min (10 USgpm)
	"0A"	2	2	2	2	—	
	"2A"	2	3	2	3	—	
	"33A"	2	2	2	2	—	19 l/min (5 USgpm)
	"6A"	3	1	3	1	—	

**Note type “33” spool at center will pass approximately 20 l/min. (5.3 USgpm) at 124 bar (1798 psi) inlet pressure..

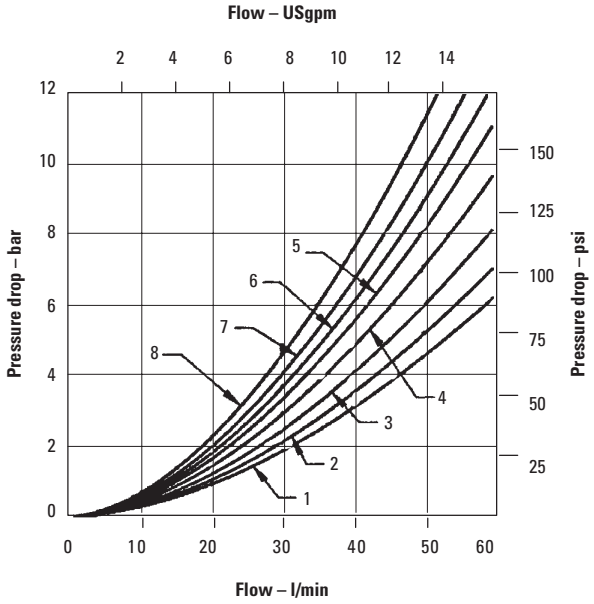
DG18V-3-**-60		Maximum flow without malfunction @350 bar (5000 psi) in l/min (USgpm)							
Valve type		"0"	"1"	"2"	"3"	"6"	"7"	"8"	"33"
	"22A"	—	—	15 (4)	—	—	—	—	—
	"*A"	57 (15)	—	57 (15)	—	30 (8)	26 (7)	—	—
	"*B"	76 (20)	19 (5)	57 (15)	76* (20)	26 (7)	57 (15)	38 (10)	57* (15)
	"*C"	76 (20)	19 (5)	57 (15)	76* (20)	26 (7)	57 (15)	38 (10)	57* (15)
	"*F"	76 (20)	19 (5)	57 (15)	76* 20)	26 (7)	57 (15)	—	57* (15)
	"*N"	53 (14)	76 (20)	45 (12)	—	—	—	—	—

**Note type "33" spool at center will pass approximately 20 l/min. (5.3 USgpm) at 124 bar (1798 psi) inlet pressure.

Pressure drop curve reference chart

Spool type	P→A	B→T	P→B	A→T	P→T @center
"0B" "0C"	4	2	4	2	4
"1B" "1C"	5	3	5	3	6
"2B" "2C"	5	2	5	2	-
"3B" "3C"	6	3	6	1	-
"6B" "6C"	6	1	6	1	-
	4	3	4	3	-
"8B" "8C"	6	4	6	4	8
"33B" "33C"	6	2	5	2	**
"0A"	5	2	5	2	—
"2A"	6	5	6	5	—
"6A"	5	7	5	7	—
"22A"	6	—	6	—	—
"0N"	3	7	3	7	—
"2N"	6	3	6	3	—
"6N"	7	1	7	1	—

** NOTE: Type "33" spool at center, will approximately pass 20 l/min. (5.3 USgpm) at 124 bar (1798 psi) inlet pressure.



The pressure drop curves give approximate pressure drop ΔP when passing 36 cSt (100 SUS) fluid(s) having a specific gravity. of .87.

For any other viscosity the pressure drop ΔP will change as follows:

Viscosity

cSt (SUS)	14 (75)	32 (150)	43 (200)	54 (250)	65 (300)	76 (350)	86 (400)
% of ΔP (Approx.)	93	111	119	126	132	137	141

For any other specific gravity (G_1)* the pressure drop ΔP will be approximately: $\Delta P_1 = \Delta P\ (G_1 / G)$

* Specific gravity of fluid may be obtained from its producer.

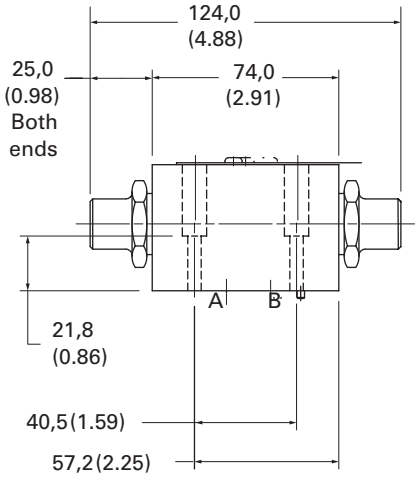
Installation dimensions

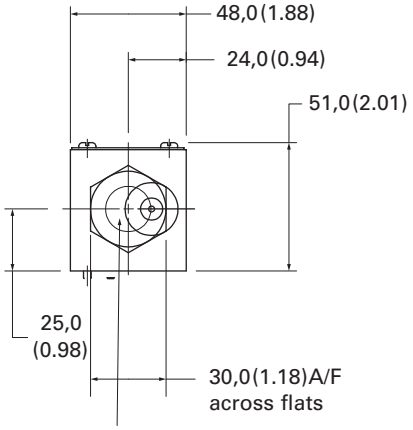
DG3V-3-*-60

DG3V-3-*-60 Hydraulic operated

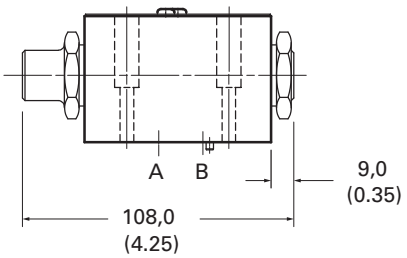
II-B

Millimeters (inches)

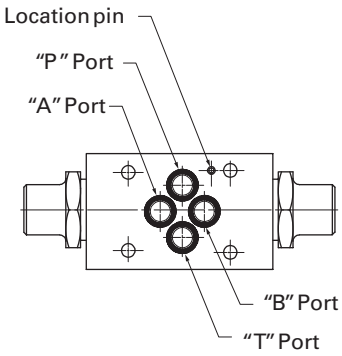




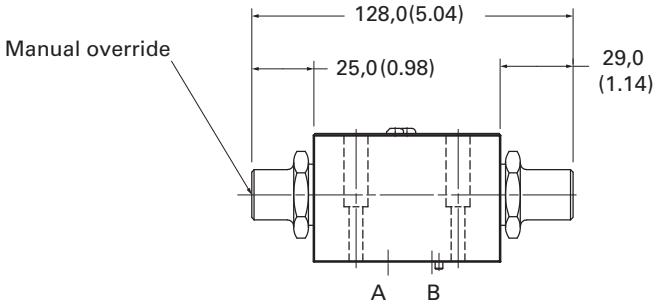
Pilot/drain connection
B – G1/8 thread
S –SAE straight thread
(7/16"- 20 UNF)



DG3V-3-**A–T–7–*–60
DG3V-3-**B–T–7–*–60
DG3V-3-**F –T–7–*–60



DG3V-3-**(L) – 7 – * – 60
DG3V-3-**A(L)– 7 – * – 60
DG3V-3-**B(L) – 7 – * – 60
DG3V-3-**C – 7 – * – 60
DG3V-3-**N – 7 – * – 60

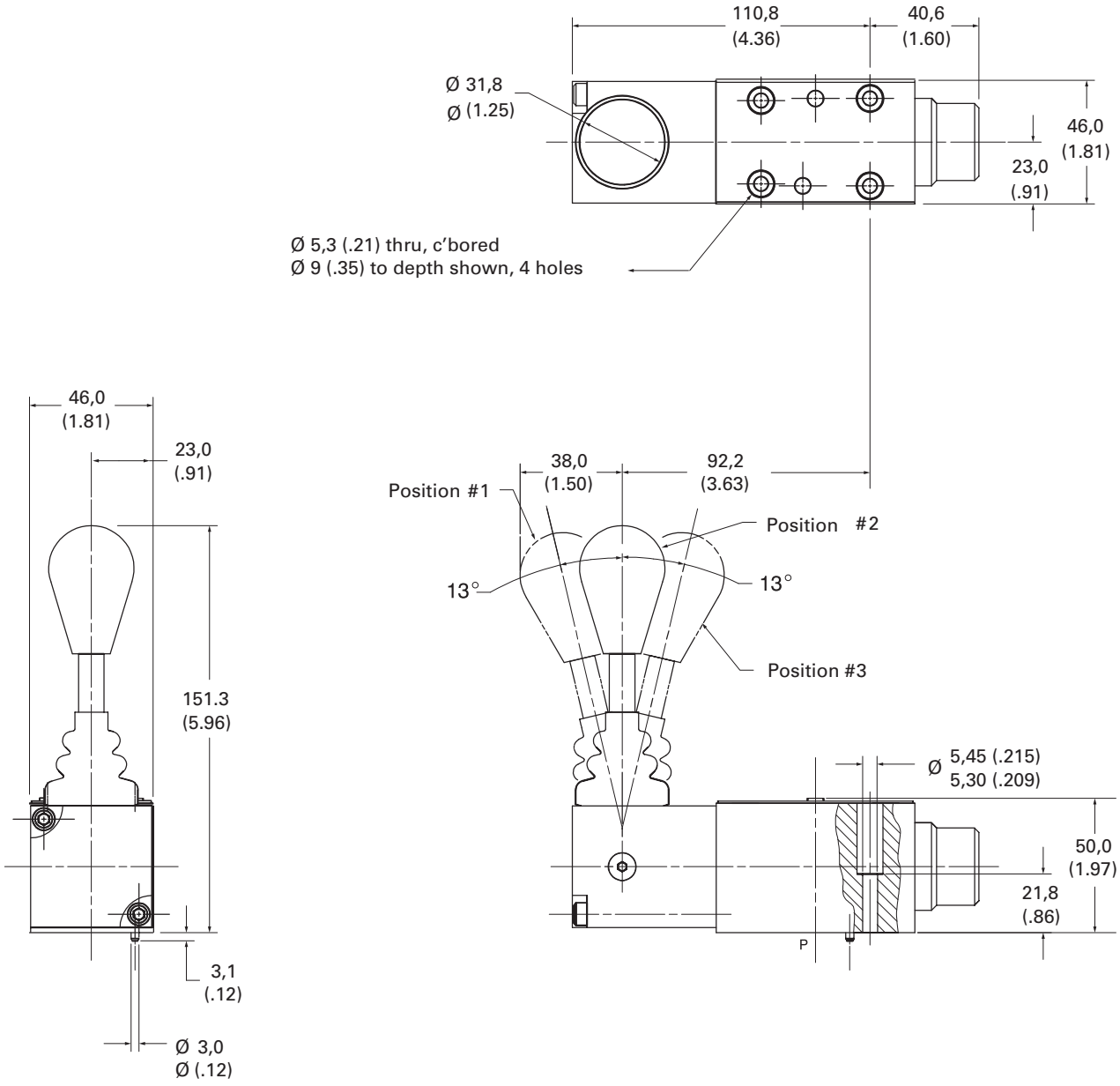


DG3V-3-**A –T–P1 –7–*–60
DG3V-3-**B –T–P1 –7–*–60
DG3V-3-**F –T–P1 –7–*–60

II-B

DG17V-3-*-60 Lever operated

Millimeters (inches)



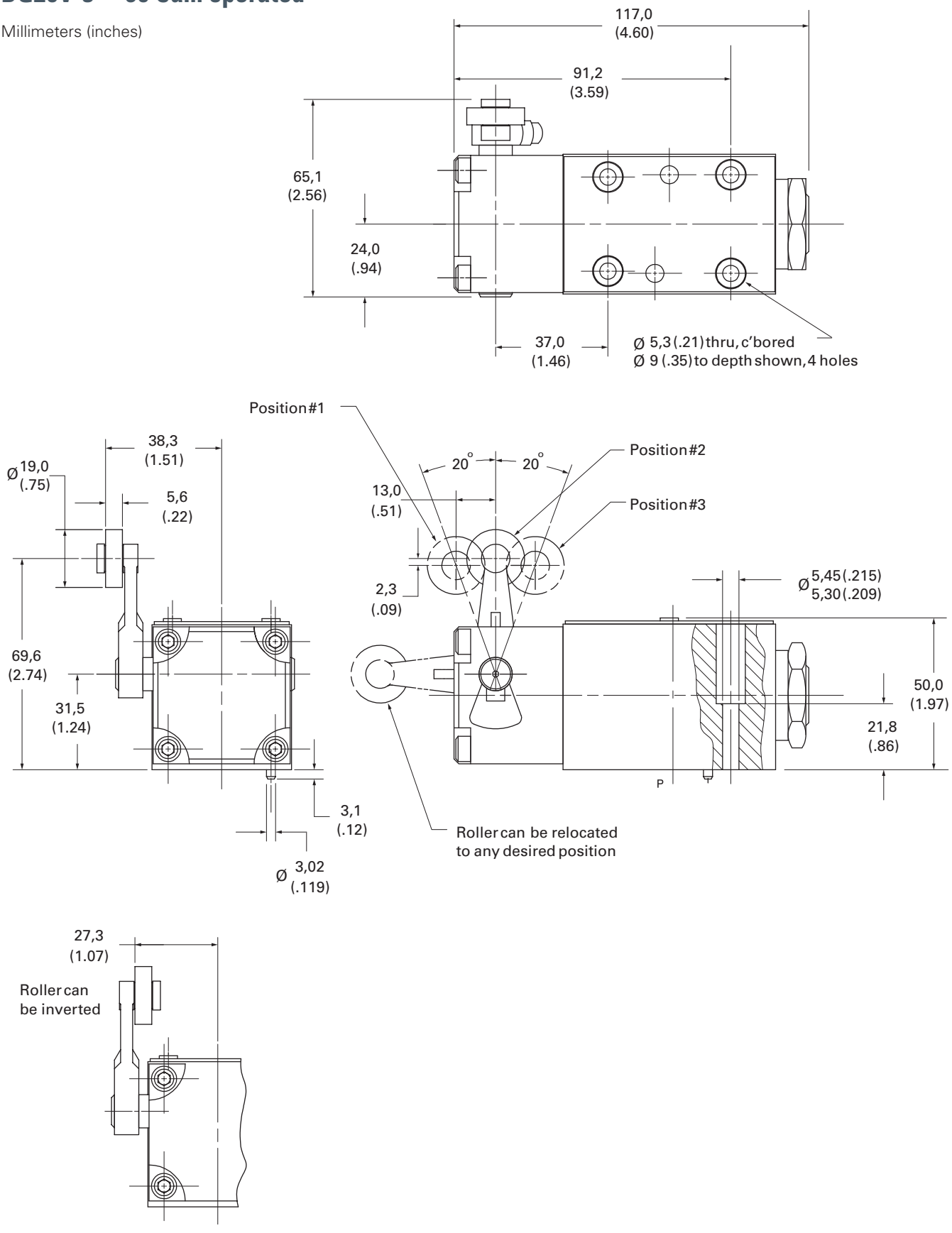
Installation dimensions

DG20V-3-*-60

DG20V-3-*-60 Cam operated

II-B

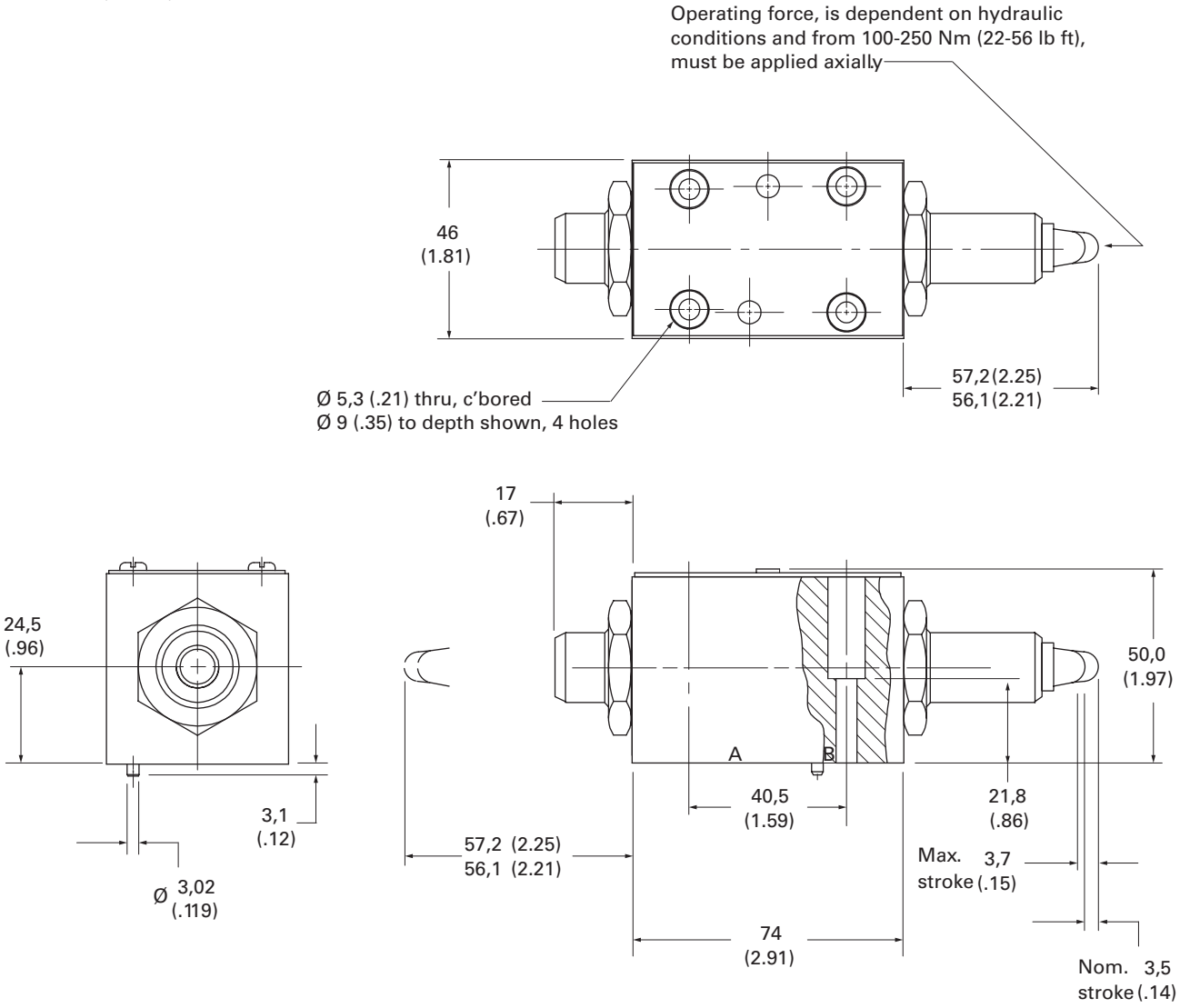
Millimeters (inches)



II-B

DG21V-3-A(L)-2-60 Plunger operated

Millimeters (inches)



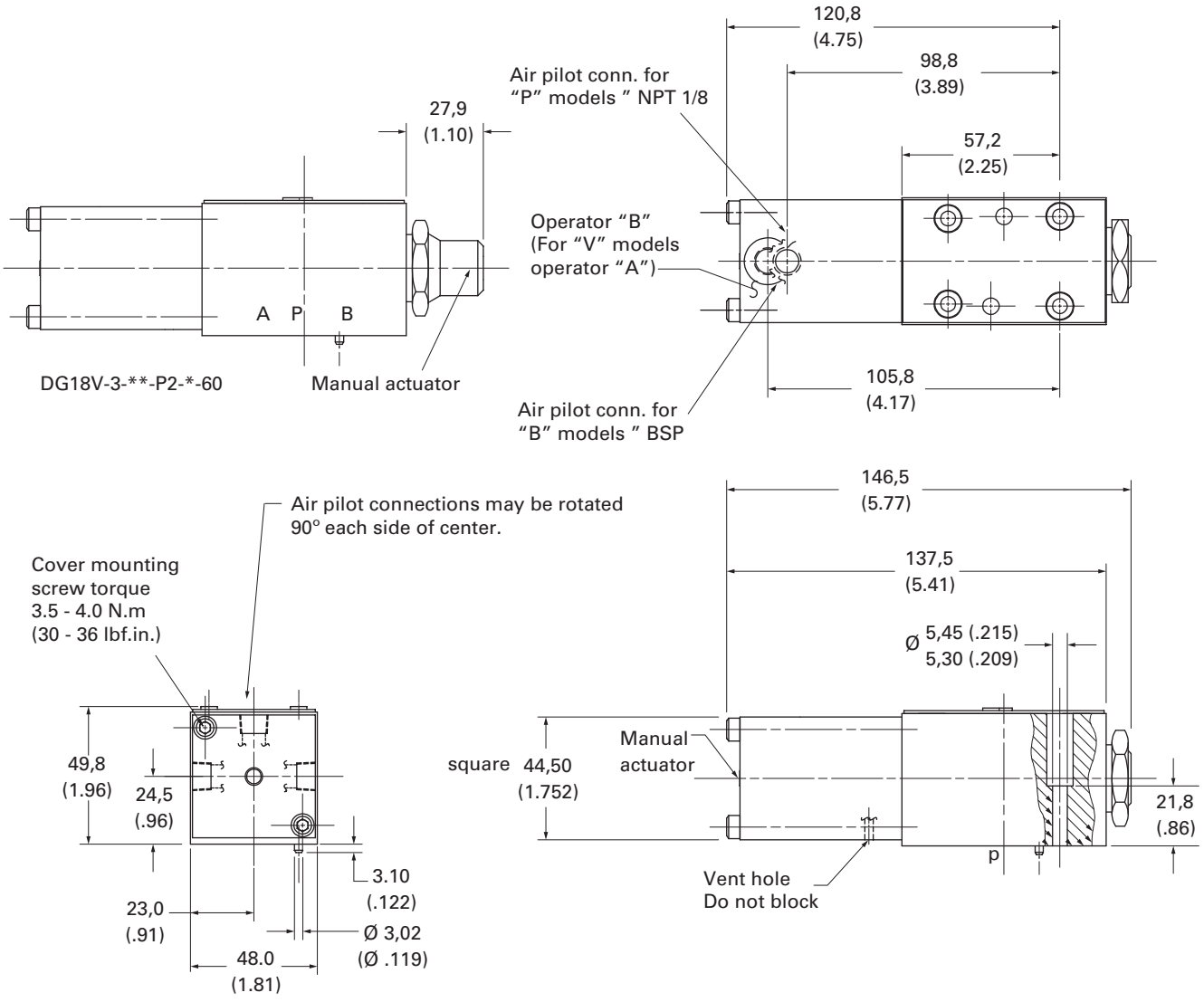
Installation dimensions

DG18V-3-*-60

DG18V-3-*-60 Air operated

II-B

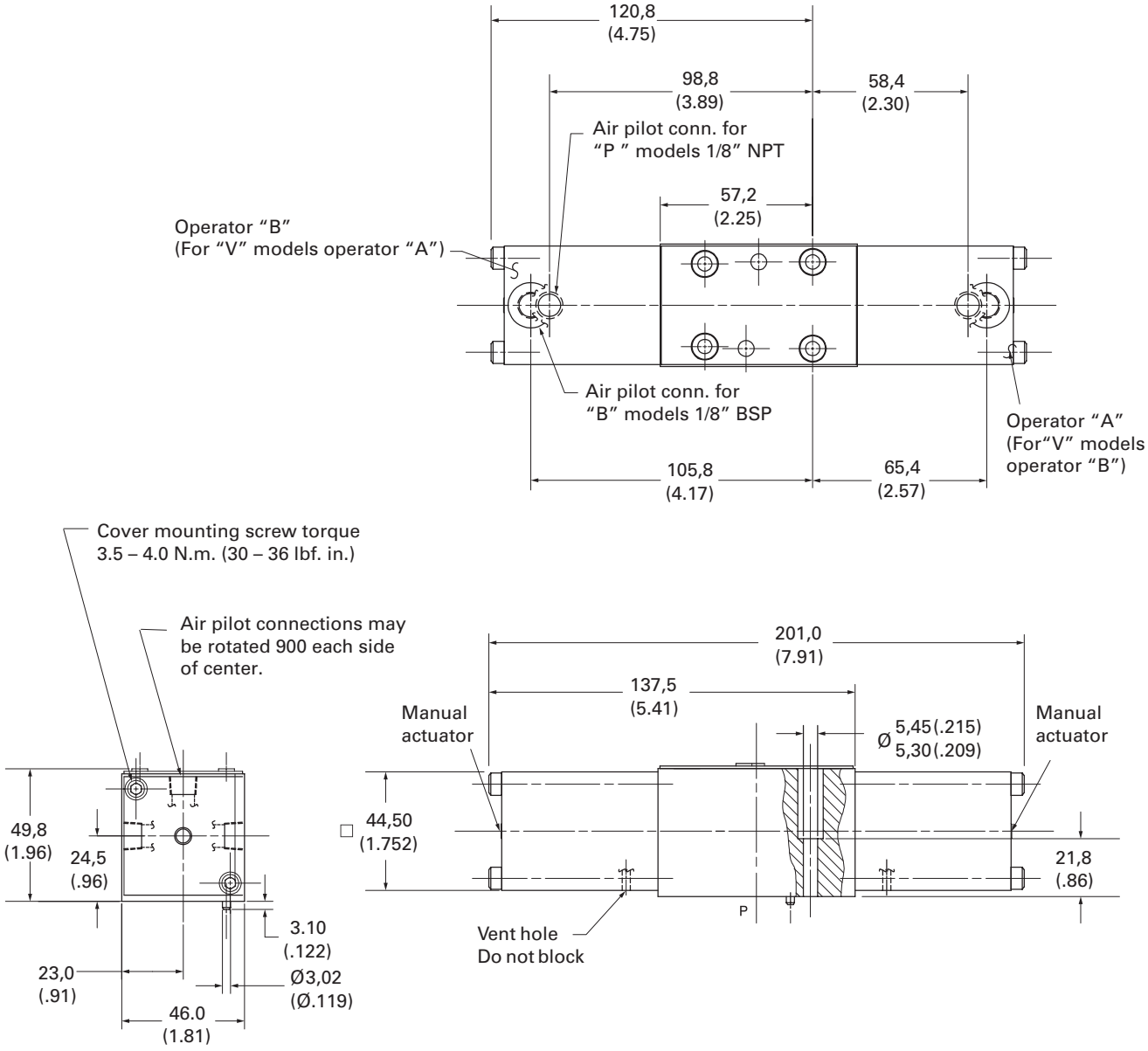
Millimeters (inches)



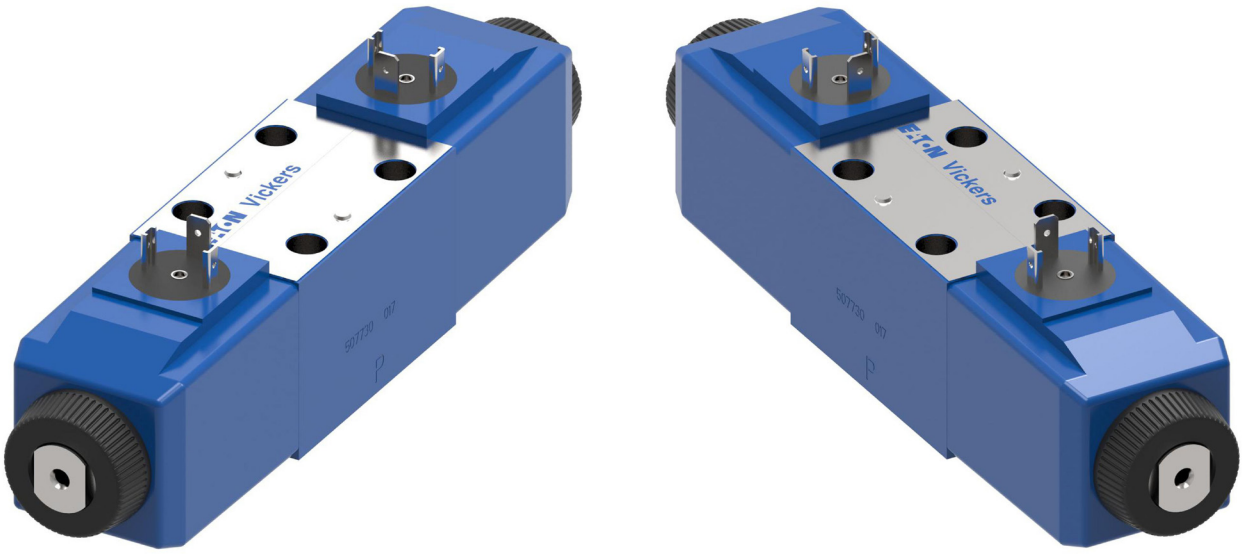
II-B

DG18V-3-*-60 Air operated

Millimeters (inches)



ISSO4401 size 03; ANSI/B93.7M-D03
Solenoid operated directional valve
DG4V-3-60 Design



General description

Solenoid operated directional control valves are for directing and stopping flow at any point in a hydraulic system.

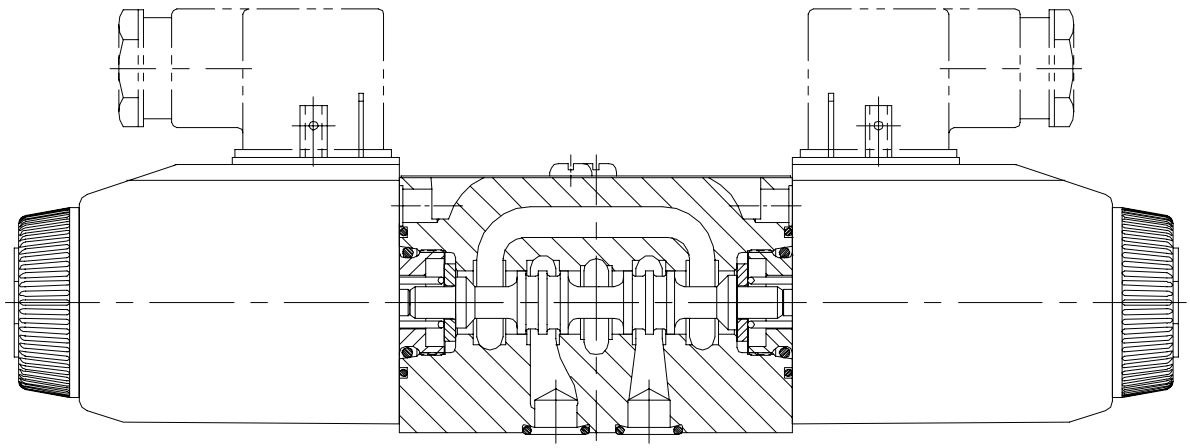
- Efficient control of greater hydraulic powers without increasing solenoid power consumption.
- Installed cost and space savings from higher power/weight-and-size ratios.
- Installation flexibility resulting from choice of numerous combinations of solenoid connectors and locations.
- Viton seals as standard for multi-fluid capability. Nitrile seals available as a model code option.
- Higher sustained machine productivity and higher uptime because of proven fatigue life and endurance, tested over 20 million cycles.
- Solenoid coils can be changed quickly and easily without leakage from hydraulic system.
- Compact, cost effective system design when used with Eaton® SystemStak™ valves and subplates.

DG4V-3-S/R - High performance and standard performance valves

- Minimum pressure drop 2.5 bar at 30 l/min
- Range of coil connectors including DIN, Deutsch, AMP and terminal box
- Range of coil voltages and power options
- Up to 80 l/min (21 USgpm) and up to 40 l/min (10.5 USgpm) respectively at 350 bar (5000 psi).
- Offers designers the opportunity to select the optimum value package for each application.
- International standard interface. The valve mounting face conforms to ISO 4401, size 03 and is compatible with related international standards.

Bolt kit and seal kit:

- Interface Seal Kit number 02-147573
- Full Seal Kit part number for DG4V-3 with U or KU coils 858995
- Full Seal Kit part number for DG4V-3 with Flying lead F coils 858995
- Bolt Kit number616452 (Metric) and 590716 (Inches)



Model code

**	DG4V—3	(*)	-	**	*(L)	-	(**)	-	(V)	M	-	(S*)	-	****	D*	(L)	-	*	*	-	6*	-	(EN***)
1	2	3		4	5		6		7	8		9		10	11	12		13	14		15		16

1 Seal type

Blank	Viton
F6	Buna Nitrile/High CAN

2 Model series

4 –	Solenoid operated
V –	Pressure rating 350 bar (5000 psi) on P, A & B ports
3 –	ISO4401 Size 03

3 Performance

Blank	High performance
S	Standard performance

4 Spool type

Please refer functional symbols on Page 37 for spool types.

5 Spool spring arrangement

A	Spring offset, end-to-end
AL	Same as "A" but left hand build
B	Spring offset, end to center
BL	Same as "B" but left hand build
C	Spring centered
N	No-spring detented

6 Manual override option

Blank	Plain override(s) in solenoid end(s) only ▲
H	Water-resistant override(s) on solenoid end(s) ▲
Z	No overrides at either end
W	Twist and lock override in solenoid ends•
▲	No override in non-solenoid end of single solenoid valves
•	DC high performance only

7 Solenoid Energization identity

Blank	None
V	Solenoid "A" is at port "A" end and/ or solenoid "B" is at port "B" end, independent of spool type
Note:	Used to select the identification of the solenoid. Refer to table on page 36.

8 Flag symbol

M	Electrical options and features

9 Spool indicator switch

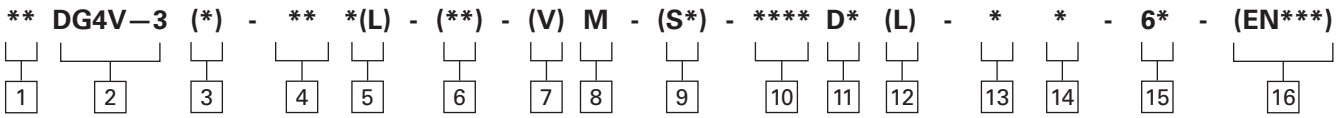
S3	Switch, wired normally open
S4	Switch, wired normally closed
S7	Spool position monitoring switch. Single solenoid valves only.
Note	Refer page 38 and 42 for further details

10 Coil type

U	ISO4400, DIN43650 connector
U1	ISO4400 fitted with PG11 plug
KU	Top exit flying lead (150mm)
KUP4	Junior timer (Amp) connector
KUP5	Integral Deutsch connector
FPM4	4-Pin micro - (12mm) brad Harrison connector
KUPM4L	Integral M12, 4-Pin connector
FW	Flying lead with 1/2" NPT thread wiring housing
FTW	Fly. Lead wired terminal block & 1/2" NPT thread wiring housing
FPA3W	Fly. Lead, 3 Pin connector & 1/2" NPT thread wiring housing
FPA5W	Fly. Lead, 5 pin connector & 1/2" NPT thread wiring housing
KUP6	Flying lead external to coil with Deutsch connector
KUP7	Packard connector pins (male)
KUP8	Special packard connector pins with seals (female)
X5	Atex approved coil, 'd' type ▲
	▲ Also CSA and UL approved

11 Solenoid indicator lights

Blank	None
L	Solenoid indicator lights ▲
	▲ Flying lead coil type only



12 **Surge suppressor/ damper**

D1	Diode positive bias
D2	Negative bias
D7	Transorb type
	See Page 45 for circuit details

13 **Coil rating**

B	110V AC 50Hz/120V AC 60 Hz
D	220V AC 50 Hz/240V AC 60 Hz
DS	28V DC 30 watt
G	12V DC
GL	–12V DC
H	24V DC
HL	24V DC
HM	24V DC 8 watt
	*HM COIL IS DG4V-3-R Standard performance with 8 Watt coil

14 **Tank pressure rating**

	Refer to "Operating Data" for port T pressure ratings.
4	70 bar (1000 psi) ▲
5	100 bar (1500 psi) for standard performance models, DG4V-3S, with AC or DC solenoids.
6	207 bar (3000 psi) for AC high performance models, DG4V-3, including spool position indicator type S6.
7	207 bar (3000 psi) for DC high performance models, DG4V-3, including spool position indicator type S6.
8	160 bar (2300 psi) for AC high performance models with lower tank port rating.
	▲ X5 coil type only

15 **Design number**

60	Basic design
61	Type 8 spool

16 **Special features**

"EN*"**	Code number assigned as required.
EN21	CSA approved models with 1/2" NPT entry conduit box, type FW and solenoid coil letter B,D,G, or H.
EN38	Low leakage version. Typical leakage 5ml/min/land at 100 bar.
Note:	EN38 valve spools have additional overlap and resulting 2X pressure drop compared to standard valve spools.

Functional symbols

Spool options

The valve function schematics apply to both U.S. and European valves

II-B

DG4V-3(S)-*NV

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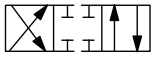

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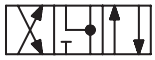

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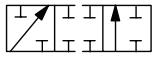

DG4V-3(S)-*AV

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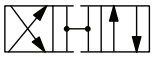

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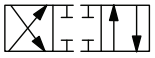

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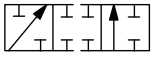

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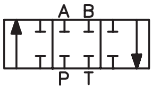

DG4V-3(S)-*ALV

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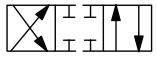

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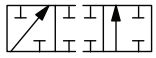

DG4V-3(S)-*CV

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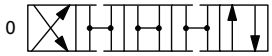

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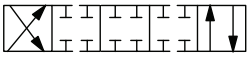

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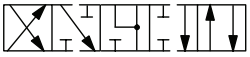

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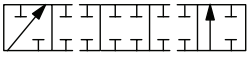

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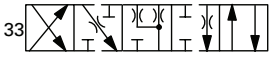

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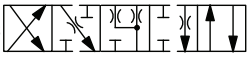

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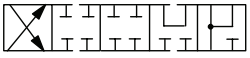

DG4V-3(S)-*BV

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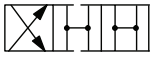

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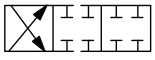

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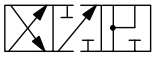

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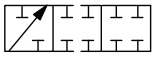

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DG4V-3(S)-*BLV

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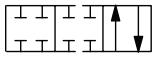

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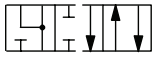

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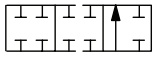

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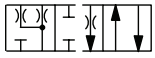

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DG4V-3(S)-8CV

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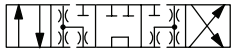

DG4V-3(S)-8BLV

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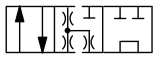

DG4V-3(S)-8BV

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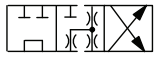
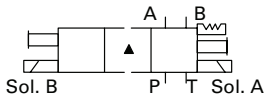
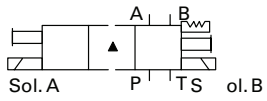
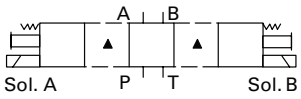
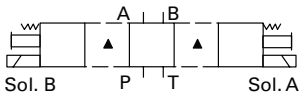
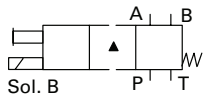
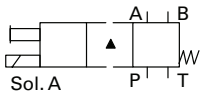
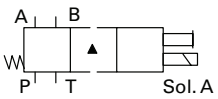
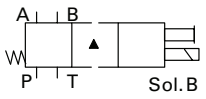


Solenoid identified to US and European standards

	U.S. Solenoid standard	European solenoid standard (specify "V" in the model code at position 7 on page 34)
Double solenoid valves, two position, detented		
Double solenoid valves, spring centered		
Single solenoid valves, solenoid at port A end		
Single solenoid valves, solenoid at port B end		

▲ Transient condition only

*Other spool types on request

Feature	DG4V-3	DG4V-3S	DG4V-3R
Pressure limits P, A and B ports	350 bar (5075 psi)	350 bar (5075 psi) ■	350 bar (5075 psi)
T port:	210 bar (3045 psi)	100 bar (1450 psi)	210 bar (3045 psi)
Flow rating	See performance data	See performance data	See performance data
Relative duty factor	Continuous; ED = 100%	Continuous; ED = 100%	Continuous; ED = 100%
Type of protection: ISO 4400 coils with plug fitted correctly	IEC 144 class IP65	IEC 144 class IP65	IEC 144 class IP65
Coil winding	Class H	Class H	Class H
Lead wires (coils type F***)	Class H	Class H	Class H
Coil encapsulation	Class F	Class F	Class F
Maximum	Permissable voltage fluctuation: Refer to temperature limits. Refer to temperature limits. Refer to Temperature Limits		
Minimum	90% rated	90% rated	90% rated
Typical response times at 100% rated volts measured from application/removal of voltage to full spool displacement of "2C" spool at:			
Flow rate P-A, B-T	40 l/min (10.6 USgpm)	20 l/min (5.3 USgpm)	20 l/min (5.3 Usgpm)
Pressure	175 bar (2537 psi)	175 bar (2537 psi)	175 bar (2527 PSI)
AC (~) energizing	15 ms	18 ms	18 ms
AC (~) de–energizing	23 ms	32 ms	32 ms
DC (=) energizing	45 ms	60 ms	60 ms
DC (=) de–energizing	28 ms	40 ms	40 ms

Power consumption, AC solenoids (for coils listed in model code).	Initial VA (RMS) ▲	Holding VA (RMS)	Initial VA (RMS) ▲	Holding VA (RMS)	Initial VA (RMS)	Holding VA (RMS)
Full power coils:						
Dual frequency coils at 50 Hz	265	49	280	61	N/A	
Dual frequency coils at 60 HZ	260	48	300	58	N/A	
Low power coils, "BL" and "DL": (Not available with "N" – No-spring detented models)	Low power coils not usable with DG4V-3S valves.		170	37	N/A	
Dual frequency coils at 50 Hz	–	–	190	37	N/A	
Dual frequency coils at 60 Hz	–	–	–	–	N/A	
Power consumption, DC solenoids at rated voltage and 20 C (68 F).						
Full power coils:						
12V, model type "G"	30W	–	30W	–	N/A	
24V, model type "H"	30W	–	30W	–	N/A	
Low power coils:						
12V, model type "GL"	Low power coils not usable with DG4V-3S valves.		–	18W	N/A	
24V, model type "HL"			18W	–	N/A	
24V, HM Coil			8W	–	N/A	

■ For applications where valves are to remain pressurized (either energized or de-energized) at pressures over 210 bar (3045 psi) without frequent switching, it is recommended to use the high performance model, DG4V-3.

▲ 1st half cycle; armature fully retracted.

Spool position indicator modes

Spool/spring arrangement types 0A, 0B, 2A, 2B, 22A, 23A, 35A, 52B, 3B, 6B

Input:	
Supply Voltage	20-32 VDC
Reverse Pol. Protection	Yes
	Outputs with alternating function - PNP
Output:	
Max output load	<=400mA ; Duty Ratio 100%
Short Circuit Protection	Yes
Hysteresis	<=0.05mm
Electrical connector	M12x1 4-Pole
Thermal shift	<=±0.1mm
Plug connections:	
Pin 1	+ Supply
Pin 2	Normal Closed
Pin 3	0V
Pin 4	Normal Open
EMC	Protection DIN EN 61000-6-1/2/3/4, Aug 2002
Humidity	0-95% rel. (nach DIN 40040)
Protection Class	IP65 DIN 40050
Vibration 0-500Hz	Max. 20g
Shock	Max. 50g

• Factory setting ensures this condition under all combinations of manufacturing tolerance and of temperature drift (see "Temperature Limits") .

DC model type "S7"

CE

This product has been designed and tested to meet specific standards outlined in the European Electromagnetic Compatibility Directive (EMC) 2004/108/EC. For instructions on installation requirements to achieve effective protection levels see this leaflet and the Installation Wiring Practices for Vickers Electronic Products leaflet 2468. Wiring practices relevant to this Directive are indicated by ⚠ Electromagnetic Compatibility (EMC).

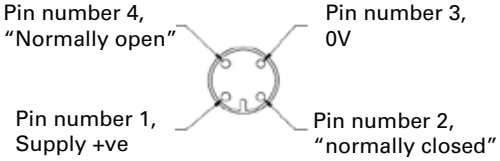
⚠ WARNING

Electromagnetic Compatibility (EMC)

It is necessary to ensure that the unit is wired up in accordance with the connection arrangements shown above. For effective protection the user's electrical cabinet, the valve subplate or manifold and the cable screens should be connected to efficient ground points. 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.

Wiring Connections

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

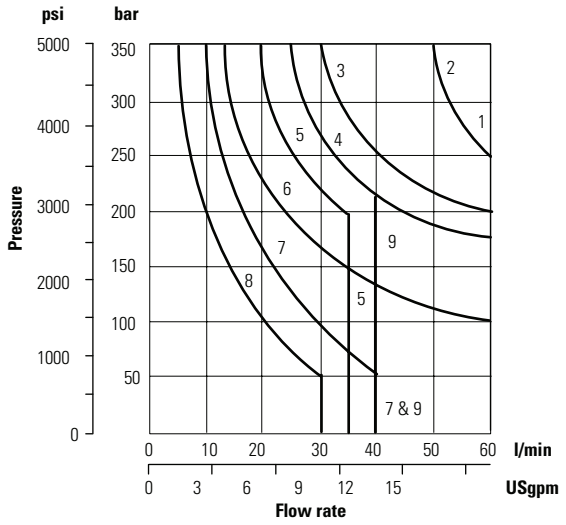


MI2 4 pin connector details

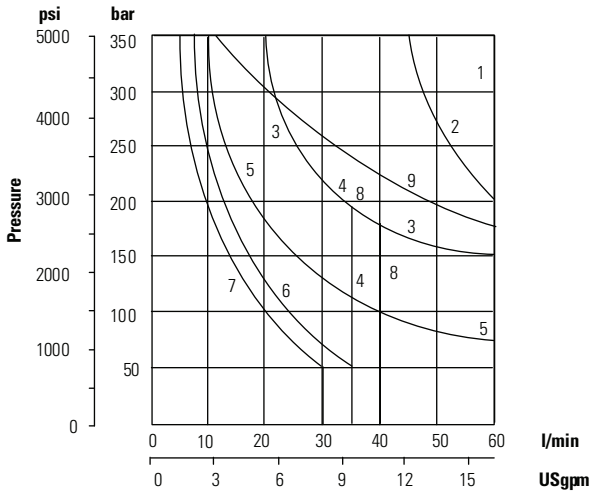
Customer's protective ground connection

DG4V-3 models (high performance)

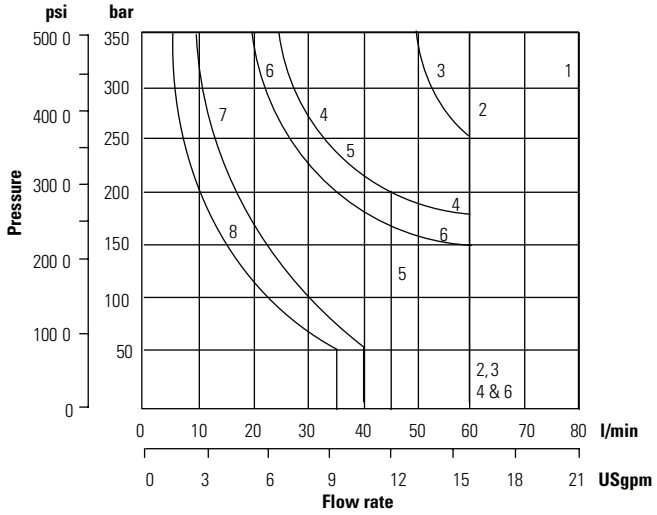
Graph 1
AC solenoid valves operating at 50 Hz



Graph 2
AC solenoid valves operating at 60 Hz



Graph 3
DC solenoid valves



Spool / spring code	Graph 1 curve	Graph 2 curve	Graph 3 curve
0A(L)	2	2	3
0B(L) & 0C	1	1	2
2A(L)	2	2	3
2B(L) & 2C	1	1	1
2N	1	1	2
6B(L) & 6C	6	5	6
8B(L) & 8C	5 ▲	4 ▲	5 ▲
22A(L)	8	7	8
22B(L) & 22C	7	6	7
33B(L) & 33C	4	3	4
52BL, 52C	6	5	6
521B	6	5	6

▲ Consult Eaton regarding each application that will jointly have flow rates approaching this curve and a pressurized volume exceeding 2000 cm3 (122 cu.in.)

II-B

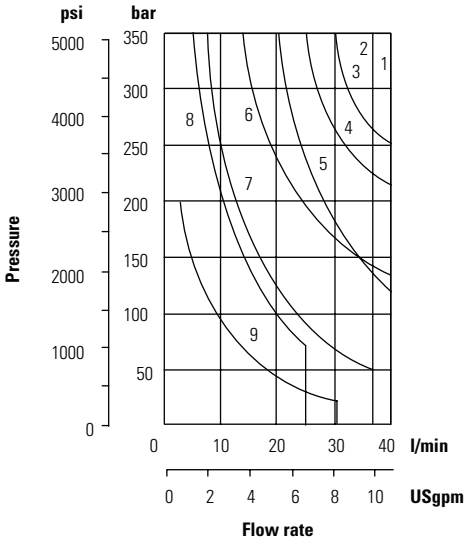
DG4V-3S models (standard performance)

Typical with mineral oil at 36 cSt (168.6 SUS) and a specific gravity of 0.87.

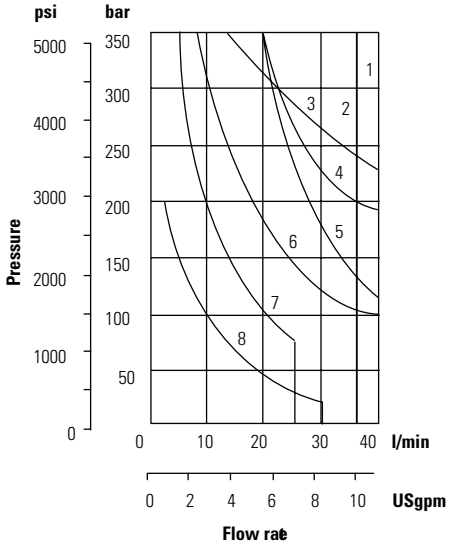
Maximum flow rates

Performance based on full power solenoid coils wand operating at 90% rated voltage. See note at bottom of next page when using low power coils (DG4V-3 models only.)

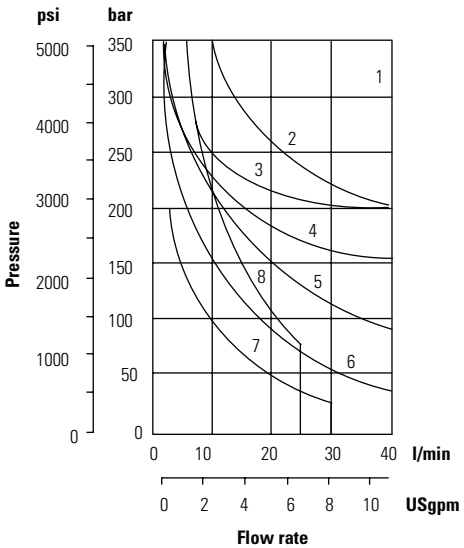
Graph 4
AC solenoid valves operating at 50 Hz



Graph 5
AC solenoid valves operating at 60 Hz



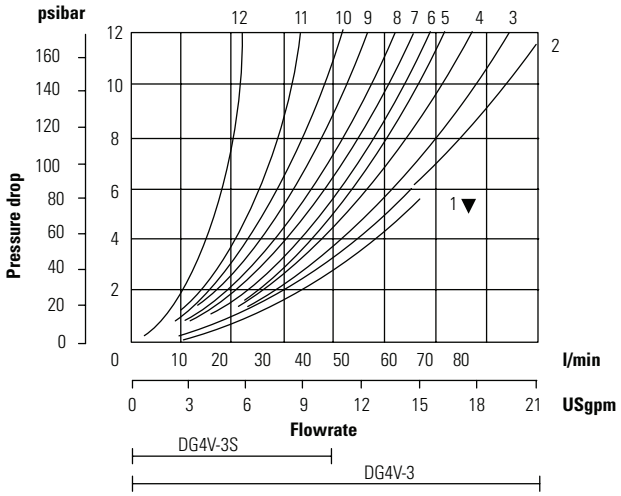
Graph 6
DC solenoid valves

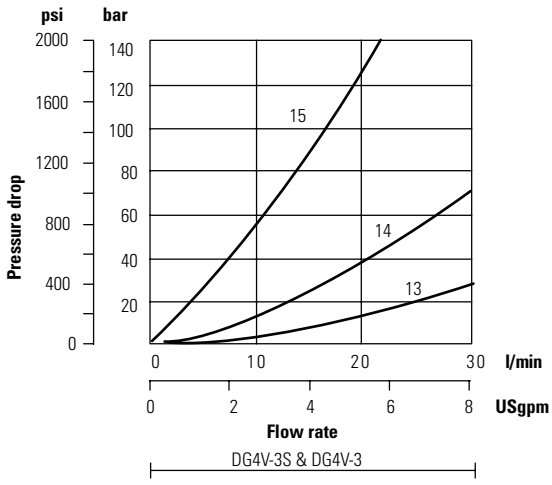


Spool / spring code	Graph 1 curve	Graph 2 curve	Graph 3 curve
0A(L)	1	1	3
0B(L) & 0C	1	1	1
2A(L)	5	5	3
2B(L) & 2C	2	2	3
2N	1	1	1
6B(L) & 6C	6	6	5
8B(L) & 8C	8 ▲	7 ▲	8 ▲
22A(L)	9	8	7
22B(L) & 22C	7	7	6
33B(L) & 33C	4	4	4
52BL, 52C	6	6	5
521B	6	6	5

▲ Consult Eaton regarding each application that will jointly have flow rates approaching this curve and a pressurized volume exceeding 2000 cm3 (122 cu.in.)

Pressure drops





▼Curve for spool type 6: not recommended for flows in excess of 60 l/min (15.8 USgpm).

Pressure drops in offset positions except where otherwise indicated

Spool / spring code	Spool positions covered	P to A	P to B	A to T	B to T	P to T	B to A or A to B
0A(L)	Both	5	5	2	2	-	-
0B(L) & 0C	De-energized	-	-	-	-	4 ▲ Δ	-
	Energized	4	4	2	2	-	-
2A(L)	Both	6	6	5	5	-	-
2B(L) & 2C	Energized	5	5	2	2	-	-
2N	Both	6	6	3	3	-	-
6B(L) & 6C	De-energized	-	-	3 ▲	3 Δ	-	-
	Energized	6	6	1	1	-	-
	Energized	4	4	3 ▲	3	-	-
8B(L) & 8C	All	9	9	5	5	3	-
22A(L), 22B(L) & 22C	All	6	6	-	-	-	-
33B(L) & 33C	De-energized	-	-	15 ▲	15 Δ	-	-
	Energized	5	5	2	2	-	-
52BL & 52C	Energized	6 ▲	6 Δ	2	-	-	10 ❍
	Energized	6 ▲	6 Δ	2	-	-	10 ❍
521B	All	6 ▲	6 Δ	-	-	-	10 ❍
	De-energized	-	-	10 ▲	11 Δ	-	10 ❍
	Energized	6	6 Δ	-	-	-	10 ❍

▲B" plugged Δ "A" plugged ❍ "P" plugged

Viscosity cSt (SUS)

14 (71.75)	20 (97.8)	43 (200)	54 (251)	65 (302)	76 (352)	85 (399)
% of ΔP (Approx.)						
81	88	104	111	116	120	124

For other viscosities, pressure drops approximate to:

A change to another specific gravity will yield an approximately proportional change in pressure drop. The specific gravity of a fluid may be obtained from its producer. Fire resistant fluids usually have higher specific gravities than oil.

Models for use with ISO 4400 (DIN 43650) connectors

II-B

Double solenoid models

DG4V-3(S)-*C-**-(V)M-U-**-60
DG4V-3(S)-*N-**-(V)M-U -**-60

Single solenoid models

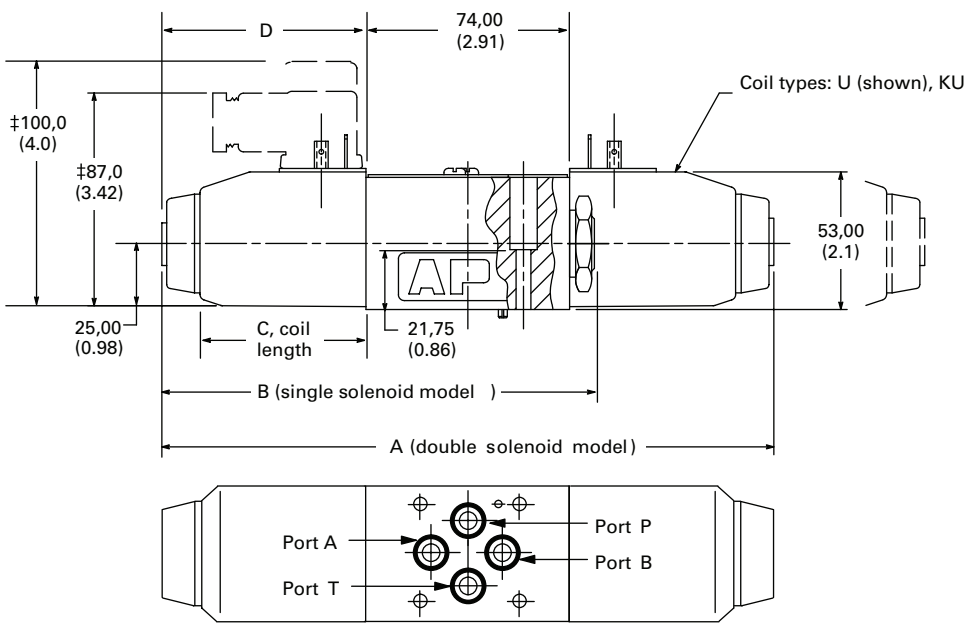
DG4V-3(S)-*A(-**) ■
DG4V-3(S)-*B(-**) ■
DG4V-3(S)-8BL(-**)

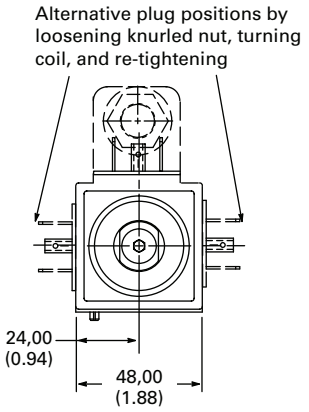
As shown

DG4V-3(S)-*AL(-**)
DG4V-3(S)-*BL(-**)
DG4V-3(S)-8B(-**)

Solenoid and end cap interchanged

3rd angle projection





■ Not applicable to type "8" spool.

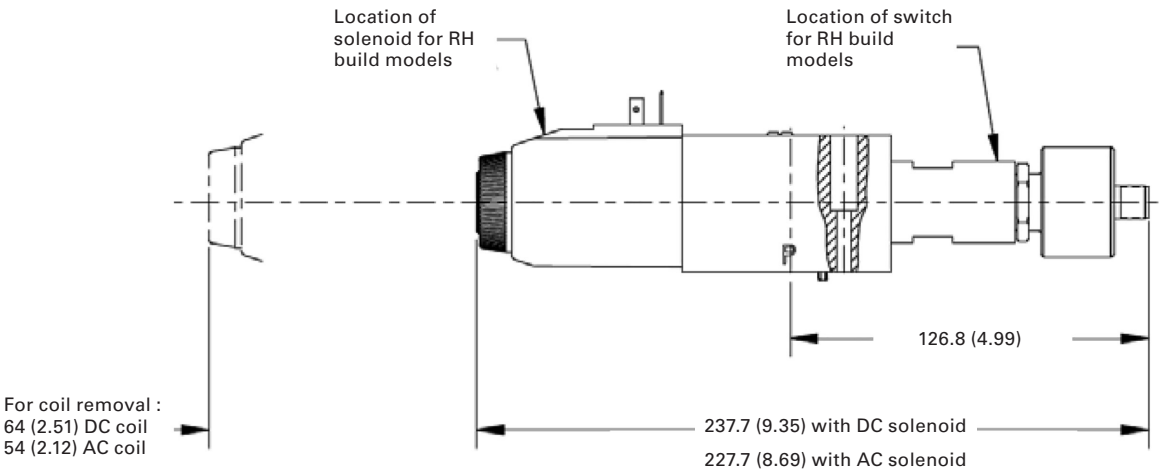
‡ Can vary dependent on source of plug.

Dimensions in mm (in).

Model type	AC or DC	A Dim.	B Dim.	C Dim.	D Dim.
All	DC =	220 (8.66)	156 (6.14)	61 (2.5)	73 (2.87)
DG4V-3	AC ~	200 (7.87)	146 (5.75)	51 (2.1)	63 (2.48)
DG4V-3S	AC ~	200 (7.87)	146 (5.75)	45 (1.7)	63 (2.48)

DG4V-3-*-A/B(L)-(V)M-S7-U-**--60

Single solenoid models with Inductive type switch indicating when the spool is in the spring off-set position. Refer Page 38 connection to switch.



Models with “F” type coils (lead wires) and conduit box.

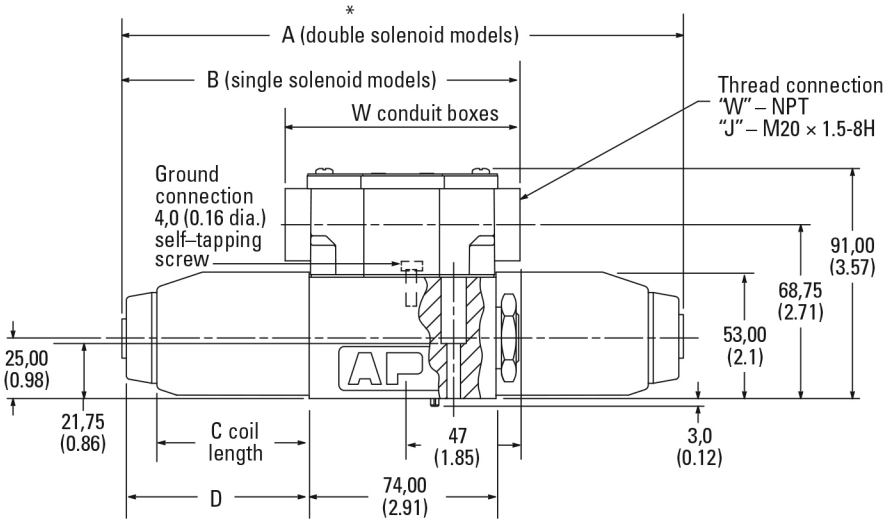
Double solenoid models
DG4V-3(S)-*C-**-(V)M-F-**-60
DG4V-3(S)-*N-**-(V)M-F-**-60

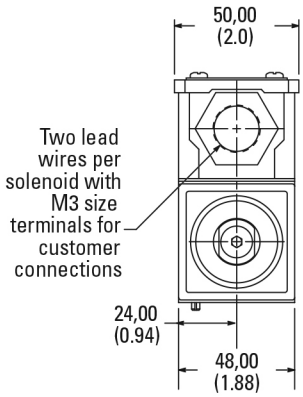
Single solenoid models
DG4V-3(S)-*A(-**)•
DG4V-3(S)-*B(-**)•
DG4V-3(S)-8BL(-**)

As shown

Single solenoid models
DG4V-3(S)-*AL(-**)•
DG4V-3(S)-*BL(-**)•
DG4V-3(S)-8B(-**)

Solenoid and end cap interchanged





* 89 (3.5) for FPB – W conduit boxes
104 (4.0) All plug-in conduit boxes

Dimensions in mm(in).

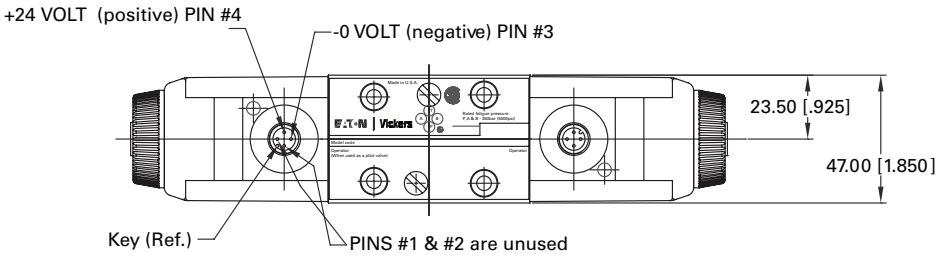
Model type	AC or DC	A Dim.	B Dim.	C Dim.	D Dim.
All	DC =	220 (8.66)	156,5 (6.14)	61 (2.5)	73 (2.87)
DG4V-3	AC ~	200 (7.87)	146,5 (5.75)	51 (2.1)	63 (2.48)
DG4V-3S	AC ~	200 (7.87)	146,5 (5.75)	45 (1.7)	63 (2.48)

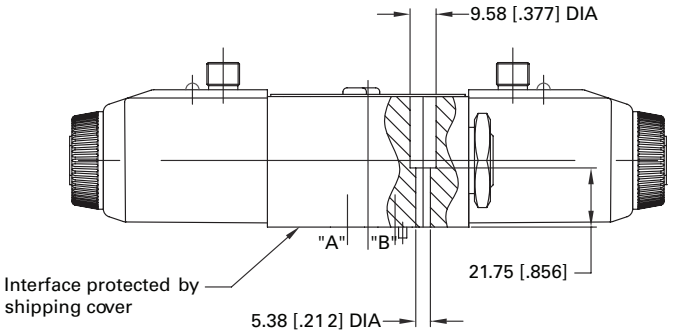
Codes FJ” and “FW”: 2 lead wires for each solenoid, approximately 150,00 (6.00) long. M3 (#6) terminals provided for customer connection.

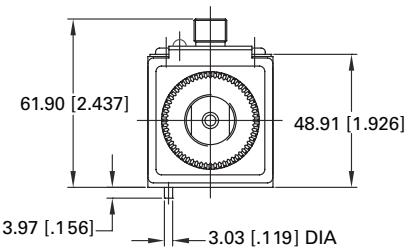
Codes “FTJ” and “FTW”: Valve supplied with lead wires connected into terminal strip suitable for M3 (#6) terminals for customer connection.

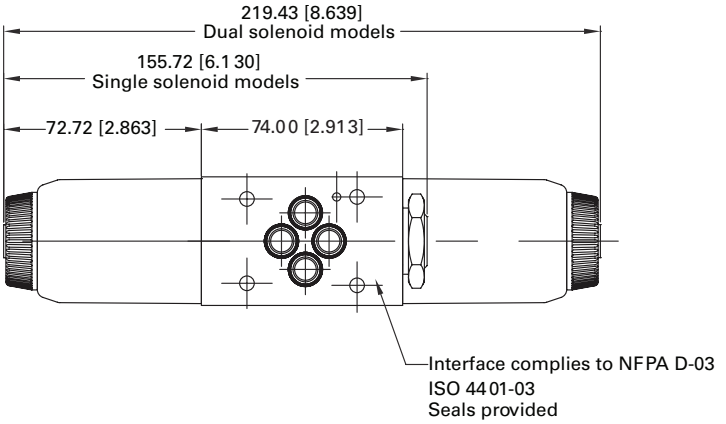
Installation dimension

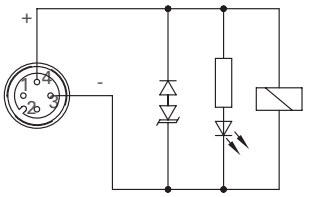
M12 Connector type





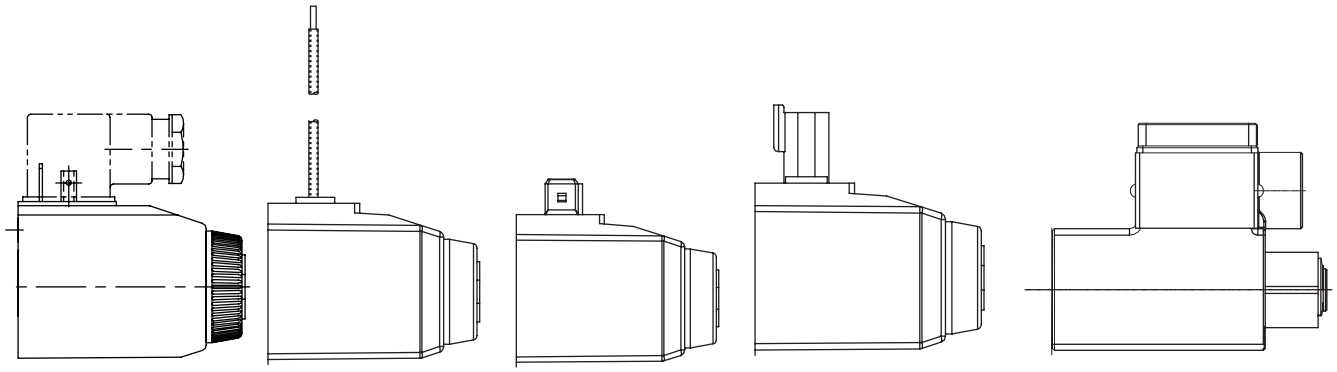






Electrical Schematic

U/U1/U6 KU KUP4 KUP5 X5



Top exit flying lead | Junior timer AMP | Deutsh | Explosion Proof

DIN 43650 Connector

Cable diameter range: Ø6–10 mm (0.24–0.40 in)

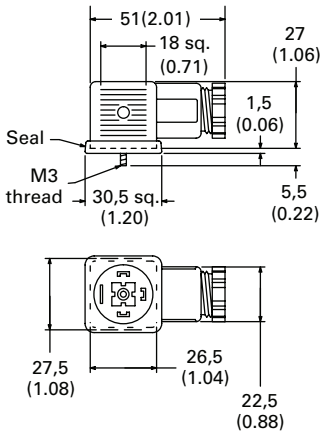
Wire section range: Ø,5–1,5 mm2 (0.0008–0.0023 in2)

Terminals: Screw type

Type of protection: IEC144 class IP65, when plugs are fitted correctly to the valves with interface seals (supplied with plugs) in place.

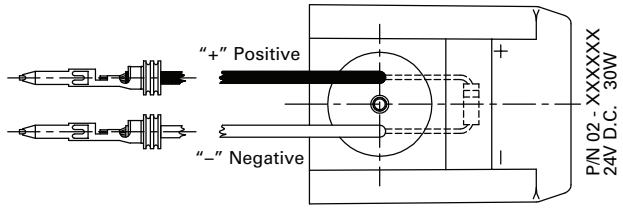
Connector can be positioned at 90° intervals on valve by re-assembling contact holder into appropriate position inside connector housing.

Connectors with and without indicator lights are available (order separately).



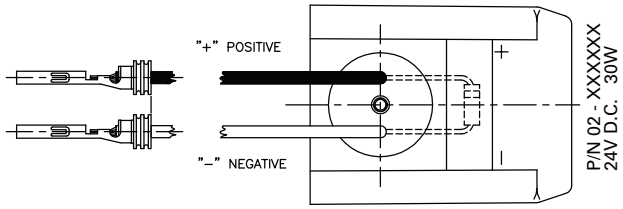
KUP 7

Packard connector pins - Male



KUP 8

Special packard connector pins with seals - Female



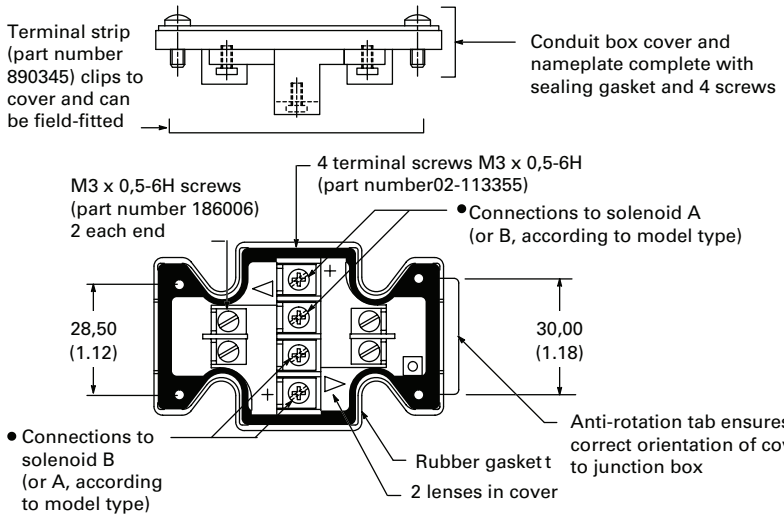
Terminal strip and lights

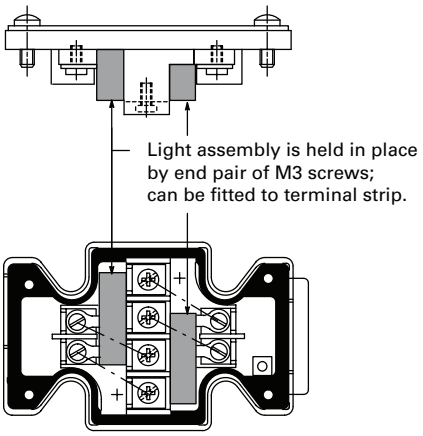
II-B

For valves with type "F" coils.

a. For DC coils the +ve lead(s) must be connected to the terminal(s) marked +. When using 3-wire incoming leads to double solenoid valves (i.e. common neutral) the inner pair of terminals must be interconnected.

b. For correct light indication of energized solenoid ensure that solenoid leads are correctly connected: light terminals are common with each outer pair of solenoid terminals according to the side with + mark.



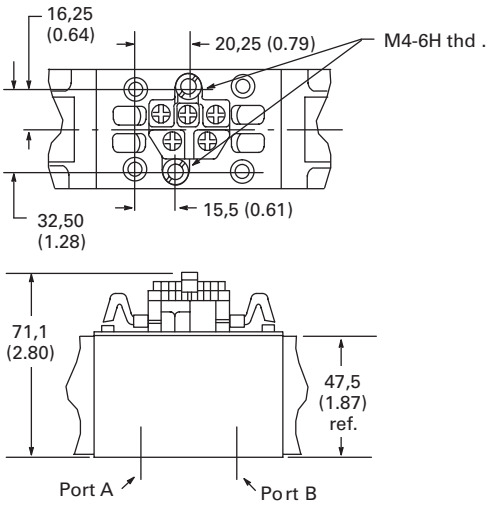


Insta-Plug

DG4V-3(S)---FPA---60

Eaton 2-part "Insta-Plug" eliminates breaking electrical inputs for valve disconnect. A male half is pre-wired to the valve body. The mating plug is inside a wire housing with external terminals for machine wire connections. Captive thumb screws, when loosened, permit the wire housing to be pulled clear of the valve for disconnect. A longer ground post provides first make/last break ground connection.

PA configuration



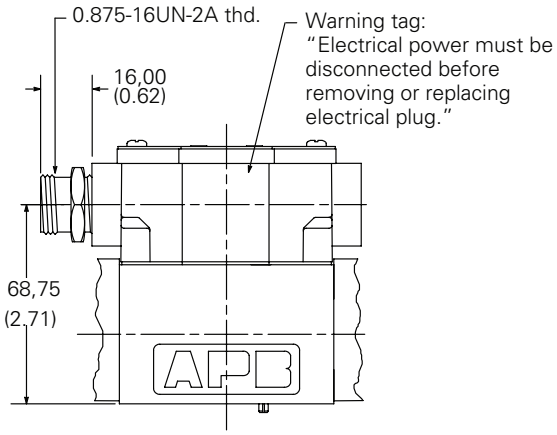
NFPA Connector T3.5.29-1980

DG4V-3(S)–FPA3W(L)-**-60

DG4V-3(S)–FPA5W(L)-**-60

The receptacle is a standard three or five pole connector with shortened leads and terminals added. The five pole plug has four leads 101,6 (4.0) long and one 177,8 (7.0) long. The three pole plug has two leads 101,6 (4.0) long and one 177,8 (7.0). All wires have underwriters recognized non-solder insulated eyelet terminals. The green wire is used for the ground (earth) connection (No. 8 screw furnished). Valves are supplied pre-wired.

Connection details and model type/model code references

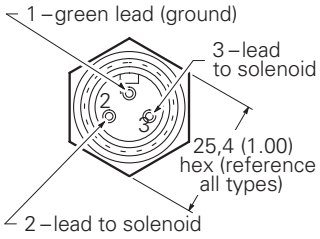


3 pin connector

Use with single solenoid valve Key model code designations:

DG4V-3(S)-*A(L)(-**)-(V) MFPA3W(L)

DG4V-3(S)-*B(L)(-**)-(V) MFPA3W(L)

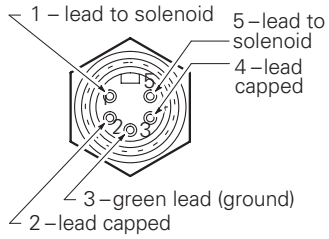


5 pin connector

Use with single solenoid valve Key model code designations:

DG4V-3(S)-*A(L)(-**)-(V) MFPA5W(L)

DG4V-3(S)-*B(L)(-**)-(V) MFPA5W(L)



Surge suppression devices (for DC valves) Standard diode (D1), (D2)

Diode in parallel with coil, positive bias. When switch (S1) is opened, the energy stored in the coil is trapped and dissipated by the diode (D1), (D2).

- Works only with DC voltage
- Polarity dependent
- Increase drop out time

Surge suppression devices (for DC valves) Standard diode (D2)

Diode in parallel with coil, negative bias. When switch (S1) is opened, the energy stored in the coil is trapped and dissipated by the diode (D2).

- Works only with DC voltage
- Polarity dependent
- Increase drop out time

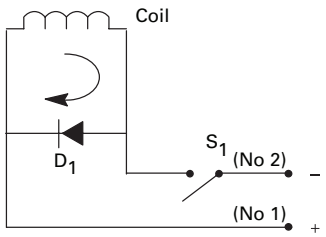
Transzorb (D7)

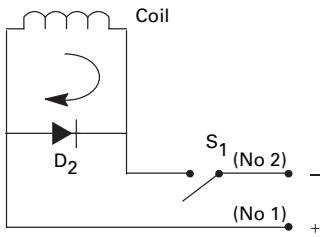
Diode and Zener diode in parallel with coil. When switch (S1) is opened, the energy stored in the coil is trapped and dissipated by the diode (D1) and Zener diode (Z1) and the coil resistance.

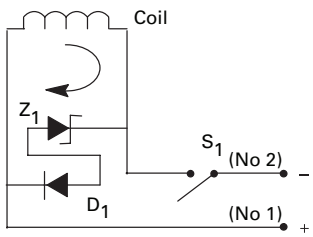
- The Zener makes exact limitation of inductive spikes.
- Works only with DC
- Polarity dependent

Valve shift and dropout times with and without surge suppression

Shift	Dropout	
CETOP 3		
Do Diode	23	60
Diode Alone	23	131
Diode/Zener	23	78







Note: These surge suppression devices are "Polarity Dependent." Proper biasing conditions must be met when installing/connecting a coil in a system. Times represent cessation/application of voltage to coil versus velocity (start/stop) of a cylinder using a single solenoid, spring offset valve (time in milliseconds).

ISSO4401 Size 03; ANSI/B93.7M-D03
Solenoid operated directional valve
DG4V-3-60 Design (Soft Shift Design)

General description

These solenoid operated directional control valves are for directing and stopping flow at any point in a hydraulic system. The soft shift feature is designed to provide smoother control of actuator acceleration and deceleration than is possible with conventional solenoid valves. The result is minimum hydraulic shock, more reliable systems with longer component life and less downtime.

There are 2 options for the soft shift feature:

a. Variable orifice design where you can use an optimized damping orifice tuned to suit your application.

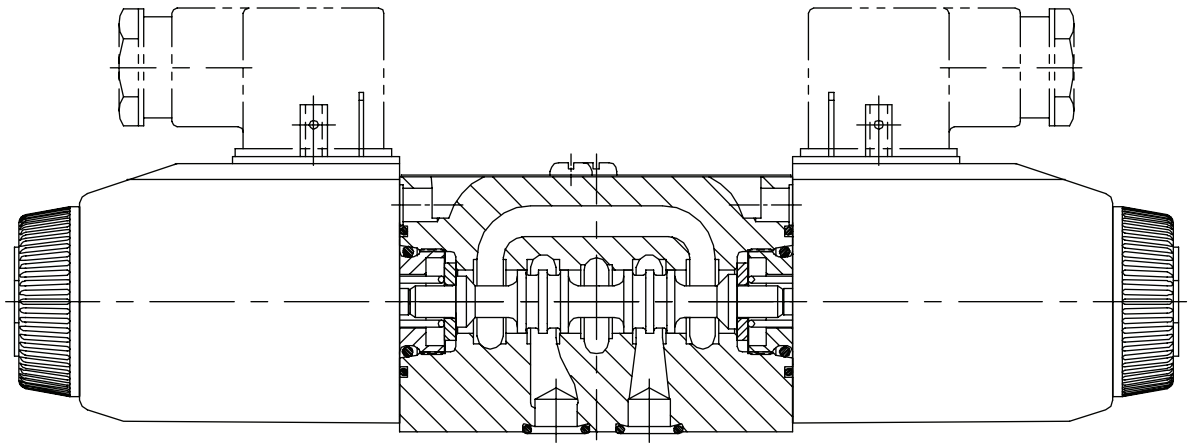
b. A fixed orifice design, which is non-serviceable and cannot be tuned.

Features & benefits

- Milled metering notches on the spool enable precise control of flow rate change as the spool is shifted.
- A "P12L"- model offers a junction box with rectifier, lights and plug-in coils for quick and easy solenoid changing without removing the valve from the machine.

Bolt kit and Seal kit:

- Interface Seal Kit number 02-147573
- Full seal kit part number for DG4V-3 with U or KU coils 858995
- Full seal kit part number for DG4V-3 with Flying lead F coils 858995
- Bolt kit number616452 (Metric) and 590716 (Inches)



Model code

DG4V-3 Soft Shift Model Series

II-B

*	DG4V-3	(*)	-	*	*(L)	*	-	**	(**)	-	(V)	M	-	****	D*	(L)	*	*	-	60
1	2	3		4	5	6		7	8		9	10		11	12	13	14	15		16

1 Seal type

Blank	Viton
F6	Buna Nitrile/High CAN

2 Valve type

4	Solenoid operated
V	Pressure rating 350 bar(5000 psi) on P, A & B ports
3	ISO4401 Size 03

3 Performance

Blank	High performance
S	Standard performance

4 Spool type

Please refer functional symbols on Page 52 for spool types.

5 Spool spring arrangement

A	Spring offset, end-to-end
AL	Same as "A" but left hand build
B	Spring offset, end to center
BL	Same as "B" but left hand build
C	Spring centered
N	No Spring Detent

6 Orifice type

2	Variable type
3	Optimized Fixed type ▲

▲ High performance only

7 Soft shift orifice size

07	0.7 mm dia

*Minimum Orifice Size recommended for high performance type "8C" spool

8 Manual override

Blank	Override in solenoid end only
H	Water-resistant override(s) on solenoid end(s) No override in non-solenoid end of single solenoid valves

9 Solenoid energization identity

Blank	None
V	Solenoid "A" is at port "A" end and/ or solenoid "B" is at port "B" end, independent of spool type
Note:	Used to select the identification of the solenoid. Refer to table on page 52.

10 Flag symbol

M	Electrical options and features

11 Coil type

U	ISO4400, DIN43650 connector
U1	ISO4400 fitted with PG11 plug
U6	ISO4400 with fitted DIN plug with lights
KU	Top exit flying lead (150mm)
KUP4	Junior timer (Amp) connector
KUP5	Integral Deutsch connector n
FW	Flying lead with 1/2" NPT thread wiring housing
FTW	Fly. lead wired terminal block & 1/2" NPT thread
	Wiring housing
FPA3W	Fly. lead, 3 Pin connector & 1/2" NPT thread
	Wiring housing
FPA5W	Fly. lead, 5 pin connector & 1/2" NPT thread
	Wiring housing
X4	Atex approved coil, 'me' type
X5	Atex approved coil, 'd' type
	• Also CSA and UL approved P12L

12 Surge suppressor/ damper

Blank	No diode
D1	diode positive bias
D2	negative bias

See Page 60 for circuit details

13 Solenoid indicator lights

Blank	No Solenoid indicator lights
L	Solenoid indicator lights ▲

▲ Flying lead coil type only

14 Coil rating

GH	12 VDC
HH	24 VDC
PH	110VDC
DJH	98VDC
DTH	18VDC
EJH	196VDC
SH	220VDC

*	DG4V-3	(*)	-	*	*(L)	*	-	**	(**)	-	(V)	M	-	****	D*	(L)	*	*	-	60
1	2	3		4	5	6		7	8		9	10		11	12	13	14	15		16

15 Tank pressure rating

Refer to "Operating Data" for port T pressure ratings.

4	70 bar (1000 psi)
• 5	100 bar (1500 psi) for standard performance models, DG4V-3S, with AC or DC solenoids.
6	207 bar (3000 psi) for AC high performance models, DG4V-3, including spool position indicator type S6.
7	207 bar (3000 psi) for DC high performance models, DG4V-3, including spool position indicator type S6.

• X5 coil type only

16 Design number

60	Basic design

Functional symbols

Spool options

The valve function schematics apply to both U.S. and european valves.

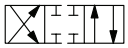
II-B

DG4V-3(S)-*N(V)

2 

DG4V-3(S)-*A(V)

0 

2 

DG4V-3(S)-*AL(V)

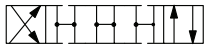
0 

2 

DG4V -3(S)-8CV

8 

DG4V -3(S)-*C(V)

0 

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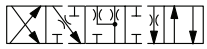
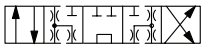
6 

33 

DG4V-3(S)-*B

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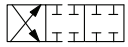
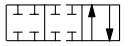
2 

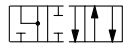
6 

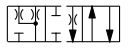
33 

DG4V-3(S)-*BL

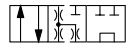
0 

2 

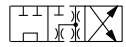
6 

33 

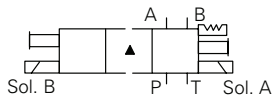
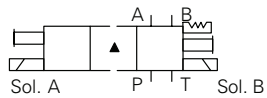
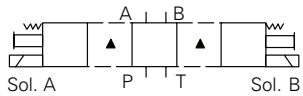
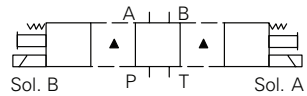
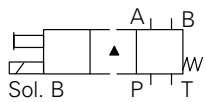
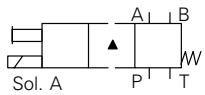
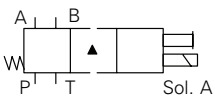
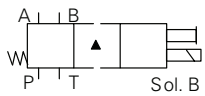
DG4V -3(S)-8BLV

8 

DG4V-3(S)-8BV

8 

Solenoid Identified to US and European Standards

	U.S. Solenoid Standard	European solenoid standard (specify "V" in the model code at position 7 on page 50)
Double solenoid valves, two position, detented		
Double solenoid valves, spring centered		
Single solenoid valves, solenoid at port A end		
Single solenoid valves, solenoid at port B end		

▲ Transient condition only

Response time

Response times are increased over that of a standard solenoid. These times are influenced by flow, pressure, applied solenoid voltage, oil viscosity and ambient temperatures. Response times can be fine tuned to the application by orifices that are interchangeable via the manual actuator in the solenoid end. See model code for available orifices.

Response times shown are for a type "2C" spool at a system pressure of 210 bar (3000 psi), flow at 19 L/min (5 USgpm), solenoid voltage at 100% of rating and 38°C (100° F) oil temperature. Times are determined from the instant of power on/off to the point of maximum cylinder velocity (shift) or the end of cylinder movement (spring return). All times are without arc suppression diodes. Spring return times can be expected to increase with diodes in place. Response times greater than 700 msec are not recommended.

Note: For the high performance type "8C" model, core tube orifice sizes smaller than 2.0 mm diameter are not recommended.

Orifice diameter mm	Response shift (ms)	Times spring return ms)	Color code
0,7	625	550	Green
0,8	400	375	Blue
0,9	250	250	Purple

Response times for spools other than the 2C spool are similar and are system dependent.

For fixed orifice(3)

Response times

Shift (ms)	Shift Return (ms)
400	175

Response times for spools other than the 2C spool are similar and are system dependent.

Orifice changing procedure

Warning

a. Before breaking a circuit connection make certain that power is off and system pressure has been released. Lower all vertical cylinders, discharge accumulators and block any load whose movement could generate pressure. Plug all removed units and cap all lines to prevent entry of dirt into the system. 2. Using a 5/32" hex key, remove manual actuator plug and spring from the end of solenoid (Tightening torque 6.2–7.3 N.m 55–65 lbf.in.)

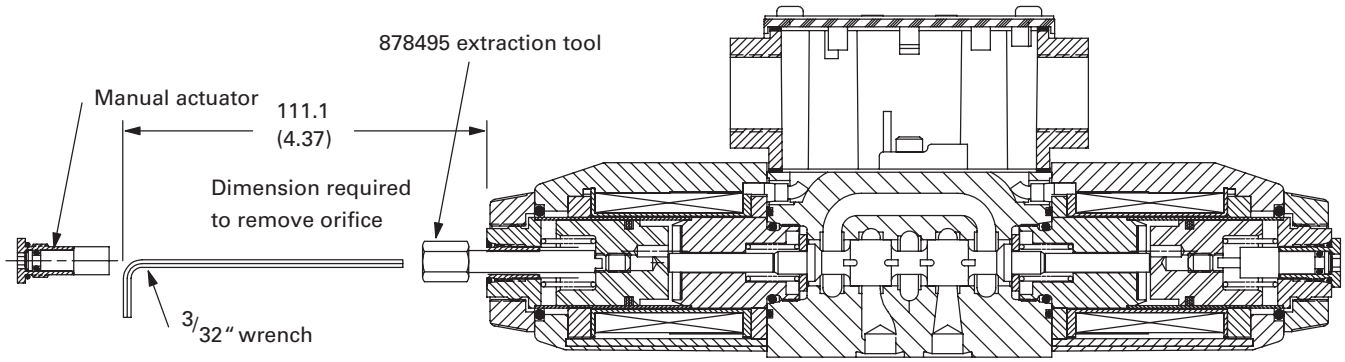
b. Insert extraction tool (878495) into solenoid via the manual actuator opening. Rotate tool until aligned and push pin into slot in armature.

c. Using 1/2" wrench and tool to prevent the armature from rotating, insert 3/32" hex key down the center of tool and remove orifice plug.

d. Replace by the same method, tightening orifice snug to ensure bottoming of threads. Smaller orifices increase response times, larger orifices decrease response time.

Orifice & tool kit 02-140211

For fine tuning shift performance, orifices must be ordered separately. The kit includes (2) each of .7, .8 & .9 mm dia. orifices, (1) installation tool, (1) 5/32" hex key and (1) 3/32" hex key.

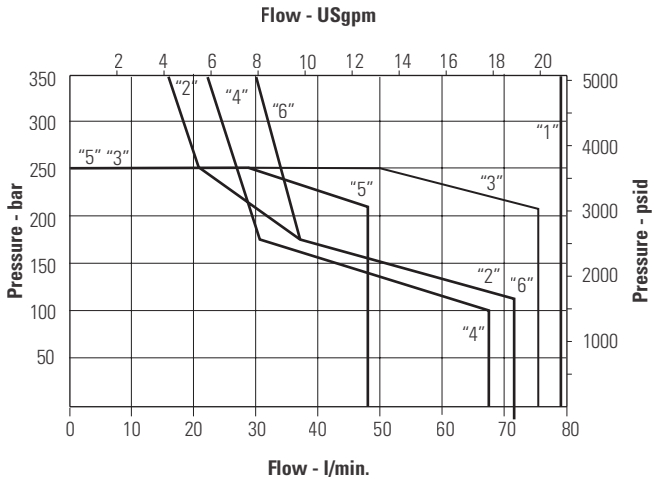


Solenoid Identified to US and European Standards

Feature	DG4V-3	DG4V-3S
Pressure Limits		
P, A and B ports	350 bar (5075 psi)	350 bar (5075 psi) ■
T port:	210 bar (3045 psi)	100 bar (1450 psi)
Flow rating	See performance data	See performance data
Relative duty factor	Continuous; ED = 100%	Continuous; ED = 100%
Type of protection: ISO 4400 coils with plug fitted correctly	IEC 144 class IP65	IEC 144 class IP65
Coil winding	Class H	Class H
Lead wires (coils type F***)	Class H	Class H
Coil encapsulation	Class F	Class F
Permissable voltage fluctuation:		
Maximum	Refer to temperature limits.	Refer to temperature limits.
Minimum	90% rated	90% rated
Typical response times at 100% rated volts measured from application/removal of voltage to full spool displacement of “2C” spool at:		
Flow rate P-A, B-T	40 l/min (10.6 USgpm)	20 l/min (5.3 USgpm)
Pressure	175 bar (2537 psi)	175 bar (2537 psi)
DC (=) energizing	45 ms	60 ms
DC (=) de–energizing	28 ms	40 ms
Power consumption, DC solenoids at rated voltage and 20 C (68 F).		
Full power coils:		
12V, model type “G”	30W	30W
24V, model type “H”	30W	30W

■ For applications where valves are to remain pressurized (either energized or de-energized) at pressures over 210 bar (3045 psi) without frequent switching, it is recommended to use the high performance model, DG4V-3.

▲ 1st half cycle; armature fully retracted.



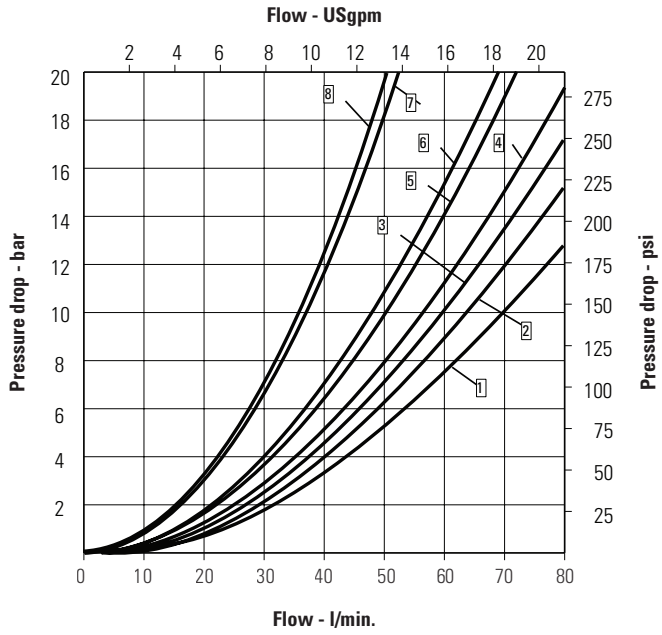
Typical with mineral oil at 36 cSt (168.6 SUS) and a specific gravity of 0.87.

Maximum flow rates

Performance based on full power solenoid coils warm and operating at 90% rated voltage. See note at bottom of next page when using low power coils (DG4V-3 models only).

Spool type	Curve number
"0C"	1
"2C"	1
"6C"	2
"8C"	5
"33C"	3
"2A"	4

Pressure drop curves



Spool type	Pressure	Drop	Curve	Reference chart
Spring centered	P-A	B-T	P-B	A-T
"0C" +	5	1	5	1
"2C"	5	4	5	4
"6C"	6	1	6	1
"8C" +	5	3	5	3
"33C" *	6	2	6	3

Spring Offset	P-A	B-T	P-B	A-T
"2A"	7	5	8	5

For any other viscosity the pressure drop (ΔP) will change as follows:

Viscosity(s)	cSt	14	32	43	54	65	76	87
	(SUS)	(75)	(150)	(200)	(250)	(300)	(350)	(400)
% of ΔP (Approximate)		93	111	119	126	132	137	141

Models for use with ISO 4400 (DIN 43650) connectors

II-B

3rd angle projection

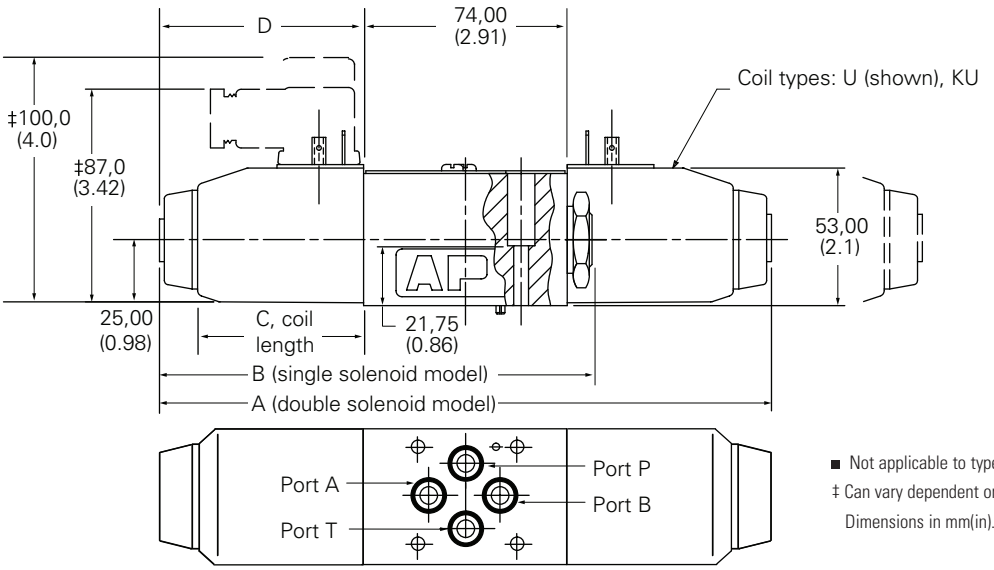
Double solenoid models ▲
DG4V-3(S)-*C-**-(V)M-U-**-60
DG4V-3(S)-*N-**-(V)M-U-**-60

Single solenoid models ▲
DG4V-3(S)-*A(-**) ■
DG4V-3(S)-*B(-**) ■
DG4V-3(S)-8BL(-**)

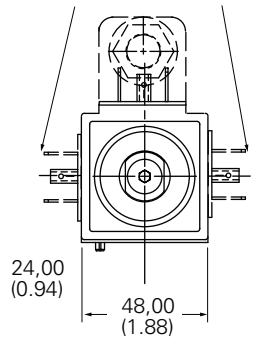
As shown

DG4V-3(S)-*AL(-**) ■
DG4V-3(S)-*BL(-**) ■
DG4V-3(S)-8B(-**)

Solenoid and end cap interchanged



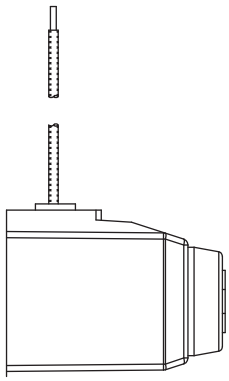
Alternative plug positions by loosening knurled nut, turning coil, and re-tightening.



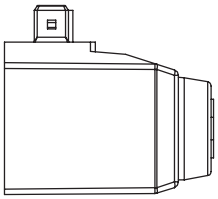
■ Not applicable to type "8" spool.
‡ Can vary dependent on source of plug.
Dimensions in mm(in).

Model type	AC or DC	A Dim.	B Dim.	C Dim.	D Dim.
All	DC=	220 (8.66)	156 (6.1 4)	61 (2.5)	73 (2.87)
DG4V-3	AC~	200 (7.87)	146 (5.75)	51 (2.1)	63 (2.48)
DG4V-3S	AC~	200 (7.87)	146 (5.75)	45 (1.7)	63 (2.48)

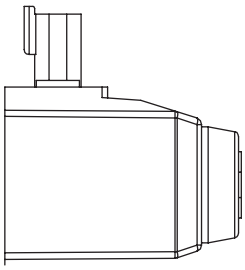
KU



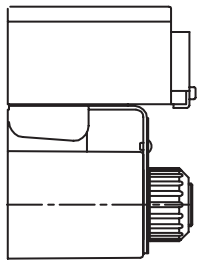
KUP4



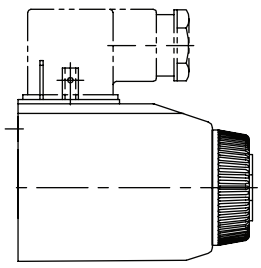
KUP5



X5

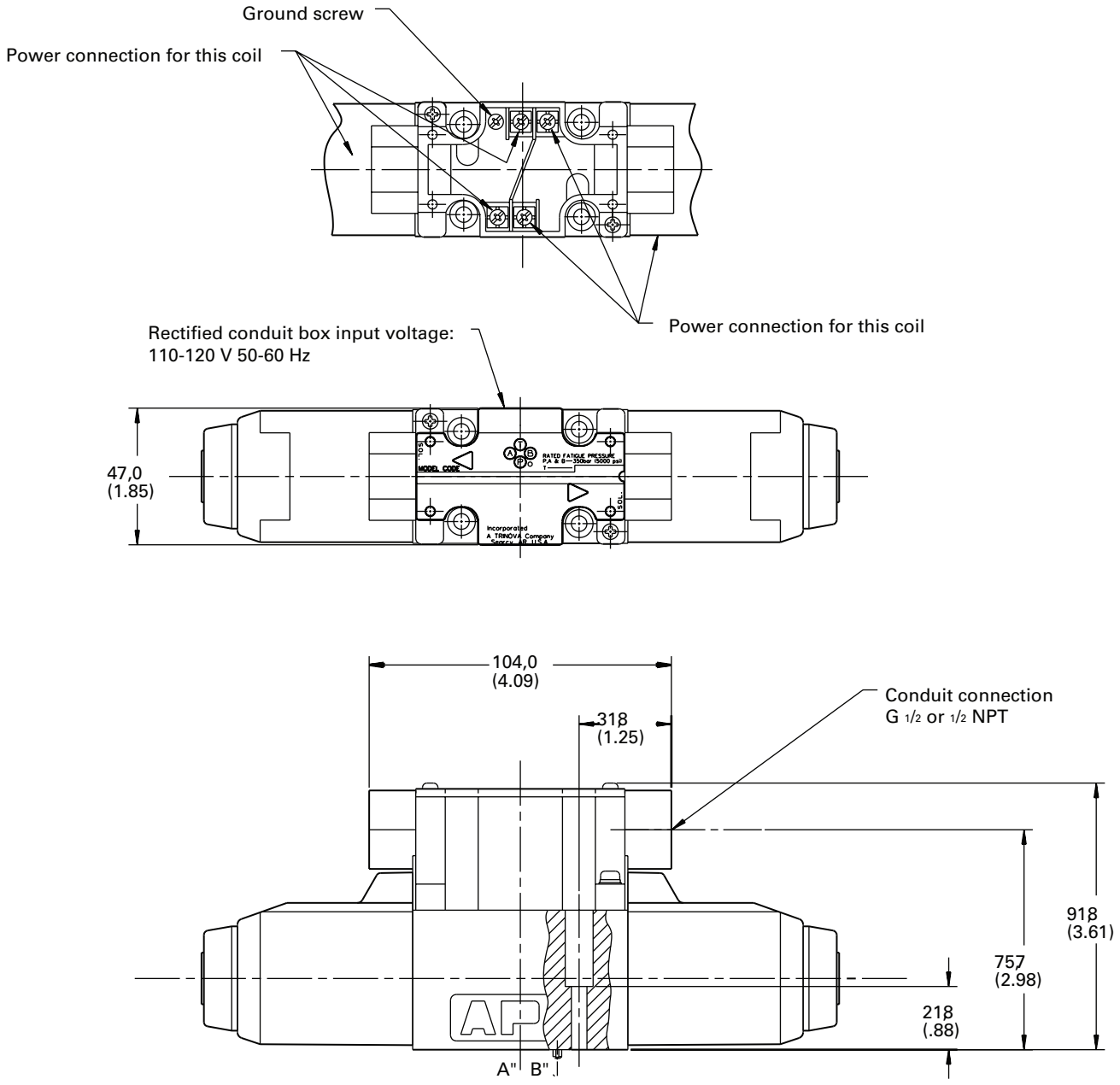


U/U1/U6



DG4V-3 - *****-M-P12L-DJH5-60
Plug-in Coil

Millimeters (inches)



Models with “F” type coils (lead wires) and conduit box.

II-B

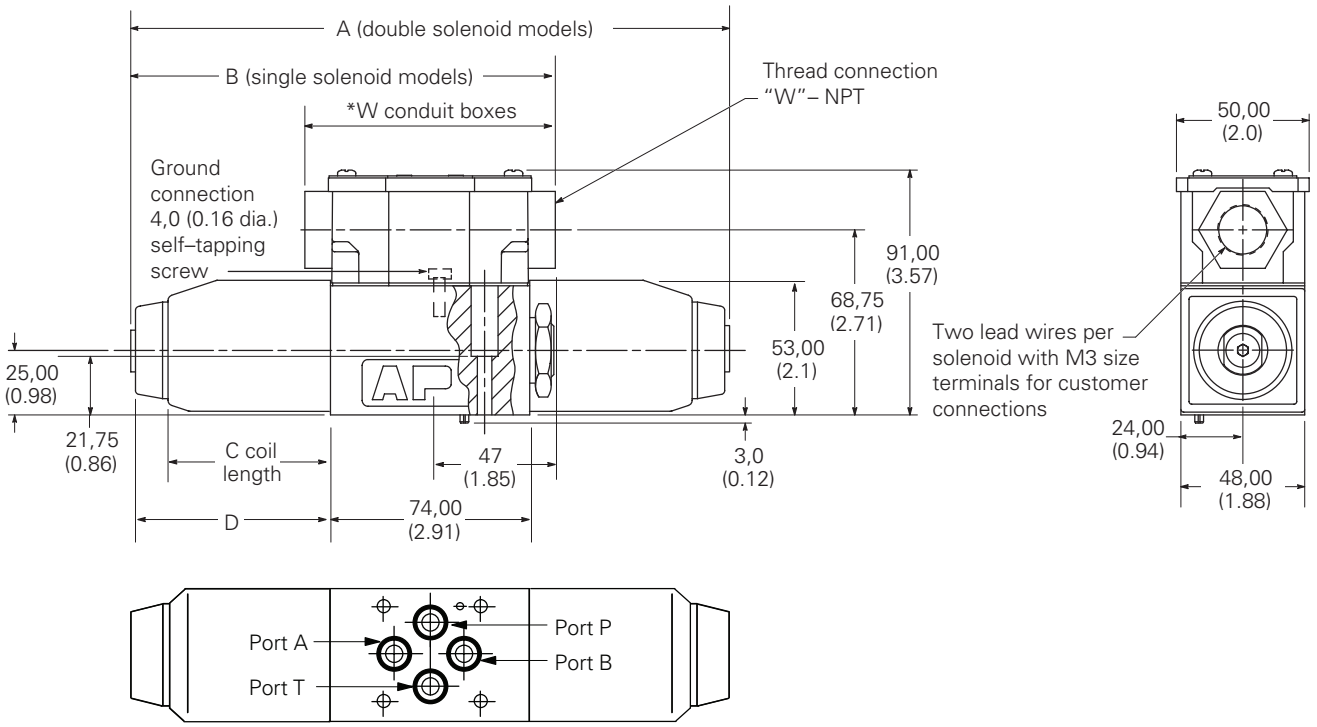
Double solenoid models ▲
DG4V-3(S)-*C-**-(V)M-F-**-60
DG4V-3(S)-*N-**-(V)M-F-**-60

Single solenoid models ▲
DG4V-3(S)-*A(-**)•
DG4V-3(S)-*B(-**)•
DG4V-3(S)-8BL(-**)

As shown

DG4V-3(S)-*AL(-**) •
DG4V-3(S)-*BL(-**) •
DG4V-3(S)-8B(-**)

Solenoid and end cap interchanged



*89 (3.5) for FPB – J & W conduit boxes
104 (4.0) All plug-in conduit boxes

Dimensions in mm(in).

Model type	AC or DC	A Dim.	B Dim.	C Dim.	D Dim.
All	DC=	220 (8.66)	156,5 (6.14)	61 (2.5)	73 (2.87)
DG4V-3	AC~	200 (7.87)	146,5 (5.75)	51 (2.1)	63 (2.48)
DG4V-3S	AC~	200 (7.87)	146,5 (5.75)	45 (1.7)	63 (2.48)

Codes "FW" : 2 lead wires for each solenoid, approximately 150,00 (6.00) long. M3 (#6) terminals provided for customer connection.

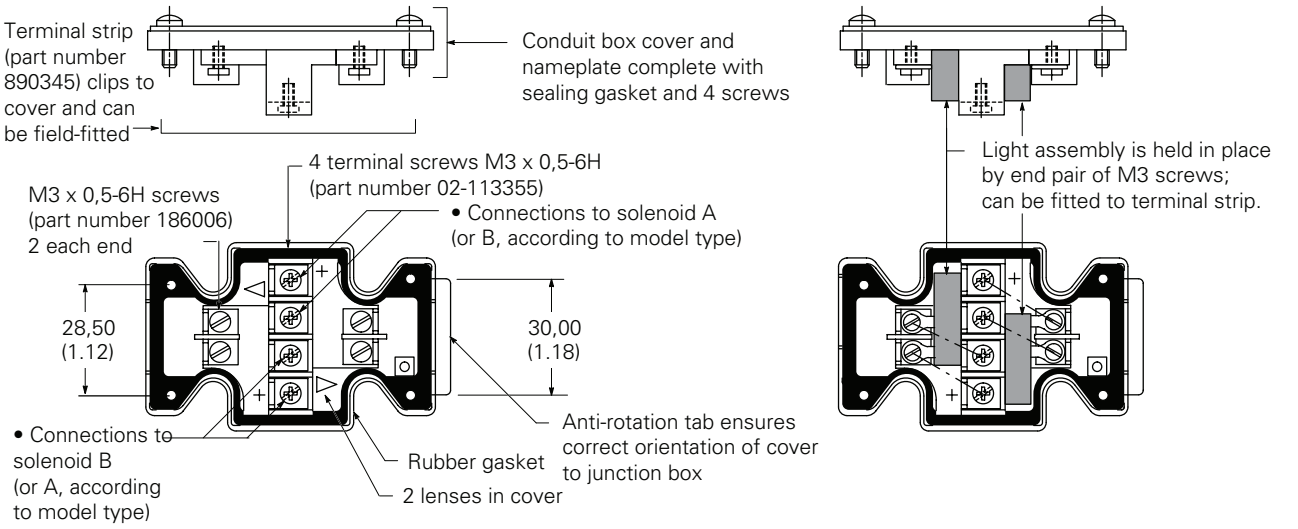
Codes "FTW" : Valve supplied with lead wires connected into terminal strip suitable for M3 (#6) terminals for customer connection.

Terminal strip and lights

a. For DC coils the +ve lead(s) must be connected to the terminal(s) marked +. When using 3-wire incoming leads to double solenoid valves (i.e. common neutral) the inner pair of terminals must be interconnected.

b. For correct light indication of energized solenoid ensure that solenoid leads are correctly connected: light terminals are common with each outer pair of solenoid terminals according to the side with + mark.

For valves with type "F" coils.

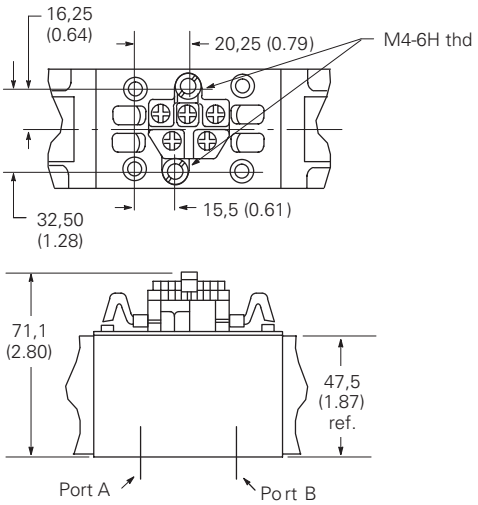


Insta-Plug

DG4V-3(S)—FPA—60 DG4V-3(S)—FPBW—60 Eaton 2-part "Insta-Plug" eliminates breaking electrical inputs for valve disconnect. A male half is pre-wired to the valve body. The mating plug is inside a wire housing with external terminals for machine wire connections.

Captive thumb screws, when loosened, permit the wire housing to be pulled clear of the valve for disconnect. A longer ground post provides first make/last break ground connection.

PA configuration



DIN 43650 Connector

Cable diameter range:

Wire section range:

Terminals:

Type of protection:

Connector can be positioned at 90° intervals on valve by re-assembling contact holder into appropriate position inside connector housing. Connectors with and without indicator lights are available (order separately):

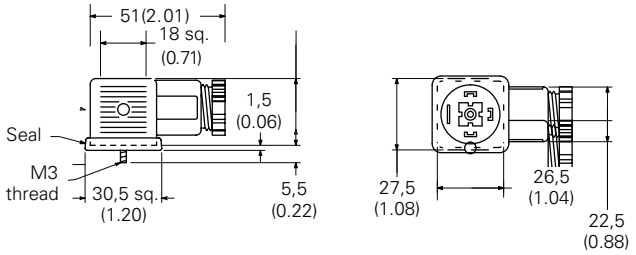
Ø6-10 mm (0.24-0.40)

Ø,5-1,5 mm2 (0.0008-

0.0023 in2)

Screw type

IEC144 class IP65, when plugs are fitted correctly to the valves with interface seals (supplied with plugs) in place.



II-B

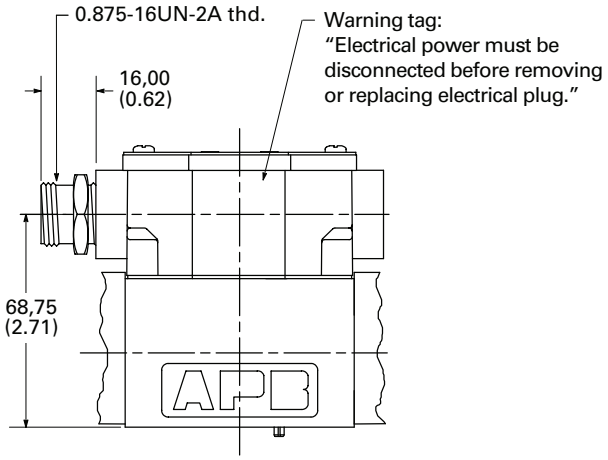
NFPA Connector T3.5.29-1980

DG4V-3(S)–FPA3W(L)-**-60

DG4V-3(S)–FPA5W(L)-**-60

The receptacle is a standard three or five pole connector with shortened leads and terminals added. The five pole plug has four leads 101,6 (4.0) long and one 177,8 (7.0) long. The three pole plug has two leads 101,6 (4.0) long and one 177,8 (7.0). All wires have underwriters recognized non-solder insulated eyelet terminals. The green wire is used for the ground (earth) connection (No. 8 screw furnished). Valves are supplied pre-wired.

Connection details and model type/model code references



3 pin connector

Use with single solenoid valve

Key model code designations:

DG4V-3(S)-*A(L)(-**)-(V)MFPA3W(L)

DG4V-3(S)-*B(L)(-**)-(V)MFPA3W(L)

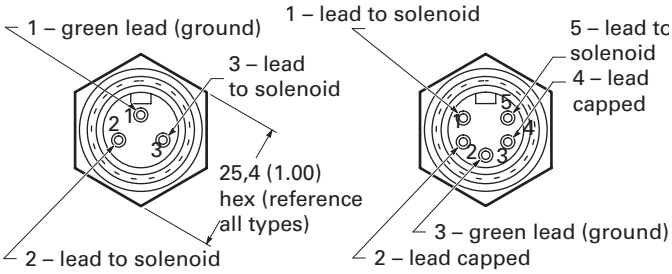
5 pin connector

Use with single solenoid valve

Key model code designations:

DG4V-3(S)-*A(L)(-**)-(V)MFPA5W(L)

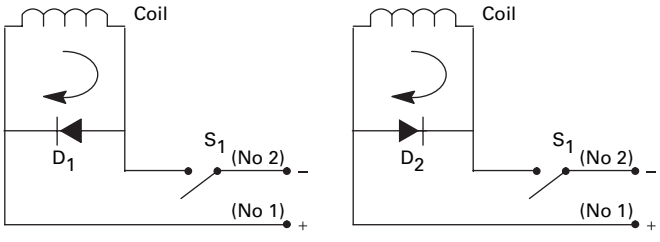
DG4V-3(S)-*B(L)(-**)-(V)MFPA5W(L)



Surge suppression devices (For DC valves) Standard diode (D1), (D2)

Diode in parallel with coil, positive bias. When switch (S1) is opened, the energy stored in the coil is trapped and dissipated by the diode (D1), (D2).

- Works only with DC voltage
- Polarity dependent
- Increase drop out time



Surge suppression devices (For DC valves) Standard diode (D2)

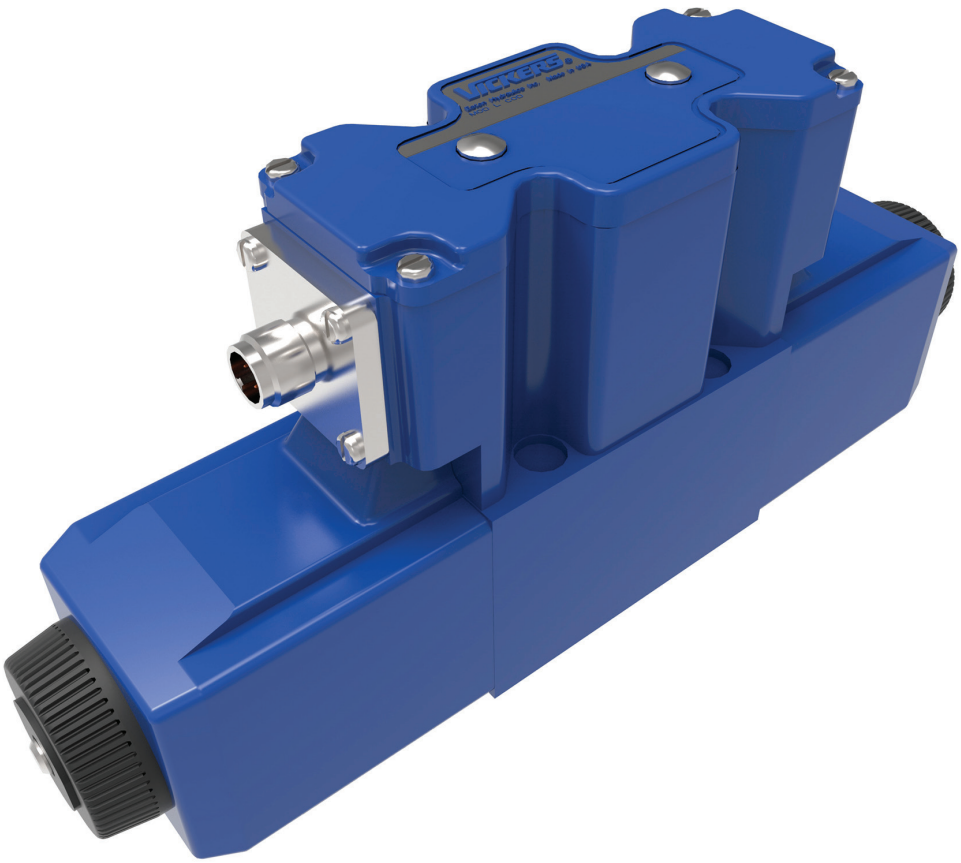
Diode in parallel with coil, negative bias. When switch (S1) is opened, the energy stored in the coil is trapped and dissipated by the diode (D2).

- Works only with DC voltage
- Polarity dependent
- Increase drop out time

Note: These surge suppression devices are "Polarity Dependent." Proper biasing conditions must be met when installing/connecting a coil in a system. Times represent cessation/application of voltage to coil versus velocity (start/stop) of a cylinder using a single solenoid, spring offset valve (time in milliseconds).

Shift	Dropout	
CETOP 3		
Do Diode	23	60
Diode Alone	23	131

ISSO4401 Size 03; ANSI/B93.7M-D03
Solenoid operated directional valve
DG4V-3-70 Design



Solenoid operated directional valve

DG4V-3-70 Design

II-B

1. Product introduction and target applications

DG solenoid valves are used in hydraulic circuits to start, stop and direct flow. With electronics on board, the DG4V3-Z-70 enables new machine control solutions, eliminating solenoid power shifting in the controls cabinet.

The DG4V3 – 70 series valve takes advantage of contemporary electronics and wiring practices applied in automation solutions world wide. Using industry standard M12 connectors and with the optional on board switching amplifier the – 70 series valve offers OEMs and users opportunity to simplify the electronics, and increase throughput by specifying preassembled and pre-wired electro-hydraulic manifold assemblies. This valve with on-board electronics has passed water immersion tests, qualified to IP67, and EMC testing to CE requirements. The rugged construction, designed and qualified by Eaton with key features such as plug in coils, M12 connector and multiple coil wattages, meeting major automotive plant specifications, makes this valve a natural for global projects.

This solenoid valve is the latest in a long line of recognized Eaton brand DG valve series. The – 70 series valve builds on the proven – 60 series valve, adding connectivity and functionality tailored for state of the art 24 VDC machine control system. This product is available from and supported by Eaton and an extensive network of qualified distribution partners world wide.

2. Functional description

Electronics are housed in a robust metal housing sealed to IP67 environmental ratings and meeting CE standards for Electromagnetic Compliance.

- **Standard features** include surge suppression and LED's indicating voltage to the active coil.
- **The "Z" option adds the switching amplifier on board,** eliminating the cost and heat associated with having this function in the machine controls cabinet. 24 VDC power is supplied separately to pin1 of the M12 connector, while pin 2 or 4 control the solid state switch connection to either solenoid A or B. Pin 3 is common.

3. Summary features and benefits

Hydraulic

Mounting interface: ISO 4401 size 03, ANSI/B93.7M size 3, CETOP RP65H, size 3, DIN 24340, NG 6 Maximum pressure: 350 bar (5000 psi) P, A and B ports. 210 bar (3000 psi) T port Maximum flow: up to 80 l/m (21 USgpm) depending on spool type and coil wattage.

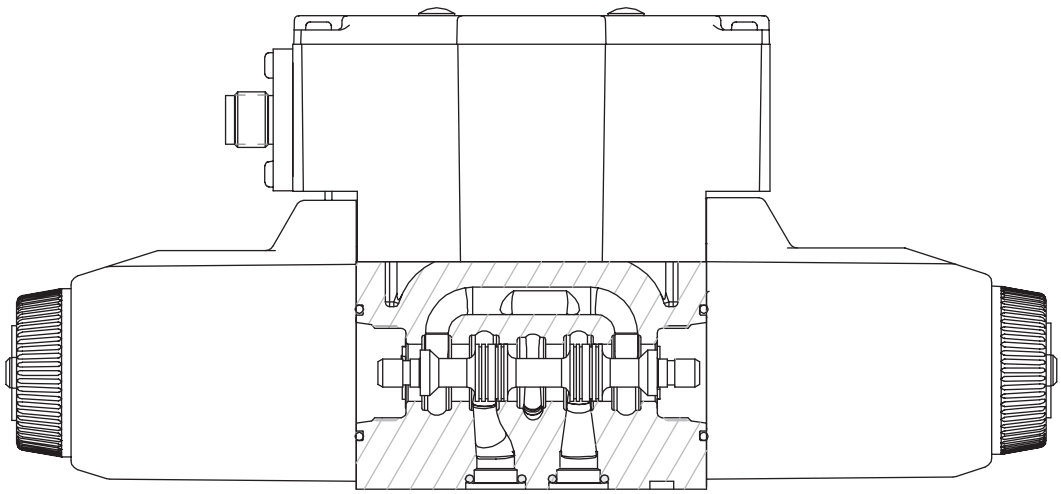
Environmental

IP 65 rated protection from low pressure water jets from all directions. IP 67 rated, water immersion tested. EMC qualified to EN 61326 CE certified, CE mark on the valve.

Electrical

- 24 VDC operation only
- M12 connection.
- Coil control options, described on page 70: - A-option, direct connection from the M-12 connector to each coil. (Model code pos 9) - Z-option, On Board Switching amplifier. Information on available coil power levels and commands required to operate the on board switching amplifier is in section 5, Technical Specifications.

Cross sectional view



DG4V-3	*	*	*	*	*	M	SN	PM4	*	S	*	7	**	70
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

1 Directional control valve

4	Solenoid operated
V	Pressure rating 350 bar (5000 psi) on P, A & B ports
3	ISO4401 Size 03

2 Spool Type

See "Functional Symbols" Section on page 65

3 Spool/spring arrangement single solenoid models

A	Spring offset, Right hand build (standard)
AL	Spring offset, Left hand build (optional)
B	Spring centered, Right hand build (standard)
BL	Spring centered, Left hand build (optional) Dual solenoid models
C	Spring centered. No R or L option
N	No spring detented. No R or L option.

4 Manual override

H	Waterproof override in solenoid ends only
Z	No overrides in either end

5 Seal type

F3	Viton Seals (standard)
F6	Buna Nitrile/High CAN

6 Solenoid Energization identity

A	Solenoid identification based on ANSI B93 9 (i.e. energize solenoid A TO GIVE flow P to A) (standard)
V	Solenoid identification determined by position of solenoid (i.e. solenoid 'A' at port 'A' end, solenoid 'B' at port 'B' end). Required for 8C-type spool.

7 Flag symbol

M	Electrical options and feature

8 Spool Indicator Switch

SN	No Switch (standard)

9 Electrical connector

PM4	4 Pin M12 Connector

10 Wiring convention

A	Pins 2, 3 & 4 direct connection used
Z	On board switching amplifier

11 Configuration

S	Standard configuration (diodes and lights included)

12 Coil rating

H	24 VDC, 30W
HL	24 VDC, 18W
HM	24 VDC, 10W

13 NP No port orifices (standard)

14 Design number

70	Design number

Functional symbols

Spool options

The valve function schematics apply to both U.S. and European valves

II-B

DG4V-3(S)-*N(V)

2 

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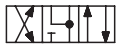
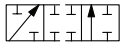
6 

22 

DG4V-3(S)-*A(V)

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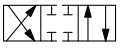
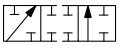
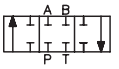
2 

22 

35 

DG4V-3(S)-*AL(V)

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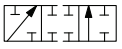
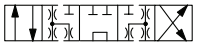
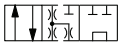
2 

22 

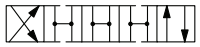
DG4V-3(S)-8C(V)

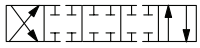
8 

DG4V-3(S)-8BL(V)

8 

DG4V-3(S)-*C(V)

0 

2 

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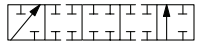
22 

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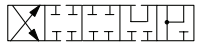
52 

DG4V-3(S)-*B/F(V)

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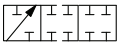
2 

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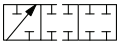
22 

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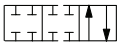
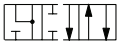
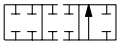
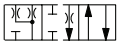
DG4V-3(S)-*BL/FL(V)

0 

2 

6 

22 

33 

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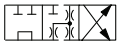
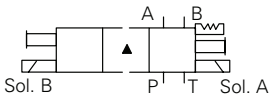
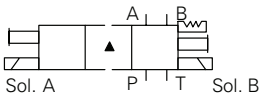
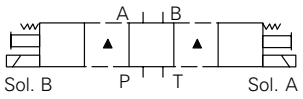
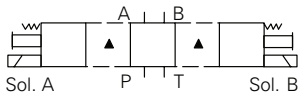
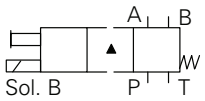
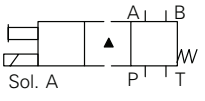
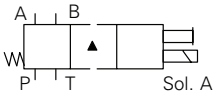
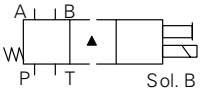
DG4V-3(S)-8B(V)

8 

Solenoid Identified to US and European standards

	U.S. Solenoid Standard	European solenoid standard (specify "V" in the model code at position 7 on page 64)
Double solenoid valves, two position, detented		
Double solenoid valves, spring centered		
Single solenoid valves, solenoid at port A end		
Single solenoid valves, solenoid at port B end		

▲ Transient conditions only

Solenoid Identified to US and European standards

Feature		DG4V-3	
Pressure limits P, A and B ports		350 bar (5075 psi)	
T port:		210 bar (3045 psi)	
Flow rating		See performance data	
Relative duty factor		Continuous; ED = 100%	
Type of protection: ISO 4400 coils with plug fitted correctly		IEC 144 class IP65	
Coil winding		Class H	
Coil encapsulation		Class F	
Permissable voltage fluctuation:			
Maximum		24 VDC ±10%	
Coil designation	**H**	**HL**	**HM**
Typical response times at 100% rated volts measured from application/removal of voltage to full spool displacement of "2C" spool at:			
Flow rate P-A, B-T	40 l/min (10.6 USgpm)	25 l/min (6.6 USgpm)	25 l/min (6.6 USgpm)
Pressure	175 bar (2537 psi)	175 bar (2537 psi)	100 bar (1500 psi)
DC (=) energizing	60 ms	65 ms	85 ms
DC (=) de–energizing	33 ms	40 ms	40 ms
Power consumption, DC solenoids at rated voltage and 20 C (68 F). Full power coils:			
24V, model type "H"	30W		
Low power coils:			
12V, model type "HL"	–	18W	–
24V, model type "HM"	–	–	10W
Weight			
Double solenoid		2.5 kg (5.5 lb) approx.	
Single solenoid		1.9 kg (4.2 lb) approx.	
Fluid cleanliness		9/17/14	
Temperature			
Fluid		-20 to + 70°C (-4 to +158°F)	
Ambient air		-20 to + 70°C (-4 to +158°F)	
Storage		-25 to + 85°C (-13 to +185°F)	

Note: For fluid recommendations refer section Q of the catalog.

Performance data

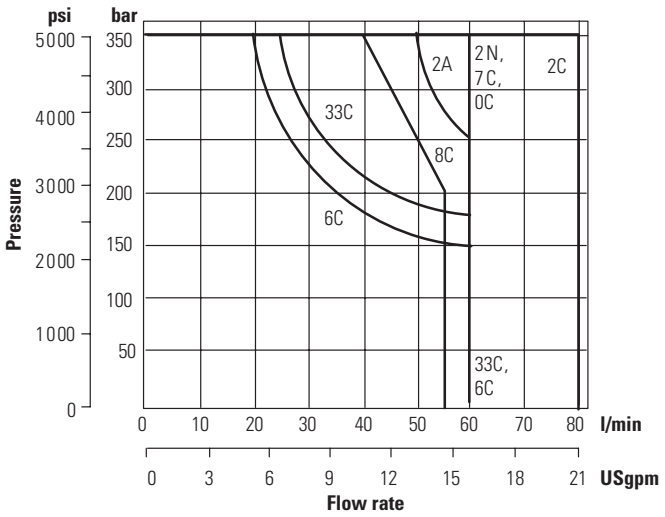
Typical with mineral oil at 36 cSt (168.6 SUS) and a specific gravity of 0.87.

II-B

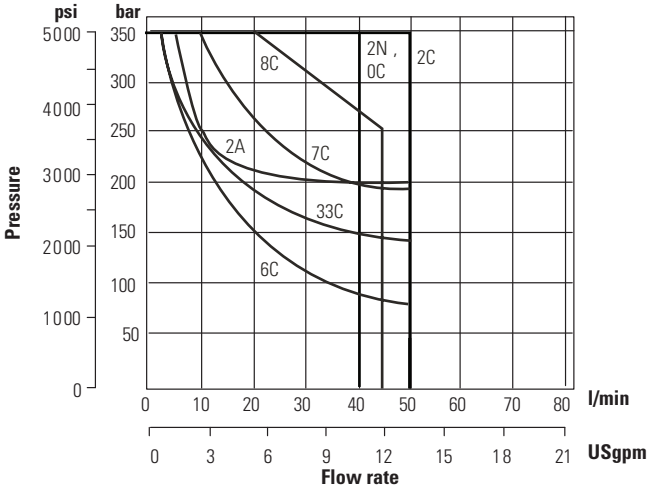
Maximum flow rates

Performance based on full power solenoid coils warm and operating at 90% rated voltage.

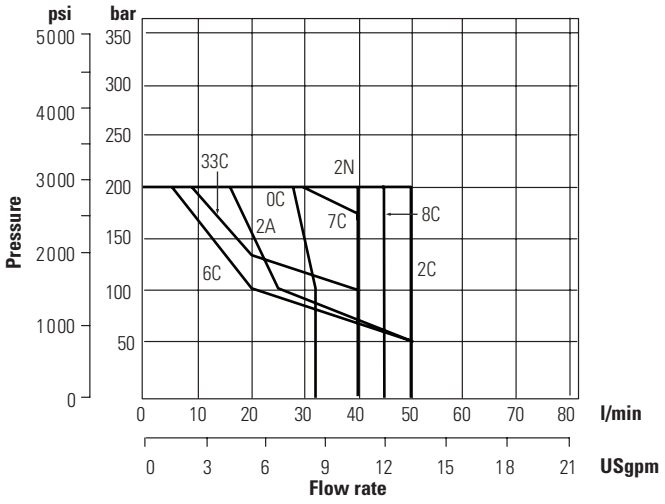
H Type Solenoid- 30W



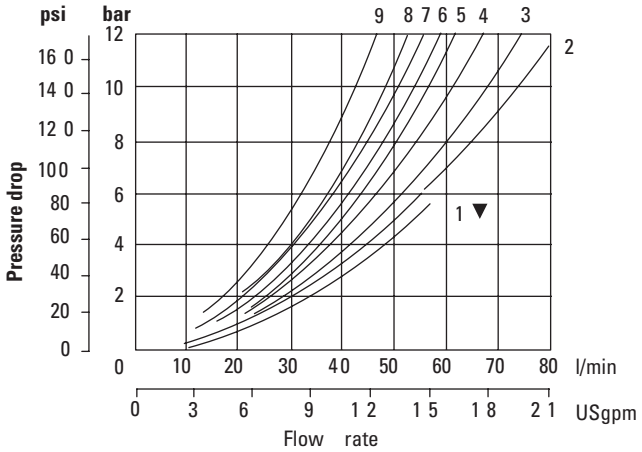
HL Type Solenoid- 18W- (optional)

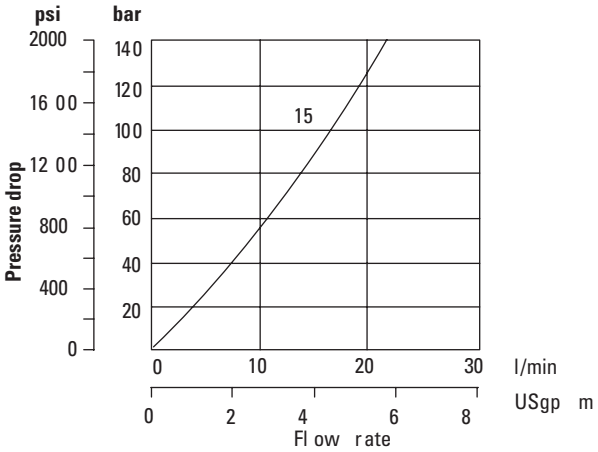


HMType Solenoid- 10W- (optional)



Pressure drop curves by spool type





▼ Curve for spool type 6: not recommended for flows in excess of 60 l/min (15.8 USgpm).

Pressure drops in offset positions except where otherwise indicated.

Spool/spring code	Covered spool positions	P-A	P-B	A-T	B-T	P-T	A-B
0A(L)	Both	5	5	2	2	-	-
0B(L) & 0C, 0F	De-energized	-	-	-	-	4 ▲■	-
	Energized	4	4	2	2	-	-
2A(L)	Both	6	6	5	5	-	-
2B(L), 2C,2F	Energized	5	5	2	2	-	-
2N (H and HL coil)	Both	6	6	3	3	-	-
2N (HM coil)	Both	8	8	5	5	-	-
6B(L), 6C, 6F	De-energized	-	-	3 ▲	3 ■	-	-
	Energized	6	6	1	1	-	-
8B(L), 8C	All	9	9	5	5	3	-
33B(L), 33C	De-energized	-	-	15 ▲	15 ■	-	-
	Energized	5	5	2	2	-	

▲"B"plugged ■ "A"plugged ❍"P"plugged

For other viscosities, pressure drops approximate to:

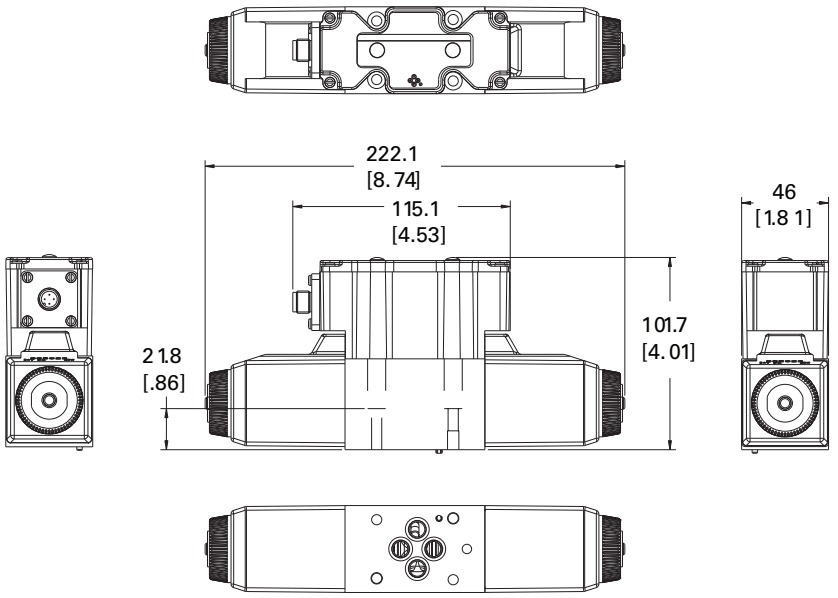
Viscosity cSt (SUS)						
14	20	43	54	65	76	85
(17.5)	(97.8)	(200)	(251)	(302)	(352)	(399)
% of Δp						
81	88	104	111	116	120	124

▲"B"plugged ■ "A"plugged ❍"P"plugged

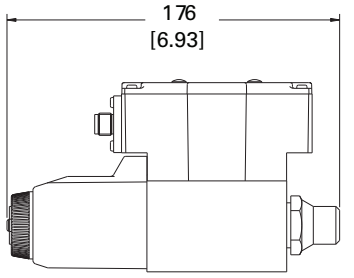
A change to another specific gravity will yield an approximately proportional change in pressure drop.

The specific gravity of a fluid may be obtained from its producer. Fire resistant fluids usually have higher specific gravities than oil.

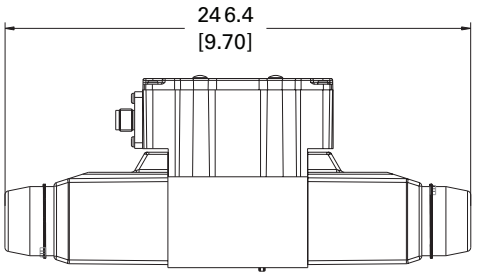
Installation dimensions



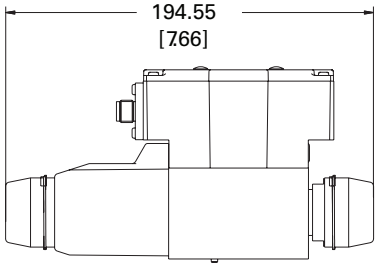
DG4V-3-*C/N -*-*M-PM4*S-***7-70



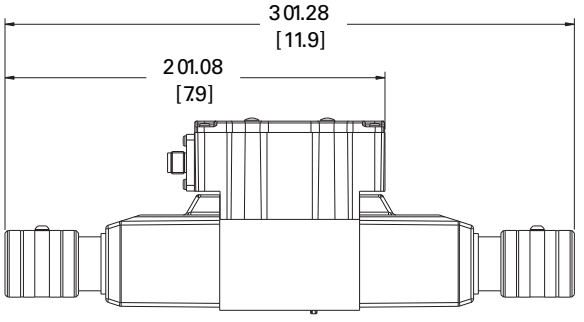
DG4V-3-**A/B/F(L)-P2 -*M-PM4*S-***7-70



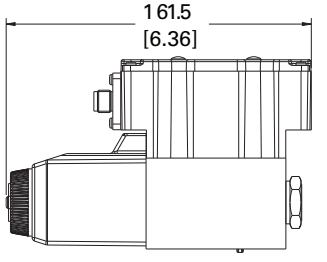
DG4V-3--*C/N-H-*M-PM4*S-***7-70



DG4V-3-*A/B/F(L)-H2 -*M-PM4*S-***7-70

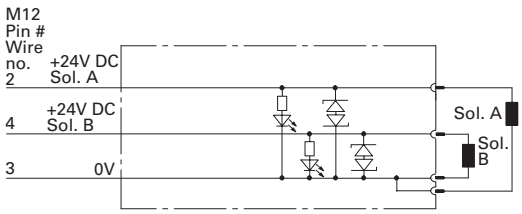


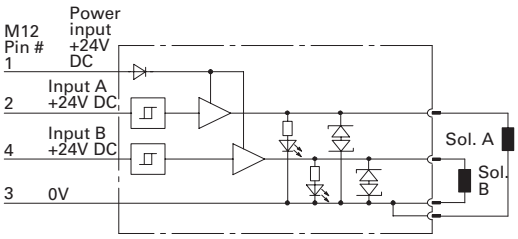
DG4V-3-****(L)-W-*M-PM4*S-***7-70



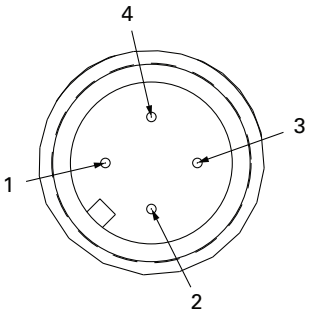
DG4V-3-* A/B/F(L)-*M-PM4*S-***7-70

Solenoid indication standard	**LED is lit when there is power to the coil.**
EMC Qualifications	To EN 61326
A-Option Direct connected coil shown to the right.	Protection network for inductive loads protects the (machine control) switch from high voltages and speeds the de-energizing of the solenoid.
Z-Option Switching Amplifier on Board shown to the right.	The circuit on the Z-option is reverse polarity protected. The output is short circuit protected. In case of a shorted solenoid, the amplifier will remove the voltage from it. When the short is removed the amplifier will restart automatically.





Electrical data:	**DG4V-3**
For the "Z" option, switching amplifier version.	
Power Supply	24 VDC + – 10% range
Control input	Per IEC 61131-2 for digital input type 2
Switching Frequency	2 Hz maximum
Range	2 to +30V
ON condition	11 V and above. 6 mA at 11 V. Maximum 20 mA at 24 V
OFF condition	5 V and below. 2 mA at 5 V



Pin 1 is only used on the Z option for 24 VDC power to the valve.

Pin 2 always controls ("Z" option) or power ("A" option) the solenoid on the "B" port side of the valve.

Pin 3 is always common or 0 volt, both A and Z control option.

Pin 4 always controls ("Z" option) or power ("A" option) the solenoid on the "A" port side of the valve.

⚠ WARNING

Electromagnetic Compatibility (EMC)

It is necessary to ensure that the valve is wired up in accordance with the connection arrangements shown in this leaflet.

For effective protection, the user's electrical cabinet, the valve subplate or manifold and the cable screens should be connected to efficient ground points.

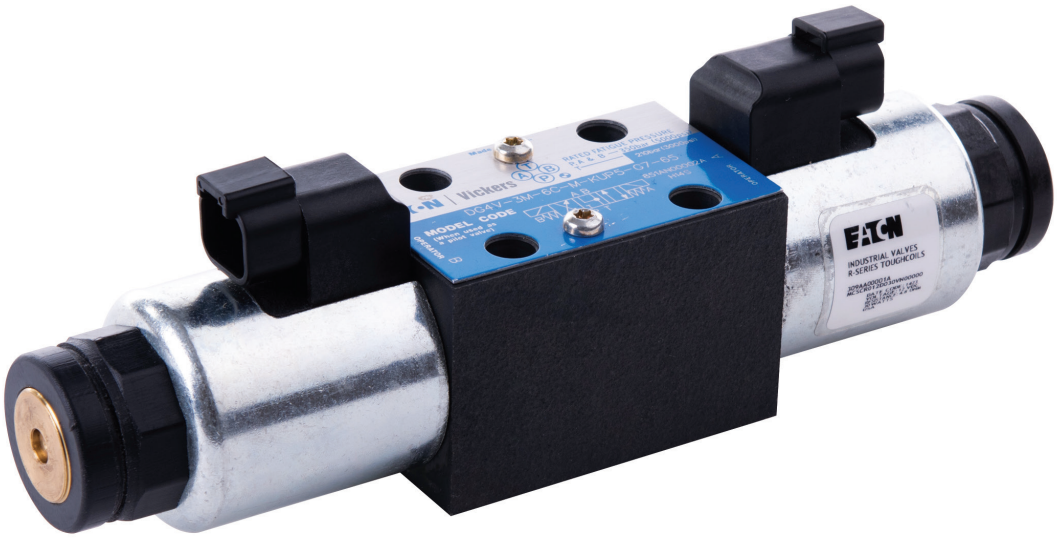
In all cases, both valve and cable should be kept as far way as possible from any source of electromagnetic radiation such as cables carrying heavy current, relays and certain kinds of portable radio transmitters, etc.

Difficult environments could mean that extra screening may be necessary to avoid interference.

Control option	**Pin number**	**Connection ref destination**
PM4AS "A" Option	1	No Connection
	2	Power, Solenoid on B-Port Side
	3	Common, Sol A & B-
	4	Power, Solenoid on A-Port Side
PM4ZS "Z" Option	1	Power Supply
	2	Control Input, Solenoid on B-Port Side
	3	Common, 0V
	4	Control Input, Solenoid on A-Port Side

Note: For left hand builds ("L" in model code pos 3) pin connection to port A and B will be reversed.

ISO4401 Size 03; ANSI/B93.7M-D03
Solenoid operated directional valve
DG4V-3M-65



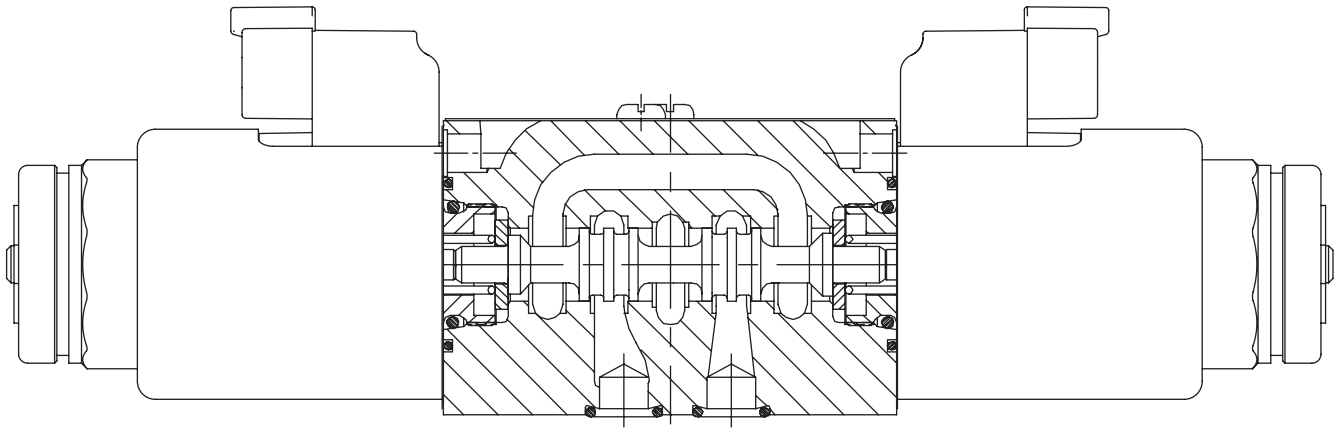
General description

Solenoid operated directional control valves are for directing and stopping flow at any point in a hydraulic system.

- Efficient control of greater hydraulic powers without increasing solenoid power consumption.
- Installed cost and space savings from higher power/ weight-and-size ratios.
- Installation flexibility resulting from choice of numerous combinations of solenoid connectors and locations.
- Viton seals as standard for multi-fluid capability. Nitrile seals available as a model code option.
- Higher sustained Machine productivity and higher uptime because of proven fatigue life and endurance, tested over 20 million cycles.
- Solenoid coils can be changed quickly and easily without leakage from hydraulic system.
- Compact, cost effective system design when used with Eaton SystemStak™ valves and subplates.

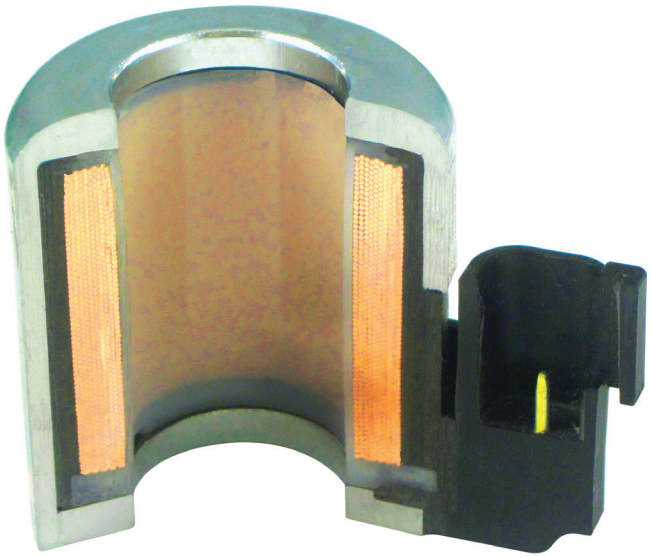
DG4V-3M High performance valves

- Minimum pressure drop 2.5 bar at 30 l/min.
- Range of coil connectors including DIN and Deutsch.
- Range of coil voltages and power options.
- Up to 80 l/min (21 USgpm) and up to 40 l/min (10.5 USgpm) respectively at 350 bar (5000 psi).
- Offers designers the opportunity to select the optimum value package for each application.
- International standard interface. The valve mounting face conforms to ISO 4401, size 03 and is compatible with related international standards.
- Rigorous coil tests for added protection against physical and environmental damage. Details on page R-3.
- Rated to IP69 best in the class



Eaton tough coils

II-B



You can rely on Eaton ToughCoils

OEM's strive to build dependable machines that get the job done without interruption – no matter the conditions. Our solenoid operated directional control valves matched with our new ToughCoils provides industry leading environmental protection and performance in a compact and rugged package.

Electro-hydraulic components are being utilized in an array of off-highway and industrial applications. Electrical winding integrity is critical. ToughCoils are encapsulated in a plastic surrounding by a one- piece deep drawn metal frame. With an IP69K rating (Deutsch type only), it has the highest ingression protection from dust and water. Most valve coils in the market only meet an ingression protection (IP) rating of 65.

ToughCoils have also passed Eaton's own rigorous tests for added protection against physical and environmental damage:

- Extreme heat
- Thermal shock dunk
- Extended vibration test
- Salt fog
- Ice
- Bench handling
- Combined environment test
- Particle impact

Flexible Mounting - ToughCoils can be reversed mounted and rotated to any degree allowing more wiring flexibility in difficult locations

*	DG4V—3	M	—	**	*(L)	—	(**)	(V)	M	—	****	—	D*	**	*	—	6*	—	***
1	2	3		4	5		6	7	8		9		10	11	12		13		15

1 Seal type

Blank	Viton
F6	Buna Nitrile/High CAN

2 Model series

4	Solenoid operated
V	Pressure rating 350 bar (5000 psi) on P, A & B ports
3	ISO4401 Size 03

3 Performance

M	Mobile high performance

4 Spool type

Please refer functional symbols on Page 76 for spool types.

5 Spool spring arrangement

A	Spring offset, end-to-end
AL	Same as "A" but left hand build
B	Spring offset, end to center
BL	Same as "B" but left hand build
C	Spring centered
N	No-spring detented

6 Manual override option

Blank	Plain override(s) in solenoid end(s) only ▲
H	Water-resistant override(s) on solenoid end(s) ▲
Z	No overrides at either end

▲ No override in non-solenoid end of single solenoid valves

7 Solenoid energization identity

Blank	None
V	Solenoid "A" is at port "A" end and/ or solenoid "B" is at port "B" end, independent of spool type

Note: Used to select the identification of the solenoid. Refer to table on page 4.

8 Flag symbol

M	Electrical options and features

9 Coil type

U	ISO4400, DIN43650 connector
U1	ISO4400 fitted with PG11 plug
KUP5	Integral Deutsch connector

10 Surge suppressor/ damper

D	Zener Diode

11 Coil Rating

G	12V DC
GL	12V DC
H	24V DC
HL	– 24V DC

12 Tank pressure rating

Refer to "Operating Data" for port T pressure ratings.

7	207 bar (3000 psi)

13 Design number

65	Basic design

15 Reverse coil option

RC	Both Coils reversed
RCA	A Coil Reversed
RCB	B coil reversed

Note: See page 10.

Functional symbols

Spool options

The valve function schematics apply to both U.S. and European valves.

II-B

DG4V-3(S)-*NV

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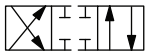
2



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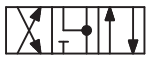

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DG4V-3(S)-*BV

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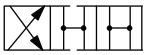

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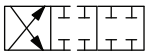

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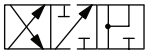

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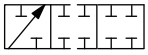

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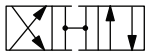
521

561

DG4V-3(S)-*AV

0



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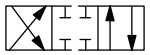

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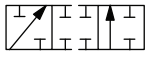

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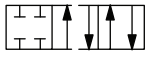

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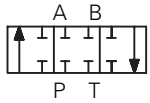

DG4V-3(S)-*BLV

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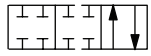

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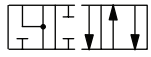

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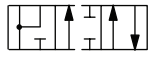

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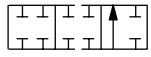

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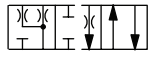

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DG4V-3(S)-*ALV

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2

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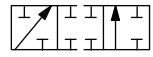

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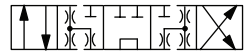
DG4V-3(S)-8CV

8



DG4V-3(S)-8BLV

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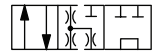

DG4V-3(S)-8BV

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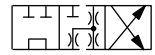

DG4V-3(S)-*CV

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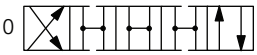

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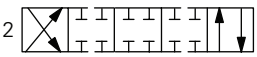

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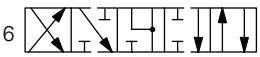

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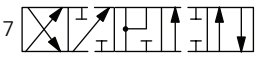

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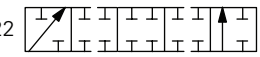

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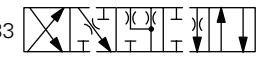

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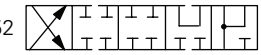

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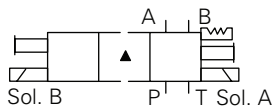
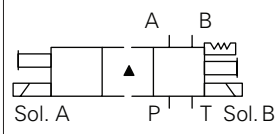
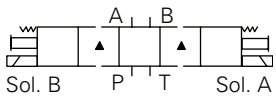
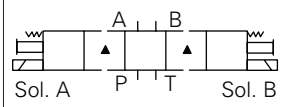
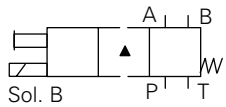
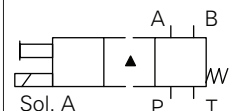
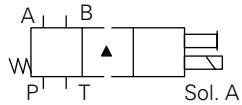
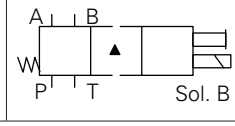
Solenoid identified to US and European standards

	U.S. Solenoid Standard	European solenoid standard (specify "V" in the model code at position 7 on page 75)
Double solenoid valves, two position, detented		
Double solenoid valves, spring centered		
Single solenoid valves, solenoid at port A end		
Single solenoid valves, solenoid at port B end		

▲ Transient conditions only

Feature	DG4V-3M
Pressure Limits P, A and B ports	350 bar (5075 psi)
T port:	210 bar (3045 psi)
Flow rating	See performance data
Relative duty factor	Continuous; ED = 100%
Type of protection: ISO 4400 coils with plug fitted correctly	IP69K for Deutsch type IP65 for DIN type
Coil winding	Class H
Coil encapsulation	Class F
Permissable voltage fluctuation: Maximum Minimum	 Refer to temperature limits. 90% rated
Typical response times at 100% rated volts measured from application/removal of voltage to full spool displacement of "2C" spool at:	
Flow rate P-A, B-T	20 l/min (5.3 USgpm)
Pressure	175 bar (2537 psi)
AC (~) energizing	18 ms
AC (~) de–energizing	32 ms
DC (=) energizing	60 ms
DC (=) de–energizing	40 ms

Power consumption, DC solenoids at rated voltage and 20 C (68 F). Full power coils:	
12V, model type "G"	30W
24V, model type "H"	30W
Low power coils:	
12V, model type "GL"	18W
24V, model type "HL"	18W

▲ 1st half cycle; armature fully retracted.

Performance data

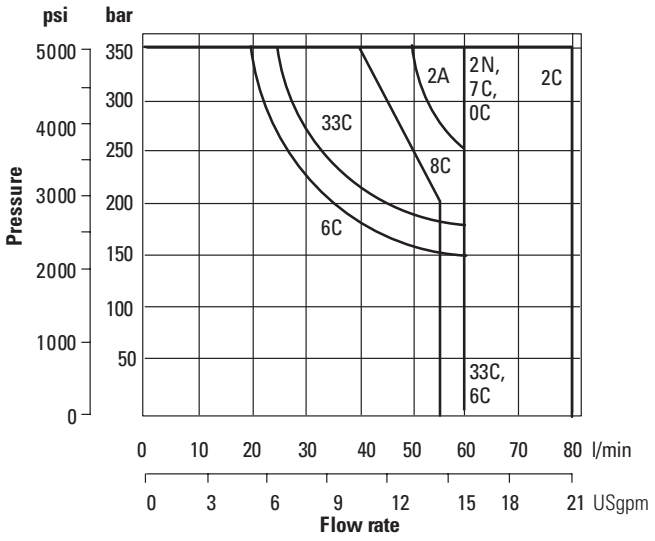
Typical with mineral oil at 36 cSt (168.6 SUS) and a specific gravity of 0.87.

II-B

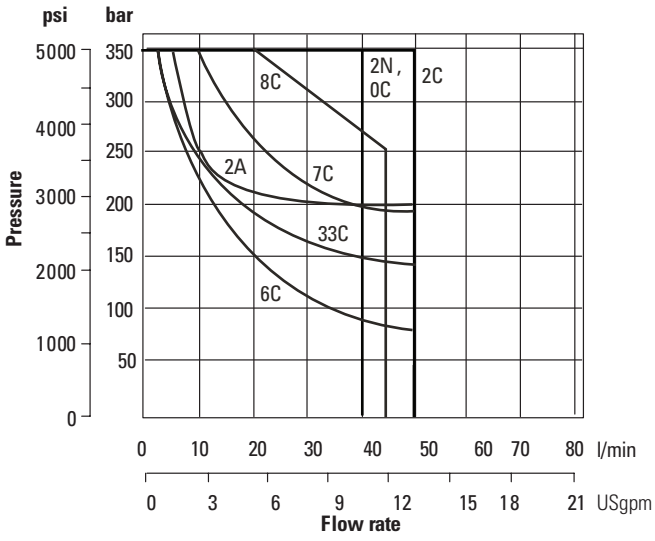
Maximum flow rates

Performance based on full power solenoid coils warm and operating at 90% rated voltage.

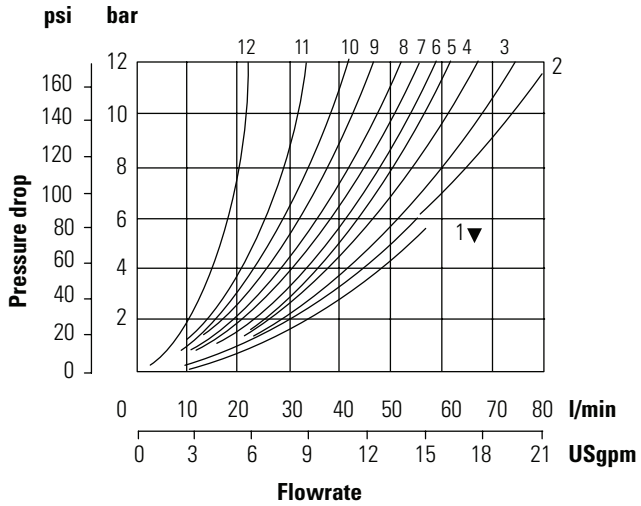
H type solenoid- 30W



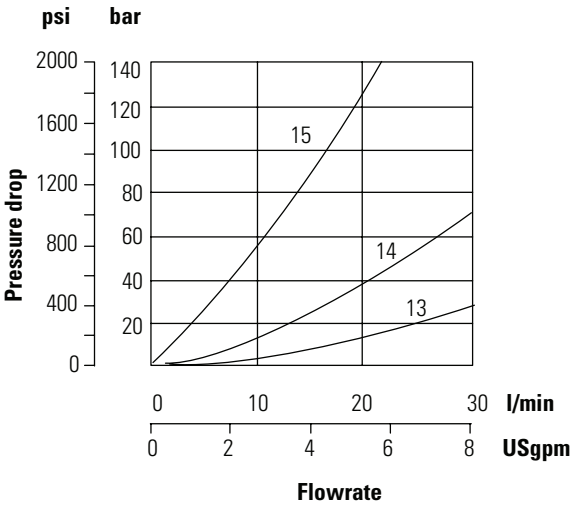
HL type solenoid- 18W- (Optional)



Pressure drops



DG4V-3



DG4V-3

▼ Curve for spool type 6: not recommended for flows in excess of 60 l/min (15.8 USgpm).

Pressure drops in offset positions except where otherwise indicated	Spool positions covered	P to A	P to B	A to T	B to T	P to T	B to A or A to B
0A(L)	Both	5	5	2	2	-	-
0B(& 0C	De-energized	-	-	-	-	4▲Δ	-
	Energized	4	4	2	2	-	-
2A(L)	Both	6	6	5	5	-	-
2B(L) & 2C	Energized	5	5	2	2	-	-
2N	Both	6	6	3	3	-	-
6B(L) & 6C	De-energized	-	-	3▲	3Δ	3	3
	Energized	6	6	1	1	-	-
7B(L) & 7C	De-energized	6▲	6Δ	-	-	-	7
	Energized	4	4	3	3	-	-
8B(L) & 8C	All	9	9	5	5	3	-
22A(L), 22B(L) & 22C	All	6	6	-	-	-	
24A(L)	De-energized	6	6	2	2	-	-
33B(L) & 33C	De-energized	-	-	15▲	15Δ	-	-
	Energized	5	5	2	2	-	-
52VL &52C	Energized	6▲	6Δ	2	-	-	10❍
56BL	Both	6▲	6Δ	11▲	10Δ	-	10❍
56C	De-energized	-	-	11▲	10Δ	-	10❍
	Energized	6▲	6Δ	2	-	-	10❍
521B	All	6▲	6Δ	-	-	-	10❍
561B	De-energized	-	-	10▲	11Δ	-	10❍
	Energized	6	6Δ	-	-	-	10❍

▲"B"plugged Δ "A"plugged ❍"P"plugged

For other viscosities, pressure drops approximate to:

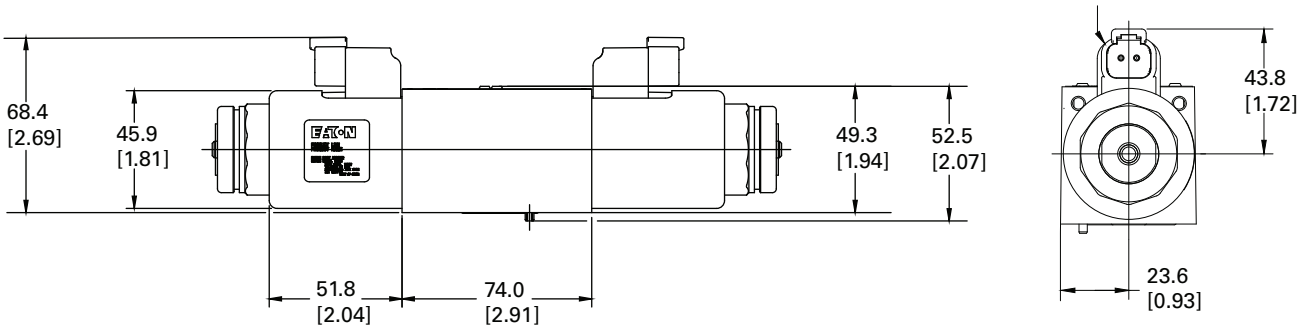
Viscosity cSt (SUS)

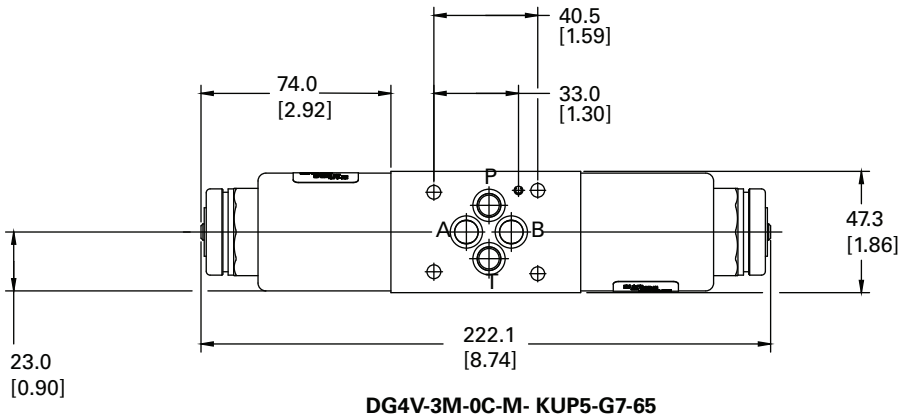
14 (17.5)	20 (97.8)	43 (200)	54 (251)	65 (302)	76 (352)	85 (399)
% of ΔP (Approx.)						
81	88	104	111	116	120	124

A change to another specific gravity will yield an approximately proportional change in pressure drop. The specific gravity of a fluid may be obtained from its producer. Fire resistant fluids usually have higher specific gravities than oil.

Installation dimension

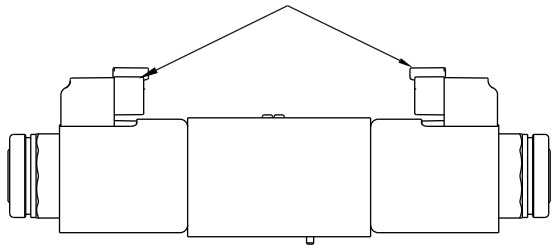
Integral deutsch connector
Deutsch male DT04-2P mating connector DT06-2S.





DG4V-3M-0C-M- KUP5-G7-65

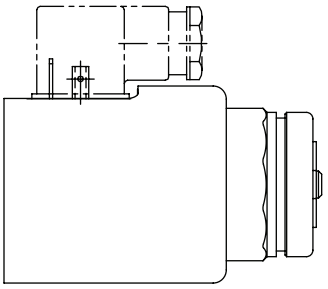
Reversed coil at both sides



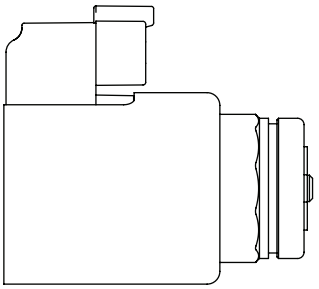
DG4V-3M-0C-M-KUP5-G7-65-RC

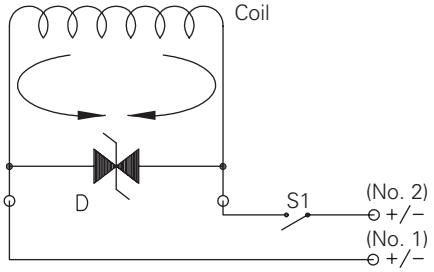
Note: Option RCA will have coil at A port reversed and option RCB will have coil at B port reversed.

U/U1



KUP5





Surge suppression device Bi - directional Zener Diode (D)

Zener diode in parallel with coil. When switch (S1) is opened, the energy stored in the coil is trapped and dissipated by the diode (D) and the coil resistance.

- The Zener makes exact limitation of inductive spikes.
- Polarity insensitive.

ISO4401 Size 03; ANSI/B93.7M-D03
DG3VP-3, DG4VP-3, CVUA-6 20 Design
Solenoid operated poppet type directional valve
DG3/4VP-3 Subplate mounted model
CVUA-6-PD- cartridge model

DG3VP-3, DG4VP-3, CVUA-6 20 Design

Solenoid operated poppet type directional valve

DG3/4VP-3 Gasket Mounted Model CVUA-6-PD- Cartridge Model

Flow rating 40 l/min (11 gpm)

Pressure Rating 315bar (4500 psi)

Bidirectional seat-valve shut-off, direct acting

Description

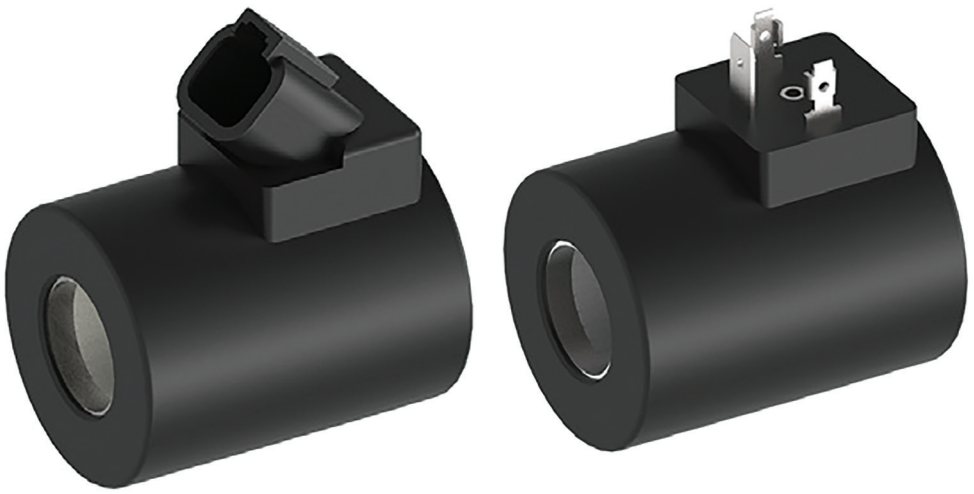
- CVUA/DG3/4VP-3 operated directional seat valves size ISO4401 - 03.
- Direct acting, pressure balanced
- Gasket mounted or push-in cartridges.
- Normal condition (de-energised closed), flow is shut off without leakage.
- The core element operates on the tried and tested principle of the guided poppet, and the guide spool has a seal.
- Two different mounting versions are available, which allows the designer to choose the insertion depth
- These type valves are predominantly used in mobile and industry where leak-tight shut off functions are crucially important.
- Zinc Nickel plated for corrosion protection
- A "de-energised open" function can be created by using the 3/2 solenoid cartridge valve and the line-mounting body.
- In this case, ports 2 and 3 are used. Port 1 is plugged.
- Design bidirectional seat-valve shut-off, direct acting poppet and valve-spool design (pressure balanced)
- Tightening torque 5.2 Nm . 5 % (4 ft-lbs . 5 %)
- Size 6, cavity type AA or cavity type AB
- Weight 0.85 kg (1.9 lbs)

Technical data

- De-energised closed
- Guided valve spool and poppet
- Available in two mounting versions
- All exposed parts with zinc-nickel plating
- High pressure wet-armature solenoids
- The slip-on coil can be rotated, and it can be replaced without opening the hydraulic envelope
- Can be fitted in a line-mounting body trial applications where leak-tight shut-off functions are crucially important.
- Examples are where loads, tensions, or clamping forces must be held without leakage.
- All external parts of the cartridge are zinc-nickel plated to DIN 50979 and are thus suitable for use in the harshest operating environments.
- The slip-on coils can be replaced without opening the hydraulic envelope and can be positioned at any angle through 360°.

General characteristics	Description, value, unit
Designation	2/2 solenoid cartridge valve
Design	Bidirectional seat-valve shut-off, direct acting poppet and valve-spool design (pressure balanced)
Mounting method	Push-in cartridge, 4 mounting bolts M5 x 10
Tightening torque	5.2 Nm ± 5 % (4 ft-lbs ± 5 %)
Size	size 6, cavity type AA or cavity type AB
Weight	0.85 kg (1.9 lbs)
Mounting attitude	Unrestricted

Coils available with DIN and Deutsch connectors



Model code

(F3) — DG*VP-3 — 10 — V M — * — * —-20**

1 2 3 4 5 6 7 8

1 Seals

F3	Viton seals
Blank	Nitrile seals

2 Function

3	Three-way
4	Four-way

3 Spool and spring arrangement

102A	Normally open, spring offset, for DG3VP models
103A	Normally closed, spring offset, for DG3VP models
104C	Normally open, spring centered, for DG4VP models
105C	Normally closed , spring centered, for DG4VP models

4 Solenoid identification

Blank	None
V	Solenoid "A" is at port "A" end and / or solenoid "B" is at port "B" end independent of spool type

5 Flag symbol

M	Electrical options and features.

6 Coil type

U	ISO4400, DIN43650
KUP5D3	Deutsch Connector H and G coils only

7 Coil rating

B	110V AC 50Hz / 115V AC 60 Hz
D	220V AC 50Hz / 230V AC 60Hz
ED	240V AC 50Hz
G	12V DC
H	24V DC
OJ	48V D
	Other voltages on request

8 Design number

20 series

(F3) — CVUA-6-PD * — * — M — U — * — 20

1 2 3 4 5 6 7 8

1 Seals

F3	Viton seals
Blank	Nitrile seals

2 Cartridge Valve Unit NG6

3 Mounting Flange Type

N	Narrow thickness flange
W	Wide thickness flange

4 Function

2	Two Way
3	Three Way

5 Flag symbol

M	Electrical options and features.

6 Coil type

U	ISO4400, DIN43650
KUP5D3	Deutsch Connector H and G coils only

7 Coil rating

B	110V AC 50Hz / 115V AC 60 Hz
D	220V AC 50Hz / 230V AC 60Hz
ED	240V AC 50Hz
G	12V DC
H	24V DC
OJ	48V DC
	Other voltages on request

8 Design number

20 series

Hydraulic characteristics	Description, value, unit
Maximum operating pressure	…315bar (…4500 psi)
Maximum flow rate	40 l/min (11 gpm)
Flow direction	1 → 2 / 2 → 1, see symbols
Hydraulic fluid	HL and HLP mineral oil to DIN 51 524; for other fluids, please contact BUCHER
Ambient temperature range 1)	-25°C … +80°C (13 °F … +176 °F)
Hydraulic fluid temperature range	-25°C … +80°C (13 °F … +176 °F)
Viscosity range	10…500mm2/s (cSt), recommended 15...250mm2/s (cSt)
Minimum fluid cleanliness Cleanliness class to ISO 4406:1999	class 20/18/15

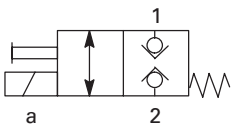
Electrical characteristics	Description, value, unit
Supply voltage	12V DC, 24V DC / 115V AC, 230V AC (50…60Hz)
Supply voltage tolerance	±10%
Ambient temperature range 1)	-25°C … +50°C (13 °F … +122 °F)
Nominal power consumption	V DC = 30…32 W / V AC = 31…32 W
Switching time	25 … 170 ms (energising) 15 … 70 ms (deenergising) These times are strongly influenced by fluid pressure, flow rate and viscosity, as well as by the dwell time under pressure.
Relative duty cycle	100%
Protection class to ISO20653 / EN60529	IP 65 / IP 67 / IP 69K, see "Ordering code" (with appropriate mating connector and proper fitting and sealing)
Electrical connection	DIN EN 175301-803, 3-pin 2 P+E (standard) for other connectors, see "Ordering code"

Functional symbols

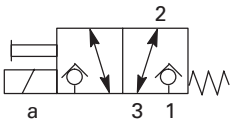
For electrical plugs see "installation dimensions" section.

For tool kits for CVUA Valves see "installation dimensions" section.

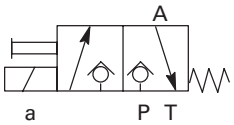
CVUA-6-PD*-2



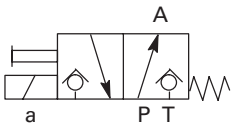
CVUA-6-PD*-3



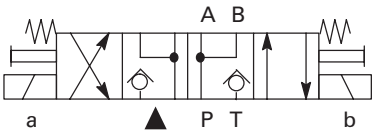
DG3VP-3-103A



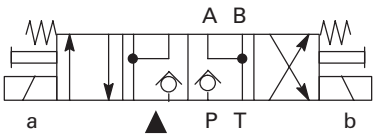
DG3VP-3-102A



DG4VP-3-104C



DG4VP-3-105C



Note: CVUA valves are supplied complete with mounting flanges and metric fixing bolts.

▲ This spool position is achieved only when both solenoids are energized simultaneously and remain so.

No leakage in either direction

Through flow in both directions

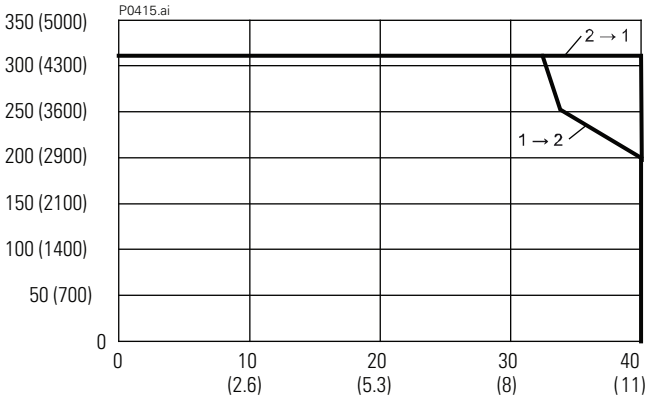
Performance graphs

II-B

DG3/4VP-3

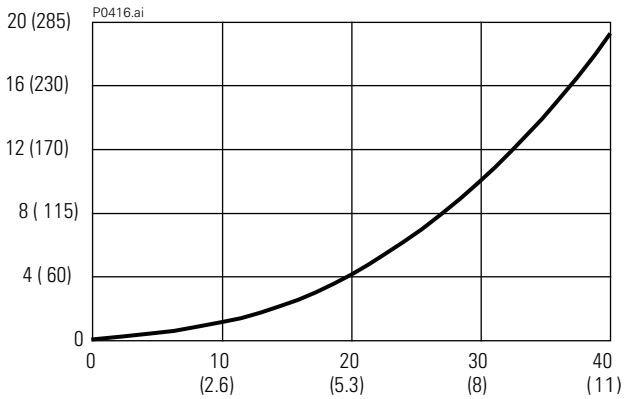
Measured with oil viscosity 33mm2/s (cSt), coil at steady-state temperature and 10 % undervoltage

p [bar (psi)]



Q [l/min (gpm)]

Δp [bar (psi)]

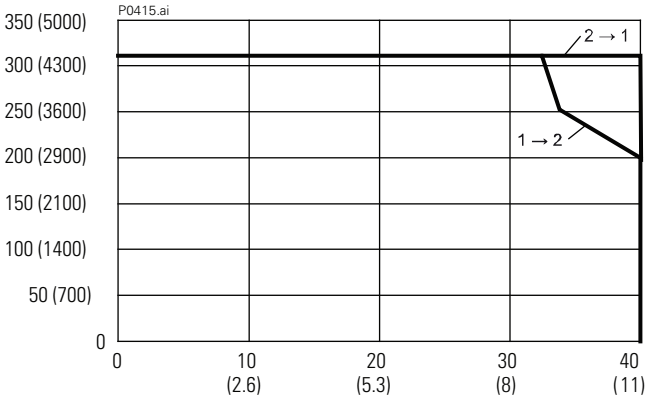


Q [l/min (gpm)]

CVUA-6

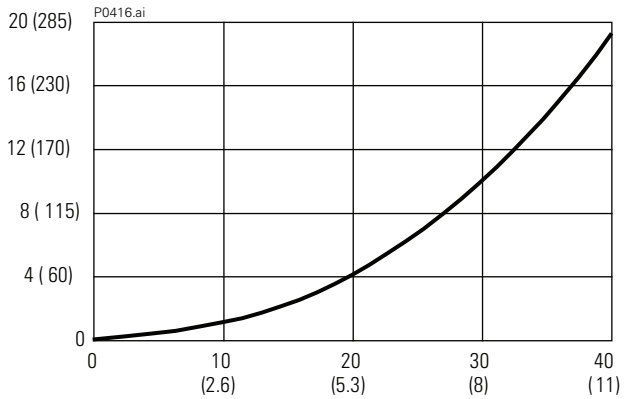
Measured with oil viscosity 33mm2/s (cSt), coil at steady-state temperature and 10 % undervoltage

p [bar (psi)]



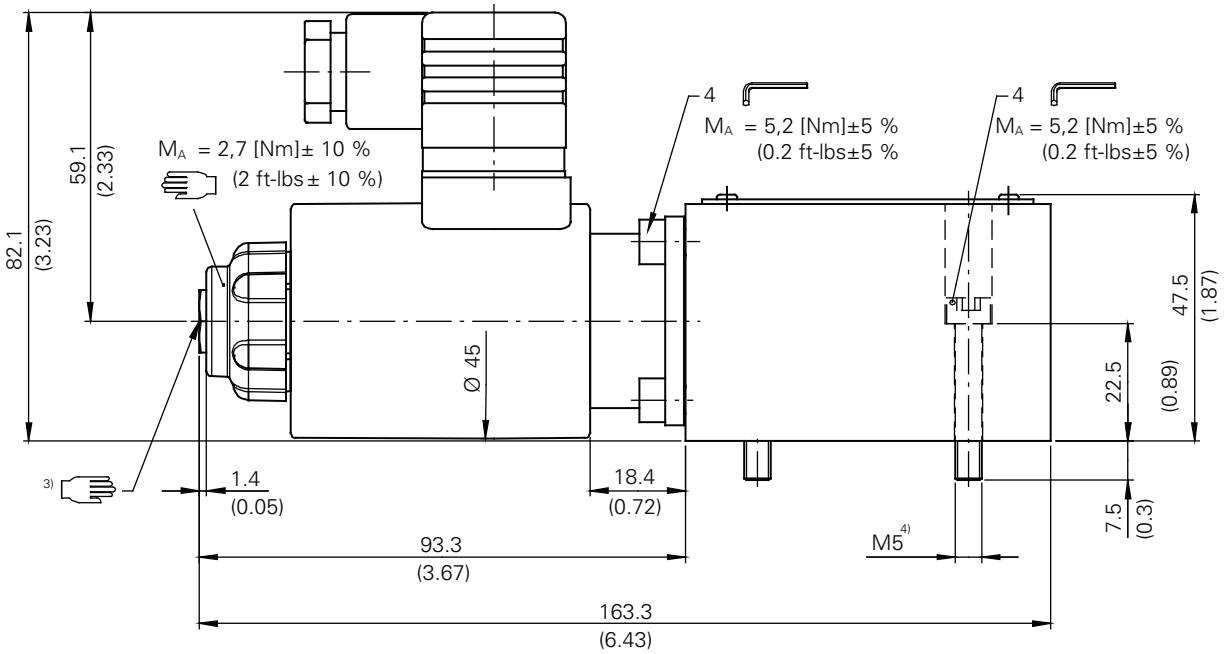
Q [l/min (gpm)]

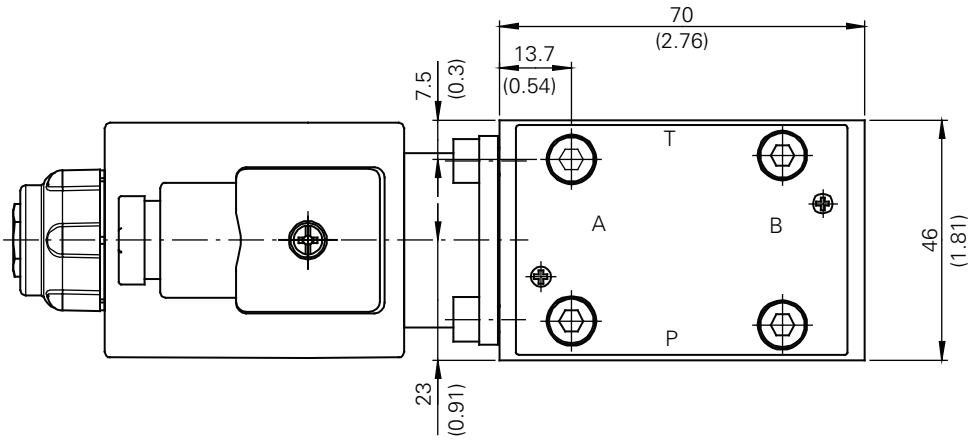
Δp [bar (psi)]



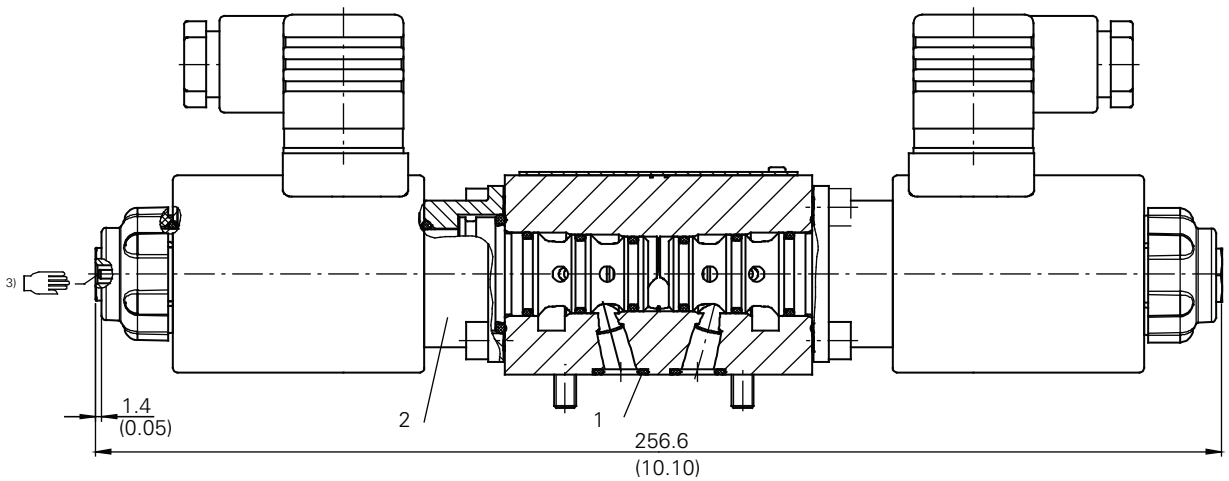
Q [l/min (gpm)]

DG3VP-3





DG4VP-3

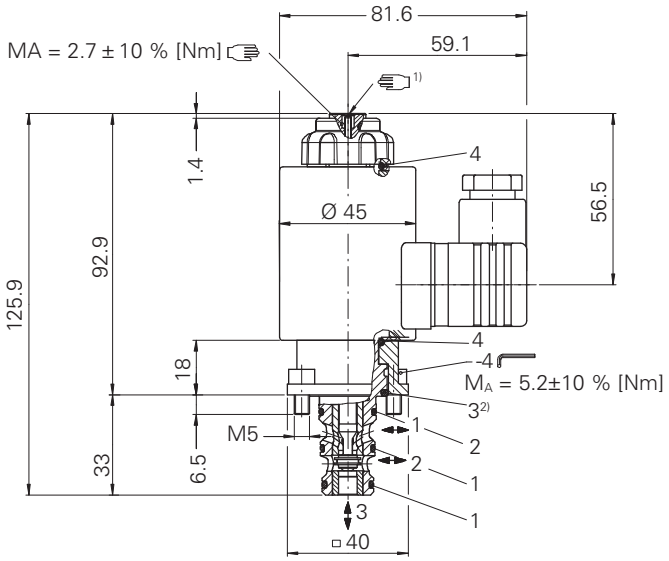


CVUA-6-PD*3

II-B

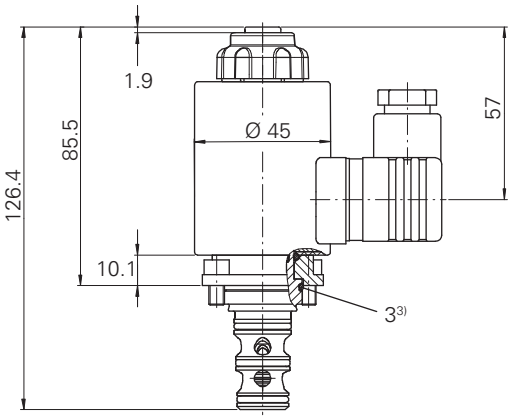
Shallow insertion model

CVUA-6-PDW3



Deep insertion model

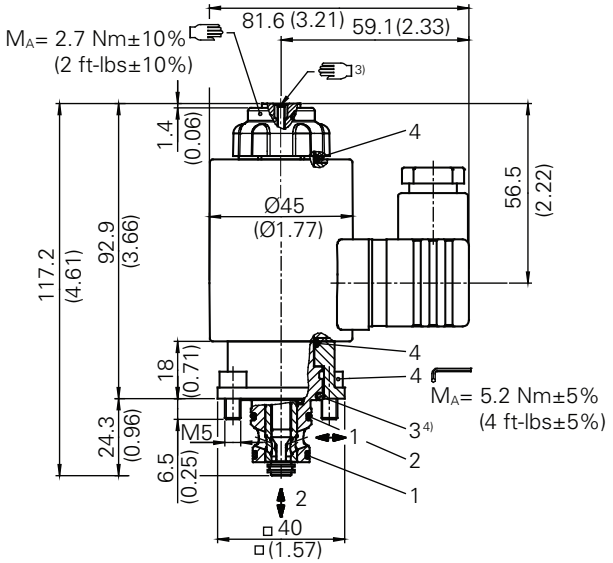
CVUA-6-PDN3



CVUA-6-PD*-2

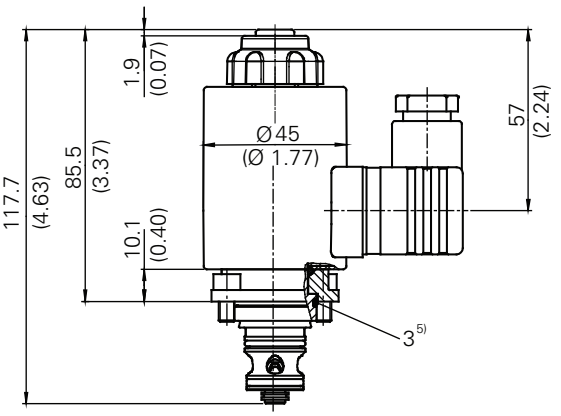
Deep insertion model

CVUA-6-PDW2



Shallow insertion model

CVUA-6-PDW2



CVUA-6-PD*-2

Recess dimensions

Notes (metric dimensions)

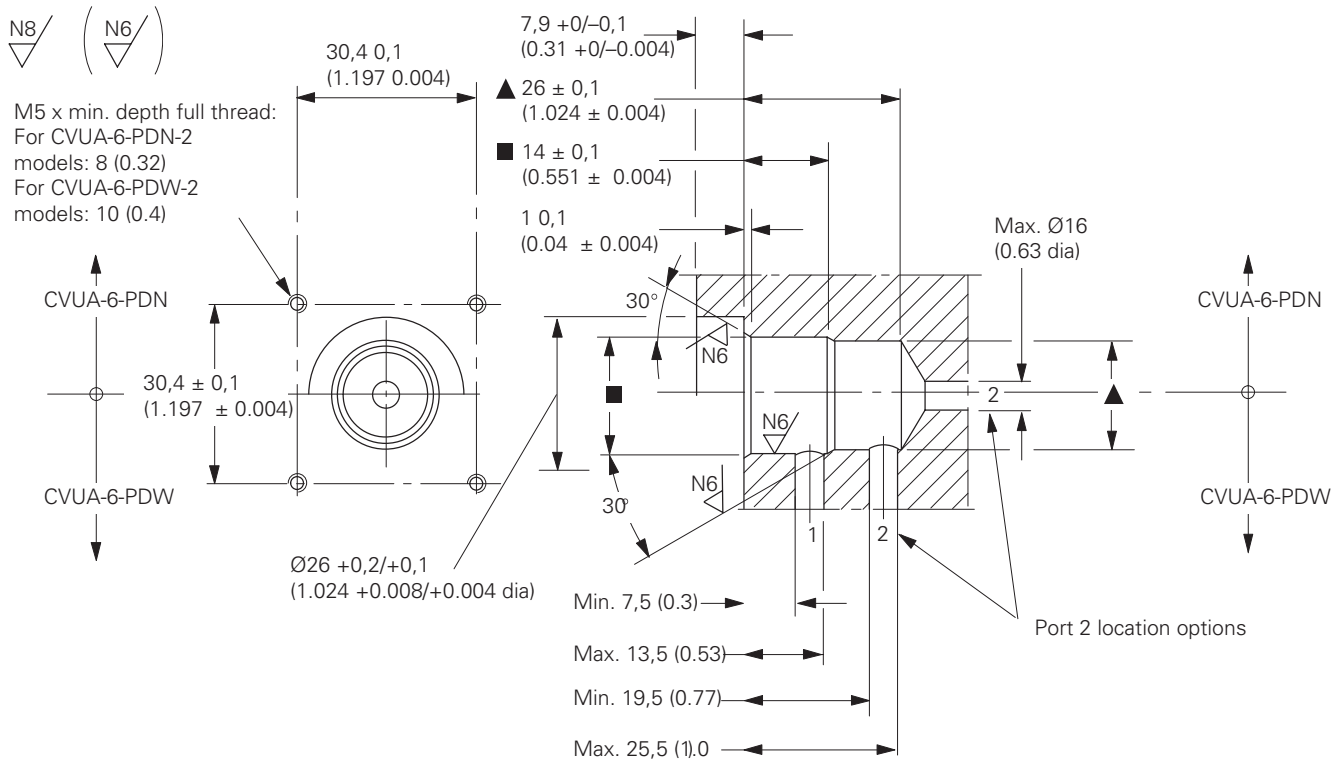
▲ Ø18 +0/–0,2 x 26 ± 0,1 deep: Ream Ø18 H7 x 20 deep min. ♦

■ Ø19 +0/–0,2 x 14 ± 0,1 deep: Ream Ø19 H7 x 8 deep min. ♦

Notes (inch dimensions)

▲ Diameter 0.709 +0/–0.008 x 1.024 ± 0.004 deep: Ream Ø18 mm H7 x 0.79 deep min. ♦

■ Diameter 0.748 +0/–0.008 x 0.551 ± 0.004 deep: Ream Ø19 mm H7 x 0.32 deep min. ♦



♦ Tool kit 638692 for machining the Ø18 mm and Ø19 mm bores (and when required, the Ø26 mm bore) can be ordered if required. The kit comprises a stepped drill and a stepped reamer.

Seal kits

6045235-001 Seal Kit for CVUA-6 10 and 20 Design

6045236-001 Seal Kit for F3-CVUA-6 10 and 20 Design

6045237-001 Seal kit for DG3/4VP-3 10 and 20 Design

6045238-001 Seal kit for F3-DG3/4VP-3 and 20 Design

CVUA-6-PD*-3

II-B

Recess dimensions

Notes (metric dimensions)

• Ø17 +0/–0,2 x 34 ± 0,1 deep: Ream Ø17 H7 x 32,5 deep min. ♦

▲ Ø18 +0/–0,2 x 26 ± 0,1 deep: Ream Ø18 H7 x 20 deep min. ♦

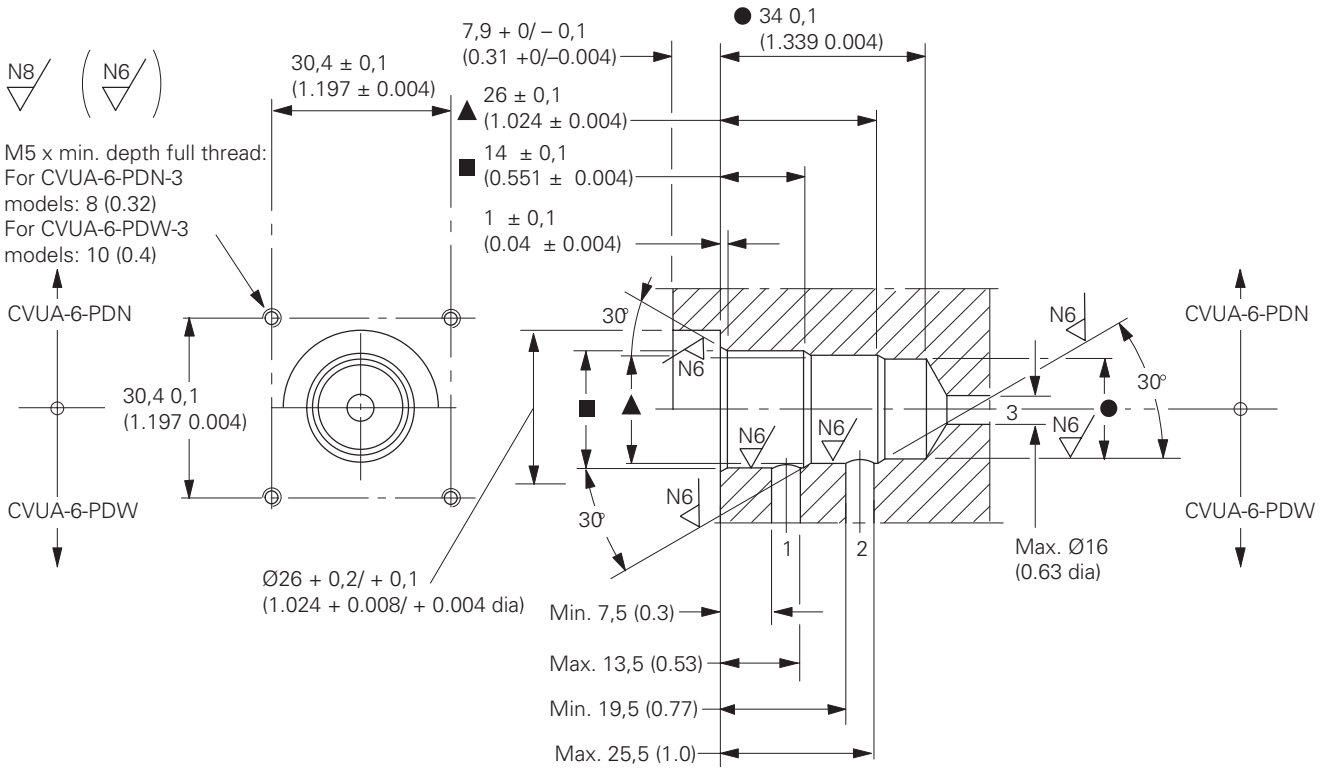
■ Ø19 +0/–0,2 x 14 ± 0,1 deep: Ream Ø19 H7 x 8 deep min. ♦

Notes (inch dimensions)

• Diameter 0.669 +0/–0.008 x 1.339 ± 0.004 deep: Ream Ø17 mm H7 x 1.28 deep min. ♦

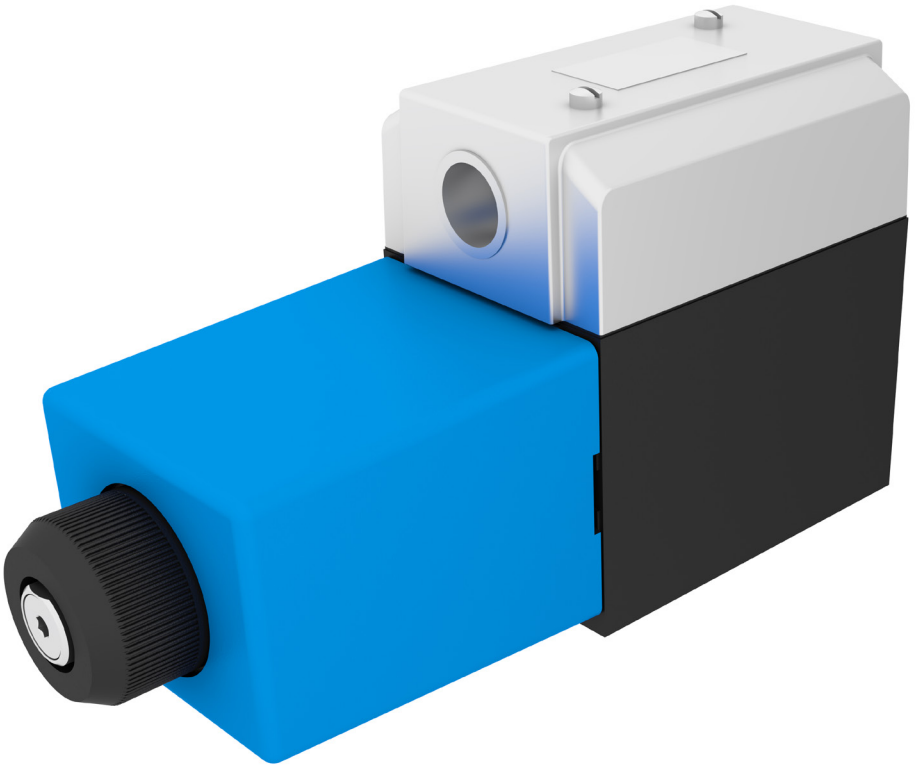
▲ Diameter 0.709 +0/–0.008 x 1.024 ± 0.004 deep: Ream Ø18 mm H7 x 0.79 deep min. ♦

■ Diameter 0.748 +0/–0.008 x 0.551 ± 0.004 deep: Ream Ø19 mm H7 x 0.32 deep min. ♦



♦ Tool kit 459285 for machining the Ø17 mm, Ø18 mm and Ø19 mm bores (and when required, the Ø26 mm bore) can be ordered if required. The kit comprises a stepped drill and a stepped reamer.

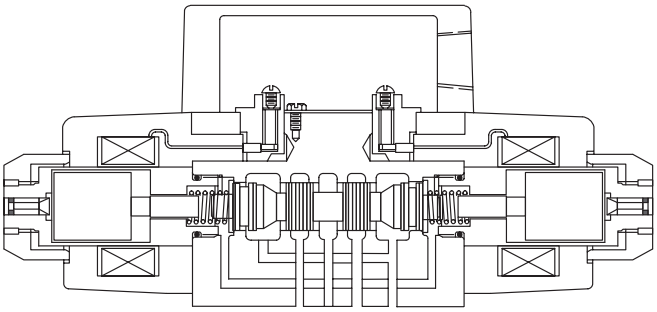
ISSO4401 Size 05; ANSI/B93.7M-D05
DG4V4-01



This wet armature solenoid operated directional control valve is for directing and stopping flow at any point in a hydraulic system. Its primary function is to determine the direction of the fluid flow in a work cylinder or determine the direction of rotation of a fluid motor.

These valves are designed to meet the requirements of high performance, precision industrial hydraulic systems operating at pressures up to 315 bar (4570 psi) and flows to 115 L/min (30 USgpm). They mount on the ISO size 05 mounting surface.

The performance of the most conventional solenoid operated directional valves is limited by the flow forces acting on the spool in opposition to the solenoids and return springs. Special attention is given to compensating for, or minimizing, these undesirable forces in the design of the series 5 valve.



Features and benefits

High performance

High pressure and flow capability with performance comparable to competitors, due to 315 bar (4570 psi) and 115 L/min (30 USgpm) ratings.

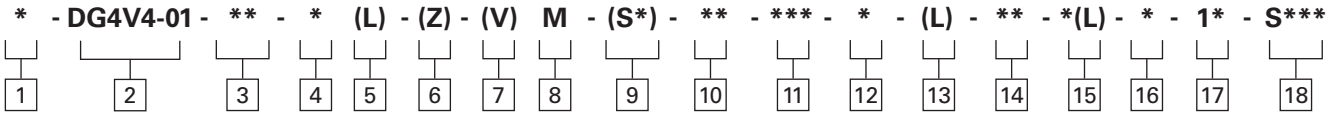
Reliability

A high margin of shifting force is available to overcome spool friction due to dirt and other contaminants. Also, a balance spool with cushioned shift means less wear and long life.

- Wet armature solenoids for quieter operation and long life with no dynamic seal leakage.
- Molded coil construction is impervious to moisture and dirt.
- Larger diameter spool combined with constant area and tangential flow passages result in low pressure drop.
- Stainless steel solenoid pin is processed hardened for long life.
- Patented detent mechanism for greater reliability and long life.

Service ability

- Plug-in coils and electrical connections simplify maintenance.
- Cartridge style manual actuators; easily replaced or exchanged for an SAE plug.
- Plug–in solenoid coil for ease of servicing can be replaced without disturbing the hydraulic system or wiring cavity.
- Two solenoid sizes to choose from for optimum performance and cost selection.
- Optional pin-type or top-side plug-in electrical connectors for easy valve replacement. Reversible to fit any installation need.
- Dual frequency (50/60 Hz) 2-wire coils for lower inventory at the OEM (optional).



1 Special seals

F3	Viton
F6	Buna nitrile/high can

2 Model series

DG4V4-01	Subplate mounting; solenoid operated. Pressure rating 315 bar (4570 psi) for ports P, A & B.

3 Spool type

Please refer functional symbols on Page 4 for spool types.

4 5 Spool/spring arrangement

A	Spring offset, end-to-end
AL	Same as "A" but left hand build
B	Spring offset, end to center
BL	Same as "B" but left hand build
C	Spring centered
N	No spring detented

6 Manual override options

Omit if serviceable.

Z	No manual override
H	Water-resistant override(s) on solenoid end(s)

7 Solenoid energization identity

V	Solenoid ''A'' is at port ''A'' end/ or solenoid ''B'' is at port ''B'' end, independent of spool type.

Omit for U.S. ANSI B93.9 standard requiring solenoid ''A'' energization to connect P to A and/ or solenoid ''B'' to connect P to B, independent of solenoid location.

8 Flag symbol

M	Electrical options and features

9 Spool indicator switch

Blank	Without switch
S3	Switch, wired normally open
S4	Switch, wired normally closed

10 Coil type

Omit for plug-in. Coils with junction box

U	ISO 4400 (DIN 43650) mounting+
U1	Connector fitted
KU	Top exit flying lead (150mm)
KUP6	Flying lead external to coil with Deutsch connector
KUPM4	

♦ Refer to pages 102 - 103 for more information. Female connector to be supplied by customer.

11 12 Junction box with electrical connectors

PA3W	Three pin connector
PA5W	Five pin connector
PM4W	M12 connector

13 Solenoid indicator lights

Omit if not required.

L	Lights fitted

14 15 Surge suppressor

Omit for low power

B	110V AC 50 Hz/120V AC 60 Hz
D	220V AC 50 Hz/240V AC 60 Hz
G	12V DC
H	24V DC

Omit for standard power.

BL	110V AC 50 Hz/120V AC 60 Hz (low watt)
HL	24V DC (low watt)

*F6 seals not available with DC low power voltages.

16 Port T code

4	70 bar (1000 psi) (low power)
5	120 bar (1750 psi) (standard power)

17 Design number

Subject to change, installation dimensions remain as shown for design numbers 10 through 19.

18 Special features

S	Special suffix
S324	CSA approved

Maximum pressure

Ports P, A & B 315 bar (4570psi)*

Port T 120 bar (1750 psi)

(See model code)

* 70 bar (1000 psi) with high water base fluids (95% maximum water content) or low watt coils

Solenoid energizing

Spring centered and spring offset valves will be spring positioned unless the solenoid is energized continuously. No-spring detented valves may be energized momentarily, approximately 0.15 second; when the solenoid is de-energized the spool will remain in the last position attained, provided there is no shock, vibration or unusual pressure transients.

Standard

Voltage rating	Inrush Amps (rms)	Holding Amps (rms)	Holding- Watts
120V AC 60 Hz	3.95	0.98	37
110V AC 50 Hz	4.10	0.98	37
240V AC 60 Hz	1.97	0.49	37
220V AC 50 Hz	1.77	0.49	36
110V AC 50 Hz	3.25	0.77	30
220V AC 50 Hz	1.55	0.42	28
240V AC 50 Hz	1.55	0.42	28
12V DC		3.64	45
24V DC		1.83	45

Low power

Voltage Rating	Inrush Amps (rms)	Holding Amps (rms)	Holding- Watts
120V AC 60 Hz	2.40	0.69	27.5
110V AC 50 Hz	2.40	0.78	28.5
240V AC 60 Hz	1.15	0.25	27.5
220V AC 50 Hz	1.10	0.35	28.5
110V AC 50 Hz	2.40	0.61	23
220V AC 50 Hz	1.00	0.24	23
240V AC 50 Hz	1.20	0.26	23
12V DC		2.33	33
24V DC		1.25	30

Response time

The following response times were measured from the point of energization/ de-energization to the point of first indication of inlet pressure change. Response up to full system pressure is dependent on the system's compressed volume and can vary with each application.

CAUTION

Any sliding spool valve, if held shifted under pressure for long periods, may stick and not return, due to silting. Therefore, it is recommended that the valve be cycled periodically to prevent this from occurring.

		AC Solenoid		DC Solenoid	
Series	Valve type	Solenoid energized	Spring return	Solenoid energized	Spring return
Standard	Spring centered	20 ms	50 ms	50 ms	80 ms
Low power		20 ms	35 ms	40 ms	35 ms
Standard	Spring offset	18 ms	25 ms	50 ms	50 ms
Low power		15 ms	35 ms	50 ms	15 ms
Standard	Detented	22 ms		120 ms	
Low power		15 ms			

Maximum flow data

Maximum recommended flow data is for AC or DC solenoids at 90% nominal voltage in a 4-way circuit with cylinder ports either looped or blocked and containing 2,5 liter (0.66 USgpm) compressed volume. Reduced performance may result when certain spools are used in 3-way circuits.

Valve function, symbol and recommended maximum flow

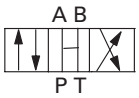
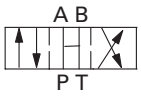
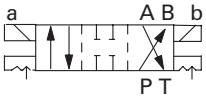
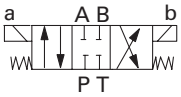
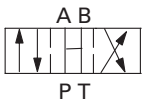
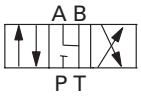
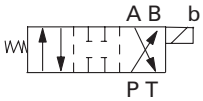
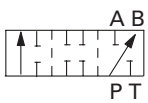
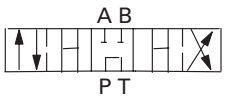
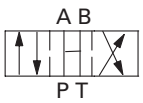
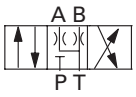
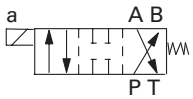
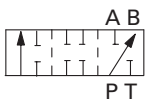
(See page 97 for maximum flow curves).

Fluids and seals

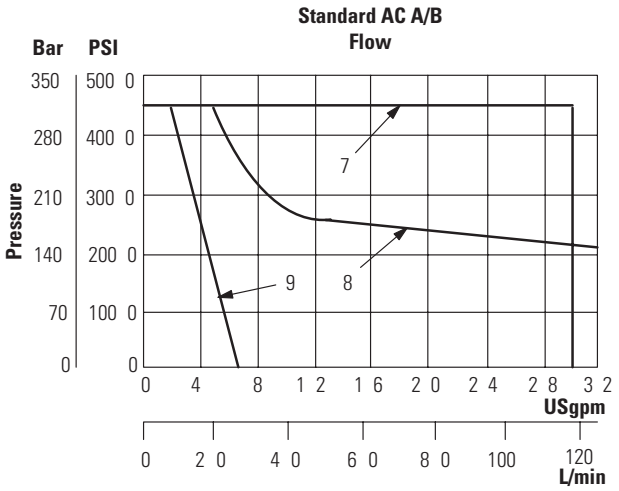
Buna N seals are standard and are compatible with water-in oil emulsions, high water base fluids and petroleum oils. For phosphate ester fire resistant fluids, Viton seals must be specified. Seals for water glycol have an F6 designation. Maximum operating pressure for high water base fluids is 1000 psi.

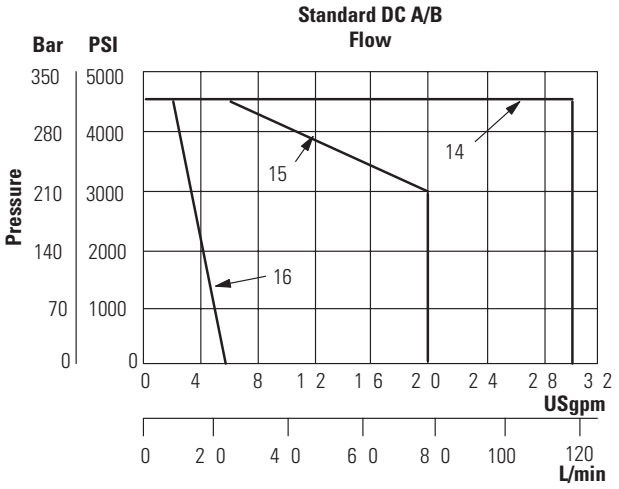
Application recommendations

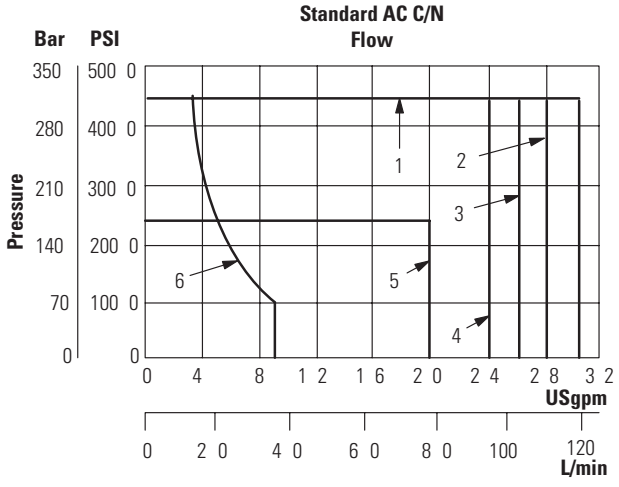
Filtration: ISO 4406 Code 20/18/15 Operating temperature: 20 to 50 C (70 to 120 F) Fluid Viscosity: 16 - 51 cSt (75 - 250 SUS)

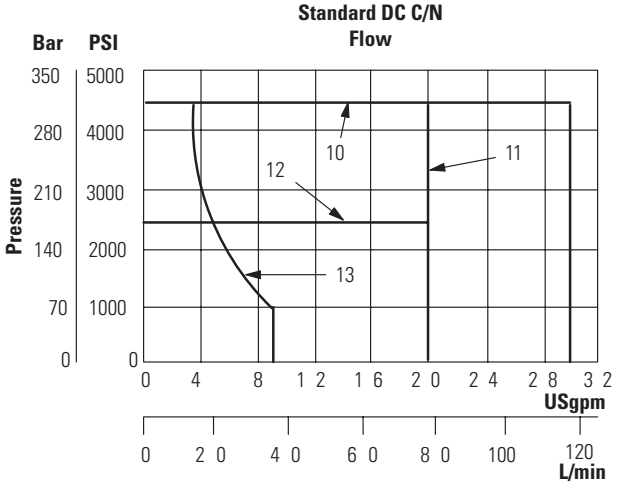
		Max. Flow curve						Max. Flow curve			
		Standard		Low power				Standard		Low power	
Spool type	3 Position spring centered (C)	AC	DC	AC	DC	Spool type	2 Position detented (N)	AC	DC	AC	DC
0		1	10	17	21	0		1	11	17	N/A
-		6	13	18	N/A	2		1	11	18	N/A
2		1	10	17	21	-	2 Position spring offset to Port A (A)				
-		4	11	18	21	0		7	14	17	21
6		3	11	18	21	2 6		7	14	17	21
-		1	10	17	21	22		9	16	N/A	N/A
8		5	12	20	21	-	2 Position spring offset to Port B (B)				
-		1	10	17	21	0		7	14	17	21
33		2	11	18	21	2 6		8	15	19	21
-	-	-	-	-	-	22		9	16	N/A	N/A

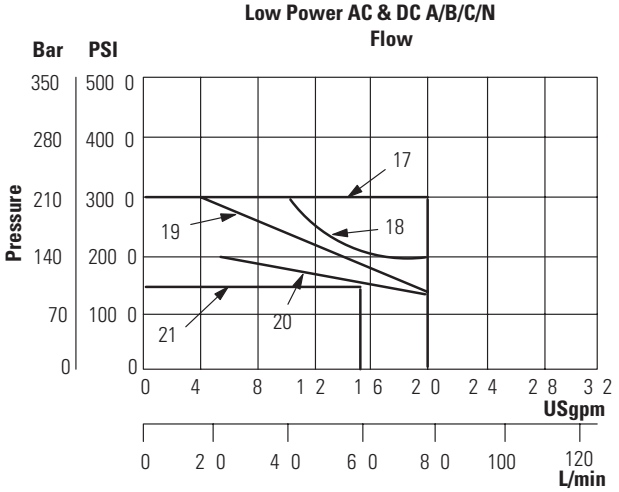
Maximum flow curves











Pressure drops in offset positions except where otherwise indicated

Spool code	P to A	P to B	A to T	B to T	P to T
0	1	1	1	2	1
1	3	4	1	6	4
2	4	4	2	3	–
3	4	4	1	3	–
6	4	4	1	2	–
7	1	1	4	6	–
8	7	7	4	4	3
11	4	3	6	1	_
22	4	4	–	–	–
31	4	4	3	1	–
33	4	4	3	3	–

For other viscosities, pressure drops approximate to:

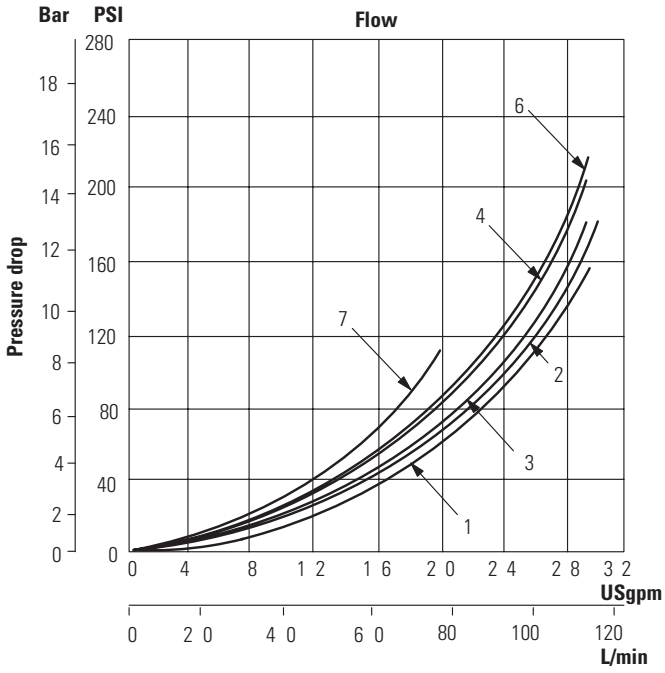
Viscosity cSt (SUS)						
14	**20**	**43**	**54**	**65**	**76**	**85**
(17.5)	**(97.8)**	**(200)**	**(251)**	**(302)**	**(352)**	**(399)**
%of ΔP						
81	88	104	111	116	120	124

A change to another specific gravity will yield an approximately proportional change in pressure drop.

The specific gravity of a fluid may be obtained from its producer. Fire resistant fluids usually have higher specific gravities than oil.

Drain

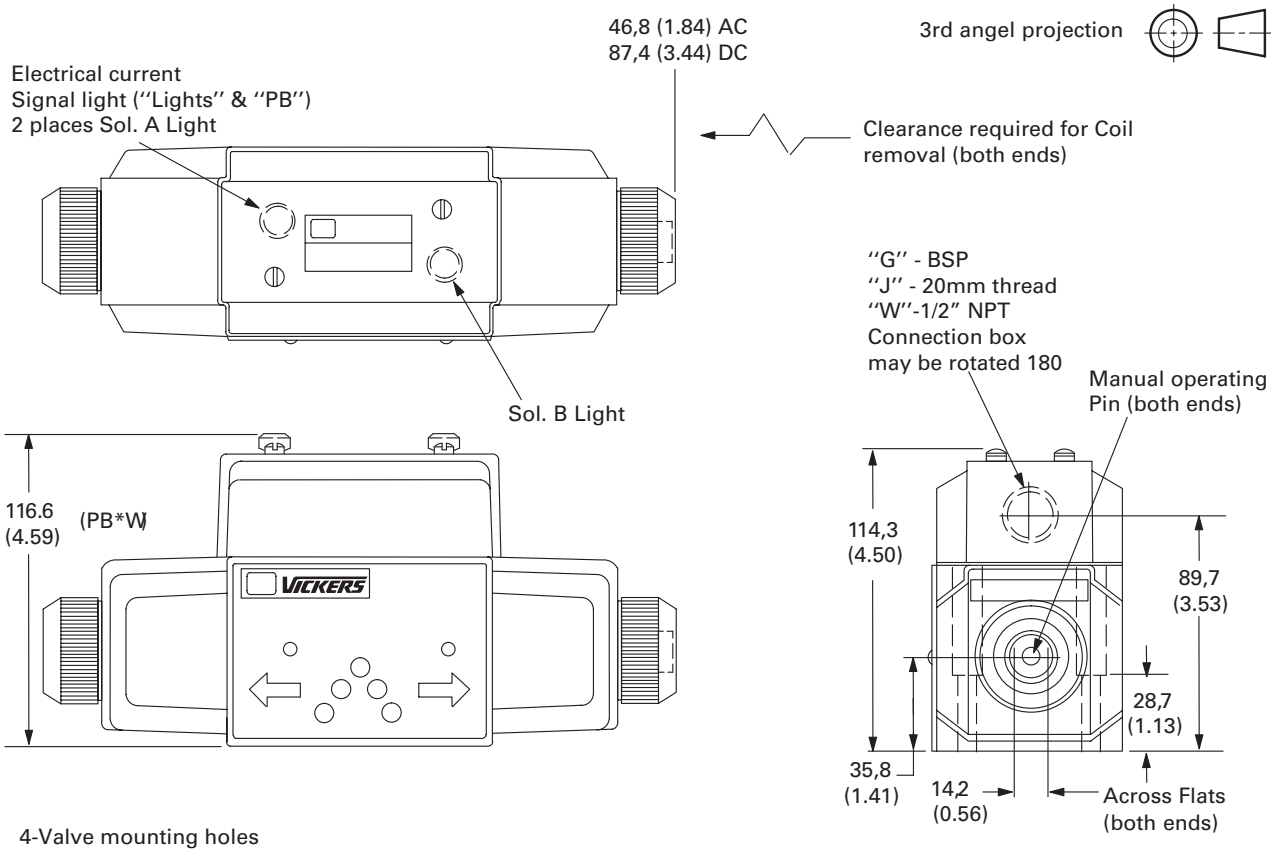
On 2-way valves, ''T'' is the drain and must be connected to the tank through a surge-free line, so there will be no back pressure at this port.

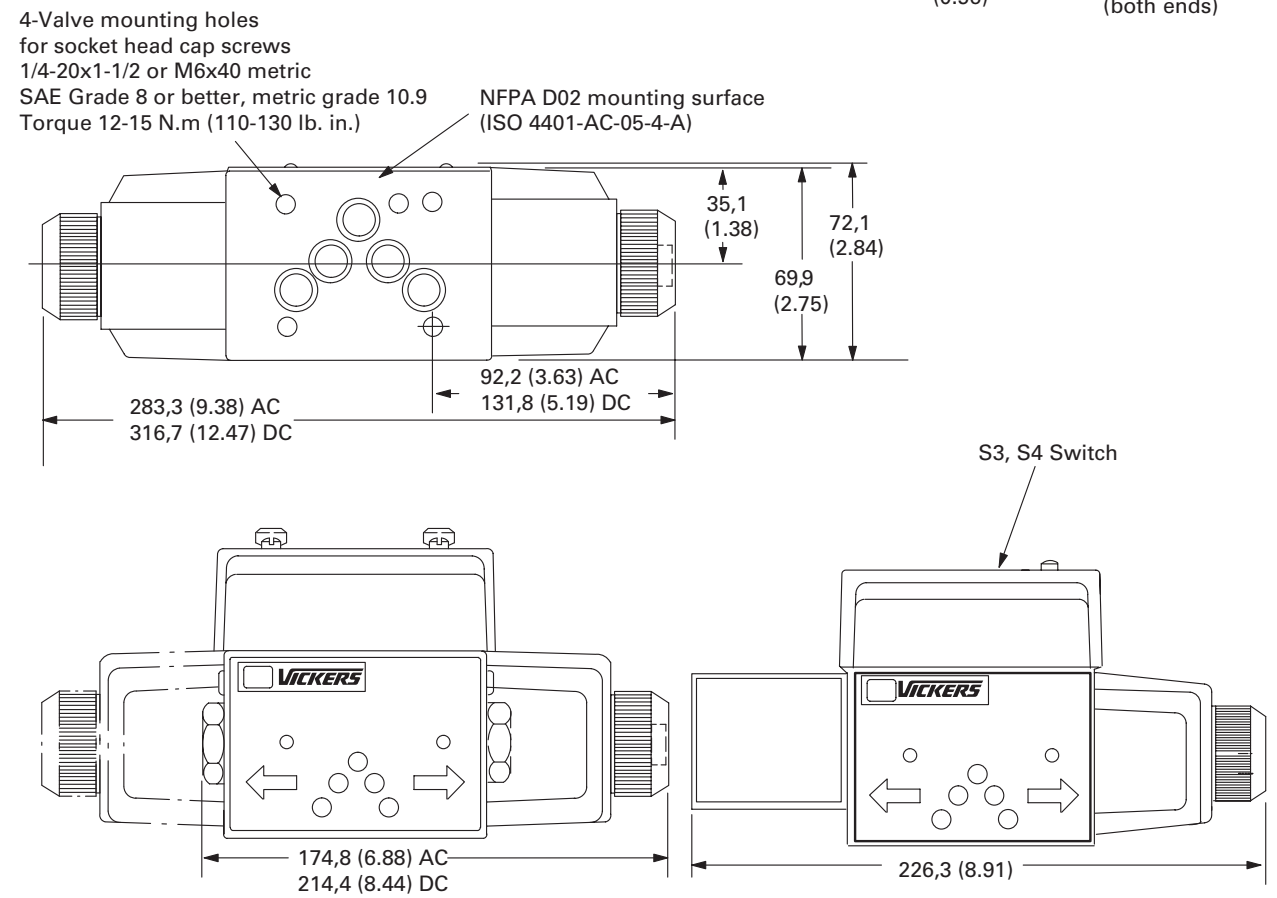


⚠ CAUTION

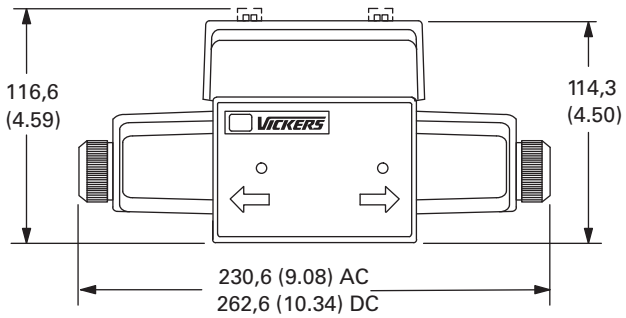
Surges of oil in a common line serving these and other valves can be of sufficient magnitude to cause inadvertent shifting of these valves. This is particularly critical in the no-spring detented type valves. Separate tank lines, or a vented manifold with a continuous downward path to tank are necessary. Consult your Vickers representative for instructions.

Standard conduit box & 'PB' Insta-plug

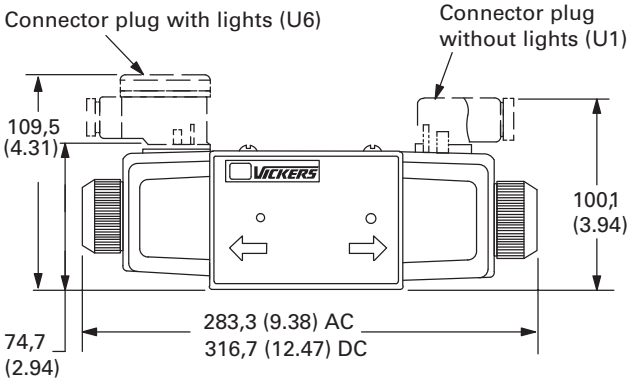




'L' Low power option

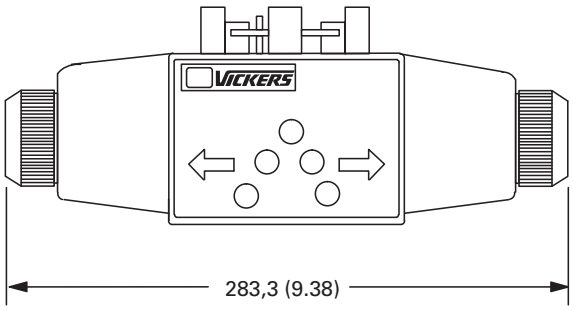


'U' DIN 43650 Connector* option

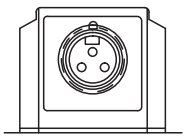


*Connector plug not included with valve

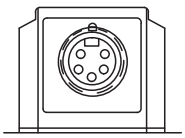
'PA'



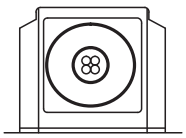
Connector option, Pin type 'PA3'/'PA5' (NFPA T 3.5.29) PM4 (SAE H1738-2)



Single Solenoid Valve (PA3)



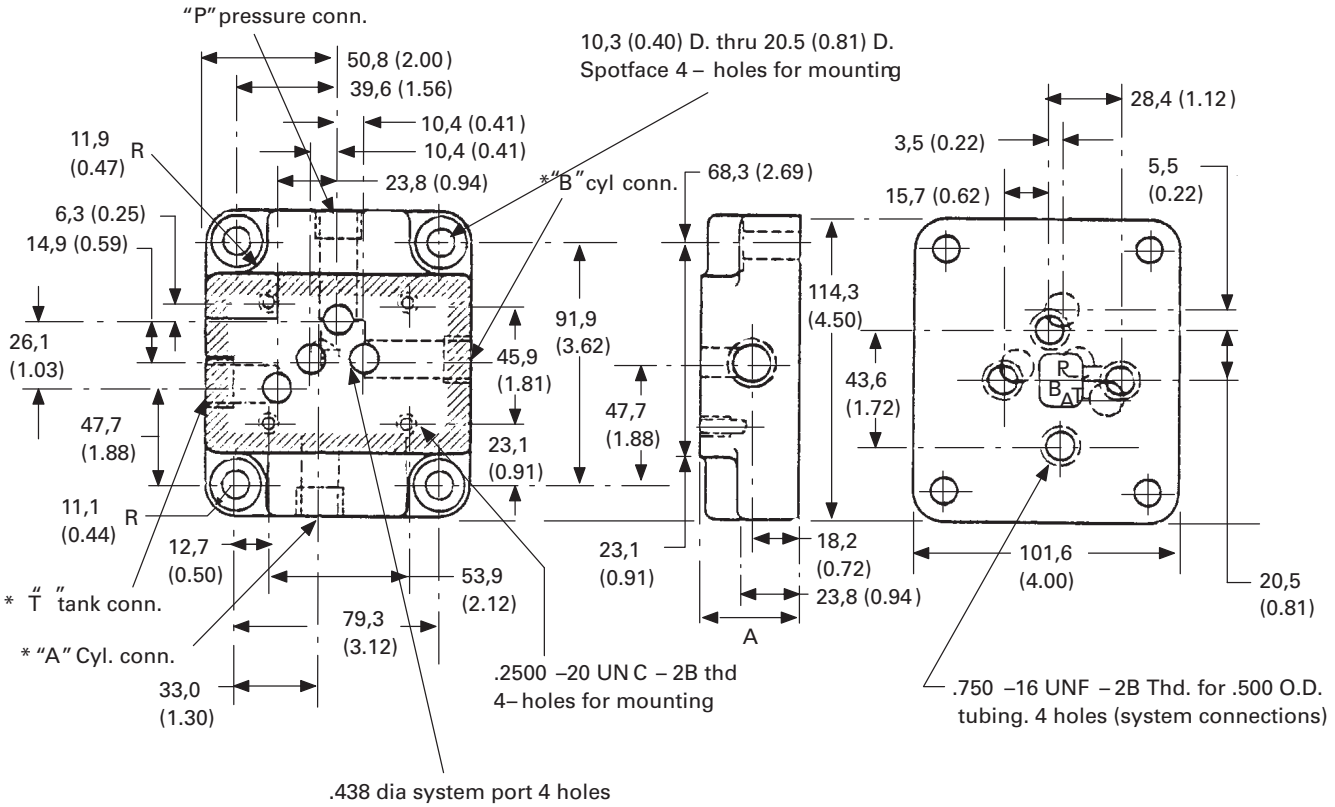
Double Solenoid Valve or Optional Single Solenoid Valve (PA5)



Double Solenoid Valve or Optional Single Solenoid Valve (PM4)

Number of Solenoids	Number of pins	Option code
Single	3	PA3
Single or Double	5	PA5
Single or Double	4	PM4

Subplate and mounting surface



***Ports on model DGSME–01–20–T8 only**

Model	Dimension "A"
DGSM–01–20–T8	31,75 (1.25)
DGSME–01–20–T8	38,10 (1.50)

Note: Metric grade 10.9 (SAE Grade 8) mounting bolts required.

Bolt kits

Bolt kits include 4 directional valve mounting bolts and are ordered separately.

***Ports on model DGSME–01–20–T8 only**

Model Codes	Sizes	Thread
BKDG01-633	¼-20-1½	Inch
BK855993M	M6x1x40	Metric

Note: Metric grade 10.9 (SAE Grade 8) mounting bolts required.

When subplate is not used, a machined pad (as indicated by subplate shaded area) must be provided for mounting; pad must be flat within 0.0127 mm (.0005 inch) and smooth within 1.6 flm (63 microinch).

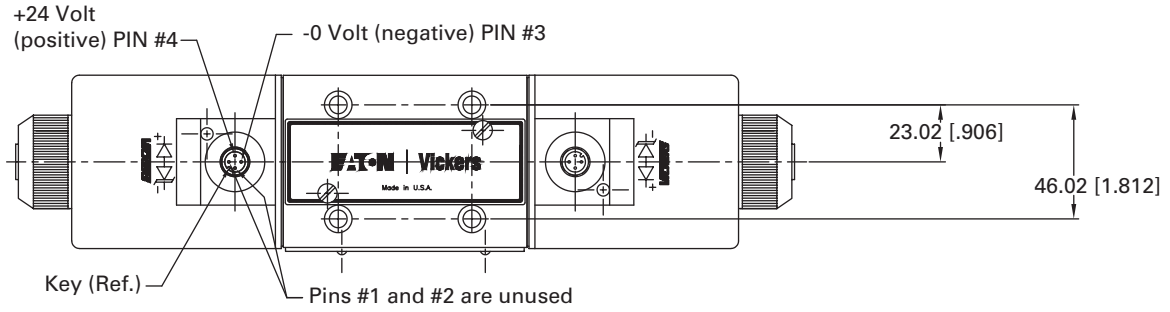
Fluid cleanliness

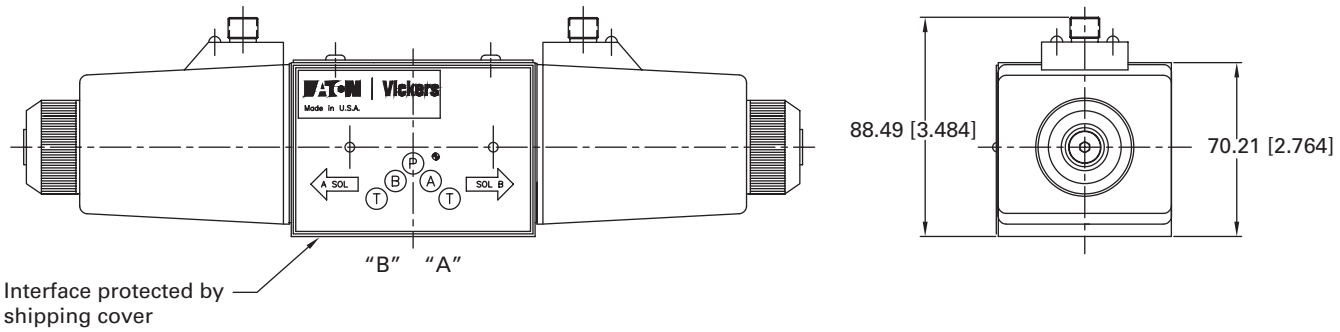
Essential information on the correct methods for treating hydraulic fluid is included in Vickers publication 561 "Vickers Guide to Systemic Contamination Control" available from your local Vickers distributor or by contacting Vickers, Incorporated. Recommendations on filtration and the selection of products to control fluid condition are included in 561.

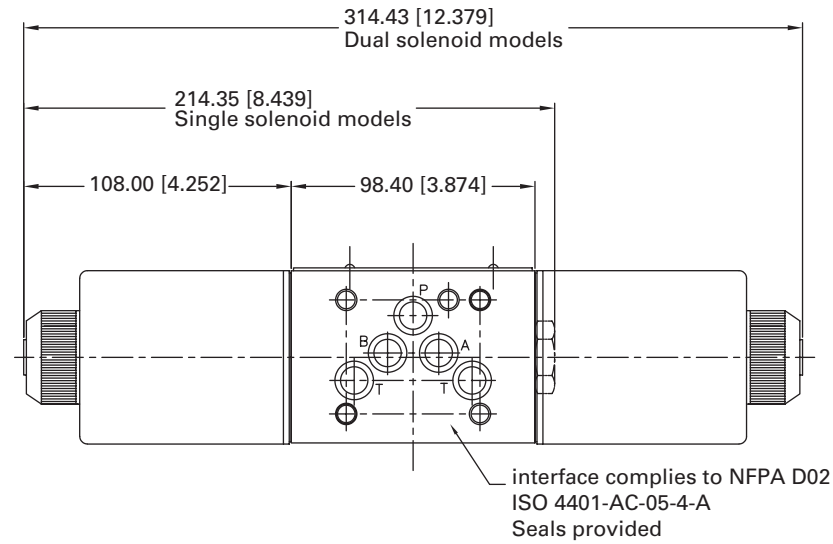
Recommended cleanliness levels, using petroleum oil under common conditions, are based on the highest fluid pressure levels in the system. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these cleanliness codes. See Vickers publication 561 for exact details.

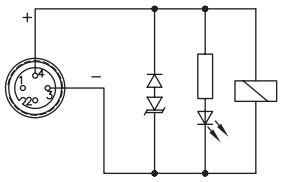
Filtration requirements

20/18/15



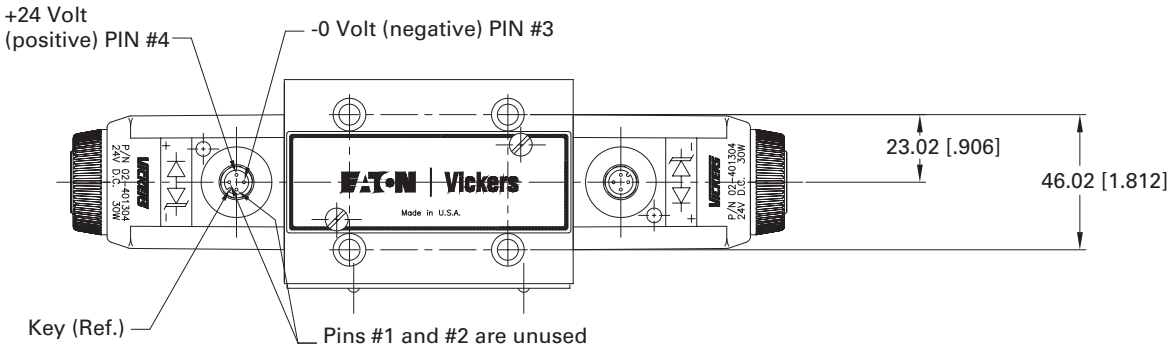


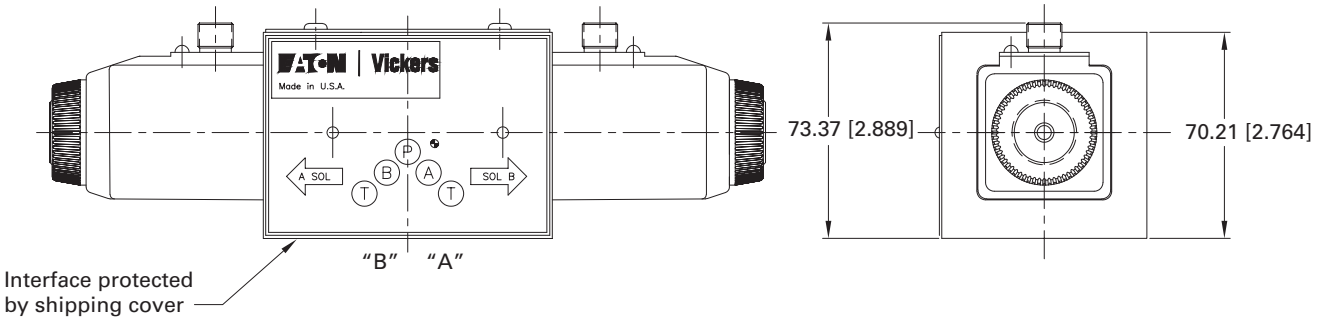


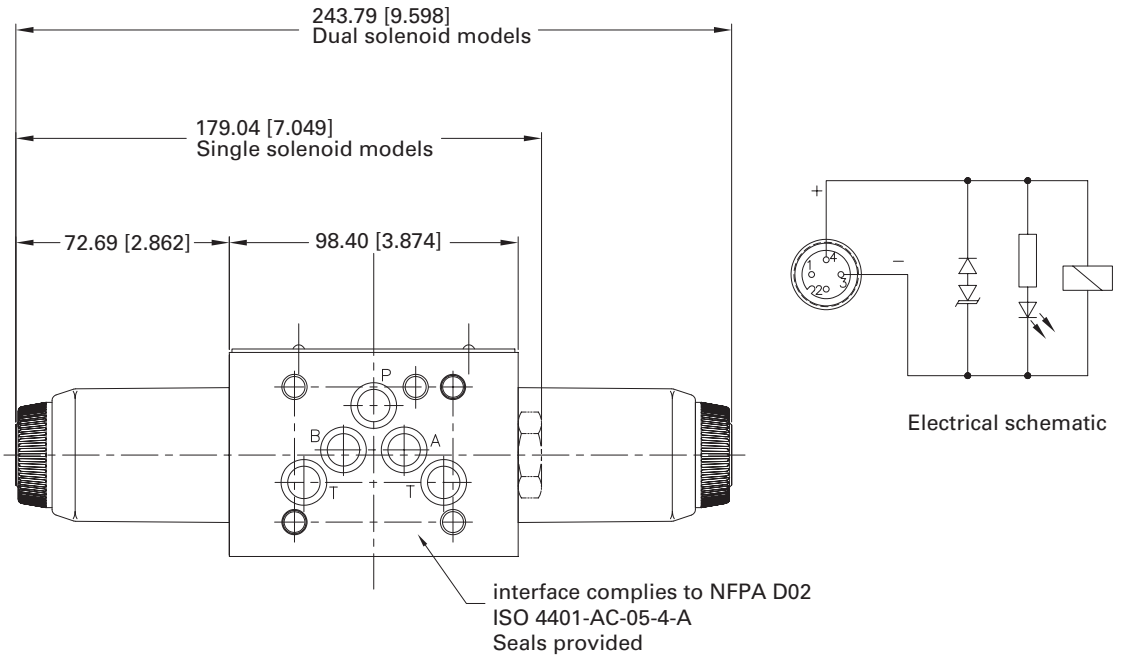


(F*) - DG4V4 - 0 1***(L) - (Z) - (V)M - KUPM4L - D7 - * - 5 10 Series
Standard power

M12 Connectors feature







(F*) - DG4V4 - 01***(L) - (Z) - (V)M - KUPM4L - D7 - *L - 4 10 Series
Low watt

ISSO4401 Size 05; ANSI/B93.7M-D05
Manual lever operated directional valve
DG17V4-01

Model code

Two & four-way directional valves

(F*)	D	G	1*	V4	-	01	*	*	(L)	-	(H)	(M	-	S*	-	U(1)	-	10
1	2	3	4	5		6	7	8	9		10	11		12		13		14

1 Interface seals

Blank	Buna N (std.)
F3	VIton (fire resistant seals)
F6	Nitrile seals (water glycol)

2 Directional control

3 Mounting type

G	Manifold or subplate

4 Control type

17	Manual lever operated

5 Flow direction

V4	Four-way, 310 bar (4500 psi)

6 Valve size

01	ISO-4401-05, NFPA-D05 interface

7 Spool type (crossover condition)

0	Open center
2	Closed center
6	Closed center, P only
8	Open center, A and B blocked
22	Closed center, 2-way
33	Closed center, bleed A & B

8 Spool/Spring arrangement

A	Spring offset (handle out)
A2	Spring offset (handle in)
C	Spring centered
N	No spring detented

9 Left hand build

Omit for standard right hand assembly

10 Handle

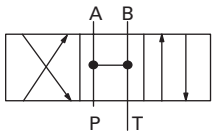
H	Booted handle for harsh environment
	Omit if not required

11 Design number

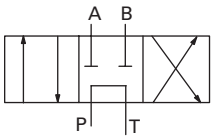
Subject to change. Installation dimensions remain as shown for design numbers 10 through 19.

Spool variations

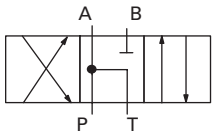
DGV4-010*-10**



DGV4-018*-10**



DGV4-011*-10**



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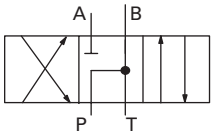
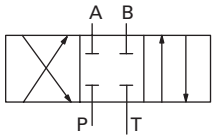
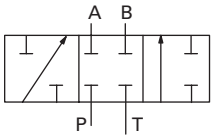


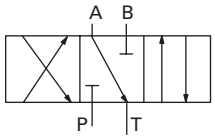
DGV4-010*-10**



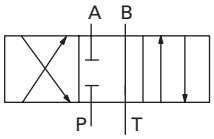
DGV4-0122*-10**



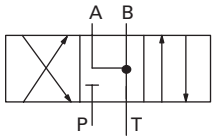
DGV4-013*-10**



DGV4-013*-10**



DGV4-016*-10**



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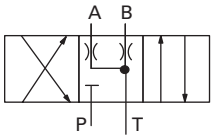
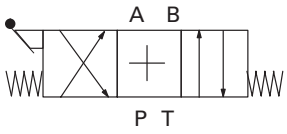


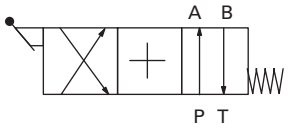
Operator variations

DG17V4-01-10 Lever operator**

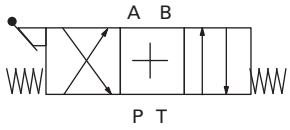


Spool variations

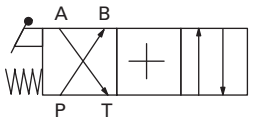
DG17V4-01*A-10



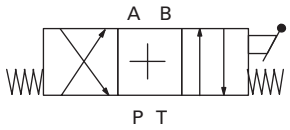
DG17V4-01*C-10



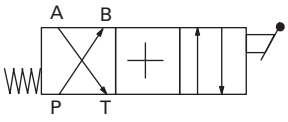
DGV4-011*-10**



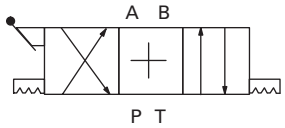
DGV4-011*-10**



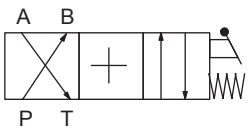
DG17V4-01*AL-10



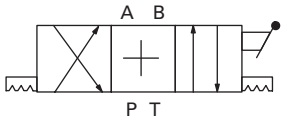
DG17V4-01*N-10



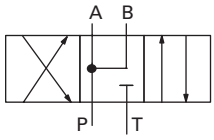
DG17V4-01*A2L-10



DG17V4-01*NL-10



DGV4-017*-10**



Performance data

Max. pressure P, A & B ports: For all spools except type "8" 315 bar (4500 psi)

For type "8" spools only 175 bar (2500 psi)

Max. pressure T port : 70 bar (1000 psi)

Max. flow:

- All DG17V4 models except type "1" and "11" spools - 114 l/min (30 USgpm)
- All DG17V4 models with type "1" and "11" spools - 45 l/min (12 USgpm)
- All DG1V4-01*N models except type "1" and "11" spools - 76 l/min (20 USgpm)
- All DG1V4-01*N models with type "1" and "11" spools - 45 l/min (12 USgpm)
- All DG1V4-01*A/C models - 30 l/min (8 USgpm)

Handle shift force:

DG17V4 "A" – 38 N. (8.5 lbs.)

DG17V4 "C" – 36 N. (8.0 lbs.)

DG17V4 "N" – 20 N. (4.5 lbs.)

Operating temperature:

20° to 50° C (70° to 120° F)

Weights (approx):

DG1V4: 3,1 kg (6.9 lbs.)

DG17V4: 3,4 kg (7.4 lbs.)

Bolt kits:

(metric) - BK855993M

(inch) - BDKG01-633

SAE grade 8 (metric grade 12,9) or better required Max. bolt torque: 12,6 Nm (112 lb. in.)

Subplate: 2 kg (4.5 lbs.)

Fluid viscosity: 75-250 SUS (15-51 cSt)

Fluid Cleanliness - See page 114.

Fluids & seals

BUNA-N seals are standard and are compatible with water-in-oil emulsions, high water based fluids, and petroleum oil. "F3" (Viton) seals are compatible with phosphate esters, and "F6" seals are for water glycol. Maximum operating pressure for high water based fluids is 69 bar (1000 psi).

Mounting Interface

ISO 4401-05

CETOP 5

NFPA D05

Shifting action

Spring offset valves are spring positioned unless lever is actuated. Spring centered valves return the spool to center position when the lever or knob control is released. No-spring detented valves will remain in the last position attained provided there is no severe shock, vibration or unusual pressure transients.

Mounting position

No-spring detented valves must be installed with the longitudinal axis horizontal for good machine reliability. The mounting position of spring-offset, and spring centered models is unrestricted.

Installation data

On two-way valves "T" is the drain connection and must be piped directly to tank through a surge-free line so there will be no back pressure at this port.

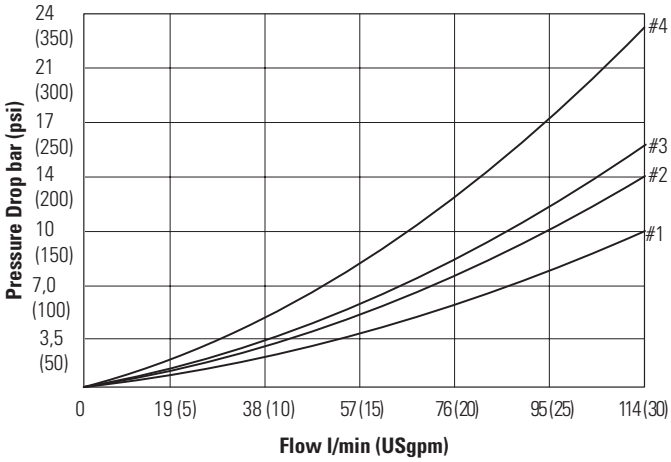
Note: Any sliding spool valve, if held for long periods of time, may stick and not spring return due to fluid residue formation and therefore, should be cycled periodically to prevent this from happening.

⚠ CAUTION

Surges of oil in a common tank line serving these and other valves can be of sufficient magnitude to cause inadvertent shifting of these valves. This is particularly critical in the no-spring detented type valves. Separate tank lines or a vented manifold with a continuous downward path to tank is necessary.

Pressure drop

See chart below



Pressure drop reference curve

DG17V4-010*-10	1	1	1	2	2
DG17V4-011*-10	1	1	1	2	2
DG17V4-012*-10	2	2	1	2	2
DG17V4-013*-10	2	2	1	2	-
DG17V4-016*-10	2	2	1	2	-
DG17V4-017*-10	1	1	3	3	-
DG17V4-018*-10	4	4	3	4	2
DG17V4-0111*-10	1	1	2	2	2
DG17V4-0122*-10	2	2	-	-	-
DG17V4-0131*-10	2	2	1	2	-
DG17V4-0133*-10	2	2	1	3	-

a. Figures in the pressure drop chart give approximate pressure drops (ΔP) when passing 20,5 cSt (100 SUS) fluid having .865 specific gravity.

b. For any other flow rate (Q_1), the pressure drop (ΔP_1) will be approximately: $\Delta P_1 = \Delta P(Q_1/Q_2)^2$

c. For any other viscosity(s), the pressure drop (ΔP) will change as follows:

d. For any other specific gravity (G_1)*, the pressure drop (ΔP_1), will be approximately: $\Delta P_1 = \Delta P(G_1/G)$

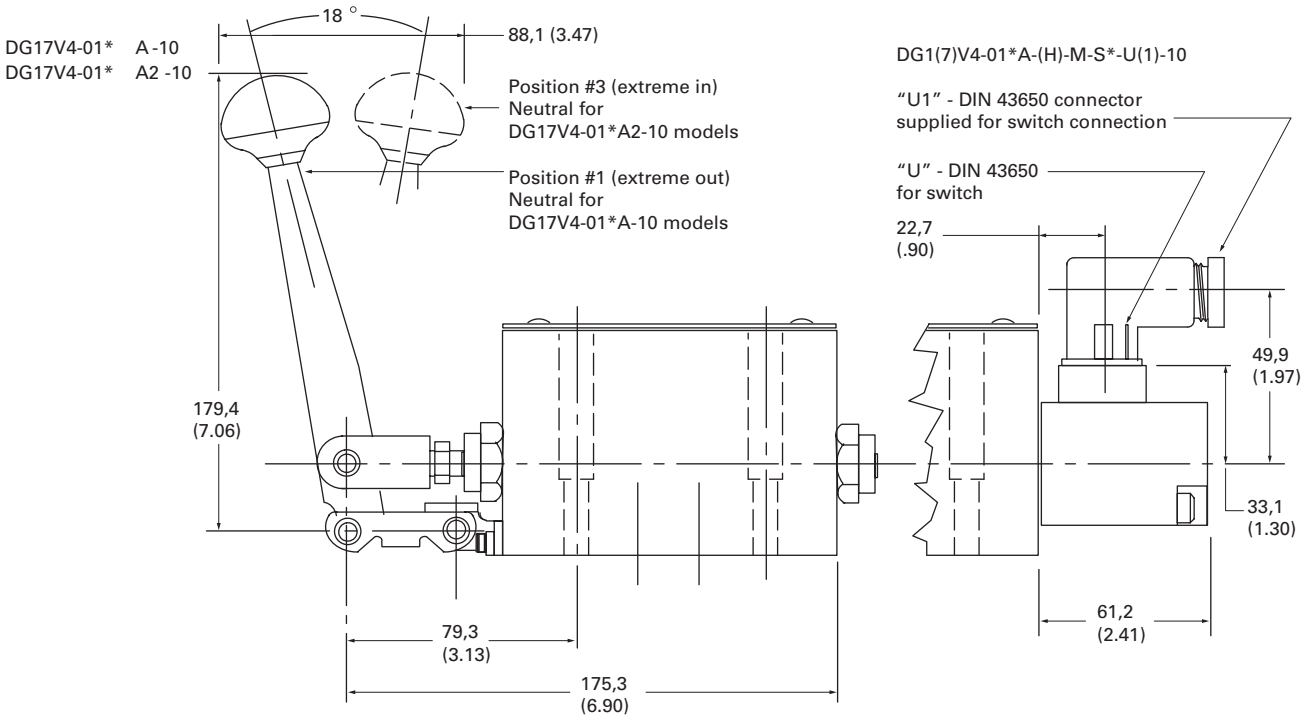
* Specific gravity of fluid may be obtained from its producer. The value is higher for fire-resistant fluids than for oil.

For other viscosities, pressure drops approximate to:

Viscosity cSt (SUS)						
14	20	43	54	65	76	85
17.5)	(97.8)	(200)	(251)	(300)	(350)	(400)
%105 of ΔP (Approx.)						
81	88	104	111	116	120	124

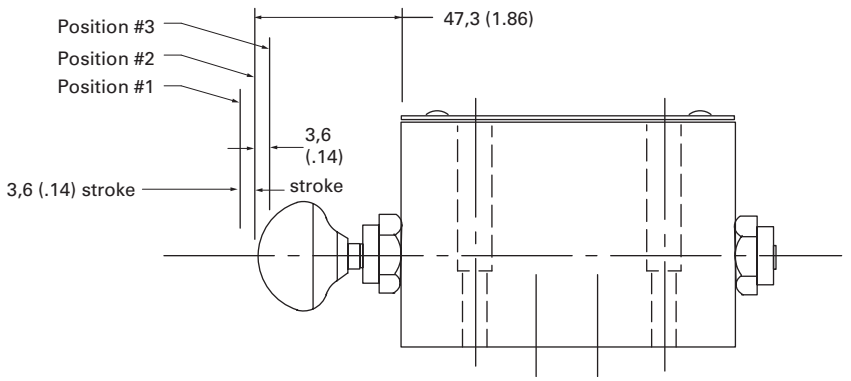
Installation dimensions

Manual lever operated valves
Millimeters (inches)



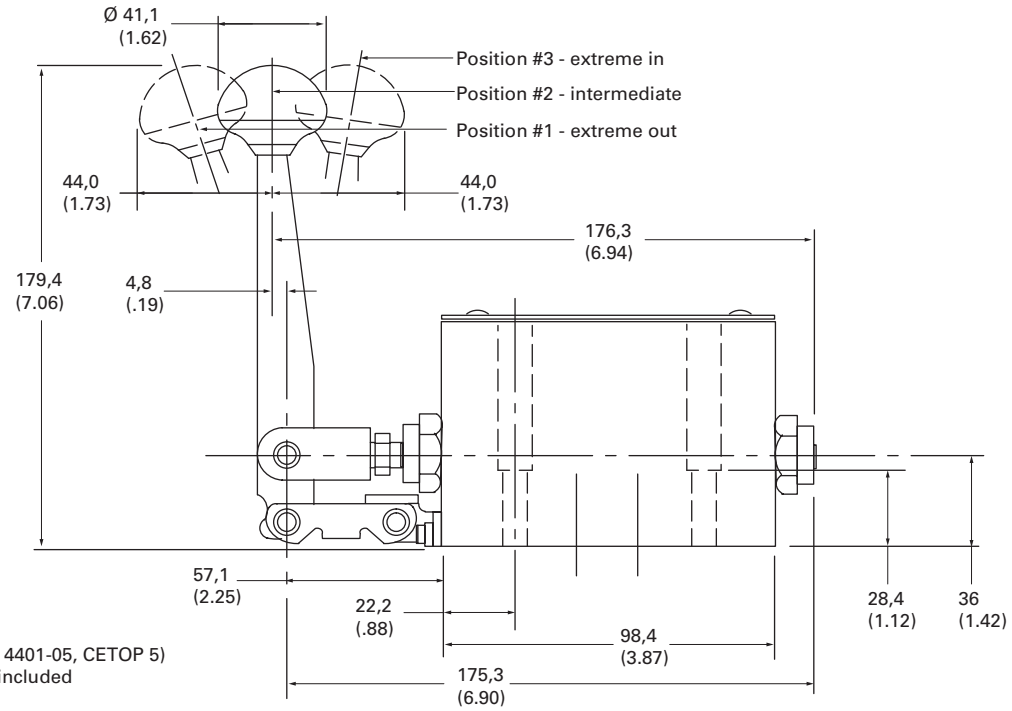
Manual knob operated valve

DG1V4-01**-10



Spring centered & no-spring detented manual lever operated valves

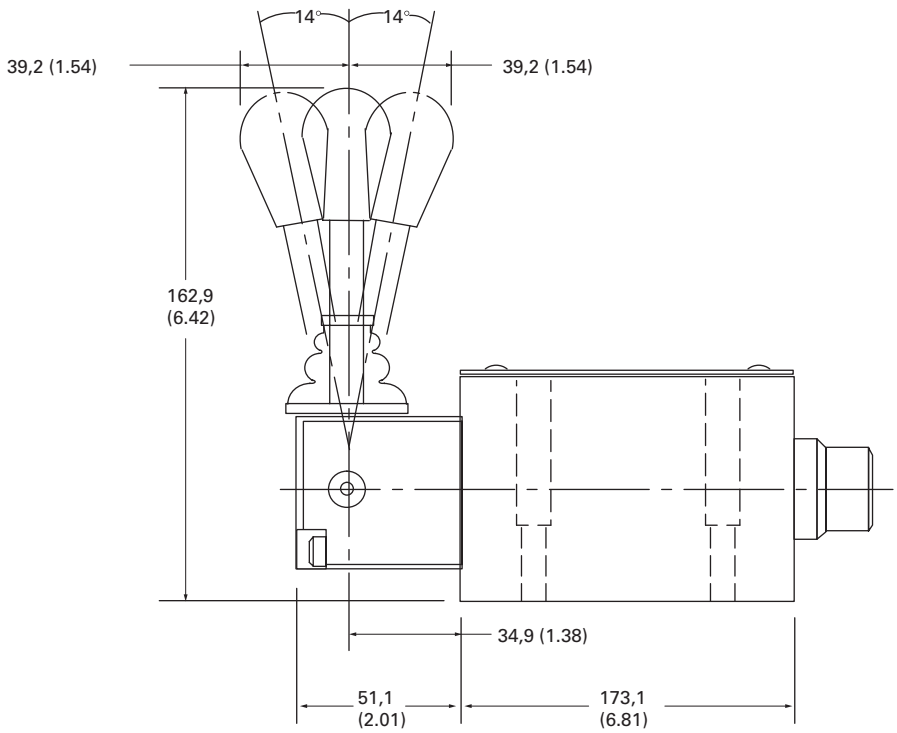
DG17V4-01-*C-10
DG17V4-01-*N-10



NFPA D-01 (ISO 4401-05, CETOP 5)
interface, seals included

Mechanically operated for harsh environments

DG17V4-01**-H-10



Subplates & bolt kits

Valves, subplates and mounting bolts must be ordered separately.

Example:

III-C

One (1) DG17V4-012A-10 Valve

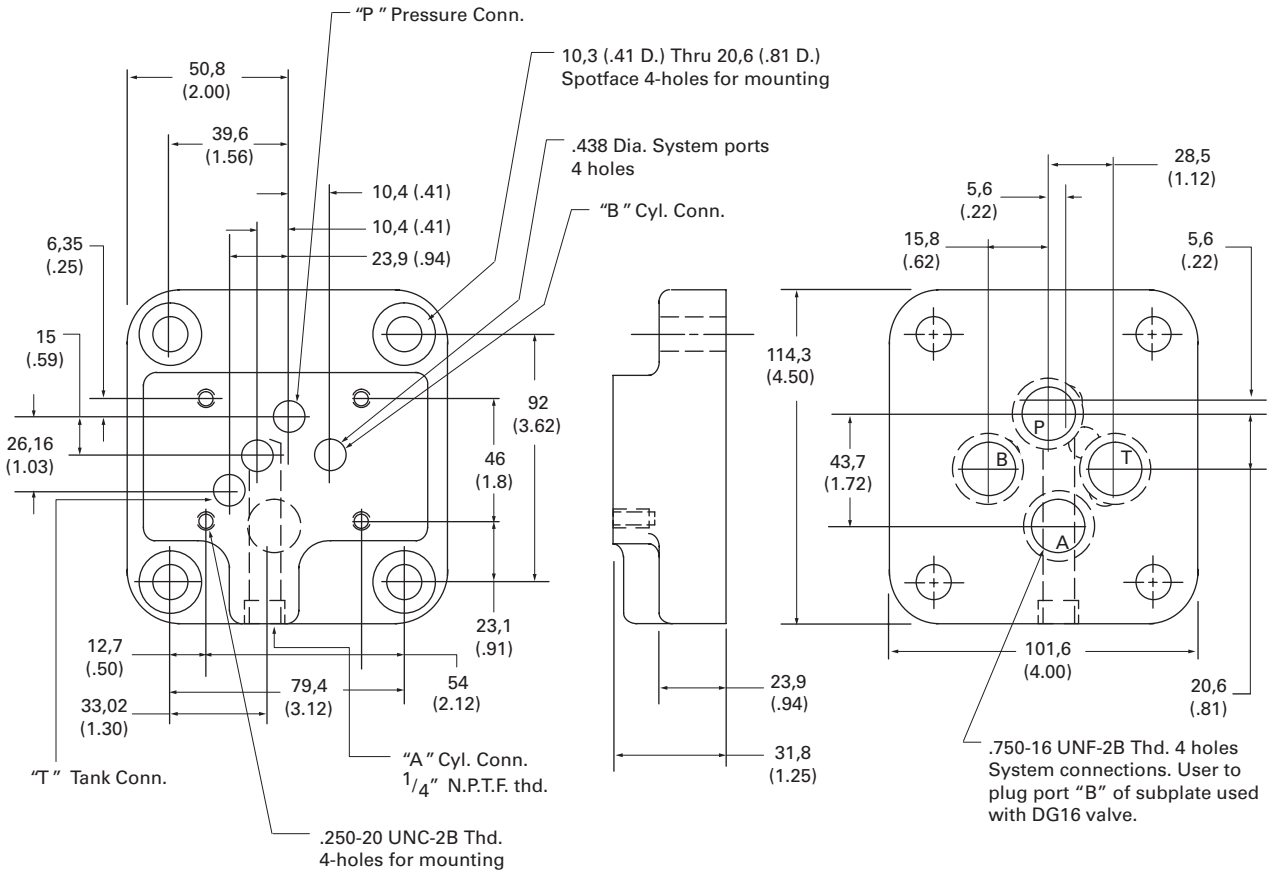
One (1) DGSM(E)-01-20-T8 Subplate

One (1) BKDG01-633 Bolt Kit

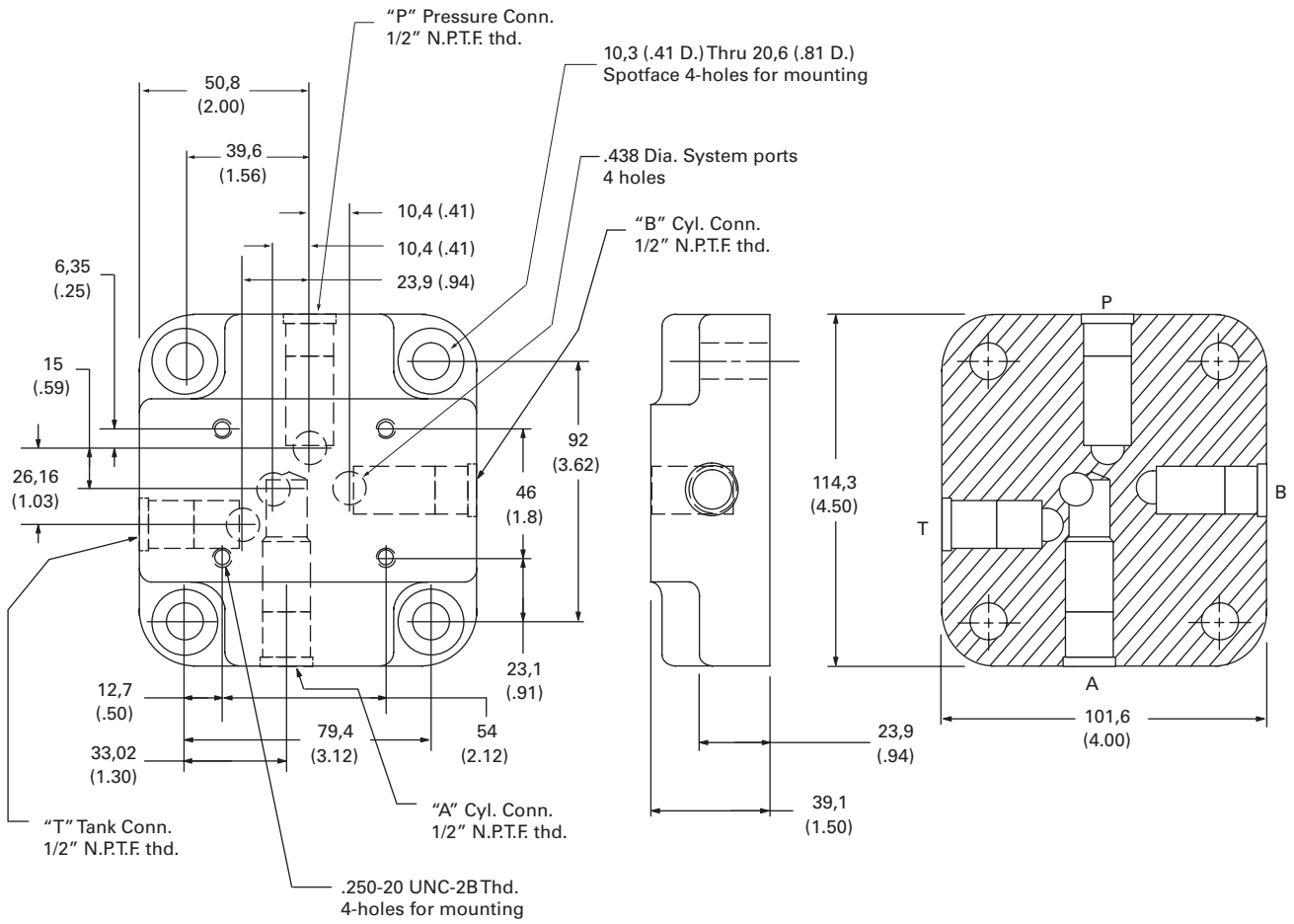
When subplate is not used, a machined pad must be provided for mounting. Pad must be flat within 0,0127 mm (.0005 inch) and smooth within 63 microinch. Mounting bolts, when provided by customer, should be SAE grade 7 or better. Torque mounting bolts to: 13 Nm (115 lb. in.)

Mounting subplate DGSM-01-20-T8

Millimeters (inches)



Mounting subplate DGSME-01-20-T8



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, and additives for protection against wear of components.

Essential information on the correct methods for treating hydraulic fluid is included in Vickers publication 561 "Vickers Guide to Systemic Contamination Control" available from your local Vickers distributor or by contacting Vickers, Incorporated. Recommendations on filtration and the selection of products to control fluid condition are included in 561.

Recommended cleanliness levels, using petroleum oil under common conditions, are based on the highest fluid pressure levels in the system and are coded in the chart below. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these cleanliness codes. See Vickers publication 561 for exact details. 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 component is shortened in fluids with higher cleanliness codes than those listed below. These codes have been proven to provide a long, trouble-free service life for the products shown, regardless of the manufacturer.

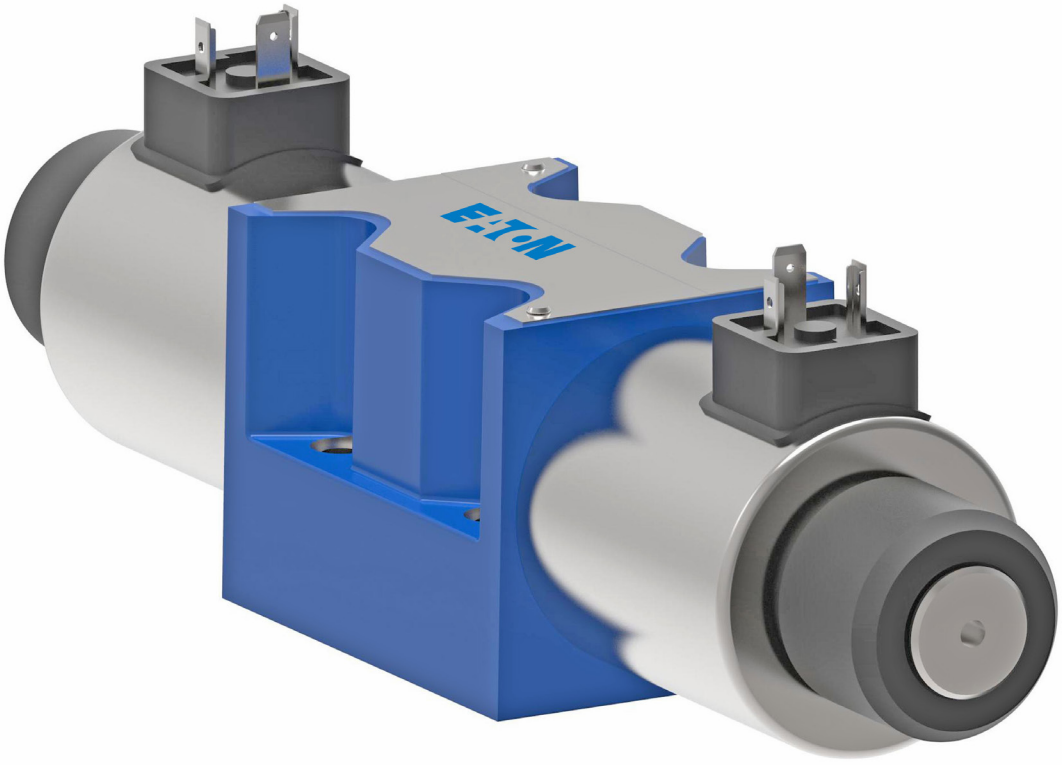
System pressure level bar (psi)

Product	<70 (<1000)	70-210 (1000-3000)	210+ (3000+)
Vane pumps – fixed	20/18/15	19/17/14	18/16/13
Vane pumps – variable	18/16/14	17/15/13	
Piston pumps – fixed	19/17/15	18/16/14	17/15/13
Piston pumps – variable	18/16/14	17/15/13	16/14/12
Directional valves	20/18/15	20/18/15	19/17/14
Pressure/flow control valves	19/17/14	19/17/14	19/17/14
Cmx valves	18/16/14	18/16/14	17/15/13
Servo valves	16/14/11	16/14/11	15/13/10
Proportional valves	17/15/12	17/15/12	15/13/11
Cylinders	20/18/15	20/18/15	20/18/15
Vane motors	20/18/15	19/17/14	18/16/13
Axial piston motors	19/17/14	18/16/13	17/15/12
Radial piston motors	20/18/14	19/17/13	18/16/13

Fluids and seals

Flourocarbon seals are standard and are suitable for use with phosphate ester type fluids or their blends, water glycol, water-in-oil emulsion fluids and petroleum oil. Refer to 694 for hydraulic fluid and temperature recommendations.

ISO4401 Size 05; ANSI/B93.7M-D05
Solenoid operated directional valve
DG4V-5-20 Design



Solenoid operated directional valve

DG4V-5-20 Design

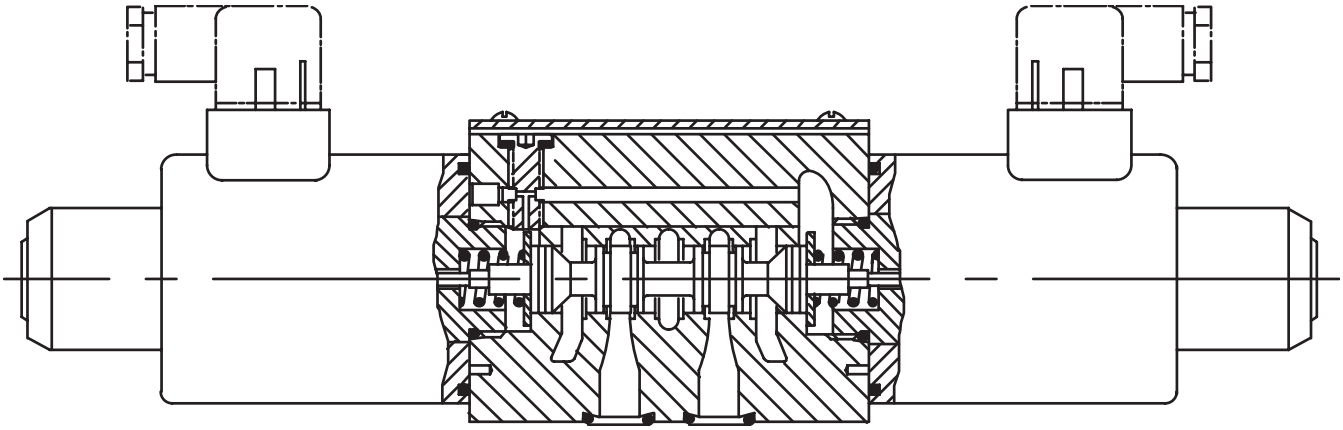
General description

A range of four-port solenoid operated directional control valves with four-land spool design to facilitate provision of smooth, variable valve response speeds.

III-C

The range includes:

- AC and DC wet-armature solenoid options with ISO 4400 (DIN 43650) electrical connections and manual overrides.
- Variable speed changeover potential in all DC models; see "Response Times" section.
- Many spool types; in spring-offset, spring centered and detented arrangements.
- Compact, cost effective system design when used with Eaton® SystemStak™ valves and subplates.



(F13-)	DG4V-5	***	*(L)	(J)	(-**)	- (V) M	(S6)	- U	**	6	- 20	- J**
1	2	3	4	5	6	7	8	9	10	11	12	13

1 Prefix, fluid compatibility

Blank	AC or DC-voltage models for petroleum oils, water-in-oil (invert) emulsions or phosphate esters. AC - voltage models for water glycols.
F13	DC-voltage models for water glycols.

2 Model series

4	Solenoid operated
V	Pressure rating 315 bar (4568 psi) on P, A & B parts
5	ISO4401 Size 05

3 Spool type

See "Functional Symbols" section

4 Spool spring arrangement

A	Spring offset to A. Single end.
AL	As 'A', but left hand build
B	Spring centered. Single end.
BL	As 'B', but left hand build
C	Spring centered. Double End.
N	No spring detented. Double end.

5 Spool design

Blank-	"0A" DC-valves and all AC valves except "8B(L)" and "8C"spool/ spring arrangements.
J	All DC valves except "0A"spool/ spring arrangements. AC valves with "8B(L)" and "8C" spool/spring arrangements.

6 Manual override option

Blank-	Standard plain override(s) in solenoid end(s) only ▼
H	Water-resistant override(s) in solenoid end(s)▼
W	Twist and lock override in solenoid end only
Z	No overrides at either end

Omit for standard plain override(s) in solenoid end(s) only ▼

▼ No override in non-solenoid end of singlesolenoid valves.

7 Solenoid energization identity

V	Solenoid "A" is at port A end and/ or solenoid "B" is at port B end, independent of spool type
Note:	Used to selct the identification of the solenoid. Refer to page 119.

8 Spool position indicator switch

Blank	No spool position monitoring switch.
S7	Spool position monitoring switch. Single solenoid valves only

9 Coil type

U	ISO 4400 (DIN 43650) mounting(s) without plug(s)
U1	ISO 4400 with fitted DIN plug
U6	ISO 4400 with fitted DIN plug with lights
KU	Flying leads from top of the solenoid
KUM	
KUP4	Junior timer (AMP) connector
KUP5D2	Moulded Deutsch connector with diode
KUP6D2	Flying lead with Deutsch connector with diode

10 Coil rating

A	110V AC 50
C	220V AC 50
ED	240V AC 50
EK	115V AC 60
EH	230V AC 60
G	12V DC
H	24V DC
HL	24V DC (32W)
OJ	48V DC
P	110V DC
NN	24V AC 50HZ
	Others on request

11 Tank pressure rating

6	160 Bar Tank Pressure Rating

12 Design number

Subject to change. Installation dimensions unaltered for design numbers 20 to 29 inclusive.

13 Coil rating

J06	0,6 mm orifice
J08	0,8 mm orifice
J10	1,0 mm orifice
J12	1,2 mm orifice
J99	No orifice. Must be specified

Where future fitting of orifice is required, see page 126, "Spool Speed Control Orifice

The valve function schematics apply to both U.S. and European valves.

DG4V-5-*N valves

2

6

DG4V-5-*A valves

0

2

22

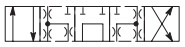
DG4V-5-*AL valves

0

2

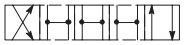
22

DG4V-5-8CV valves



DG4V-5-*C valves

0



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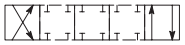

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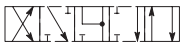

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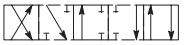

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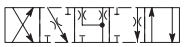

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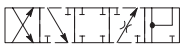

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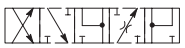
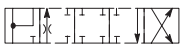


521



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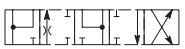


DG4V-5-*B valves

0

2

6

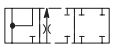
13

33

52

56

521



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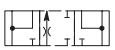


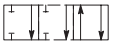
DG4V-5-*BL valves

0

2

6

13



33

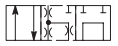
52

56

521

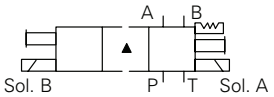
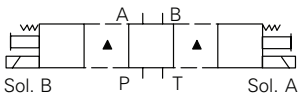
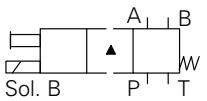
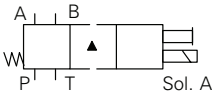
561

DG4V-5-8BLV valves



DG4V-5-8BV valves

Solenoid identified standards

	U.S. Solenoid Standard
Double solenoid valves, two position, detented	
Double solenoid valves, spring centered	
Single solenoid valves, solenoid at port A end	
Single solenoid valves, solenoid at port B end	

▲ Transient conditions only

Feature	DG4V-5	
Pressure Limits		
P, A and B ports	315 bar (4500 psi)	
T port: TA	120 bar (1750 psi) for AC Sol.	
TB	160 bar (2325 psi) for DC Sol.	
Flow rating	See performance data	
Relative duty factor	Continuous; ED = 100%	
Type of protection:		
ISO 4400 coils with plug fitted correctly	IEC 144 class IP65	
Coil winding	Class H	
Lead wires (coils type F***)	Class H	
Coil encapsulation	Class F	
Permissible voltage fluctuation:		
Maximum	Refer to temperature limits.	
Minimum	90% rated	
Typical response times at 100% rated volts measured from application/removal of voltage to full spool displacement of "2C" spool at:		
Flow rate P-A, B-T	40 l/min (10.6 USgpm)	
Pressure	175 bar (2537 psi)	
AC (~) energizing	30 ms	
AC (~) de–energizing	40 ms	
DC (=) energizing	120 ms ■	
DC (=) de–energizing	45 ms ■*	
Power consumption, AC solenoids (for coils listed in model code).	**Initial VA (RMS) ▲**	**Holding VA (RMS)**
Full power coils:		
Dual frequency coils at 50 Hz	700	105
Dual frequency coils at 60 HZ	105	130
Power consumption, DC solenoids at rated voltage and 20 C (68 F).		
Full power coils:		
Others	38W	
Model type "HL"	32W	
Mass, Approx. kg (lb)		
Single solenoid models, AC coils	4,0 (8.8)	
Single solenoid models, DC coils	4,8 (10.6)	
Double solenoid models, AC coils	4,5 (9.9)	
Double solenoid models, DC coils	6,3 (13.9)	
Temperature Limits		
Minimum ambient	–20 °C (–4 °F)	
Maximum ambient:		
AC 50 Hz valves	50 °C (122 °F)	
AC 60 Hz valves	40 °C (104 °F)	
DC valves	70 °C (158 °F)	

Spool speed control orifice

For fine tuning of valve spool speed. Only applicable to valves already fitted with an orifice or blank plug, see model code, page 118.

Orifice kit

Orifice kits must be ordered separately, part number 02-350116. Kit comprises 1 off each as per code 13 on page 118:

* In pure switched conditions, devoid of the efffects of any suppression diodes and full-wave rectifiers.

■ DG4V-5-2CJ valves. Longer response times can be obtained by fitting an orifice plug in a special pilot port, standard in all bodies. An orifice kit 459065, containing a selection of plugs of differing orifice size, can be ordered separately. Ask your Eaton representative for details.

▲ 1st half cycle; armature fully retracted.

Spool position indicator models

Spool/spring arrangement types 0A, 2A, 2AJ , 22A, 22AJ, 35A, 35AJ, 0BJ, 2BJ, 6BJ

Input:	
Supply voltage	20-32 VDC
Reverse Pol. Protection	Yes
	Outputs with alternating function - PNP
Output:	
Max output load	<=400mA ; Duty Ratio 100%
Short Circuit Protection	Yes
Hysteresis	<=0.05mm
Electrical connector	M12x1 4-Pole
Thermal shift	<=±0.1mm
Plug connections:	
Pin 1	+ Supply
Pin 2	Normal Closed
Pin 3	0V
Pin 4	Normal Open

EMC Protection	DIN EN 61000-6-1/2/3/4, Aug 2002
Humidity	0-95% rel. (nach DIN 40040)
Protection Class	IP65 DIN 40050
Vibration 0-500Hz	Max. 20g
Shock	Max. 50g

• Factory setting ensures this condition under all combinations of manufacturing tolerance and of temperature drift (see "Temperature Limits") .

DC model type "S7"

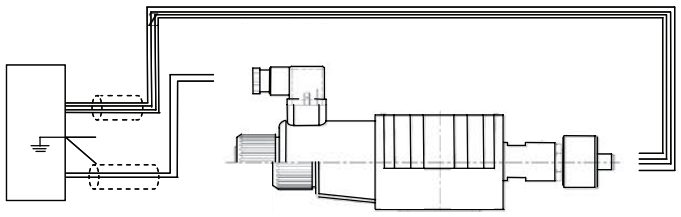
CE

This product has been designed and tested to meet specific standards outlined in the European Electromagnetic Compatibility Directive (EMC) 2004/108/EC. For instructions on installation requirements to achieve effective protection levels see this leaflet and the Installation Wiring Practices for Vickers Electronic Products leaflet 2468. Wiring practices relevant to this Directive are indicated by ⚠ Electromagnetic Compatibility (EMC).

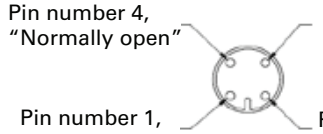
⚠ WARNING

Electromagnetic Compatibility (EMC) It is necessary to ensure that the unit is wired up in accordance with the connection arrangements shown above. For effective protection the user's electrical cabinet, the valve subplate or manifold and the cable screens should be connected to efficient ground points. 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.

Wiring Connections



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



Switch

MI2 4 pin connector details

Customer's protective ground connection

Typical with mineral oil at 36 cSt (168.6 SUS) and a specific gravity of 0.87.

Max. Flow rates

Based on warm solenoid(s) operating at 10% below rated voltage. Flow limits applicable to following usages:

a. All valves except those with types 22, 52, 56, 521 and 561 spools having simultaneous equal flow rates from P to A or B and from B or A to T.

b. Valves with type 22 spools having flow from P to A or B, the other being blocked. T is drained at all times.

c. Valves with types 52, 56, 521 and 561 spools having one service port connected to the full bore end of a 2:1 area ratio double-acting cylinder and the other service port to the annulus end.

d. Valves with type 23 spools having single flow from A or B to T, P and the other service port being blocked.

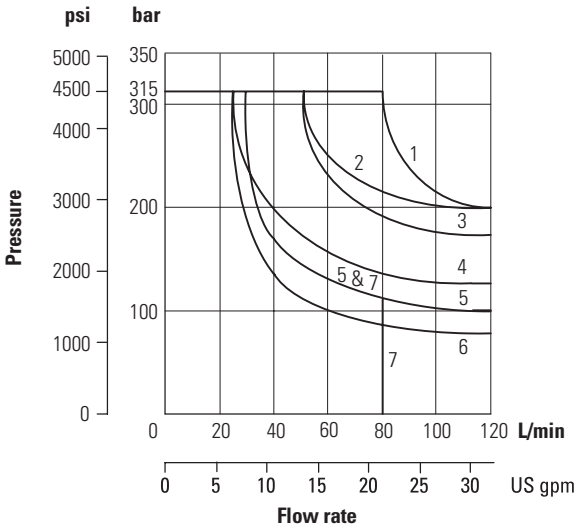
Consult Eaton with application details if any of the following are required:

a) Single flow path, i.e. P to A, P to B, A to T or B to T.

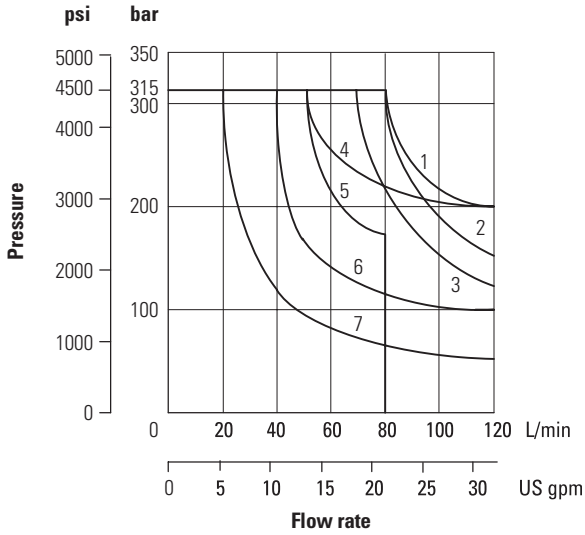
b) Substantially different simultaneous flow rates between P to A or B and B or A to T.

c) Spools as in 3 above are to be used with cylinder ratios greater than about 3:1 at low flow rates or 2:1 at high flow rates.

AC Solenoid Valves



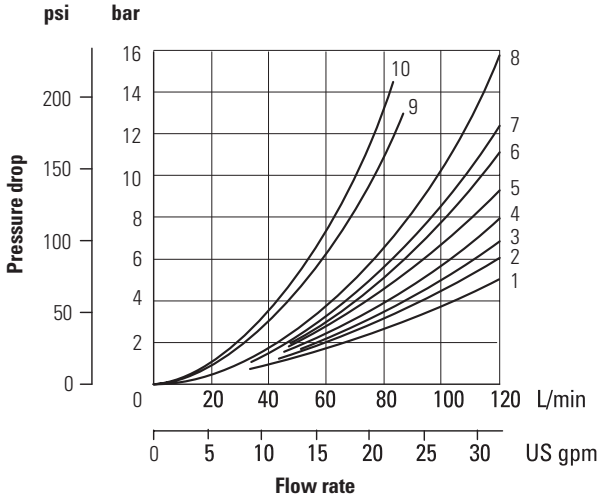
DC Solenoid Valves

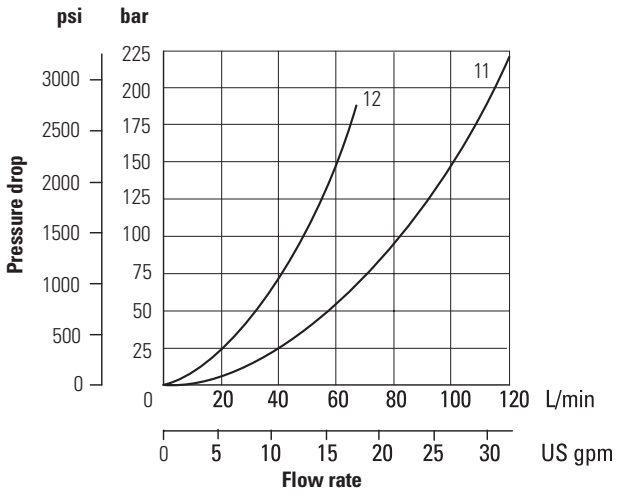


Spool/spring code	AC valve graph curve	DC valve graph curve
0A(L)	3	2
0B(L) & 0C	2	4
1B(L) & 1C	6	7
2A(L)	3	2
2B(L), 2C & 2N	1	1
3B(L), 3C, 6B(L) & 6C	4	6
6N	3	3
7B(L) & 7C	1	1
8B(L) & 8C	7	5
11B(L), 11C & 22A(L)	6	7
23A(L)	5	6
31B(L) & 31C	4	6
33B(L), 33C	3	6
52B(L), 52C, 56BL, 56C, 521B, 521C, 561B & 561C	4	6

Performance data

Pressure Drops Typical with petroleum oil at 36 cSt (170 SUS) and a specific gravity of 0,87

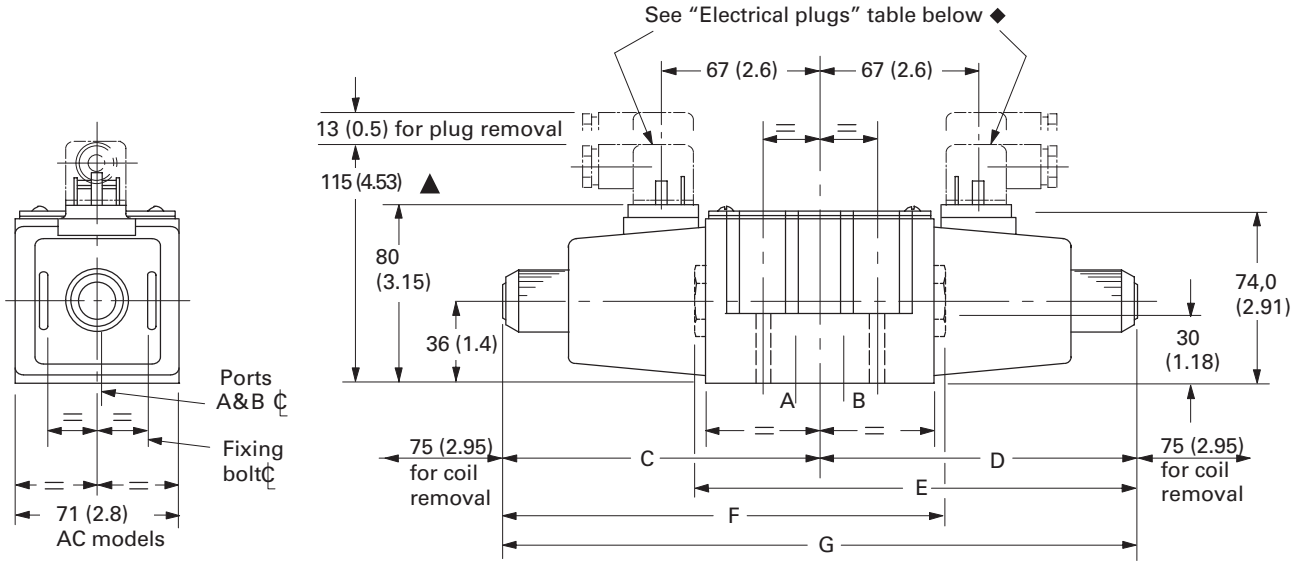




Spool/spring code	Spool positions covered	P to A	P to B	A to	B to T	–	
0A(L)	Both	2	2	4	5	3t	–
0B(L) & 0C	De-energized	–	–	–	–	–	–
	Energized	1	1	6	7	6u	–
1B(L) & 1C	De-energized	–	–	–	–	–	–
	Energized	1	2	6	4	–	–
2A(L)	Both	3	3	5	6	–	–
2B(L) & 2C	All	2	2	4	5	–	–
2N	Both	3	3	5	6	–	–
3B(L) & 3C	De-energized	–	–	5	–	–	–
	Energized	2	3	6	5	-	–
6B(L) & 6C	De-energized	–	–	5m	6u	–	–
	Energized	3	3	6	7	–	–
6N	Both	4	4	4	5_	–	–
7B(L) & 7C	De-energized	3m	3u	–	–	–	5 ⁙
	Energized	2	2	5	6	–	–
8B(L) & 8C	All	2	2	7	8	8	–
11B(L) & 11C	De-energized	–	–	–	–	6m	–
	Energized	2	1	4	7	–	–
22A(L)	Both	3	3	–	–	–	–
23A(L)	Both	3	3	5	6	–	–
31B(L) & 31C	De-energized	–	–	–	6	–	–
	Energized	3	2	4	7	–	–
33B(L) & 33C	De-energized	–	–	12m	12u	–	–
	Energized	2	2	5	6	–	9 ⁙
52BL & 52C	All	7m	8	4	–	–	–
56BL & 56C	De-energized	–	–	8m	10u	–	9 ⁙
	Energized	7m	8	6	–	–	9 ⁙
521B & 521C	All	8	7u	–	5	–	–
561B & 561C	De-energized	–	–	10m	8u	–	9 ⁙
	Energized	8	7u	–	7	–	–

AC Solenoid models

III-C



▲ May vary according to plug source.

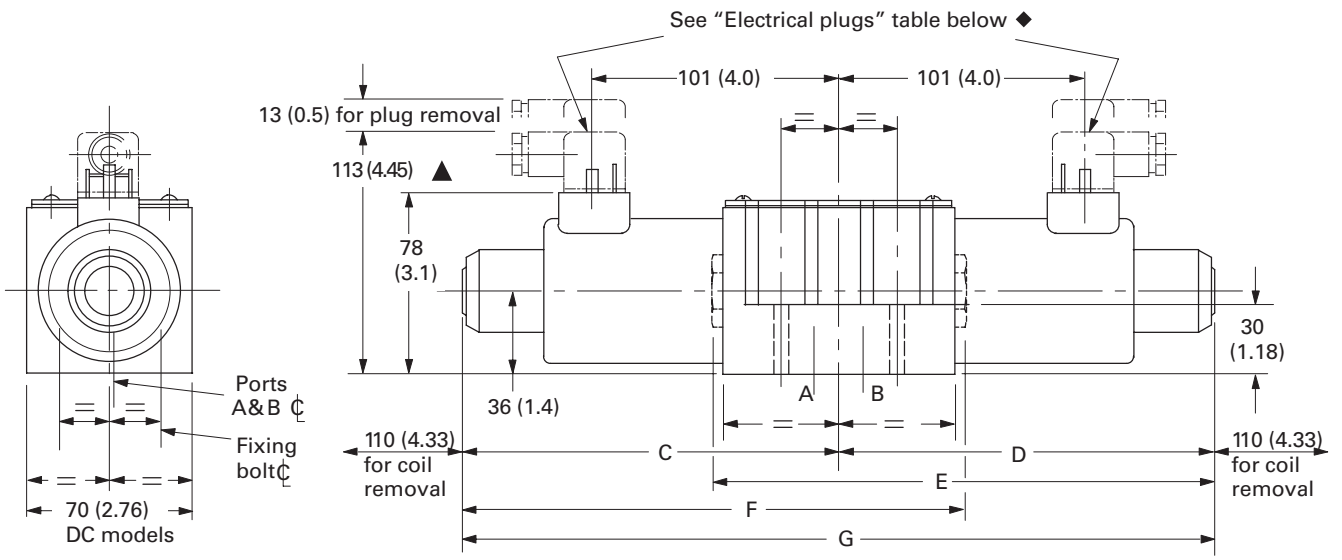
◆ The cable entry can be repositioned at 90° intervals from the position shown. This is done by reassembling the contact holder into the appropriate position inside the plug housing.

Model	Solenoid at:	C	D	E	F	G
DG4V-5-*A(L)/B(L)(-Z)-(V)M	Port A end	123 (4.84)	–	–	182 (7.17)	–
	Port B end	–	123 (4.84)	182 (7.17)	–	–
DG4V-5-*C/N(-Z)-(V)M	Both ends	123 (4.84)	123 (4.84)	–	–	246 (9.68)
DG4V-5-*C/N-H-(V)M	Both ends	138 (5.43)	138 (5.43)	–	–	276 (0.87)

Installation dimensions in mm (inches)

DC Solenoid models

3rd angle projection



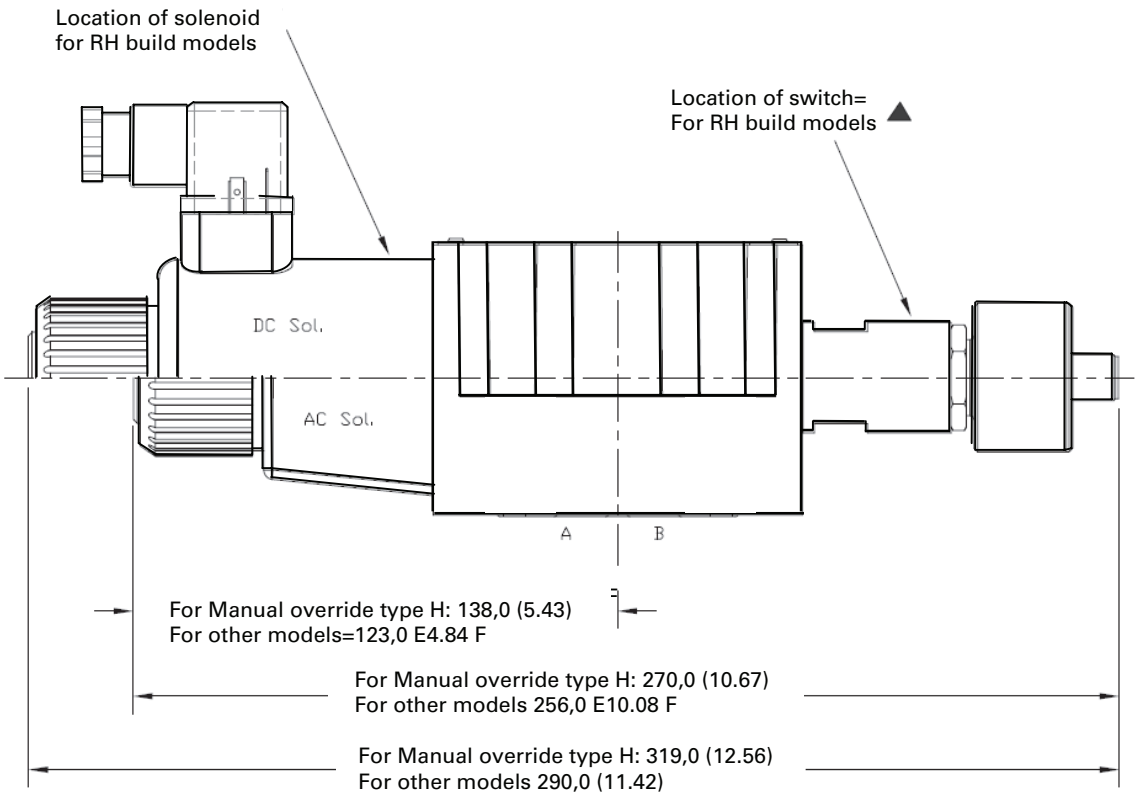
▲ May vary according to plug source.

♦ The cable entry can be repositioned at 90° intervals from the position shown. This is done by reassembling the contact holder into the appropriate position inside the plug housing.

Model	Solenoid at:	C	D	E	F	G
DG4V-5-*A(L)/B(L)(-Z)-(V)M	Port A end	156 (6.14)	–	–	215 (8.46)	–
	Port B end	–	156 (6.14)	215 (8.46)	–	–
DG4V-5-*C/N(-Z)-(V)M	Both ends	156 (6.14)	156 (6.14)	–	–	312 (12.28)
DG4V-5-*C/N-H-(V)M	Both ends	185 (7.28)	185 (7.28)	–	–	370 (14.57)

Installation dimensions in mm (inches)

Spool position indicator switch models



▲ For LH models ("L" in model code location 4) solenoid and switch locations are reversed

⚠ Wiring: See warning note on page 118

Installation dimensions in mm (inches)

DIN 43650 Connector

Cable diameter range:

Wire section range:

Terminals:

Type of protection:

Connector can be positioned at 90° intervals on valve by re-assembling contact holder into appropriate position inside connector housing.

Connectors with and without indicator lights are available (order separately):

Ø6–10 mm (0.24–0.40)

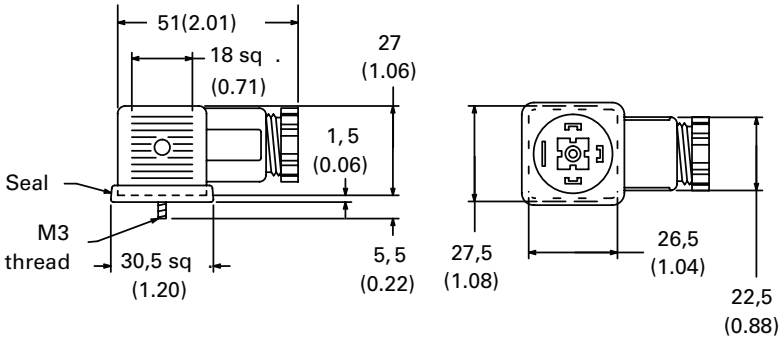
Ø,5–1,5 mm2

(0.0008– 0.0023 in2)

Screw type

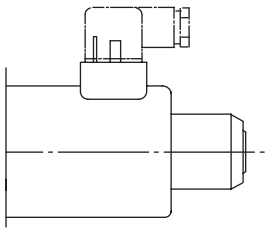
IEC144 class IP65, when plugs are fitted correctly to the valves with interface seals (supplied with plugs) in place.

Recptacle	Voltage (AC or DC)	Part numbers Gray – "A" sol.	Black – "B" sol.
U1 Coils without lights		710776	710775
U6 Coils with lights	12-24	977467	977466
	100-125	977469	977468
	200-240	977471	977470

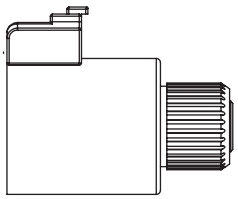


Connecters

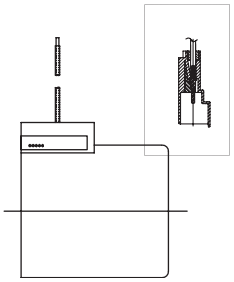
U/U1/U6



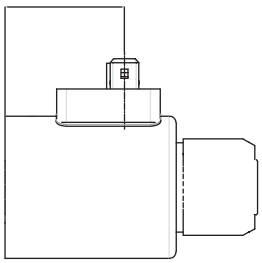
KUP5/KUPSD2



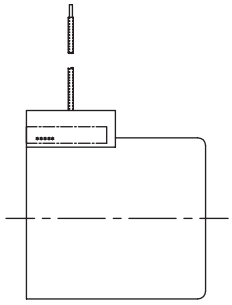
KUP6



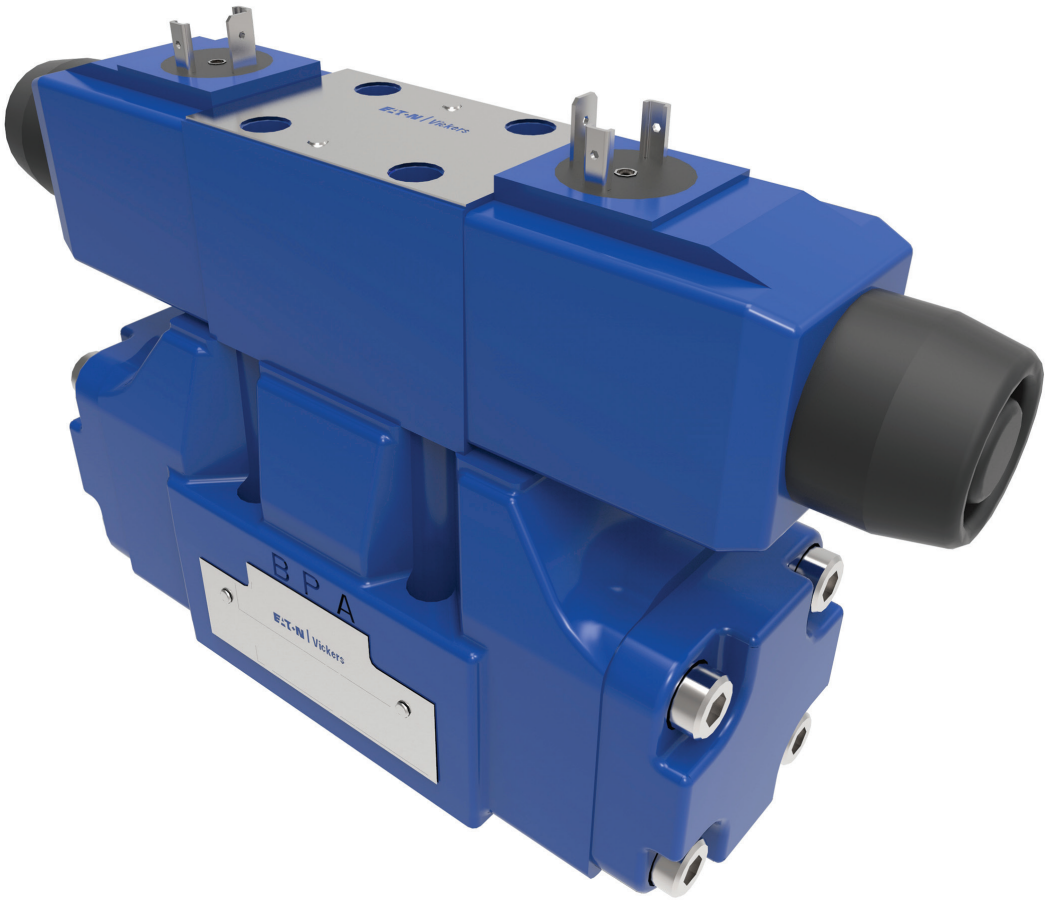
KUP4



KU



ISO4401 size 05, ANSI/B93.7M-D05
DG3V-5 10 & DG5V-5 10 Design



Pilot Operated Directional Valve

DG3V-5-10 Design

Solenoid Controlled Pilot Operated Directional Valve

DG5V-5-10 Design

General description

DG*V-5 valves are used primarily for controlling the starting, stopping and direction of fluid flow.

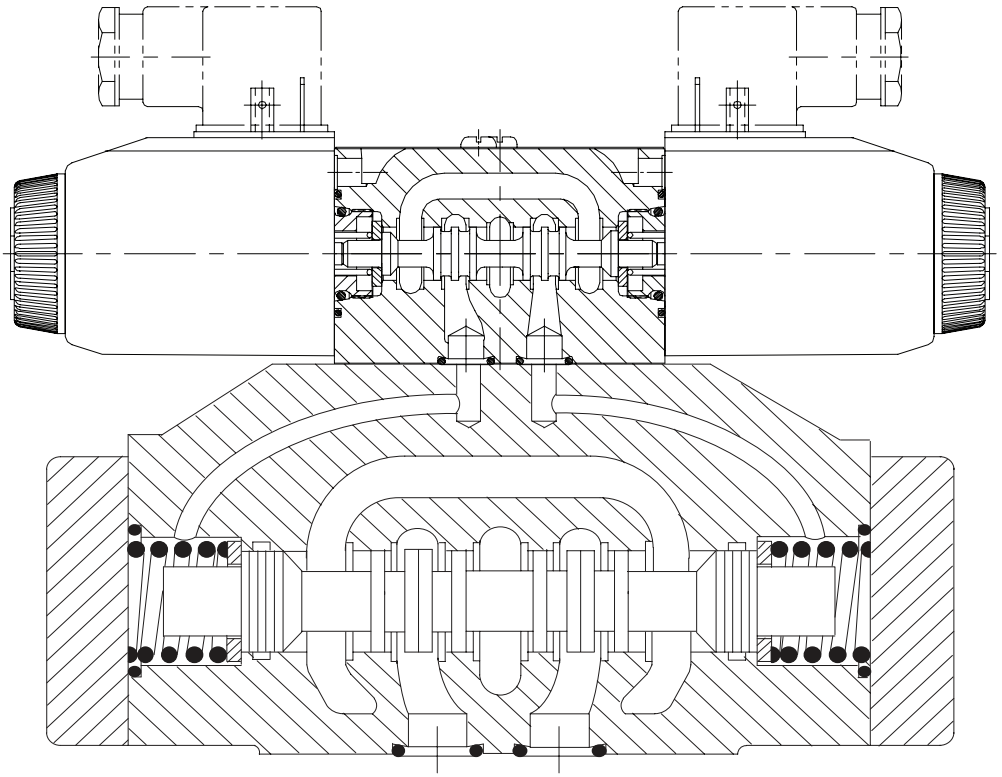
Two series of valves, DG5V solenoid controlled, pilot operated and DG3V pilot operated models are available with a wide selection of spools. These include meter in and meter-out spools and a regeneration type that can obviate extra valves essential in traditional circuit arrangements. All spools have been designed to provide good low shock, fast response characteristics which can be enhanced by optional stroke and/or pilot choke adjustments.

Models include spring offset, spring centered and detented versions.

Features and Benefits

- High pressure and flow capability for maximum cost-effectiveness.
- Low headloss to minimize power wastage.
- Low shock characteristics to maximize machine life.
- Facility to change solenoid coils without disturbing the hydraulic envelope.
- The many optional features, particularly for DG5V valves, permit matching to virtually every application within the valve's power capacity.
- Optional mainstage spool position monitoring switch (CE marked)

Typical Section DG5V-5-2C



For pilot operated valves:

DG3V-5- ** * (-*) -1*

2 3 4 14

For solenoid controlled, pilot operated valves:

(F6-)DG5V-5- ** ** (**) (-P) (-E) (-T) (*) - (V) M - ***** - (L) ** - * -* -10**

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

1 Blank Viton

F6 Buna Nitrile/High CAN

2 Spool type

See "Functional Symbols" section on pages 133-134.

3 Spool spring arrangement

A Spring offset, end-to-end
AL Same as "A" but left hand build
B Spring offset, end-tocenter ▲
BL Same as "B" but left hand build ▲
C Spring centered ▲
N No-spring detented ▲
▲ Not available for DG3V-5

4 Spool control

1 Stroke adjustments, both ends ▲■
2 Pilot choke (dual) adjustments
27 Dual pilot choke and stroke adjustment "A" port end only ▼▲■
28 Dual pilot choke and stroke adjustment "B" port end only
3 Pilot choke and stroke adjustments ▲■
7 Stroke adjustment "A" port end only ▼
8 Stroke adjustment "B" port end only ▼
▲ Not applicable to DG5V-5-*B(L) models.
▼ Not applicable to models shown in the "Spring offset, end-to-center, opposite hand" section on page 134
■ Not applicable for spool "8" models

5 Main stage spool monitoring switch

Blank None
PCA Center sensing switch on "A" port end
PCB Center sensing switch on "B" port end
PDA Double offset sensing switch on "A" port end
PDB Double offset sensing switch on "B" port end
* The spool position monitoring switch shown on this technical document is CE marked and certified and complies to European Standard EN 61000-6-4: 2001 (Emissions) for Class A and European Standard EN 61000-6-2: 2001 (Immunity).

6 Pilot pressure supply

E Valve configured for external pilot supply to port "X"
Blank Internal pilot supply (port "X" must be blanked off, e.g. at the valve mounting face, when using internal pilot supply)

7 Pilot drain arrangement ◆

T Valve configured for internal pilot valve drain (port "Y" must be blanked off, e.g. at the valve mounting face, when using internal drain) Blank external drain from port "Y".
◆ See 15 for pressure limits.

8 Pilot valve manual override option

Blank Plain override(s) on solenoid end(s) only. ▲
H Water-resistant override(s) on solenoid end(s) ▲
Z No override at either end
▲ No overide in non solenoid end of single solenoid valve.

9 Solenoid identity method

V Solenoid "A" at port "A" end of pilot valve body and/or solenoid "B" at port "B" end of pilot valve body, independent of main-stage port locations and spool type. Omit (except as noted below) for US ANSI B93.7 standard requiring solenoid "A" energization to connect main ports P and A and/or solenoid "B" energization to connect P and B, independent of solenoid location.
Note The "V" code is always used for valves with type "8" spool as the solenoid identity is the same for both methods of identification.

10 Flag symbol

M Electrical options and features

11 Solenoid type/ connection(s)

U ISO4400, DIN43650 connector
U1 ISO4400 fitted with PG11 plug
KU Top exit flying lead (150mm)
KUP4 Junior timer (Amp) connector
KUP5 Integral Deutsch connector
FW Flying lead with 1/2" NPT thread wiring housing
FTW Fly. lead wired terminal block & 1/2" NPT thread
Note Refer DG4V3 catalog for more options

12 Indicator lights

Blank None
L Solenoid indicator lights•
•Flying lead coil type only

(F6-)DG5V-5- ** ** (**) (-P) (-E) (-T) (*) - (V) M - ***** - (L) ** - * *15 -10**

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

13	**Surge suppressor/ damper**	
	D1	Diode positive bias
	D2	Negative bias
	D7	Transorb type
14	**Coil rating**	
		See Page 7 for circuit details
	B	110V AC 50Hz/120V AC 60 Hz
	BL	110V 50 Hz/120V 60 Hz
	D	220V AC 50 Hz/240V AC 60 Hz
	DS	28V DC 30 watt
	G	12V DC
	GL	12V DC
	H	24V DC
	HL	24V DC
	HM	24V DC 8 watt
15	**Port T or Y maximum pressure†**	
	6	160 bar (2300 psi), for AC solenoids only
	7	210 bar (3000 psi), for DC solenoids only
16	**Design number**	

Pilot pressure

a. Pilot pressure must always exceed tank line pressure by at least the requisite minimum pilot pressure. This also applies when combining open center spools (0, 1, 8, 9 and 11) with internal pilot pressure, but they should be used only with externally drained valves.

b. Internally drained valves may be used only when surges in the tank line cannot possibly overcome the minimum pilot pressure differential referred to above. When the possibility of pressure surges in the tank line exist, externally drained valves are recommended.

c. When DG5V-7-*N valves are de-energized the pilot and main spools remain in the last selected position, provided that pilot pressure is maintained. If pilot pressure fails, or falls below the minimum, the main spool will spring center.

Caution: Because of this in-built feature the flow conditions of the center position must be selected with care, for the effect on both the direction of flow and the pilot pressure.

Stroke adjustment options

These control the maximum opening of the main spool/ body passages by adjusting the limits of spool stroke. By this means, the response time and the pressure drop across the valve for any particular flow rate can be controlled. Stroke adjusters can be fitted at either or both ends of the main-stage valve for adjusting the stroke in one or both directions. One use of stroke adjusters is for controlling the metering characteristics of "X*" or "Y*"- type spools. (See model code #4.)

Pilot choke adjustment

Options These provide a meter-out flow control system to the fluid in the pilot chambers of main-stage valves. It allows the velocity of the mainstage spool to be controlled, thereby reducing transient shock condition. For optimum results, a constant reduced pilot pressure is recommended.

Control data, general

a. Dependent on the application and the system filtration, any sliding spool valve, if held shifted under pressure for long periods of time, may stick and not move readily due to fluid residue formation. It may therefore need to be cycled periodically to prevent this from happening.

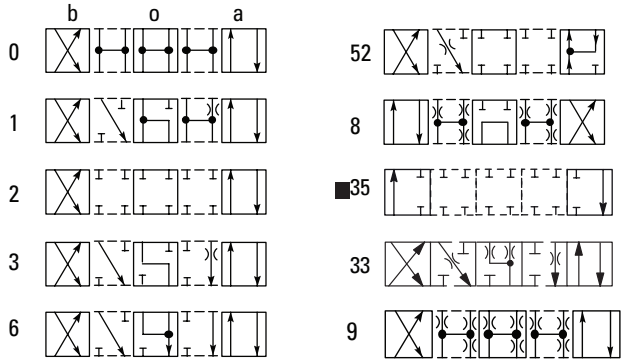
b. Surges of fluid in a common drain line serving two or more valves can be of sufficient magnitude to cause inadvertent shifting of the spools. It is recommended that circuit protection be used, such as separate drain lines.

c. Control by stroke adjusters, pilot chokes and minimum-pilot pressure generator options is described on this page.

Functional symbols

Spool types

Shown in 3-position form, plus 2 transients.



Notes:

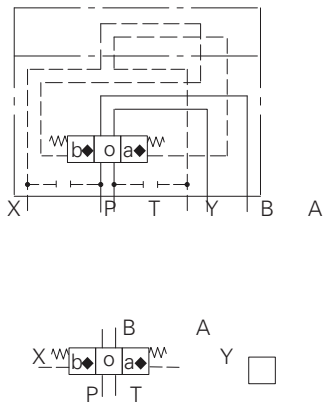
1. In certain 2-position valves, the "o" position becomes an additional transient, i.e. in DG5V-5-**A(L) and DG5V-5-**N valves.

■ Only 35A available.

DG3V-5 Pilot operated models

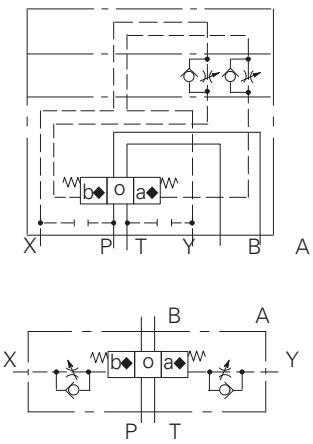
Comprehensive and simplified symbols.

Spring centered, DG3V-5-C**
Spool types: All

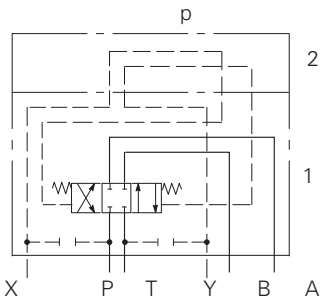


◆ "a" and "b" interchanged for spool type 8

DG3V-5-C models with pilot choke**
Obtained by specifying "2" at Model Code position

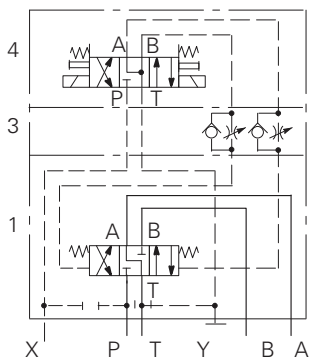


DG3V-5-2C



Note: That for clarity pilot lines (dotted lines in illustrations) are omitted from the main-stage nameplate.

DG5V-5-3C-2-E-T



Symbols on nameplates

Typical illustrations for:

Control elements (i.e. solenoid pilot valve, choke module, cover plate) used with size 5 main stage valves are standard Eaton units complete with their individual nameplates including model code and symbols. The main stage carries the model code of the 2-stage valve and the functional symbol of the main stage spool. Referring to the examples, nameplates are located as follows:

1. On main stage (DG3V- 5/ DG5V-5)

2. On cover plate (DG3V-5)

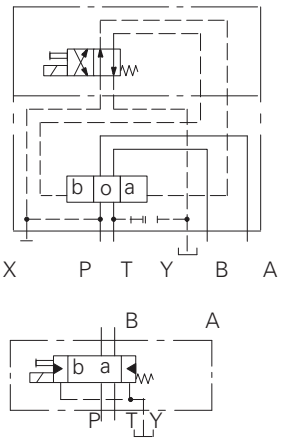
3. On pilot choke module (DG5V-5)

4. On pilot stage valve (DG5V-5)

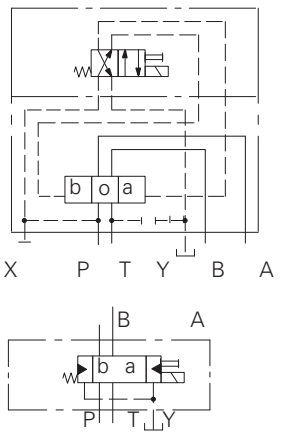
DG5V-5, Solenoid controlled, Pilot operated models ▲

Comprehensive and simplified symbols shown configured for external pilot supply and internal drain

Spring offset, End-to-end, DG5V-5-A**
Spool types: 0, 2, 6, 35, 52

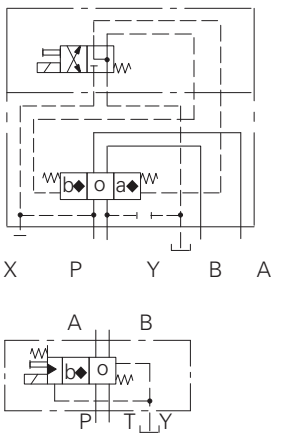


Spring offset, end-to-end, opposite hand, DG5V-5-AL**
Spool types: 0, 2, 6, 52



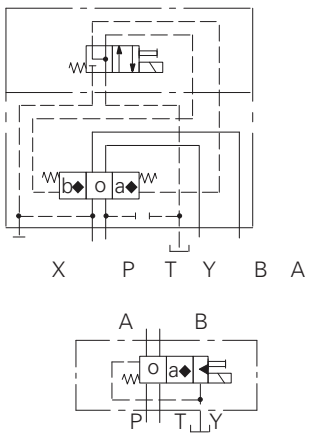
Spring offset, end-to-center

Models	Spool types
DG5V-5-***B**	0, 2, 52
DG5V-5-***BL**	8

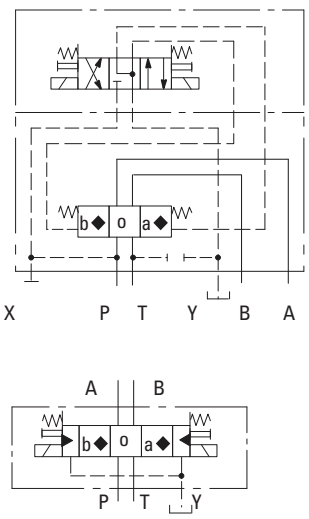


Spring offset, end-to-center, opposite hand

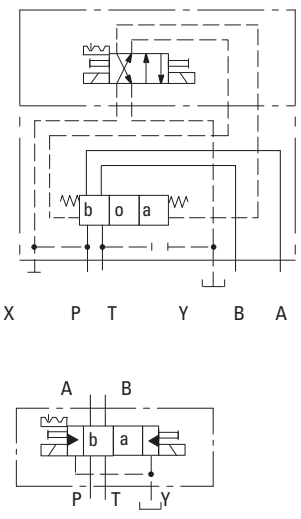
Models	spool types
DG5V-5-***B**	8
DG5V-5-****BL**	0, 2, 52



Spring centered, DG5V-5-C**
Spool types: All

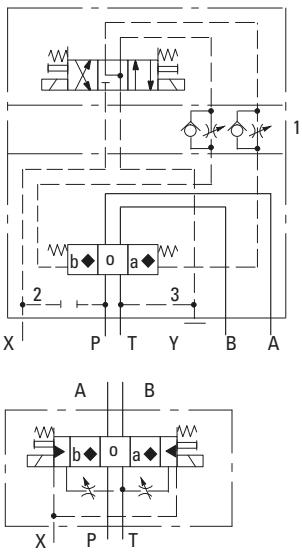


Detented, DG5V-5-N ■**
Spool types: 0, 2, 6, 52



DG5V-5 Options
The following are shown in a DG5V-5-**C example:

1. Pilot choke module
2. External pilot connection
3. Internal drain



■ Subject to availability of pilot pressure.

▲ All main-stage assemblies are spring-centered. The conditions described depend on the availability of pilot pressure in excess of 4.5 bar (65 psi) to move the spools against these springs. This is particularly important when using external pilot pressure supply

Solenoid Identification (refers to installation drawing, page 10 - 12) For model code variants:

Position 3, spool spring arrangement
Position 8, solenoid identity method

Model	Spool types	Solenoid identify main port A end	Solenoid identify main port B end
DG5V-5-*A/B(-2)(-E)(-T)(-**)-M	All except "8"	-	B
DG5V-5-*A/B(-2)(-E)(-T)(-**)-VM	All except "8" ""8" only	- B	A -
DG5V-5-*AL/BL(-2)(-E)(-T)(-**)-M	All except "8"	A	-
DG5V-5-*AL/BL(-2)(-E)(-T)(-**)-VM	All except "8" ""8" only	B -	- A
DG5V-5-*C/N(-2)(-E)(-T)(-**)-M	All except "8"	A	B
DG5V-5-*C/N(-2)(-E)(-T)(-**)-VM	All spools	B	A

Operating data

Maximum pressures:	
DG3V-5 valves; ports:	
P, A, B, X and Y	315 bar (4500 psi)
T	315 bar (4500 psi)
DG5V-5-(L)(-*)(-E)(-*) valves, (externally drained); ports:**	
P, A, B, T and X	315 bar (4500 psi) ▲
Y with AC solenoid	160 bar (2300 psi)
Y with DC solenoid	210 bar (3000 psi)
DG5V-5-(L)(-*)(-E)-T(-*) valves, (internally drained)u; ports:**	
P, A, B and X	350 bar (5000 psi) ▲
T with AC solenoid	160 bar (2300 psi)
T with DC solenoid	210 bar (3000 psi)
Maximum flow (for both DG3V-5 and DG5-V5)	160 L/min (42Usgpm)
Pilot pressures	Refer segment B for pilot valve data

▲ The DG5V, 50 design two-stage valves have been designed to satisfy the needs of most applications.

Consult your Eaton representative about an alternative model if:

a. Valves are required to remain pressurized for long periods without frequent switching, and /or

b. Back pressure on the drain port of externally drained models (or the tank port of internally drained models) is required to rise above 210 bar (3000 psi).

Electrical information		
Voltage ratings, DG5V valves	See 14 in "model code" on page 131	
Voltage limits, DG5V valves:		
Maximum voltage	See "Temperature limits", on page 136	
Minimum voltage	90% of rated voltage	
Power consumption, DG5V valves with AC solenoids:	**Initial VA rms**	**Holding VA rms**
Dual-frequency coils at 50 Hz, types "B" and "D"	280	61
Dual-frequency coils at 60 Hz, types "B" and "D"	300	58
Power consumption, DG5V valves with DC solenoids	30W at rated voltage and 20 C (68 F)	
Relative duty factor, DG5V valves	Continuous; ED = 100%	
Type of protection, DG5V valves:		
ISO 4400 coils with plug fitted correctly	IEC 144 class IP65	
Junction box	IEC 144 class IP65 (NEMA 4)	
Coil winding	Class H	
Lead wires (coil types "F****")	Class H	
Coil encapsulation	Class F	

Temperature limits:	See appendix
Fluid temperature limits	See appendix
Ambient temperature limits:	-20°C (-4°F)
Minimum ambient, all valves	
Maximum ambients, DG5V valves with coils listed in 12 in "Model Code" two pages back, and under conditions stated below:	
Dual-frequency coils:	
at 50 Hz and 107% of rated voltage	65°C (150°F)
at 50 Hz and 110% of rated voltage	65°C (150°F)
at 60 Hz and 107% of rated voltage	65°C (150°F)
at 60 Hz and 110% of rated voltage	65°C (150°F)
Single-frequency (50 Hz) coils at 50 Hz and	65°C (150°F)
110% of rated voltage	
DC coils at 110% of rated voltage	70°C (158°F)

Temperature limits:	See appendix
Valves	See page 139, 140, 141
Mass (weight), basic models:	**kg (lb) approx.**
DG3V-5-*A(L)	10,0 (22.0) ◆
DG3V-5-*/*B(L)/*C	7,3 (16.1) ◆
DG5V-5-*A/B (AC voltages)	8,4 (18.5) ◆
DG5V-5-*A/B (DC voltages)	8,5 (18.7) ◆
DG5V-5-*C/N (AC voltages)	8,7 (19.2) ◆
DG5V-5-*C/N (DC voltages)	9,1 (20.0) ◆
◆ Add 1,1 kg (2.4 lb) when pilot chock adjustment is fitted.	

Note : For information on pilot valves please refer segment B of the catalog.

Pilot pressures

Differential pressure, i.e. pilot pressure at port P (or port X) minus pilot drain pressure at port T (or port Y).

Maximum 315 bar (4567 psi)

Minimum (for max. flow):
For spool types 0, 1, 8 ♦, 11 4,5 bar (65 psi)

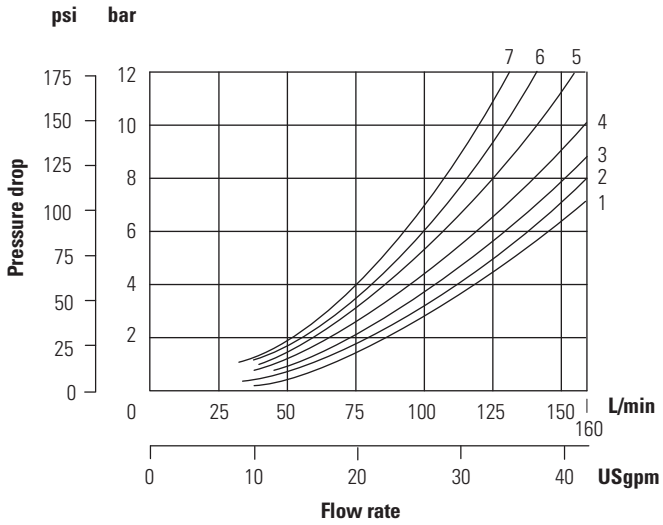
For spool type 6 8 bar (116 psi)

For spool types 2, 3, 31, 33, 52 10 bar (145 psi)

All main stages are spring centered. Selection of spool offset positions "a" or "b" requires pilot pressure equal to or in excess of the above minimums to move the spool against the spring force. This is particularly important when using external pilot pressure supply.

♦ When using a type 8 spool with the valve configured for internal pilot supply, flow through the valve should be at least 80 L/min (21 USgpm) to generate 4,5 bar (65 psi) pressure drop when the spool is in the center position (flow P to T).

Based on petroleum oil at 36 cSt (168 SUS) and at 50 C (122 F).



DG5V-5-**N

The spool of the pilot valve of this model is detent-held in its last selected position, and the spool will remain ▲ in this position after the solenoid has been de-energized.

The main stage is spring-centered and requires at least minimum pilot pressure to hold the spool in its offset ("detent-held") position. When pilot pressure falls below the recommended minimum, the main-stage spool will move to position "o" under the action of the centering springs. The system designer should ensure that under these conditions the flow condition at center position "o" is appropriate for the application.

▲ See comment in "Mounting Attitude".

Pilot choke module

This allows the velocity of the main-stage spool to be controlled, thereby reducing transient shock conditions. For best results a constant, low pilot pressure is recommended.

Spool type	P → A	B → T	P → B	A → T	A → T	B → T	P → T
0	4	4	1	4	1	3	5
1	1	4	1	4	3	-	6
2	1	2	1	5	-	-	-
3	2	3	1	4	5	-	-
6	1	2	1	3	-	-	-
8	4	2	2	6	-	-	7
33	2	2	3	4	-	-	-
35A	See page 14						
52	2	3	3	5	-	-	-

Solenoid controlled models with ISO 4400 (DIN 43650) electrical connections and optional pilot choke

DG5V-5-**(L)(-2)(-E)(-T)(-*)-(V)M-U example For solenoid identification see previous page.

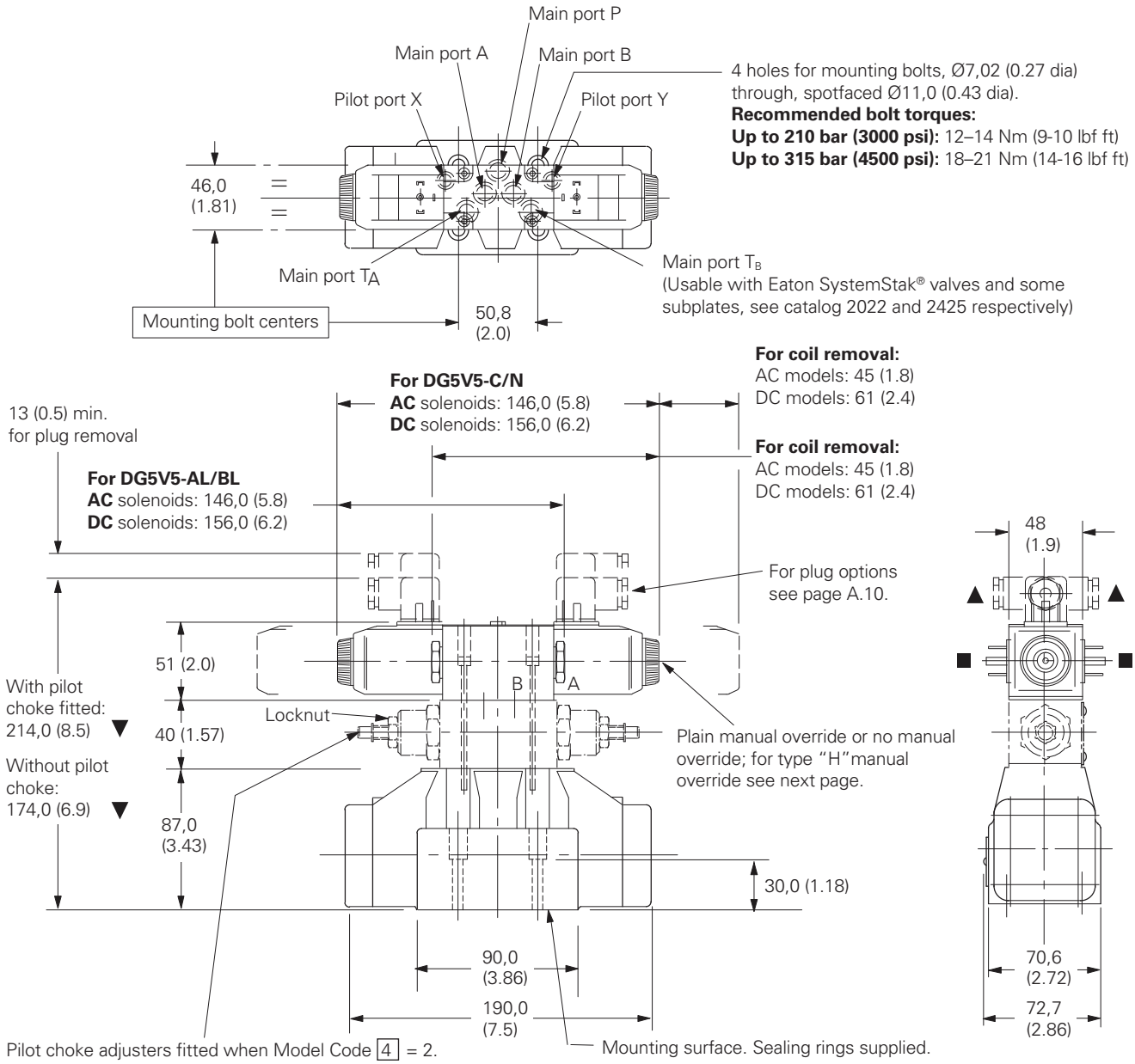
▼ May vary according to plug source.

■ Alternative plug positions by loosening knurled nut counter-clockwise, turning coil and re-tightening nut.

▲ Cable entry can be positioned at 900 either way from position shown, by re-assembling the contact holder into the appropriate position inside the plug connector housing.

Milimeters (inches)

3rd angle projection



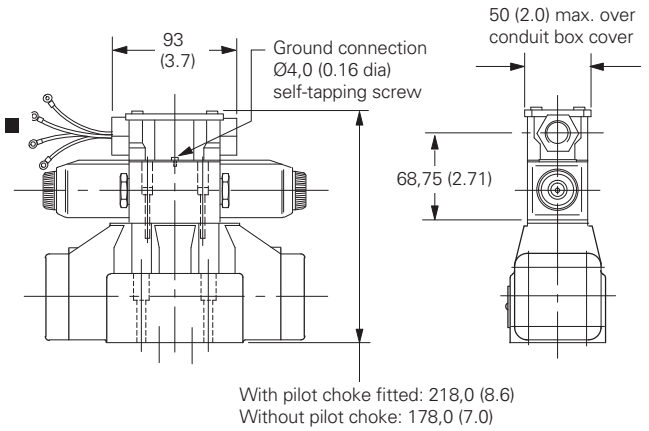
Installation dimensions

III-C

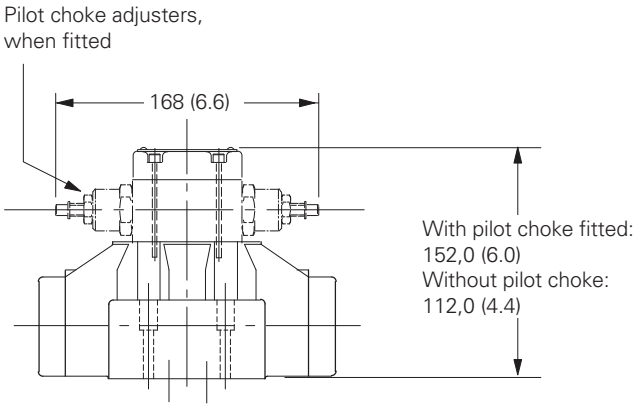
Solenoid controlled models with junction box having optional terminal strip and indicator lights
DG5V-5-***(L)(-2)(-E)(-T)(-*)-(V)M-F****(L) example

For solenoid identification see page A.7.

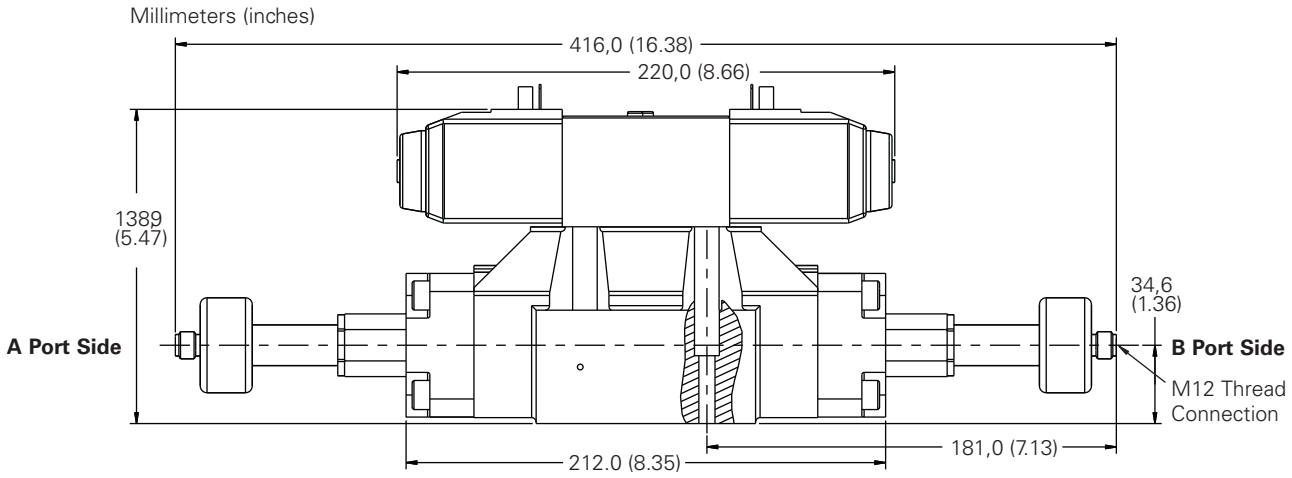
Available also with other options shown on previous and following pages.



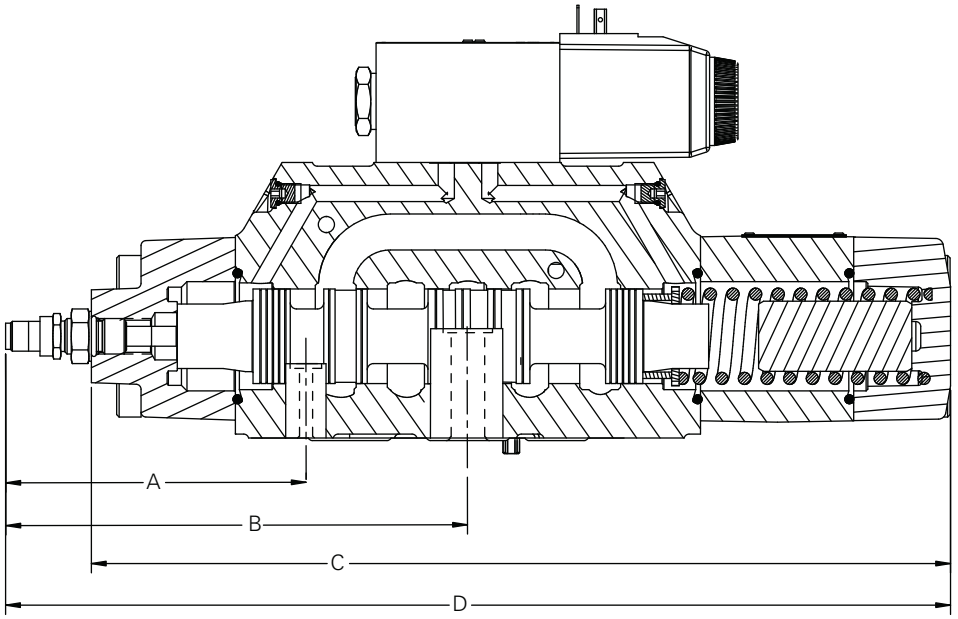
Pilot operated models with optional pilot choke
DG3V-5-** C(-2) example



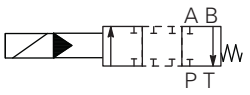
DG5V-5 with main stage spool monitoring switch "PCA", "PCB", "PDA", "PDB models (LVDT style)



Valve for safety circuit application (35A Spool)



Main Stage Hydraulic Symbol



DG5V with PPA Switch Option Shown

Model	A	B	C	D	Leakage P-A	Flow curve
	mm (in)	mm (in)	mm (in)	mm (in)	cc/min (in³/min)	
DG5V5-35A	118.5 (4.67)		234.7 (9.24)	262.1 (10.32)	Available upon request	Available upon request

Electrical Information

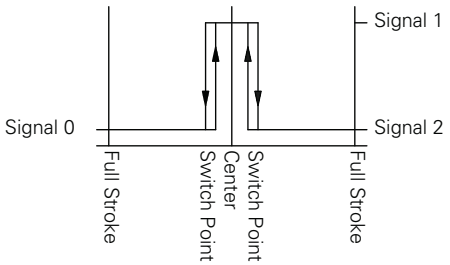
Mainstatge spool monitoring switch [LVDT style] specification

Specifications

Supply voltage (Vs)	24VDC ± 20%
(Full wave bridge with capacitor) reverse polarity protection	MAX. 300 V installed
Ripple voltage	10%
Current consumption	40 mA APPROX
Outputs	Nc contact positive
Sensing distance (offset position)	9.36 to 9.65 mm
Sensing distance (from center position)	± 0.35 to 0.65 mm
Hysteresis	&#2;0.06mm
Output voltage	(No short circuit protection)
Signal 1	Vs – 2.5 V
Signal 0	< 1.8 V
Output current	< 400 mA AT INPUT + 20%
Environmental protection	IP65 (with mounted plug)
Operating temp range	-20° C to +85° C
Maximum operating pressure	315 bar (4500 psi)
CE Declaration of Conformity No.	00 02 002 9 93

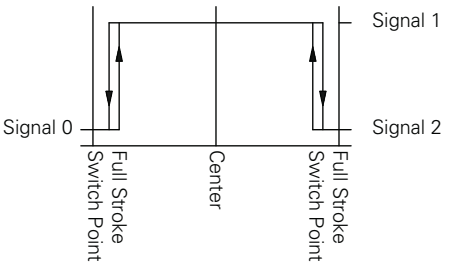
Attention: EMC only ensured when using screened cables and screened plug casing!

Typical "PCA/PCB" output (for sensing center position)



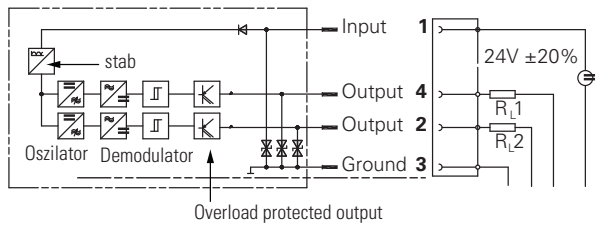
Signal 0 = Volt age at pin 2/4 < 1.8V
Signal 1 = Volt age at pin 2/4 > (Vs – 2.5V)

Typical "PDA/PDB" output (for full shift sensing)



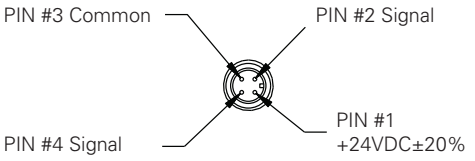
Signal 0 = Volt age at pin 2/4 < 1.8V
Signal 1 = Volt age at pin 2/4 > (Vs – 2.5V)

Electrical Schematic and Mating Connector Detail

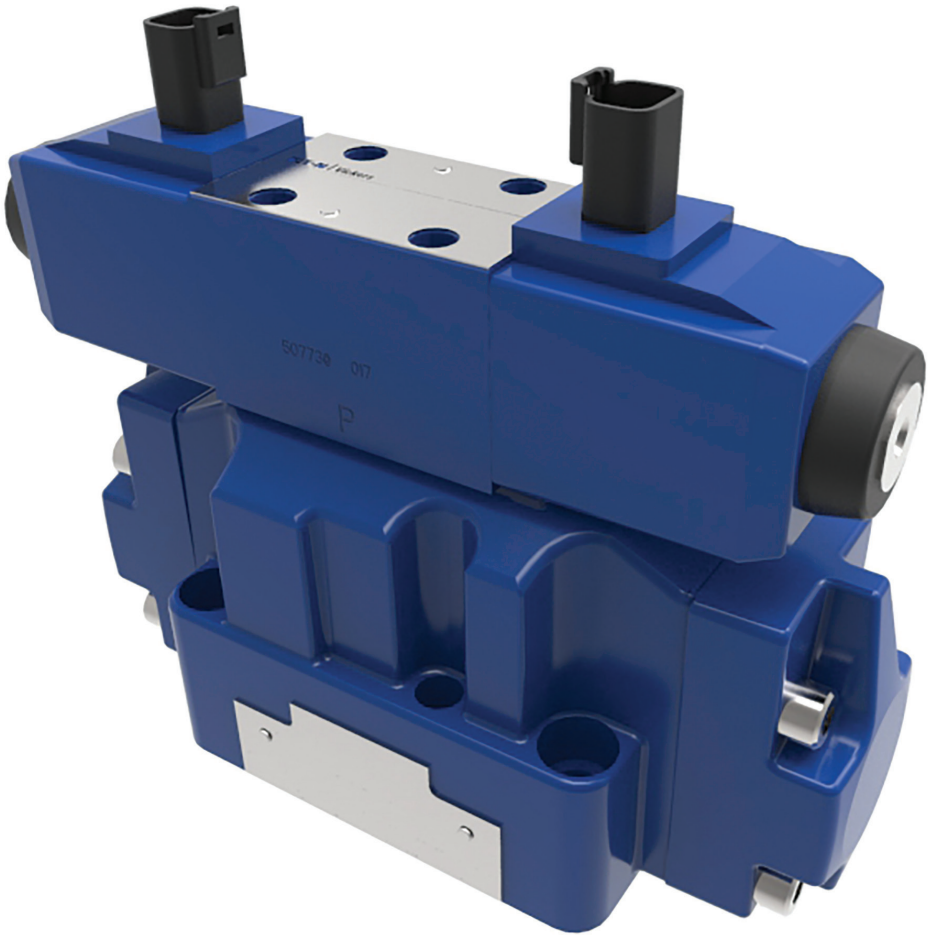


R L1,RL 2 = e.g. Coil Resistance of the switch relay >/= 60 OHMS

Connector Detail



ISO4401 Size 07; ANSI/B93.7M-D07
DG5V-7 30 Design & DG3V-7 20



Pilot operated directional valve

DG3V-7-20 Design

Solenoid controlled pilot operated directional valve

DG5V-7-30 Design

General description

DG*V-7 valves are used primarily for controlling the starting, stopping and direction of fluid flow.

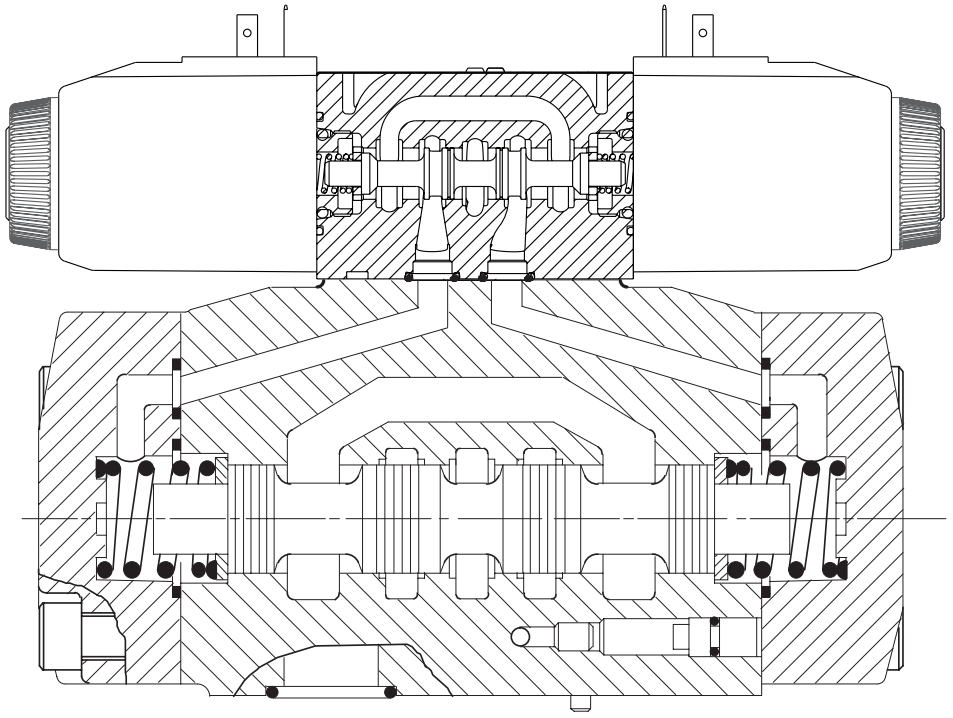
Two series of valves, DG5V solenoid controlled, pilot operated and DG3V pilot operated models are available with a wide selection of spools. These include meter-in and meter-out spools and a regeneration type that can obviate extra valves essential in traditional circuit arrangements.

All spools have been designed to provide good low shock, fast response characteristics which can be enhanced by optional stroke and/or pilot choke adjustments.

Models include spring offset, spring centered and detented versions.

Features and benefits

- High pressure and flow capability for maximum cost-effectiveness.
- Low headloss to minimize power wastage.
- Low shock characteristics to maximize machine life.
- Facility to change solenoid coils without disturbing the hydraulic envelope.
- The many optional features, particularly for DG5V valves, permit matching to virtually every application within the valve's power capacity.
- Optional mainstage spool position monitoring switch (CE marked)



For pilot operated valves:

*** DG3V-7 ** * (-**) 20**

1 2 3 4 15

For solenoid controlled, pilot operated valves:

*** - DG5V-7- ** ** (-**) (-P**) (-E) (-T) - (-K) - (-*) (V)M - ***** (L) ** - *** -* - 30**

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

IV-D

1 Fluid compatibility

Blank	Standard BUNANitrile Seals
F3	Viton Seals
Note	For further information see "Hydraulic Fluids" section on page 13.

2 Spool type

See "Functional Symbols" section on pages 5-6.

3 Spool spring arrangement

A	Spring offset, end-to-end (P to B when operated)
AL	As "A" but left-hand build (P to A when operated)
B	Spring offset, endtocenter (P to B when operated)■
BL	As "B" but left-hand build (P to A when operated) ■
C	Spring centered
N	Two-position detented
■	DG5V option. Same function from DG3V-7-*C valves by alternating pilot supply to one port (X or Y) and permanently draining the other.

4 Spool control

	Omit if not required
1	Stroke adjustment at both ends
2	Pilot choke adjustment both ends
3	"1" and "2" combined
7	Stroke adjustment, port A end only
8	Stroke adjustment, port B end only
27	"2" and "8" combined Omit if not required
28	"2" and "8" combined Omit if not required
▲	Not applicable to DG5V-7-*B(L) models.
▼	Not applicable to models shown in the "Spring offset, end-to-center, opposite hand" section on page 143
◆	Not applicable to models shown in the "Spring offset, end-to-center" section on page 143
■	Not applicable for spool "8" models

5 Main stage spool monitoring switch

Blank	None
PCA	Center sensing switch on "A" port end
PCB	Center sensing switch on "B" port end
PDA	Double offset sensing switch on "A" port end
PDB	Double offset sensing switch on "B" port end
*	The spool position monitoring switch shown on this technical document is CE marked and certified and complies to European Standard EN 61000-6-4: 2001 (Emissions) for Class A and European Standard EN 61000-6-2: 2001 (Immunity).
■	Not applicable for spool "8" models

6 External pilot supply, DG5V valve option

Blank	for internal pilot supply
E	Valve configured for external pilot supply to port X

7 Internal pilot drain, DG5V valve option

Blank	Omit for external drain, which is also mandatory for 1, 8 and 9 spool-type valves
T	Valve configured for internal pilot valve drain.

8 Minimum pilot pressure generator (P port option)

Blank	None
K	0.35 bar cracking pressure

9 Manual override option

Blank	Plain override in solenoid end(s) only
H	Water-resistant manual override on solenoid
Z	No override at either end
	No override in non solenoid end of single solenoid valves. • DC only

10 Solenoid energization indentity

V	Solenoid "A" is at port A end of pilot valve and/ or solenoid "B" at port B end independent of mainstage valve port locations or spool type; German practice.
Omit	(Except as noted below) for US ANSI B93.9 standard whereby solenoid "A" is that which, when energized, connects P to A in main-stage valve, and/or solenoid "B"connects P to B.
Note	Energization identities on valves with type 8 spools are identical under US and German practices. In such cases the "V" code is used.

Model code (Continued)

IV-D

For solenoid controlled, pilot operated valves:

* - DG5V-7-	**	**	(-**)	(-P**)	(-E)	(-T)	-	(-K)	-	(-*)	(V)M	-	*****	(L)	**	-	***	-*	-	30
1	2	3	4	5	6	7		8		9	10		11	12	13		14	15		16

11 Solenoid type connection(s)

U	ISO4400, DIN43650 connector
U1	ISO4400 fitted with PG11 plug
KU	Top exit flying lead (150mm)
KUP4	Junior timer (Amp) connector
KUP5	Integral Deutsch connector
FW	Flying lead with 1/2" NPT thread wiring housing
FTW	Fly. lead wired terminal block & 1/2" NPT thread wiring housing

12 Indicator lights

Blank	None
L	Solenoid indicator lights•
	• Flying lead coil type only

13 Surge suppressor/ damper

D1	Diode positive bias
D2	Negative bias
D7	Transorb type

14 Coil rating

	See Page 7 for circuit details
B	110V AC 50Hz/120V AC 60 Hz
BL	110V 50 Hz/120V 60 Hz
D	220V AC 50 Hz/240V AC 60 Hz
DS	28V DC 30 watt
G	12V DC
GL	12V DC
H	24V DC
HL	24V DC
HM	24V DC 8 watt

15 Tank port rating

6	210 bar (3000 psi) for AC performance.
7	210 bar (3000 psi) for DC performance.

16 Design number

20	Series for DG3V valves.
30	Series for DG5V valves.
	Subject to change.

Pilot pressure

a. Pilot pressure must always exceed tank line pressure by at least the requisite minimum pilot pressure. This also applies when combining open center spools (0, 1, 8, 9 and 11) with internal pilot pressure, but they should be used only with externally drained valves.

b. Internally drained valves may be used only when surges in the tank line cannot possibly overcome the minimum pilot pressure differential referred to above. When the possibility of pressure surges in the tank line exist, externally drained valves are recommended.

c. When DG5V-7-*N valves are de-energized the pilot and main spools remain in the last selected position, provided that pilot pressure is maintained. If pilot pressure fails, or falls below the minimum, the main spool will spring center.

Caution: Because of this in-built feature the flow conditions of the center position must be selected with care, for the effect on both the direction of flow and the pilot pressure.

Stroke adjustment options

These control the maximum opening of the main spool/body passages by adjusting the limits of spool stroke. By this means, the response time and the pressure drop across the valve for any particular flow rate can be controlled. Stroke adjusters can be fitted at either or both ends of the main-stage valve for adjusting the stroke in one or both directions. One use of stroke adjusters is for controlling the metering characteristics of "X*" or "Y*"- type spools. (See model code #4.)

Pilot choke adjustment options

These provide a meter-out flow control system to the fluid in the pilot chambers of main-stage valves. It allows the velocity of the mainstage spool to be controlled, thereby reducing transient shock condition. For optimum results, a constant reduced pilot pressure is recommended.

Control data, general

a. Dependent on the application and the system filtration, any sliding spool valve, if held shifted under pressure for long periods of time, may stick and not move readily due to fluid residue formation. It may therefore need to be cycled periodically to prevent this from happening.

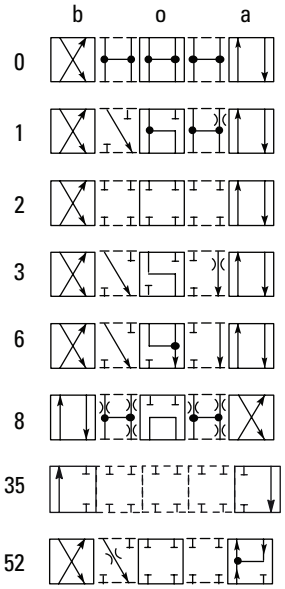
b. Surges of fluid in a common drain line serving two or more valves can be of sufficient magnitude to cause inadvertent shifting of the spools. It is recommended that circuit protection be used, such as separate drain lines.

c. Control by stroke adjusters, pilot chokes and minimum-pilot-pressure generator options is described on this page.

Functional symbols

Spool types

Shown in 3-position form, plus 2 transients.



Note:

1. In the detailed and simplified symbols on this and the previous pages, the transient positions are omitted for simplicity.
2. In certain 2-position valves, the “o” position becomes an additional transient, i.e. in DG5V-7-*A(L) and DG5V-7-*N valves.

Your Eaton representative can provide further details.

- Only 35A available

DG3V-7 options

The following are shown in a DG3V-7-*C example:

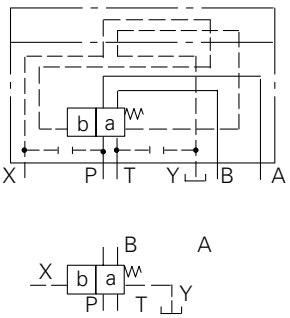
1. Pilot choke module
2. Stroke adjusters at either or at both ends (shown at both ends in example)

One or more options can be built into any DG3 series valve.

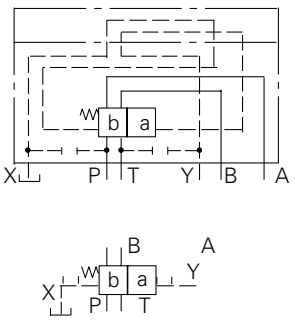
DG3V-7 pilot operated models

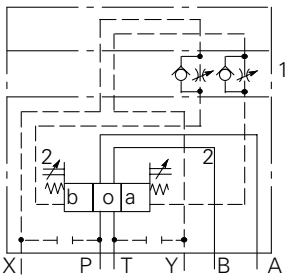
Comprehensive and simplified symbols.

Spring offset, end-to-end, DG3V-7-*A

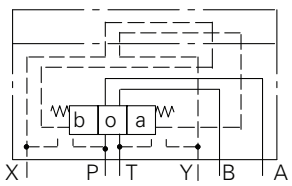


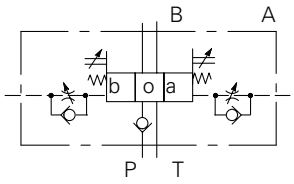
Spring offset, end-to-end, opposite hand, DG3V-7-*AL

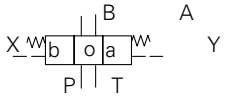




Spring centered, DG3V-7-*C



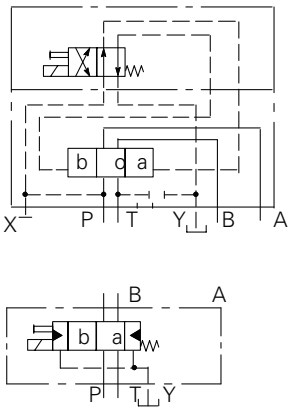




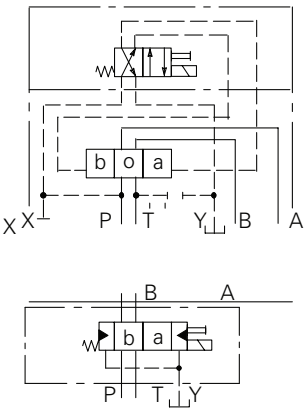
DG5V-7, Solenoid controlled, pilot operated models

Comprehensive and simplified symbols shown configured for external pilot supply and internal drain

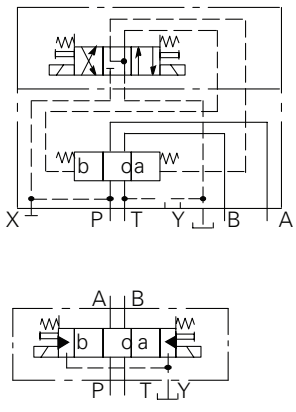
Spring offset, end-to-end, DG5V-7-*A



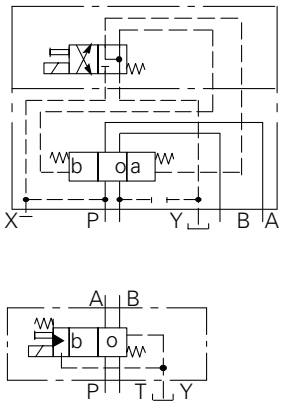
Spring offset, end-to-end, opposite hand, DG5V-7-*AL



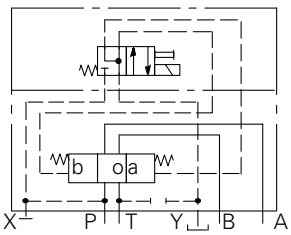
Spring centered, DG5V-7-*C



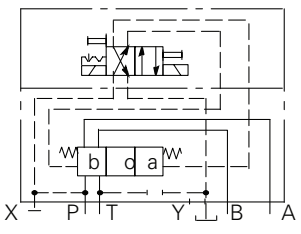
Spring offset, end-to-center DG5V-7-*B



Spring offset, end-to-center, opposite hand DG5V-7-*BL



Detented, DG5V-7-*N

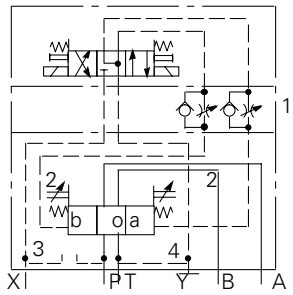


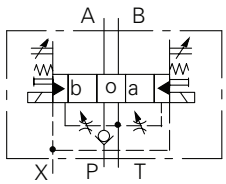
DG5V-7 Options

The following are shown in a DG5V-7-*C example:

1. Pilot choke module
2. Stroke adjusters, at either or at both ends (shown at both ends in example)
3. External pilot connection
4. Internal drain

One or more options can be built into any DG5 series valve.





Solenoid identification

Model (see also in "Model Code" on page 8)	Spool types	Solenoid identity at: Main port "A" end	Solenoid identity at: Main port "B" end
DG5V-7-*A/B(-**)(-E)(-T)(-*)-M	All except "8"	–	B
DG5V-7-*A/B(-**)(-E)(-T)(-*)-VM	All except "8"	–	A
	"8" only	B	–
DG5V-7-*AL/BL(-**)(-E)(-T)(-*)-M	All except "8"	A	–
DG5V-7-*AL/BL(-**)(-E)(-T)(-*)-VM	All except "8"	B	–
	"8" only	–	A
DG5V-7-*C/N(-**)(-E)(-T)(-*)-M	All except "8"	A	B
DG5V-7-*C/N(-**)(-E)(-T)(-*)-VM	All spools	B	A

Operating data

Maximum pressures:	
DG3V-7 valves; ports:	
P, A, B, X and Y	350 bar (5000 psi)
T	250 bar (3626 psi)
DG5V-7-(L)(-*)(-E)(-*) valves, (externally drained); ports:**	
P, A, B, T and X	350 bar (5000 psi) ▲
Y	210 bar (3045 psi) ▲
DG5V-7-(L)(-*)(-E)-T(-*) valves, (internally drained)u; ports:**	
P, A, B and X	350 bar (5000 psi) ▲
T	210 bar (3045 psi) ▲
Pilot pressures	See "Pilot Pressures" on page 146

▲ The DG5V, 50 design two-stage valves have been designed to satisfy the needs of most applications.

Consult your Eaton representative about an alternative model if:

a. Valves are required to remain pressurized for long periods without frequent switching, and /or

b. Back pressure on the drain port of externally drained models (or the tank port of internally drained models) is required to rise above 210 bar (3000 psi).

Maximum flow rates, L/min (USGPM) at the minimum pilot pressures ■, and with spool type					
See pilot pressures on page 147	70 (1000)	140(2000)	210 (3000)	280 (4060)	350 (5000)
0, 2, 3, 6, 31, 33, 35, 52 or 521 ◆	300 (80)	300 (80)	300 (80)	300 (80)	300 (80)
1, 9 or 11	260 (69)	220 (58)	120 (32)	100 (26)	90 (24)
8	300 (80)	300 (80)	250 (66)	165 (44)	140 (37)

■ Higher flow rates possible at higher pilot pressures; consult your local Eaton sales engineer.

◆ Consult your local Eaton sales engineer regarding flow limits relative to the regenerative position of type 52 and 521 spools.

Electrical information		
Control (swept) volume(s), DG3V and main-stage of DG5V valves:	7.28 cm3 (0.44 in3)	
Center-to-end	14.56 cm3 (0.88 in3)	
End-to-end	See 14 in "Model Code" on page 140	
Voltage ratings, DG5V valves		
Voltage limits, DG5V valves:		
Maximum voltage	See "Temperature limits", on page 145	
Minimum voltage	90% of rated voltage	
Power consumption, DG5V valves with AC solenoids:	**Initial VA rms**	**Holding VA rms**
Dual-frequency coils at 50 Hz, types "B" and "D"	265	49
Dual-frequency coils at 60 Hz, types "B" and "D"	260	48
Power consumption, DG5V valves with DC solenoids	30W at rated voltage and 20 C (68 F)	
Relative duty factor, DG5V valves	Continuous; ED = 100%	
Type of protection, DG5V valves:		
ISO 4400 coils with plug fitted correctly	IEC 144 class IP65	
Junction box	IEC 144 class IP65 (NEMA 4)	
Coil winding	Class H	
Lead wires (coil types "F*****")	Class H	
Coil encapsulation	Class F	

Pressure drop characteristics	See page 146, 147
Response times, DG5V valves:	
Typical values for a DG5V-7-2C-E spring centered, externally piloted valve under standard test conditions and operating with 150 L/min (40 USgpm) at 350 bar (5000 psi).	

Coil rating:	Pilot pressure, bar (psi):	Time, ms ■ Energizing	De-energizing
110V 50 Hz	15 (218)	75	40
	50 (730)	50	40
	150 (2180)	40	40
	210 (3000)	40	40
	250 (3600)	40	40
24V DC	15 (218)	90	45 ▲
	50 (730)	65	45 ▲
	150 (2180)	55	45 ▲
	210 (3000)	55	45 ▲
	250 (3600)	55	45 ▲

◆ From applying a signal at the solenoid until the main-stage spool completes its travel.

▲ In pure switched circuit conditions, devoid of the effects of any suppression diodes and full-wave rectifiers.

Temperature limits:	See page 146, 147
Fluid temperature limits	See appendix
Ambient temperature limits:	See appendix
Minimum ambient, all valves	-20°C (-4°F)
Maximum ambients, DG5V valves with coils listed in 12 in "Model Code" two pages back, and under conditions stated below:	
Dual-frequency coils:	
at 50 Hz and 107% of rated voltage	65°C (150°F)
at 50 Hz and 110% of rated voltage	65°C (150°F)
at 60 Hz and 107% of rated voltage	65°C (150°F)
at 60 Hz and 110% of rated voltage	65°C (150°F)
Single-frequency (50 Hz) coils at 50 Hz and 110% of rated voltage	65°C (150°F)
DC coils at 110% of rated voltage	70°C (158°F)

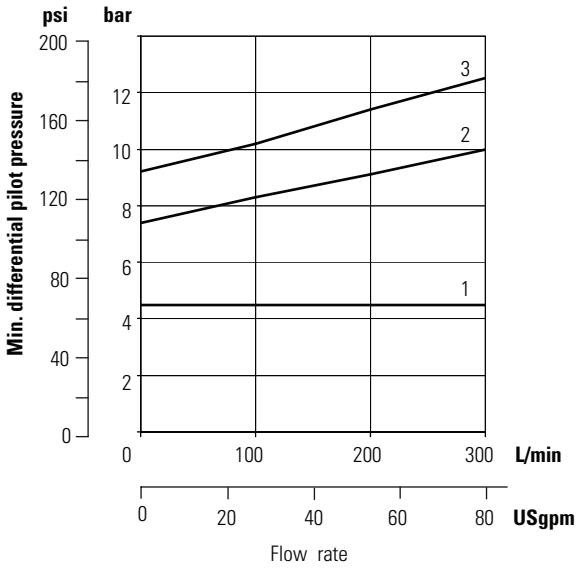
Installation dimensions:	
Valves	See page 148, 149, 150
Mass (weight), basic models:	kg (lb) approx.
DG3V-7-*A(L)	10,0 (22.0) ◆
DG3V-7-*/*B(L)/*C	7,3 (16.1) ◆
DG5V-7-*A/B (AC voltages)	8,4 (18.5) ◆
DG5V-7-*A/B (DC voltages)	8,5 (18.7) ◆
DG5V-7-*C/N (AC voltages)	8,7 (19.2) ◆
DG5V-7-*C/N (DC voltages)	9,1 (20.0) ◆

◆ Add 1,1 kg (2.4 lb) when pilot chock adjustment is fitted.

Notes: For information on pilot valves please refer segment B, C, D of the catalog.

Pilot pressures

Maximum: 350 bar (5000 psi). Typical minimum differential pilot pressure characteristics, shown below, are based on looped flow through P to A to B to T under standard test conditions.



Applicable to:

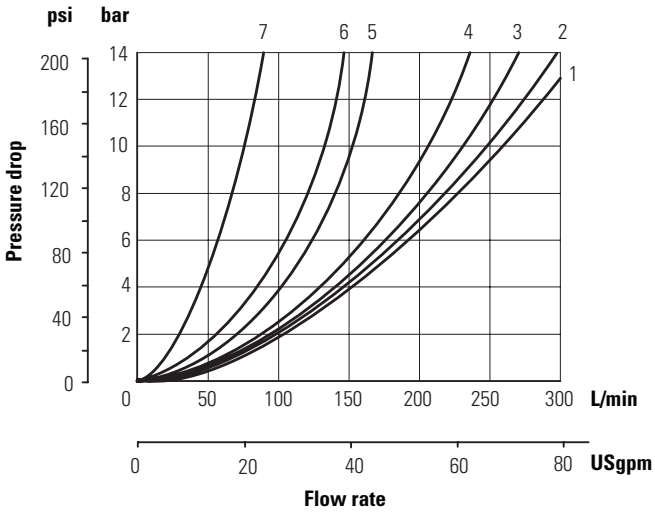
Model	Spool type	Curve correction
DG3V-7-*C	All	As drawn
DG5V-7-*A(L)	0, 2, 6, 9, 52, X2 & Y2	Subtract 3 bar (44 psi)
DG5V-7-*B(L)	0, 2, 6, 52▲, X2 & Y2	As drawn
DG5V-7-*C	All	As drawn
DG5V-7-*N	0, 2, 6, 9, 52, X2 & Y2	As drawn

▲ DG5V-7-52BL models only.

Pilot pressures

The following typical pressure drops (△p) at flow rates (Q) are based on standard test conditions, using oil of 0,865 specific gravity. Except where otherwise stated, for any other flow rate (Q1) the pressure drop (△p1) will be approximately △p1 = △p (Q1/Q)².

Spool types	0	1	2	3	4	6	8	9	11	31	33	52	X*	Y*
Curve ref.	1	1	3	3	1	2	1	1	1	3	3	3	3	3



Flow-direction curve reference

Spool type	P - A	B - T	P - B	A - T	P - T
0	2	1	2	3	3 ■
1	1	2	2	3	4 ▼
2	1	2	1	2	-
3	1	2	1	3	-
4	2	2	2	1	6
6	1	1	1	3	-
8	2	2	2	1	5
9	1	2	1	3	7
11	2	3	1	2	4
31	1	3	1	2	-
33	1	2	1	2	-
52 ▲	2●	-	3 ▼	-	-
52 ◆	-	-	3	3	-

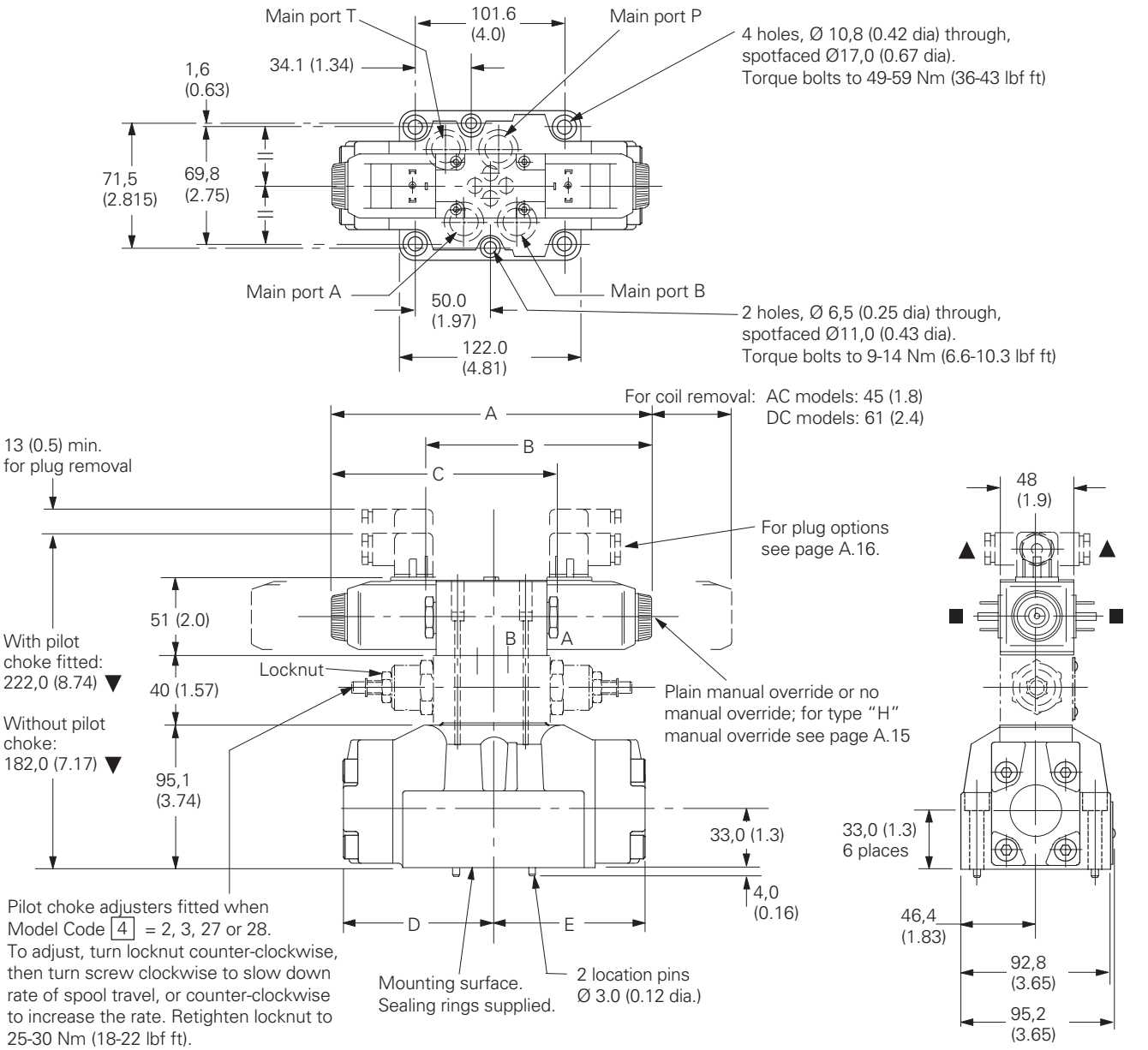
Solenoid Controlled Models with ISO 4400 (DIN 43650) Electrical Connections and Pilot Choke

DG5V-7–**(L)(-2)(-E)(-T)(-*)-(V)M–U example

For dimensions A, B, C, D and E see page 148

For solenoid identification see page 150

For stroke adjusters see page 151



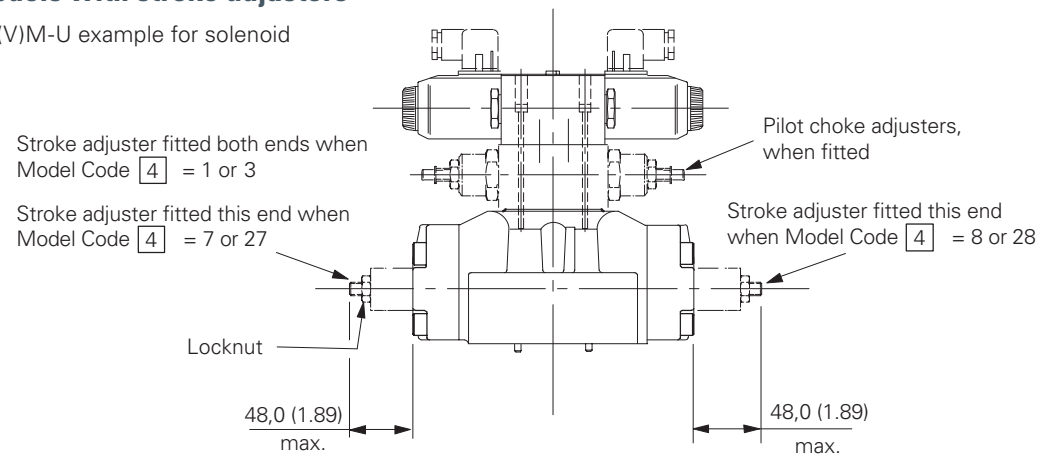
▼ May vary according to plug source.

■ Alternative plug positions by loosening knurled nut counter-clockwise, turning coil and re-tightening nut.

▲ Cable entry can be positioned at 90 either way from position shown, by re-assembling the contact holder into the appropriate position inside the plug connector housing.

Solenoid controlled models with stroke adjusters

DG5V-7-***(L)(-2)(-E)(-T)(-*)-(V)M-U example for solenoid identification see page 16



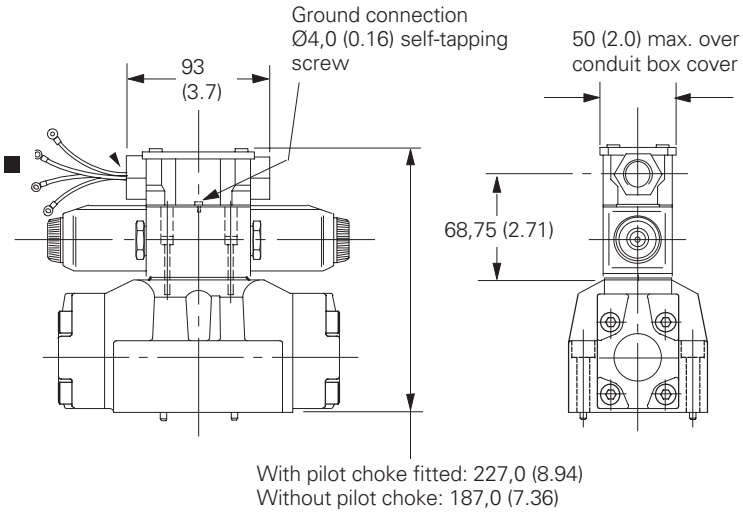
To adjust:

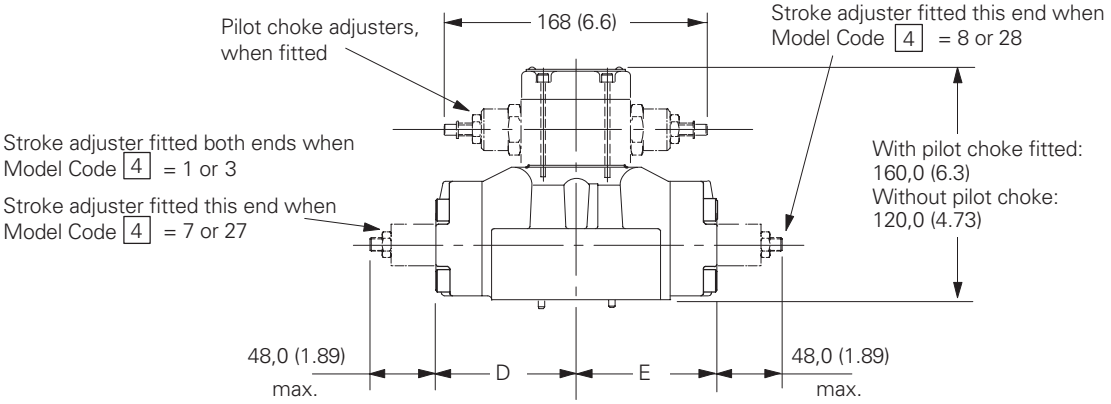
Turn locknut counter-clockwise, then turn screw clockwise to shorten stroke, or counter-clockwise to increase stroke. Re-tighten locknut.

Solenoid Controlled Models with Junction Box having Optional Terminal Strip and Indicator Lights

DG5V-7-***(L)(-**)(-E)(-T)(-*)-(V)MF**(L) example.

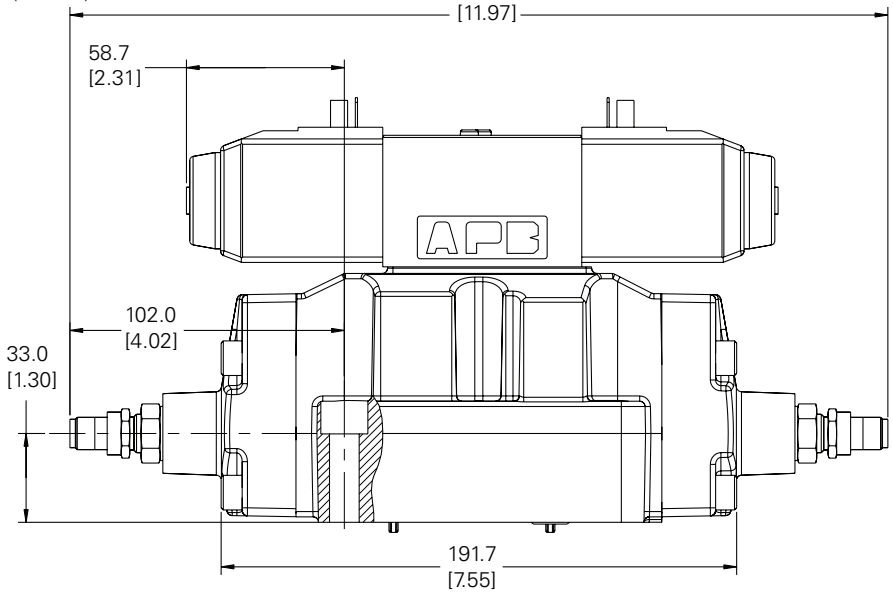
For solenoid identification see page 150
Available also with other options shown above and on previous page.





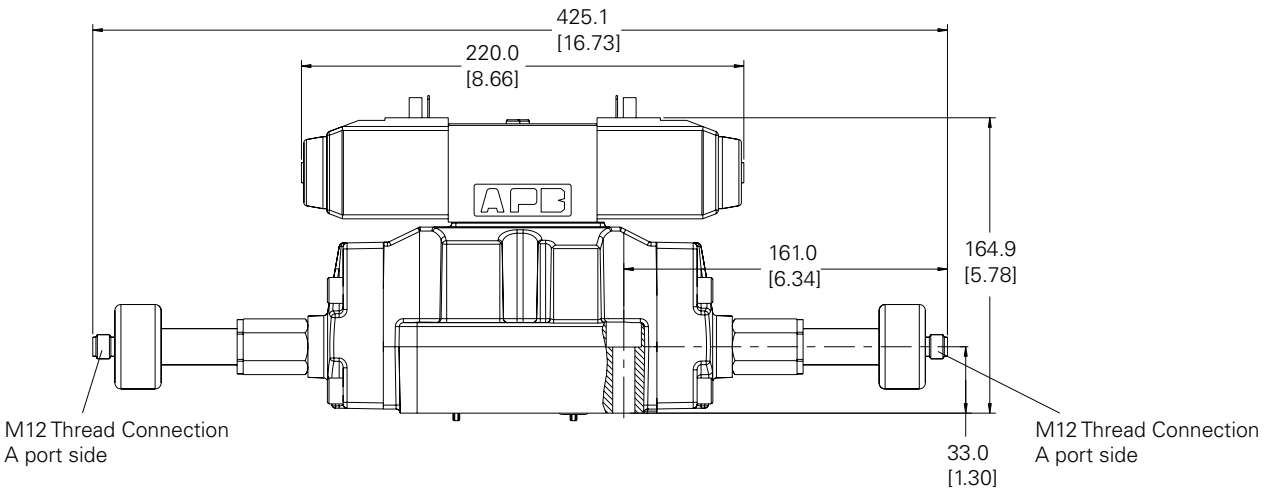
DG5V-7 with main stage spool monitoring switch "PPA", "PPB" or "PPD" models (proximity switch)

Millimeters (inches)



DG5V-7 with main stage spool monitoring switch "PPA", "PPB" or "PPD" models (LVDT style)

Millimeters (inches)



Installation dimensions

Solenoid identification

Model (see also in 10 "Model Code" on page 140)	Spool types	Solenoid identity at: main port "A" end	Solenoid identity at: main port "A" end
DG5V-7-*A/B(-**)(-E)(-T)(-K)(-*)-M	All except "4" & "8"	-	B
DG5V-7-*A/B(-**)(-E)(-T)(-K)(-*)-VM	All except "4" & "8" "4" & "8" only	-	A
		B	-
DG5V-7-*AL/BL(-**)(-E)(-T)(-K)(-*)-M	All except "4" & "8"	A	-
DG5V-7-*AL/BL(-**)(-E)(-T)(-K)(-*)-VM	All except "4" & "8" "4" & "8" only	B	-
		-	A
DG5V-7-*C/D/N(-**)(-E)(-T)(-K)(-*)-M	All except "4" & "8"	A	B
DG5V-7-*C/D/N(-**)(-E)(-T)(-K)(-*)-VM	All spools	B	A

Dimensions

Basic model designation	AC models			DC models				
	A	B	C	A	B	C	D	E
DG3V-7-*C	–	–	–	–	–	–	97,0 (3.82)	97,0 (3.82)
DG3V-7-*A ■	–	–	–	–	–	–	97,0 (3.82)	131,0 (5.16)
DG3V-7-*A(L) ■ DG3V-7-*D	–	–	–	–	–	–	131,0 (5.16)	97,0 (3.82)
DG5V-7-*A ■ DG5V-7-*B ■ DG5V-7-4/8BL	–	147 (5.8)	–	–	157 (6.2)		97,0 (3.82)	97,0 (3.82)
DG5V-7-*AL ■ DG5V-7-*BL ■ DG5V-7-4/8B	–	–	147 (5.8)	–	–	157 (6.2)	97,0 (3.82)	97,0 (3.82)
DG5V-7-*C DG5V-7-*N	200 (7.8)	–	–	200 (7.8)	–	–	97,0 (3.82)	97,0 (3.82)
DG5V-7-*D	200 (7.8)			200 (7.8)			131,0 (5.16)	97,0 (3.82)

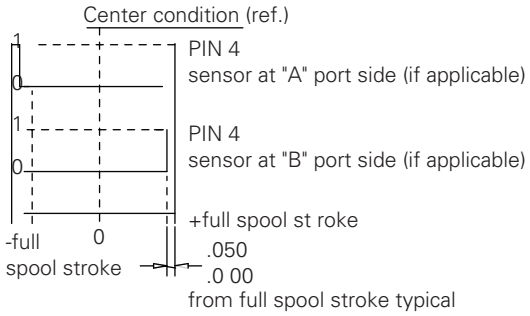
■ Not types "8" or "8" spools.

IV-D

Specifications	
Supply voltage (vs)	10 to 30 Vdc
Supply current (Is)	8 mA at 24 Vdc (plus load current)
Supply over-voltage rating:	35 Vdc continuous
Supply reverse polarity rating	-35 Vdc (with no shorts)
Short circuit tolerance:	Continuous short between any two pins
High potential test, pin to case:	300 Vdc
Electronmagnetic compatibility:	ISO 7637 Parts O and I worst case and
	Immunity to Radiated Electromagnetic Fields, 10 KHZ to 1 GHZ per SAE J1113/25 Sep 95
Pins to case resistance	50 Megohms
Load dump tolerance:	80 Vdc Peak, 400 ms Decay, with 1.5 Ohm Source Impedance
Switching frequency:	0 to 3K Hz
Output:	Open collector PNP sourcing, normally open
Sensing distance (offset position):	1.27 ± 0.25 mm (.050" ± .010")
Hysteresis:	0.25 mm (.010") Max.
Rise/fall time:	6.5/1.5 microsec R1=820 Ohm, C1=20 pF @ 8Vdc
Output leakage current	10µa Max.
Output voltage high:	+Vs – 2.2 Vdc minimum
Output load current:	200 mA Max.
Operating pressure:	350 bar (5000 psi)
Operating temperature:	-40° to 110°C
Humidity:	0 to 100%

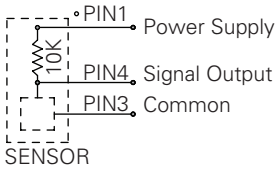
Electrical information shown in this window is for offset sensing, proximity switch "PPA" , "PPB" or "PPD" models

Functional diagram - spring offset

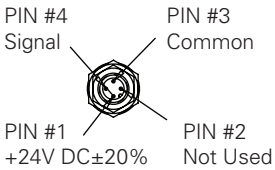


1= voltage at pin 4 (Vs – 2.2V) min.
0= voltage at pin 4 0.5V min.

Output circuit wiring instructions



Connector detail



Electrical information

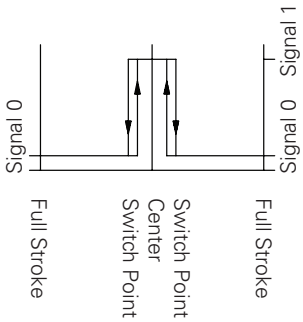
Main stage spool monitoring switch (LVDT style)

Specifications	
Supply voltage (Vs)	24VDC +/-20%
(Full wave bridge with capacitor) reverse polarity protection	Max. 300 V Installed
Ripple voltage	10%
Current consumption	40 mA Approx.
Outputs	NC Contact Positive
Sensing distance (offset position)	5.85 to 6.15 mm
Sensing distance (from center position)	± 0.35 to 0.65 mm
Hysteresis	<0.06 mm
Output voltage	(No Short Circuit Protection)
Signal 1	Vs – 2.5 V
Signal 0	< 1.8 V
Output current	< 400 mA AT INPUT + 20%
Environmental protection	IP65 (With Mounted Plug)
Operating temp range	-20° C to +85° C
Operating pressure	315 bar (4500 psi)
CE Declaration of Conformity No.	00 02 002 9 93

Attention: EMC only ensured when using screened cables and screened plug casing!

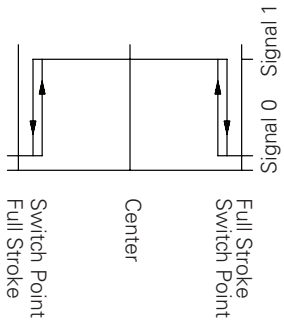
Electrical information shown in this window is for offset sensing, proximity switch "PPA" , "PPB" or "PPD" models

Typic AL "PC A/PCB" output (For sensing center position)



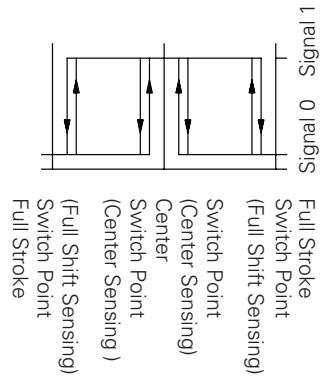
Signal 0 =V oltage at pin 2/4 < 1 .8 V
Signal 1 =V oltage at pin 2/4 > (Vs – 2.5V)

Typic AL "PD A/P DB" output (For full shift sensing)



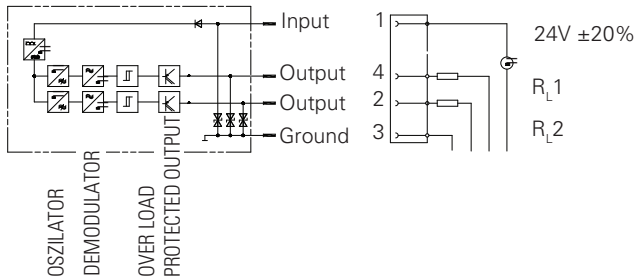
Signal 0 =V oltage at pin 2/4 < 1 .8V
Signal 1 =V oltage at pin 2/4 > (Vs – 2.5V)

Typical "PCD" output (For center se nsing 'a' port end, Full shift sensing 'b' port end)

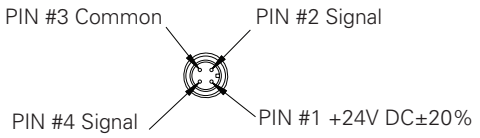


Signal 0 =Voltage at pin 2/4 < 1 .8V
Signal 1 =Voltage at pin 2/4 > (Vs – 2.5V)

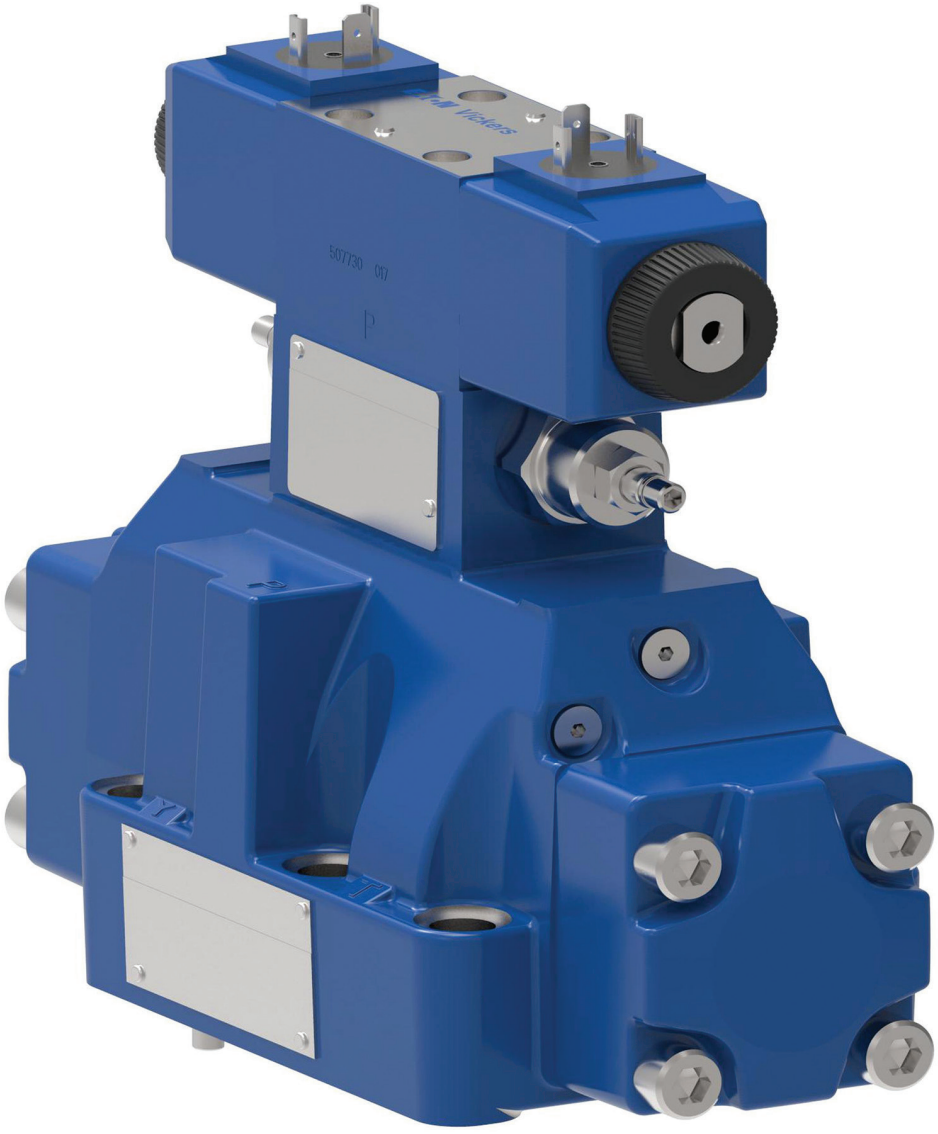
Electrical schematic and mating connector detail



Connector detail



ISO4401 size 08; ANSI/B93.7M-08
DG3V-8 & DG5V-8 10 Design



Remote pilot operated directional valve

DG3V-8 10 Design

Solenoid controlled pilot operated directional valve

DG5V-8 10 Design

General description

The Size 8 Directional Control Valve serves as a control valve package. It offers directional control, pilot pressure reducers, pilot chokes, and main stage stroke adjustment to control the flow. The valves are generally used to control large flows up to 700 l/min (185 USgpm) at 350 bar (5000 psi) and provide low pressure drops. The range includes:

- **DG3V-8 -** remote pilot operated valve.
- **DG5VM-8-H -** DG4V-3-60 high performance D03 pilot valve 210 bar (3000 psi) tank line rating.

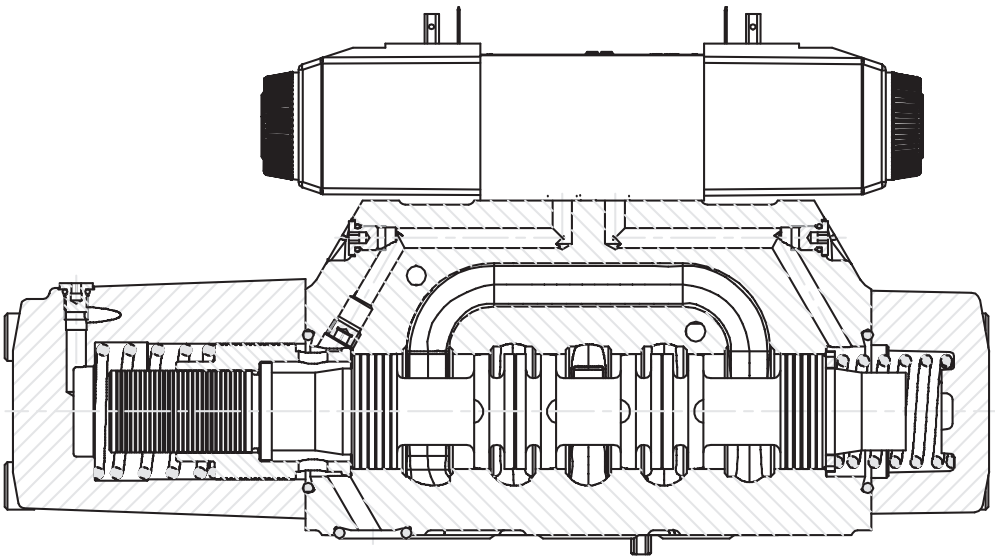
Each valve contains a mainstage spool which is positioned in the valve by special arrangement. The four arrangements are:

- **Spring offset -** For single stage operation, one spring returns spool to an offset position. For two–stage operation, springs and washers are removed from main stage and offset action is obtained from pilot valve.
- **Spring centered -** Spring and washer are located on both ends of main stage spool to control centering.
- Pressure centered - Centering springs are used in addition to pilot pressure, to provide positive centering should pilot pressure fail.
- **No spring for DG3 -** Springs and washers are provided so that in the event of pilot pressure failure, the main spool will spring center.

Features and benefits

A ''mini-system'' capability with wide variety of spool and spring arrangements, stroke and pilot choke adjustments, integral check valves.

- High force solenoids and centering springs assure consistent shifting through a wide range of pressure and silting extremes.
- Optional Mainstage Spool Position Monitoring Switch (CE marked)
- Suitable for demanding industrial or mobile applications by providing for reliable operations.
- Endurance tested to 10 million cycles and fatigue tested without failure to ensure highest reliability.
- Fatigue testing performed to NFPA specifications to ensure the highest reliability in applications requiring high flows and pressure.
- Solid cast body and cored passages for maximum strength and minimal pressure drop.
- Electrical options including coil types, connections, and wiring housings allow full compatibility and reliable performance in any system application.
- Plain, waterproof options are available to facilitate system troubleshooting or servicing.



(F*) - DG3V - 8 - (B) - ** - (L) - (*) - (*) - 10

1 2 3 4 5 6 7 8 9

1 Seals

F3 Seals for fire resistant fluids.
F6 Seals for water glycol.

2 Directional control valve

DG3V Subplate mounted; pilot operated remote operator. Pressure rating 350 bar (5000 psi) for all ports.

3 Valve size

8 Valve size CE TOP 8, NFPA D08

5 Spool types

Please refer functional symbols on page 7 for spool types.

6 Spool spring arrangement

A Spring offset to cylinder 'A'
AL Spring offset to cylinder "B" remove section 7
C Spring centered
D Pressure centered

8 Spool control modifications

1 Stroke adjustment (both ends) (available on C & B lank (no spring) models)
2 Pilot choke adjustment (available on all models)
3 Pilot choke and stroke adjusters (both ends) (available on C & Blank (no spring) models)
Stroke adjusters on cylinder A end only (available on A, C & Blank (no spring) models)
7 Stroke adjusters on cylinder A end only (available on A, C & Blank (no spring) models)
8 Stroke adjusters on cylinder 'B' end only (available on AL, C, & Blank (no spring) models)
27 If both are required (available on A, C, & Blank (no spring) models)

9 Check valve in pressure port

K 0,35 bar (5 psi) check
Q 2,42 bar (35 psi) check
R 3,45 bar (50 psi) check
S 5,20 bar (75 psi) check

10 Design number

Subject to change. Installation dimensions remain as shown for design numbers 10 through 19.

DG5V-8 Solenoid controlled pilot operated directional valves

(F*)-DG5V-8 - * - (B) - * - ** - (**) - (*) - P - (E) - (T) - (*) - (V) - M - * ** * * - (L) - (*) - ** - 10**

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

V-E

1 Seals (omit if not required.)

F3	Seals for fire resistant fluids.
F6	Seals for water glycol.

2 Pilot valve type

H	CETOP 3, High performance

3 Spool Types

Please refer functional symbols on page 7 for spool types.

5 Spool spring arrangement

A	Spring offset, end to end (P to B when shifted)
AL	Spring offset, end to end, left hand build (P to A when shifted)
B	Spring centered, single solenoid (P to B when shifted)
BL	Spring centered, single solenoid, left hand build (P to A when shifted)
C	Spring centered, dual solenoid
N	Two position detented

6 Manual override option

Blank	Plain override in solenoid end(s) only ▲
H	Water-resistant override on solenoid end(s)
Z	No override at either end No override in non-solenoid end of single-solenoid valves.
Omit	None required
1	Stroke adjustment both ends (not available on "D" pressure centered, models)
2	Pilot choke adjustment
3	Pilot choke adjustment and stroke adjustment both ends (not available on "D" pressure centered, models)
7	Stroke adjustment on 'A' port end (not available on "D", pressure centered models)
8	Stroke adjustment on 'B' port end
27	Pilot choke adjustment and stroke adjustment on "A' port end (not available on "D", pressure centered, models)
28	Pilot choke adjustment and stroke adjustment on 'B' port end
3	"1" and "2" combined ▲■
7	Stroke adjustment, port A end only ▼
8	"2" and "7" combined ▼
27	"2" and "8" combined Omit if not required
▲	Not applicable to DG5V-7-*B(L) models.
▼	Not applicable to models shown in the "Spring offset, end-to-center, opposite hand" section on page 6
◆	Not applicable to models shown in the "Spring offset, end-to-center" section on page 6
■	Not applicable for spool "8" models

8 Main stage spool monitoring switch

Blank	None
PCA	Center sensing switch on "A" port end (not available on "D", pressure centered, and 1/3/7/27, stroke adjust models)
PCB	Center sensing switch on "B" port end (not available on 1/3/8/28, stroke adjust models)
PDA	Double offset sensing switch on "A" port end (not available on "D", pressure centered, and 1/3/7/27, stroke adjust models)
PDB	Double offset sensing switch on "B" port end (not available on 1/3/8/28, stroke adjust models)
PCD	Center sensing switch on "A" port end and double offset sensing switch on "B" port end (not available on "D", pressure centered, and 1/3/7/8/27/28, stroke adjust models)
PPA	Offset sensing proximity switch "A" port end (not available on "D", pressure centered, and 1/3/7/27, stroke adjust models)
PPB	Offset sensing proximity switch "B" port end (not available on 1/3/8/28, stroke adjust models)
PPD	Offset sensing proximity switch both ends (not available on "D", pressure centered, and 1/3/7/8/27/28, stroke adjust models)
Note	The spool position monitoring switch shown on this technical document is CE marked and certified and complies to European Standard EN 61000-6-4: 2001 (Emissions) for Class A and European Standard EN 61000-6-2: 2001 (Immunity).

9 External pilot pressure

E	External pilot pressure.
Blank	For internal pilot pressure models.

10 Internal pilot drain

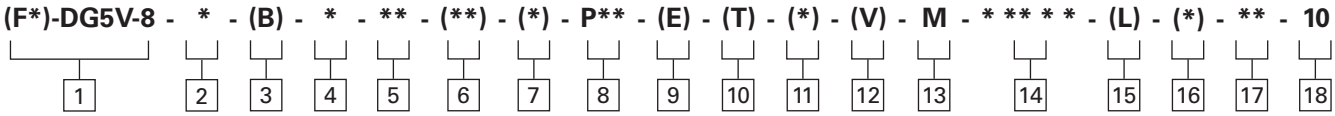
T	Internal pilot drain to 'T' port.
Blank	For external pilot Frain models.

11 Check valve in pressure port (Omit if not required.)

K	0,35 bar (5 psi) check
S	5,20 bar (75 psi) check

12 Solenoid energization identity (Omit if not required.)

Blank	Standard arrangement for ANSI B93.9 (i.e. energize solenoid A to follow flow P to A).
V	Solenoid identification determined by position of solenoid (i.e. solenoid A at port A end/solenoid B at port B end).
Note	4 and 8 type spools are always V. Solenoid energization identity is independent of mainstage porting.



13 Flag symbol

M	Electrical options and features

14 Coil Type

U	ISO4400, DIN43650 connector
U1	ISO4400 fitted with PG11 plug
KU	Top exit flying lead (150mm)
KUP4	Junior timer (Amp) connector
KUP5	Integral Deutsch connector
FW	Flying lead with 1/2" NPT thread wiring housing
FTW	Fly. lead wired terminal block & 1/2" NPT thread wiring housing
Note	Refer DG4V3 Catalog for more options

12 Indicator lights

Blank	None
L	Solenoid indicator lights•

• Flying lead coil type only

13 Surge suppressor/ damper

D1	Diode positive bias
D2	Negative bias
D7	Transorb type

14 Coil rating

See Page 7 for circuit details

B	110V AC 50Hz/120V AC 60 Hz
BL	110V 50 Hz/120V 60 Hz
D	220V AC 50 Hz/240V AC 60 Hz
DS	28V DC 30 watt
G	12V DC
GL	12V DC
H	24V DC
HL	24V DC
HM	24V DC 8 watt

18 Design number

General description

DG5V-8 models are two-stage directional control valves having an integrally mounted wet armature solenoid pilot valve. These valves are generally used to control the movement of a work cylinder or the rotation of a fluid motor.

Pressure centered models

Designated by ''D'' under spring/spool arrangement in model code.

This option provides faster, more positive spring centering time by use of pilot pressure to center the spool. The valve spool is returned to center position when pilot pres sure is applied at both ends of the spool. The centering springs are used in addition to pilot pressure to ensure positive centering of spool.

If pilot pres sure fails or falls below the required minimum, the spool will spring return to the center position. Pilot pres sure is not available through the use of and integral check valve. Pressure centered valves have a drain port ''W'' and must have provisions for this feature.

Notes:

Pressure centered valves require a pilot valve which directs pilot oil to connections ''X'' and ''Y'' of the valve at the same time pressure centering is desired. The centering time depends on the rate of pressure rise in the pilot chamber.

Spring offset models

Designated by ''A'' under spring/spool arrangement in model code.

Spring offset model has an internal spring which returns the spool to offset position when the pilot connection ''X'' is open to tank. Pilot connection ''Y'' becomes a drain connection and must be pioped directly to tank at atmospheric pressure through a surge-free tank line. Back pressure at this connection would cause valve to malfunction.

Caution:

Spring offset models contain a high assembled spring load. Call Eaton Service for disassembly instructions.

Spring centered models

Designated by ''C'' under spring/spool arrangement in model code.

A spring and washer arrangement is used on both ends of the spool. If control pressure is removed, the valve will go to center position due to spring force.

No-Spring models

Designated by a ''Blank'' under spring/spool arrangement in model code.

When the solenoid is de-energized, the spool returns to the last position attained.

Performance characteristics

Spring centered, pressure centered and spring offset models require continuous pilot pressure to maintain shifted position. Spring centered models return valve spool to center position by centering springs when pilot pressure fails or falls below minimum requirement.

Shift times

Shift times are defined as the time from pilot pressure application/removal to the point of the s tart of a pressure rise/ decline in appropriate port.

Caution:

Flow conditions of the spring centered position must be selected with care, both for the effect on the direction of the flow, and the pilot pres sure. (The "9" main spool will not ensure sufficient pilot pressure in the center position for internal pilot pressure models).

Pressure centered models:

Valve spool is returned to center position by pilot pressure, when pilot pressure is removed. If pilot pressure fails or falls below the required minimum, the valve spool will spring return to center position. (At spring centered valve flow rates).

Caution:

Surges of oil in a common tank line serving these and other valves can be sufficient enough to cause inadvertent shifting of these valves. This is very critical in the no-spring detented valves. Separate tank lines or a vented manifold with a continuous downward path to tank is necessary.

Notes:

Any sliding spool valve, if held for long periods of time, may s tick and not spring return due to fluid residue formation and therefore, should be cycled periodically to prevent this from happening.

Shifting action

The pilot valve solenoids of spring centered, pressure centered, and spring offset models must be energized continuous ly to keep the main stage spool in the shifted position. No-spring detented models only need to be energized momentarily (for approximately 0.1 second).

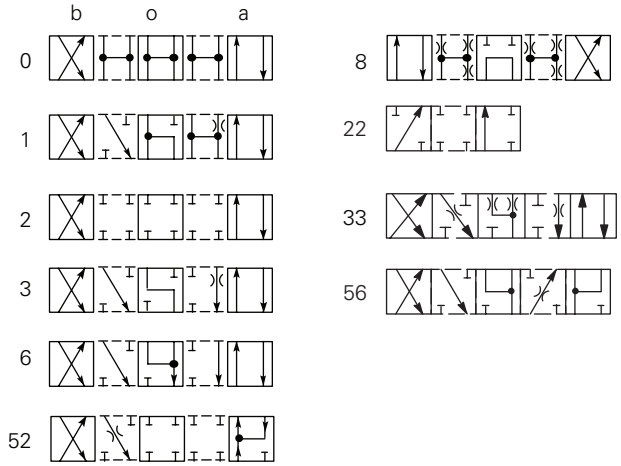
Spring centered and pressure centered models return the valve spool to the center position when both solenoids are de-energized or pilot pres sure fails or falls below minimum requirements. Spring offset models return the spool to the offset position by pilot pres sure when the solenoid is de-energized.

When no-spring detented models are de-energized, the pilot and main spools remain in their las t position as long as there are no unusual shock, vibration, or pressure transients, and the spool axis is horizontal. If pilot pressure fails or falls below minimum requirements, the main spool will spring center (at spring centered flow rates), but will not drift to a reversal of flow position. The pilot stage will remain in the detented position.

When used as other than a normal 4–way valve, consult your Eaton representative.

Spool types

Shown in 3-position form, plus 2 transients.



Notes:

1. In the detailed and simplified symbols on this and the previous pages, the transient positions are omitted for simplicity.

2. In certain 2-position valves, the "o" position becomes an additional transient, i.e. in DG5V-8-*A(L) and DG5V-8-*N valves.

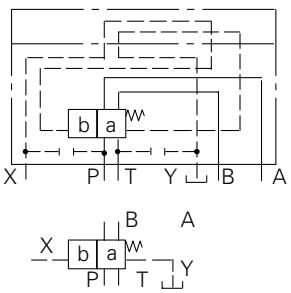
Your Eaton representative can provide further details.

V-E

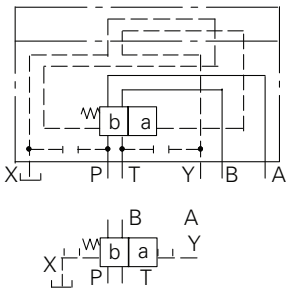
DG3V-8 pilot operated models

Comprehensive and simplified symbols.

Spring offset, end-to-end, DG3V-8-*A



Spring offset, end-to-end, DG3V-8-*A



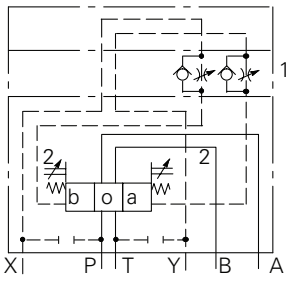
DG3V-8 options

The following are shown in a DG3V-8-*C example:

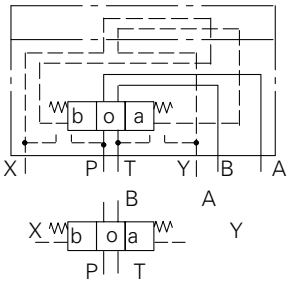
1. Pilot choke module

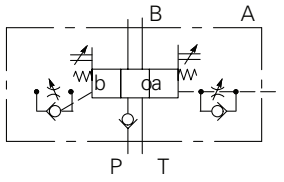
2. Stroke adjusters at either

or at both ends (shown at both ends in example) One or more options can be built into any DG3 series valve.



Spring centered, DG3V-8-*C

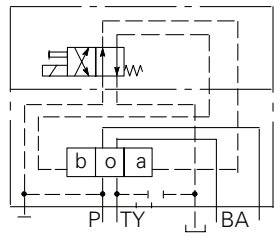


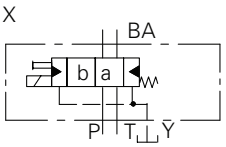


DG5V-8, solenoid controlled, pilot operated models

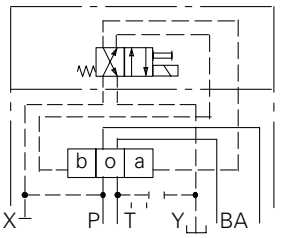
Comprehensive and simplified symbols shown configured for external pilot supply and internal drain

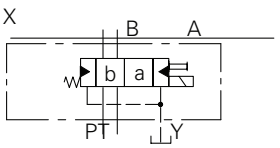
Spring offset, end-to-end, DG5V-8-*A



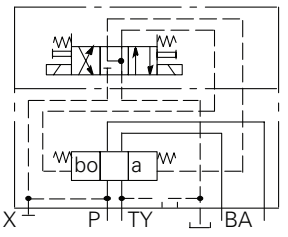


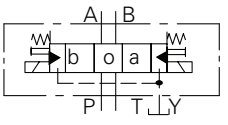
Spring offset, end-to-end, opposite hand, DG5V-8-*AL



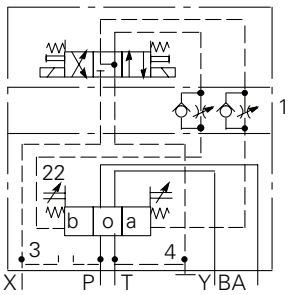


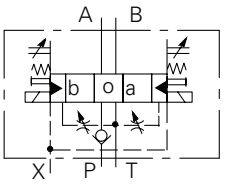
Spring centered, DG5V-8-*C



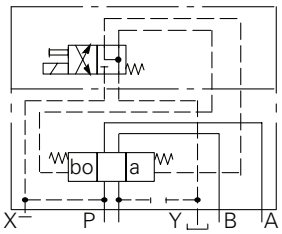


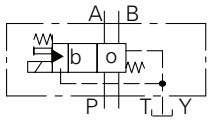
DG5V-8 options



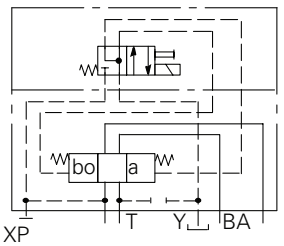


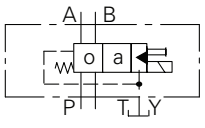
Spring offset, end-to-center DG5V-8-*B



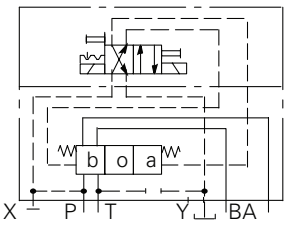


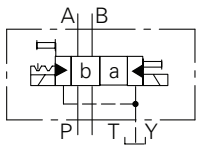
Spring offset, end-to-center, opposite hand DG5V-8-*BL





Detented, DG5V-8-*N





The following are shown in a DG5V-8-*C example:

1. Pilot choke module
2. Stroke adjusters, at either or at both ends (shown at both ends in example)
3. External pilot connection
4. Internal drain One or more options can be built into any DG5 series valve.

Maximum pressures:	
DG3V-8 valves; ports:	
P, A, B and T *	350 bar (5000 psi)
Y §	350 bar (5000 psi)
DG5V-8 valves, (externally drained)	
P, A, B, T and X *	350 bar (5000 psi) ▲
Y §	210 bar (3000 psi)
DG5V-8 valves, (internally drained)	
P, A, B and X	350 bar (5000 psi) ▲
T §	210 bar (3000 psi)
Maximum flow without mal-function (DG3V-8 and DG5V-8)	700 L/min (185 Usgpm)
Pilot pressures	See "Pilot Pressures" on page 150

Electrical information:	See 17 in "model code" on page 148
Voltage ratings, DG5V valves	See "Temperature limits", on page 151
Voltage limits, DG5V valves:	90% of rated voltage
Maximum voltage	Initial VA rms Holding VA rms
Minimum voltage	265 49
Power consumption, DG5V valves with AC solenoids:	260 48
Dual-frequency coils at 50 Hz, types "B" and "D"	30W at rated voltage and 200C (680F)
Dual-frequency coils at 60 Hz, types "B" and "D"	Continuous; ED = 100%
Power consumption, DG5V valves with DC solenoids	IEC 144 class IP65
Relative duty factor, DG5V valves	IEC 144 class IP65 (NEMA 4)
Type of protection, DG5V valves:	Class H
ISO 4400 coils with plug fitted correctly	Class H
Junction box	Class F
Coil winding	
Lead wires (coil types "F****")	
Coil encapsulation	

Note: For information on pilot valves please refer segment B, C, D of the catalog.

▲ The DG5V, 10 design two-stage valves have been designed to satisfy the needs of most applications.

Consult your Eaton representative about an alternative model if:

a) Valves are required to remain pressurized for long periods without frequent switching, and /or

b) Back pressure on the drain port of externally drained models (or the tank port of internally drained models) is required to rise above 350 bar (5000 psi).

* The method for verifying the rated fatigue pressure of the complete unit conforms to NFPA/T2.6.1 R1-1991 (Catalog C/90), Fluid Power Systems and Products method for verifying the fatigue pressure rating of the pressure containing envelope.

§ Internal drain models drain the pilot valve through the tank port of the mainstage. External drain models drain the pilot valve through the "Y' port of the mainstage. To provide proper operation without malfunction, the pilot pressure must always exceed tank or drain line pressure by the minimum pilot pressure required per valve and spool type (see charts on page 16). Tank or drain line surges which would reduce this differential are to be avoided as they may cause the mainstage to shift. Mainstage tank pressure is limited to the tank line rating of the pilot valve on internally drained models (with "T" included in the model code). Internal drains may be used with all models except pressure centered "D" models. Pressure centered models must be externally drained through "Y" and "W" ports. To achieve the maximum tank line rating of 350 bar (5000 psi) of the mainstage, an external pilot drain must be used and it is recommended that a separate line be provided directly to the tank.

Operating data

Pressure drop characteristics	See page 152, 153

Response times, DG5V valves:

Typical values for a DG5V-8-2C-E spring centered, externally piloted valve under standard test conditions and operating with 150 L/min (40 USgpm) at 350 bar (5000 psi).

Coil rating:	Pilot pressure, bar (psi):	Energizing	Time, ms ◆ De-energizing
110V 50 Hz	15 (218)	75	40
	50 (730)	50	40
	150 (2180)	40	40
	210 (3000)	40	40
	250 (3600)	40	40
24V DC	15 (218)	90	45 ▲
	50 (730)	65	45 ▲
	150 (2180)	55	45 ▲
	210 (3000)	55	45 ▲
	250 (3600)	55	45 ▲

◆ From applying a signal at the solenoid until the main-stage spool completes its travel.

▲ In pure switched circuit conditions, devoid of the effects of any suppression diodes and full-wave rectifiers.

Temperature limits:	
Fluid temperature limits	See appendix
Ambient temperature limits:	See appendix
Minimum ambient, all valves	-20°C (-4°F)
Maximum ambients, DG5V valves with coils listed in 12 in "model code" two pages back, and under conditions stated below:	
Dual-frequency coils:	
at 50 Hz and 107% of rated voltage	65°C (150°F)
at 50 Hz and 110% of rated voltage	65°C (150°F)
at 60 Hz and 107% of rated voltage	65°C (150°F)
at 60 Hz and 110% of rated voltage	65°C (150°F)
Single-frequency (50 Hz) coils at 50 Hz and	65°C (150°F)
110% of rated voltage	
DC coils at 110% of rated voltage	70°C (158°F)

Installation dimensions:	
Valves	See page 157 to 163
Mass (weight), basic models:	kg (lb) approx.
DG3V-8-*A(L)	10,0 (22.0) ◆
DG3V-8-*/*B(L)/*C	7,3 (16.1) ◆
DG5V-8-*A/B (AC voltages)	8,4 (18.5) ◆
DG5V-8-*A/B (DC voltages)	8,5 (18.7) ◆
DG5V-8-*C/N (AC voltages)	8,7 (19.2) ◆
DG5V-8-*C/N (DC voltages)	9,1 (20.0) ◆

◆ Add 1,1 kg (2.4 lb) when pilot choke adjustment is fitted.

▲ In pure switched circuit conditions, devoid of the effects of any suppression diodes and full-wave rectifiers.

Typical with mineral oil at 36 cSt (168.6 SUS) and a specific gravity of 0.87.

Maximum flow rates

Performance based on full power solenoid coils warm and operating at 90% rated voltage.

Pressure drop & malfunction flow

The following table lists the appropriate pressure drop curve and malfunction flow curve between ports for each spool type. Use the following example to determine pressure drop for a selected spool.

Example: Find the pressure drop from P → B for type 7 spool. Using the table find numeral 7 in the spool type column. To the right of numeral 7 find the reference curve 2 (from pressure drop curve chart at bottom of page) under P → B column.

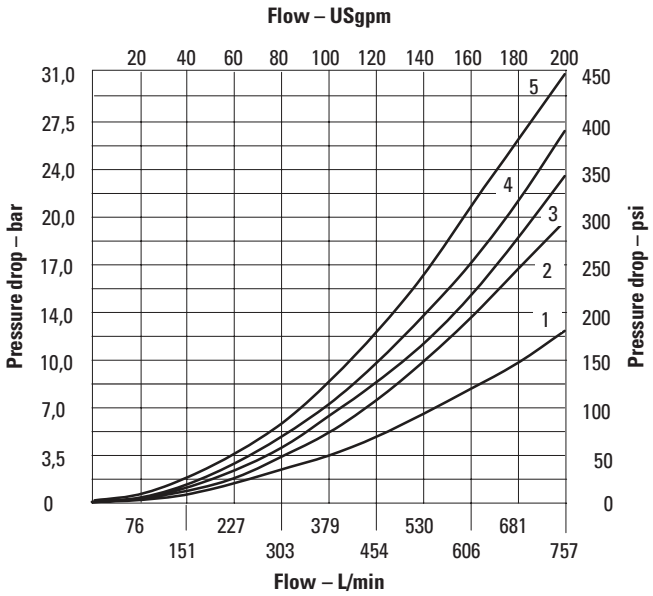
The pressure drop from P → B for type 7 spool would be obtained on curve 2. Likewise, the malfunction for numeral 7 would be found on curve 1 (from malfunction flow curve chart at bottom of page).

1. Figures in the pressure drop chart give approximate pressure drop (ΔP) when passing 473 l/min (125 USgpm) flow (Q) of 35 cSt (164 SUS) fluids(s) having .865 specific gravity.
2. For any other flow rate (Q_1), the pressure drop (ΔP_1) will be approximately: $\Delta P_1 = P(Q_1/Q)^2$.
3. For any other viscosity(s), the pressure drop (ΔP), will change as follows:
4. For any other specific gravity (G_1), the pressure drop (ΔP_1) will be approximately: $\Delta P_1 = \Delta P(G_1/G)$.

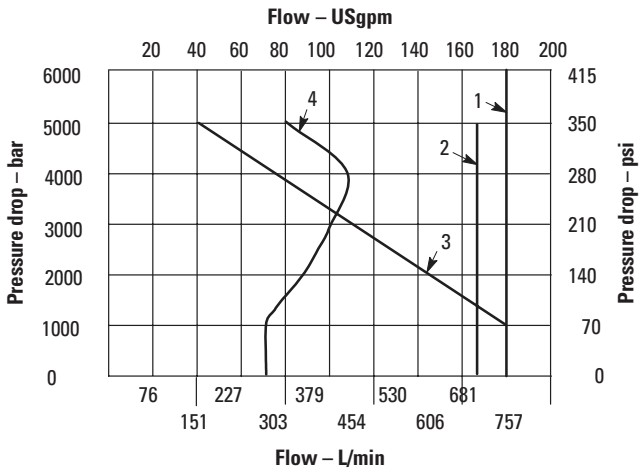
Spool Type	Pressure drop curve number P → A	B → T	P → B	A → T	P → T in center	Malfunction flow curve number
0	2	2	2	2	3	1
1	1	2	1	3	2	3
2	1	2	1	1	–	2
3	**1**	**2**	**1**	**4**	**–**	**2**
6	1	3	1	4	–	1
8	4	3	4	2	5	1
33	1	3	1	2	–	2
35	See page 28					
52	2	–	4	4	–	1

Viscosity cSt (SUS)	14 (17.5)	20 (97.8)	43 (200)	54 (251)	65 (302)	76 (352)	85 (399)
% of PΔ (Approx.)	81	88	104	111	116	120	124

Pressure drop curves



Malfunction flow curves



Performance data

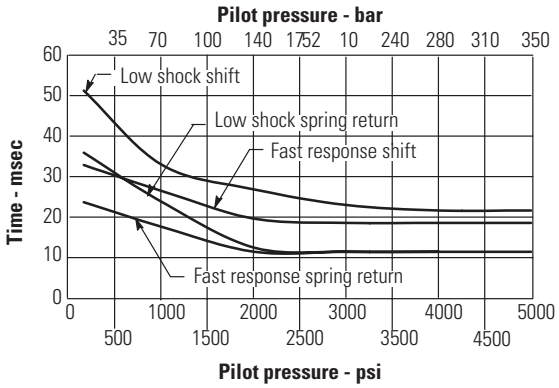
DG3V-8 Model

V-E

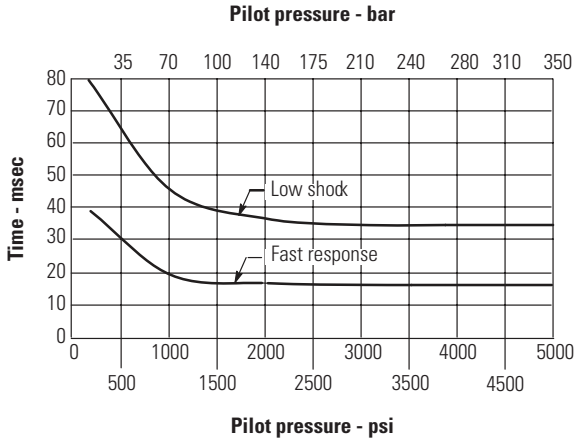
Response time

The response time shown in the charts are defined as the time between pilot pressurization/ de-pressurization and the initial change in the inlet port pressure.

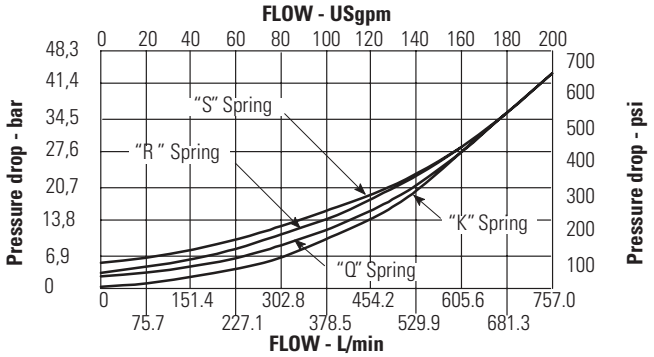
Offset to offset



Center to offset



Pressure drop across check valve



Spring centering times @ rated flow & pressure

Spool type	Time
Closed center	.040 sec.
Open center	.050 sec.

Centering times for pressure Centered valves @ rated pressure (A to P or B to P)

ee malfunction flow curves on page 148.
350 bar (5000 psi)
350 bar (5000 psi)
350 bar (5000 psi)
nforms to NFPA/T2.6.1 R1-1991
e fatigue pressure rating of the

Integral check valves

For internal pilot pressure, an integral pressure port check valve is available. This back pressure will be present at the cylinder ports. The pilot pressure generated is the total of: P → T drop through the valve in center condition, pressure drop through the check valve, plus the pressure at the tank port.

To prevent load drop, a check valve in the pressure port can be used to prevent reverse flow from a cylinder port to the pressure port.

Pressure drop & malfunction flow

The following table lists the appropriate pressure drop curve and malfunction flow curve between ports for each spool type. Use the following example to determine pressure drop for a selected spool.

Example: Find the pressure drop from P → B for type 7 spool. Using the table find numeral 7 in the spool type column.

To the right of numeral 7 find the reference curve 2 (from pressure drop curve chart at bottom of page) under P → B column.

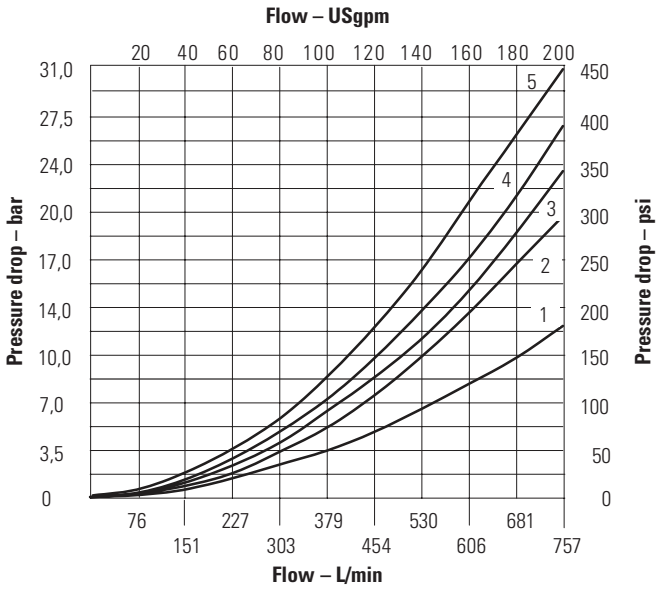
The pressure drop from P → B for type 7 spool would be obtained on curve 2. Likewise, the malfunction for numeral 7 would be found on curve 1 (from malfunction flow curve chart at bottom of page).

1. Figures in the pressure drop chart give approximate pressure drop (ΔP) when passing 473 l/min (125 USgpm) flow (Q) of 35 cSt (164 SUS) fluids(s) having .865 specific gravity.
2. For any other flow rate(Q_1), the pressure drop (ΔP_1) will be approximately $\Delta P_1 = \Delta P(Q_1/Q)^2$.
3. For any other viscosity(s), the pressure drop (ΔP), will change as follows:
4. For any other specific gravity (G_1), the pressure drop (ΔP_1) will be approximately: $\Delta P_1 = \Delta P(G_1/G)$.

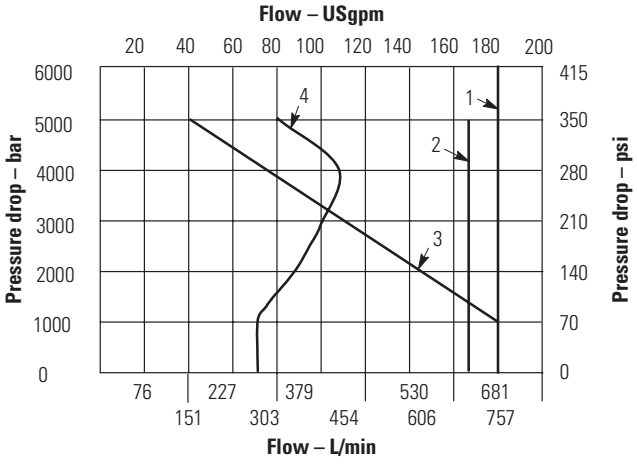
	Pressure drop curve number					Malfunction flow curve number
Spool type	**P → A**	**B → T**	**P → B**	**A → T**	**P → T in center**	
0	2 →	2 →	2 →	2 →	3 →	1
1	1	2	1	3	2	3
2	1	2	1	1	–	2
3	1	2	1	4	–	2
6	1	3	1	4	–	1
8	4	3	4	2	5	1
33	1	3	1	2	–	2
35A	See page 165					
52	2	–	4	4	–	1

Viscosity cSt (SUS)	**14 (75)**	**32 (150)**	**43 (200)**	**54 (250)**	**65 (300)**	**76 (350)**	**86 (400)**
% of PΔ (Approx.)	93	111	119	126	132	137	141

Pressure drop curves



Malfunction flow curves



V-E

Performance data

DG5V-8 Model

V-E

Response times

Response times are defined as the time from solenoid energization/de-energization to the point of the start of a pressure rise/decline in appropriate port.

Solenoid energizing

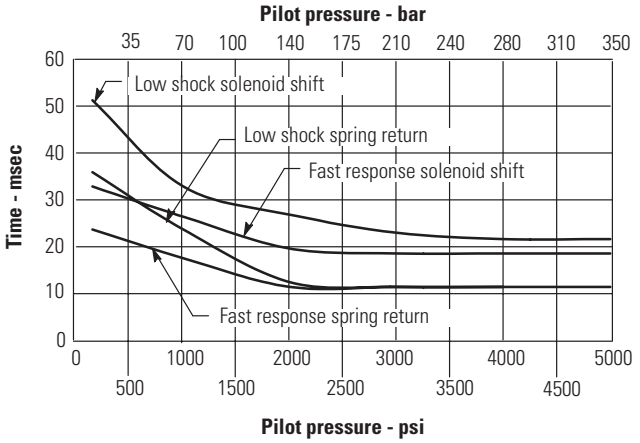
Spring centered, pressure centered and spring offset DG5V-8 types must be energized continuously. No-spring detented DG5V-8 type may be energized momentarily. Pressure centered and spring centered DG5V-8 types return valve spool to center position when both solenoids are de-energized.

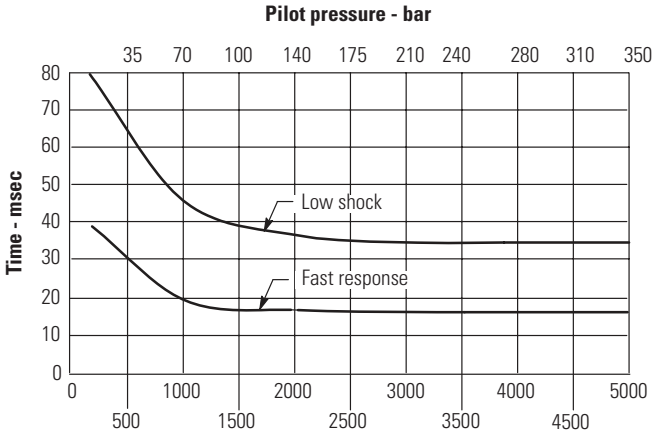
Mounting position

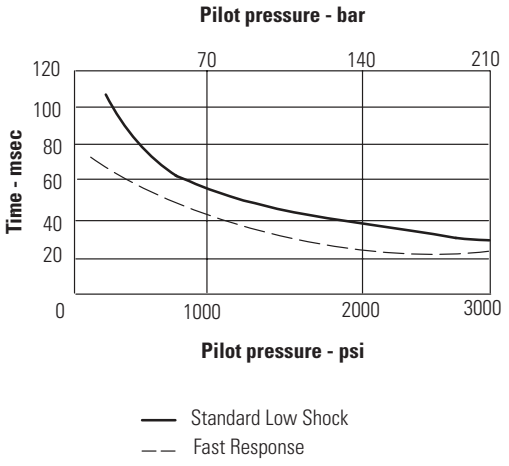
No–spring detented valves must be installed with the longitudinal axis horizontal for good machine reliability. The mounting position of spring centered and spring offset models is unrestricted provided that the pilot pressure supply is maintained as required. (Spring offset valves do not have a spring in the main spool section).

Spring centering times @ Rated flow & pressure

Spool type	Time
Closed center	.040 sec.
Open center	.050 sec.





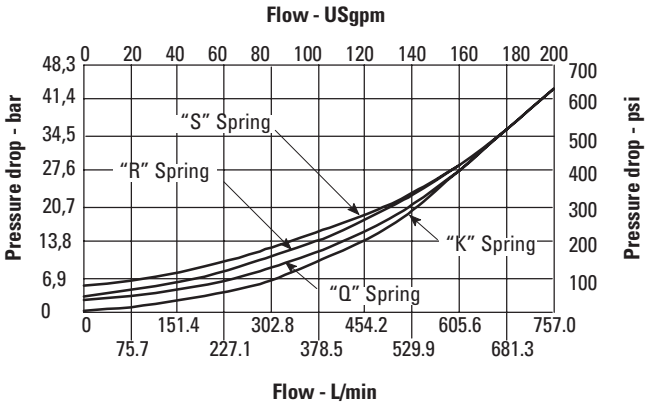


Integral check valves

For internal pilot pressure, an integral pressure port check valve is required for internally piloted valves with open center spools (0,1,4,8 & 9). The pilot pressure generated is the total of: P → T drop through the valve in center condition, pressure drop through the check valve, plus the pressure at the tank port.

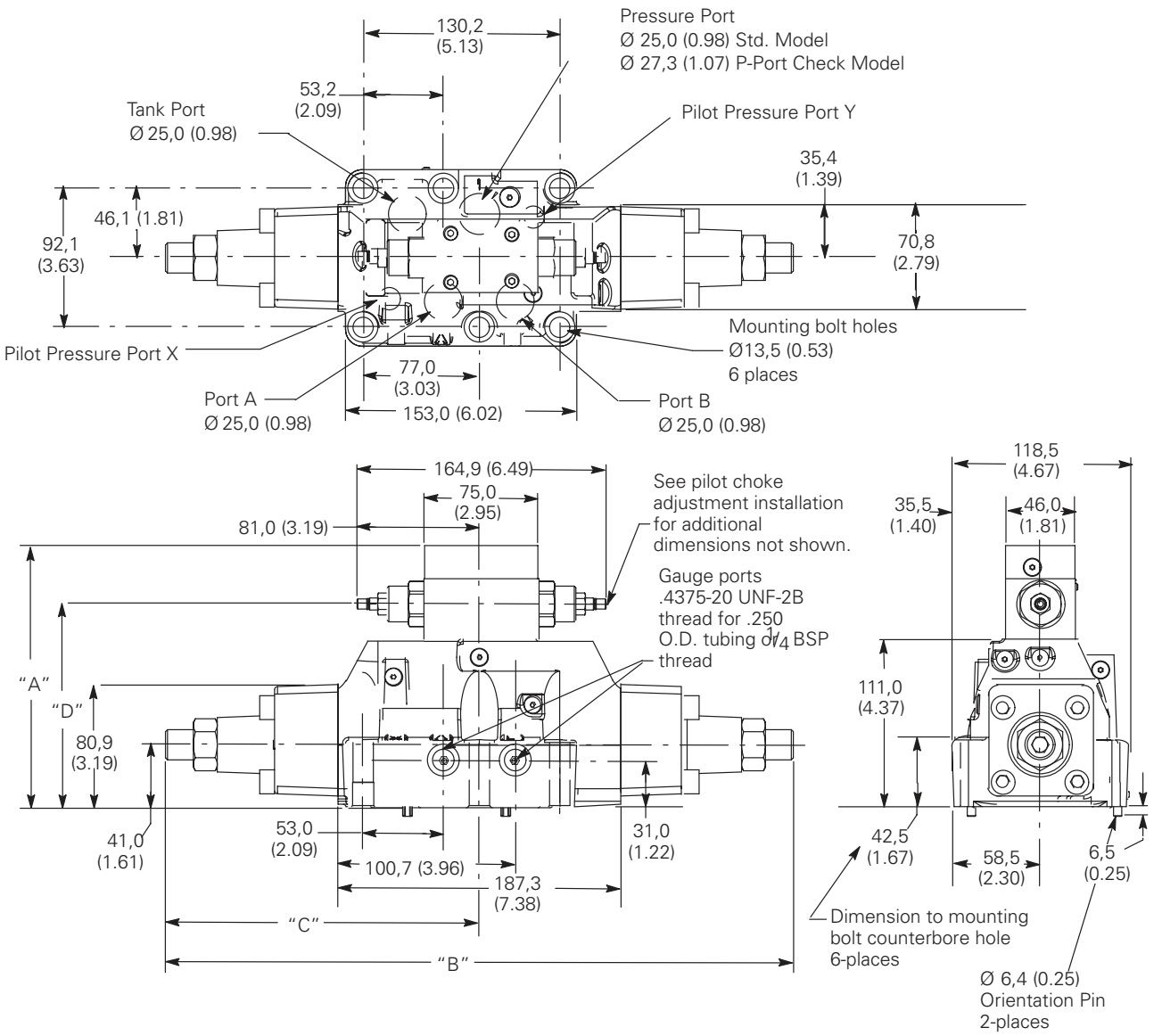
For proper operation, total pressure drop must be greater than the minimum required pilot pressure (see chart). To prevent load drop, a check valve in the pressure port can be used to prevent reverse flow from a cylinder port to pressure port. If using as reverse flow check, maximum reverse pressure is limited to 210 bar (3000 psi).

Pressure drop across check valve



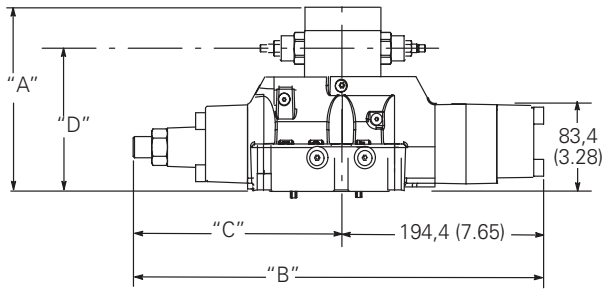
Installation dimensions

DG3V-8-(C)-*-*-10 spring centered model
Millimeters (inches)

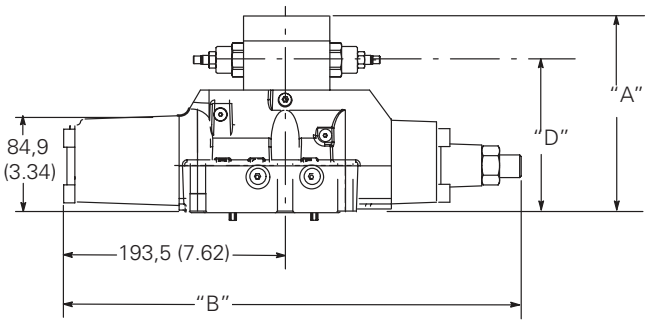


Spool control modifications	"A" dimension	"B" dimension	"C" dimension	"D" Dimension (pilot choke adjustment)
Without pilot choke or stroke adjustment	133,0 (5.23)	265,3 (10.44)	132,6 (5.22)	–
Stroke adjustment (both ends)	133,0 (5.23)	415,9 (16.37)	208,0 (8.18)	–
Pilot choke adjustment	173,0 (6.81)	265,3 (10.44)	132,6 (5.22)	134,2 (5.28)
Stroke adjustment on cyl. 'A'	133,0 (5.23)	340,6 (13.40)	208,0 (8.18)	–
Stroke adjustment on cyl. 'B'	133,0 (5.23)	340,6 (13.40)	132,6 (5.22)	–
Pilot choke and stroke adjustment on cyl. 'A'	173,0 (6.81)	340,6 (13.40)	208,0 (8.18)	134,2 (5.28)
Pilot choke and stroke adjustment on cyl. 'B'	173,0 (6.81)	132,6 (5.22)	134,2 (5.28)	134,2 (5.28)
Pilot choke and stroke adjustment (both ends)	173,0 (6.81)	415,9 (16.37)	208,0 (8.18)	134,2 (5.28)

DG3V-8-(L)-*-*-10 spring offset model
Millimeters (inches)



DG3V-8-D-*-*-10 pressure centered model
Millimeters (inches)



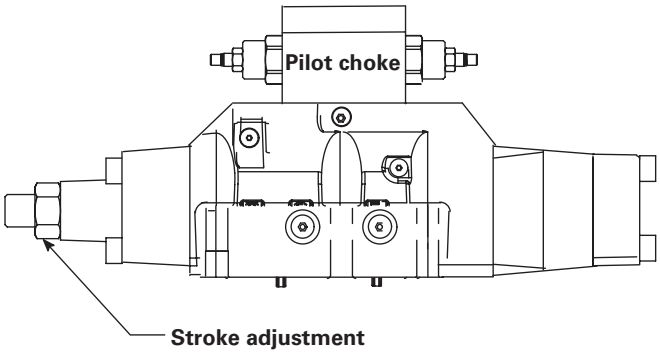
Spool control modifications	"A" dimension	"B" dimension	"C" dimension	"D" Dimension (pilot choke adjustment)
Without pilot choke or stroke adjustment	133,0 (5.23)	265,3 (10.44)	132,6 (5.22)	–
Without pilot choke or stroke adjustment (left-hand build)	133,0 (5.23)	326,9 (12.87)	194,4 (7.65)	134,2 (5.28)
Pilot choke adjustment	173,0 (6.81)	265,3 (10.44)	132,6 (5.22)	134,2 (5.28)
Stroke adjustment on cyl. 'A' (left-hand build)	133,0 (5.23)	402,3 (15,83)	208,0 (8.18)	–
Stroke adjustment on cyl. 'B'	133,0 (5.23)	340,6 (13.40)	132,6 (5.22)	–
Pilot choke and stroke adjustment on cyl. 'A' (left-hand build)	173,0 (6.81)	340,6 (13.40)	208,0 (8.18)	134,2 (5.28)
Pilot choke and stroke adjustment on cyl. 'B'	173,0 (6.81)	340,6 (13.40)	132,6 (5.22)	134,2 (5.28)

Pilot choke DGMFN-3-Y-A2W-B2W-41

Pilot choke increases the amount of time to shift the mainstage spool, lowering the possibility of large flow transients in the circuit. It is adjusted by backing off locknuts and turning adjusting screws inward to decrease rate of spool travel and outward to increase spool travel rate. See spool control modifications in model code.

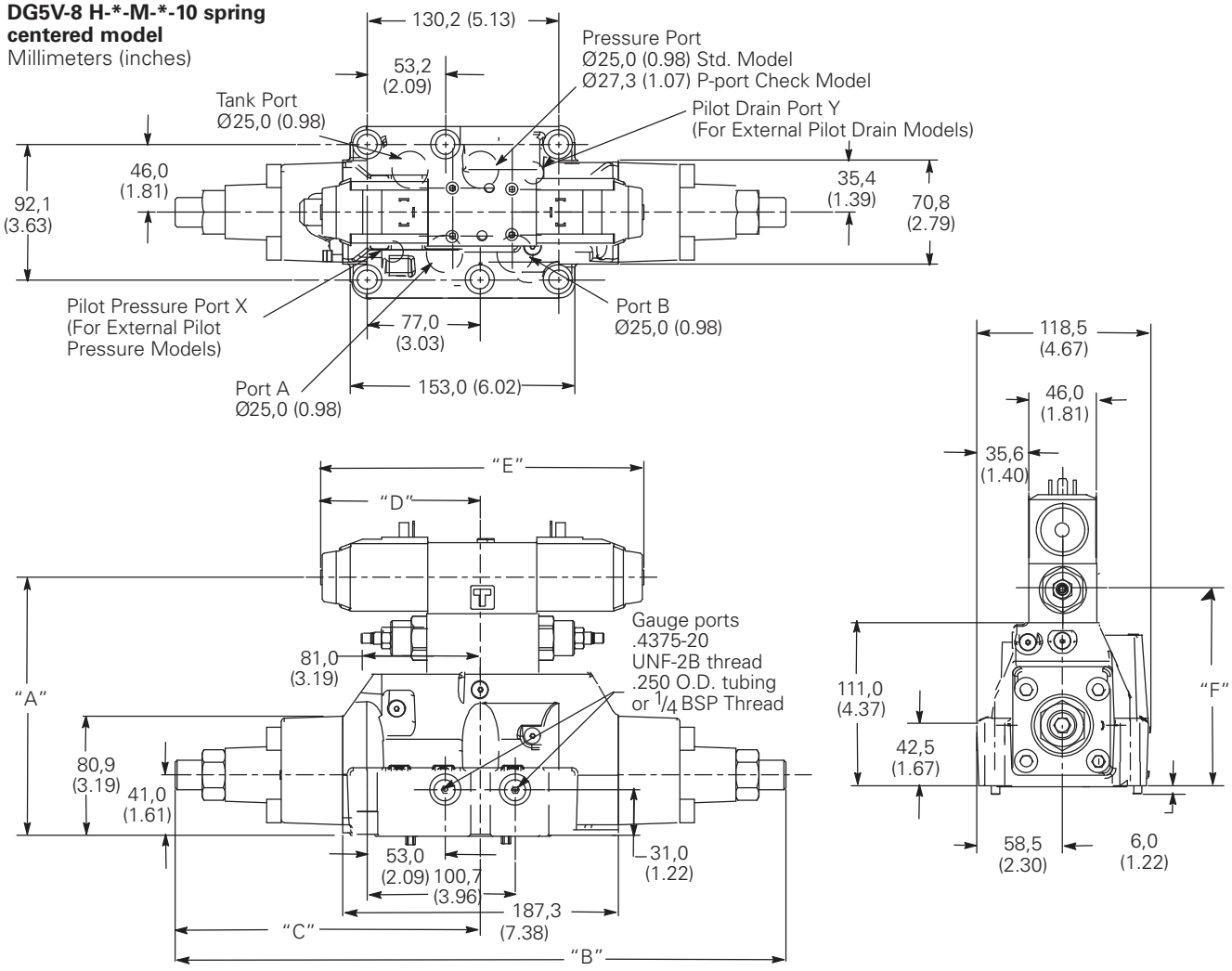
Stroke adjustment

Stroke adjustment limits movement of the mainstage spool. Backing off the jamnut and turning the adjusting screw inward decreases spool stroke. See spool control modifications in model code.).



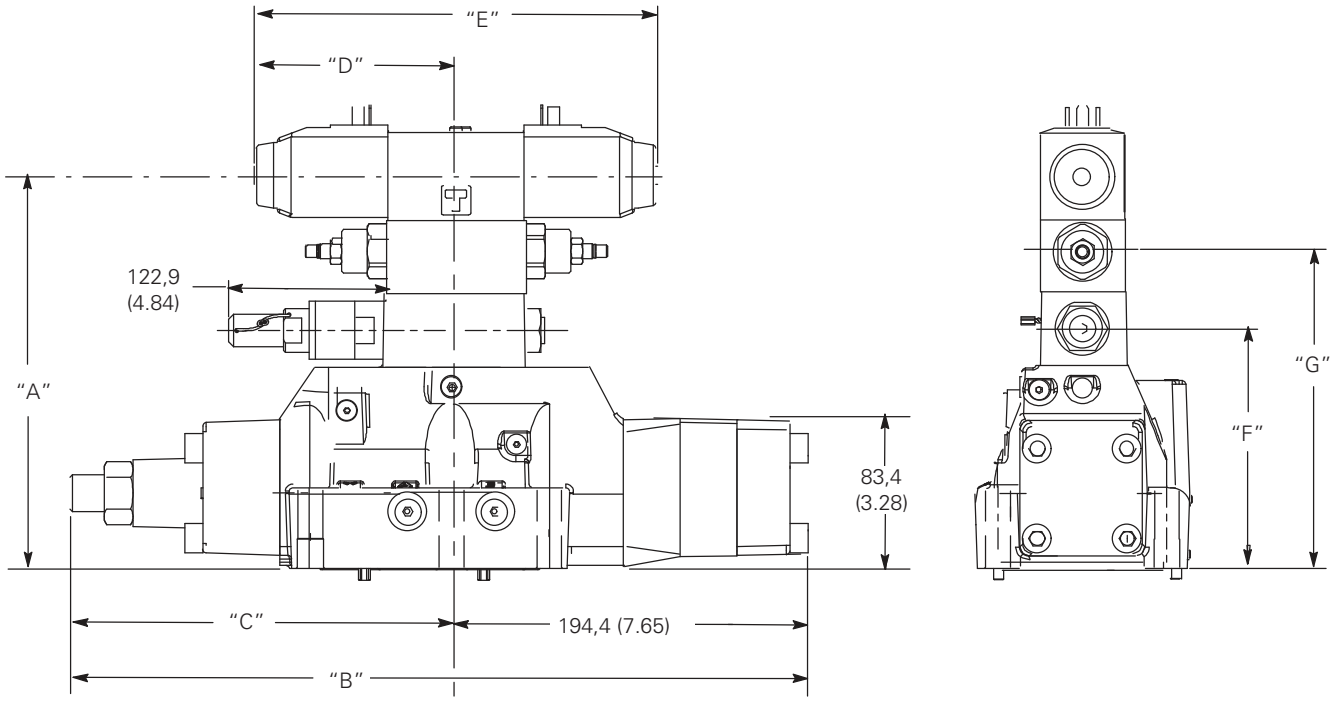
Installation dimensions

DG5V-8 H-*-M-*-10 spring centered model
Millimeters (inches)



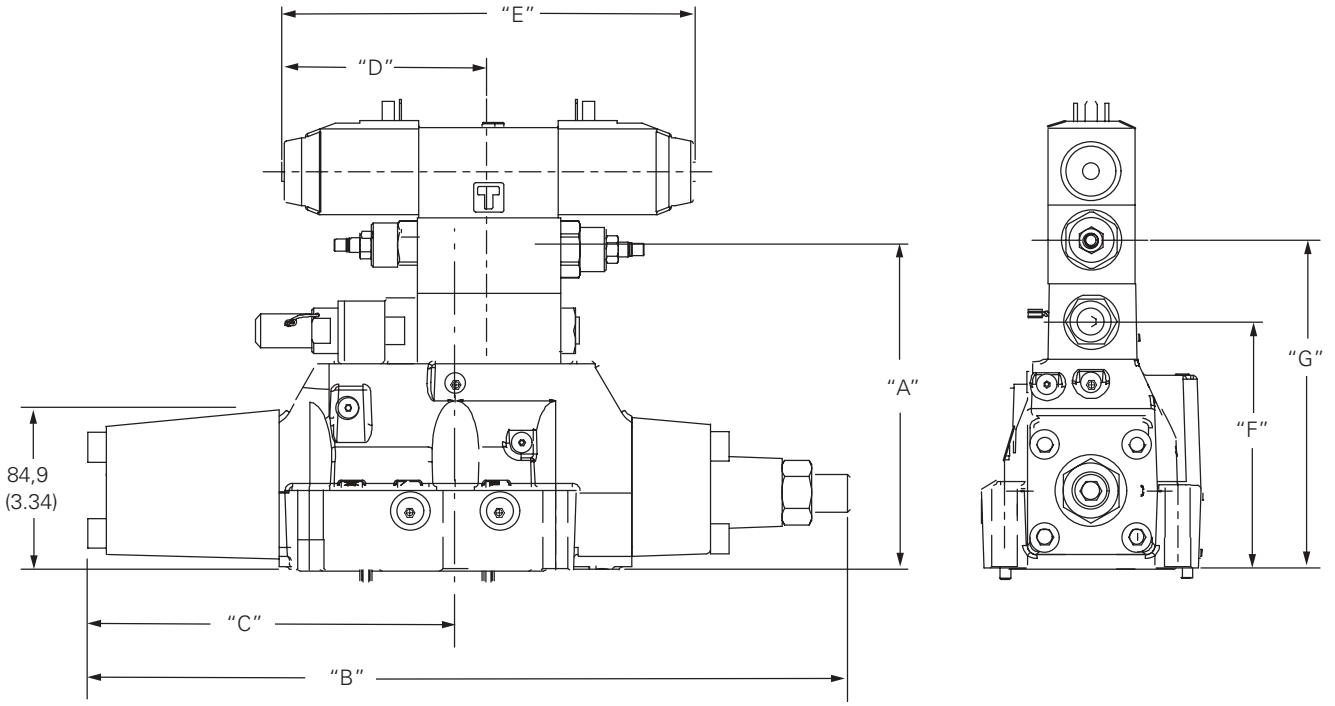
	Dimensions										
	"A"	"B"	"C"	"D"		"E" pilot				"F"
						Dual solenoid		Single solenoid		
Spool control modifications				AC Sol.	DC Sol.	AC Sol.	DC Sol.	AC Sol.	DC Sol.	Pilot choke
Without pilot choke or stroke adjustment	135,6 (5.33)	265,3 (10.44)	132,6 (5.22)							
Stroke adjustment (both ends)		415,9 (16.37)	208,0 (8.18)							
Pilot choke adjustment	175,6 (6.91)	265,3 (10.44)	132,6 (5.22)							134,2 (5.28)
Stroke adjust. on cyl. 'A'	135,6 (5.33)	340,6 (13.40)	208,0 (8.18)	98,8 (3.88)	108,8 (4.28)	200,0 (7.87)	220,0 (8.66)	146,5 5.76)	156,5 (6.16)	
Stroke adjust on cyl. 'B'			132,6 (5.22)							
Pilot choke and stroke adjust. on cyl 'A'	175,6 (6.91)		208,0 (8.18)							
Pilot choke and stroke adjust. on cyl. 'B'			132,6 (5.22)							134,2 (5.28)
Pilot choke and stroke adjust. on both ends		415,9 (16.37)	208,0 (8.18)							

DG5V-8-A(L)-*-*-10 spring offset model
Millimeters (inches)



	Dimensions											
	"A"	"B"	"C"	"D"		"E" pilot				"F"	"G"	
						Dual solenoid		Single solenoid				
Spool control modifications				AC Sol.	DC Sol.	AC Sol.	DC Sol.	AC Sol.	DC Sol.	Reducer module	Pilot Choke	
Without pilot choke or stroke adjustment	175,6 (6.91)	265,3 (10.44)	132,6 (5.22)									
Stroke adjustment (both ends)		415,9 (16.37)	208,0 (8.18)									
Pilot choke adjustment	215,6 (8.48)	265,3 (10.44)	132,6 (5.22)								134,2 (5.28)	
Stroke adjust. on cyl. 'A'	175,6 (6.91)	340,6 (13.40)	208,0 (8.18)	98,8 (3.88)	108,8 (4.28)	200,0 (7.87)	220,0 (8.66)	146,5 (5.76)	156,5 (6.16)	134,2 (5.28)		
Stroke adjust on cyl. 'B'			132,6 (5.22)									
Pilot choke and stroke adjust. on cyl 'A'	215,6 (8.48)		208,0 (8.18)									
Pilot choke and stroke adjust. on cyl. 'B'			132,6 (5.22)								134,2 (5.28)	
Pilot choke and stroke adjust. on both ends		415,9 (16.37)	208,0 (8.18)									

DG5V-8-A(L)-*-*-10 spring offset model
Millimeters (inches)



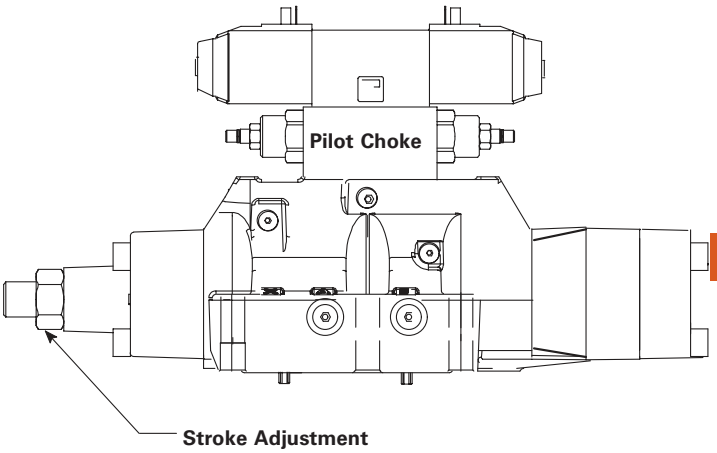
	Dimensions										
	"A"	"B"	"C"	"D"		"E" pilot				"F"	"G"
						Dual solenoid		Single solenoid			
Spool control modifications				AC Sol.	DC Sol.	AC Sol.	DC Sol.	AC Sol.	DC Sol.	Reducer module	Pilot Choke
Without pilot choke or stroke adjustment	135,6 (5 33)	326,1 (12.83)	193,5 (7.61)	98,8 (3.88)	108,8 (4.28)	200,0 (7.87)	220,0 (8.66)	146,5 (5.76)	156,5 (6.16)		
Stroke adjust on cyl. 'B'		401 5 (15.80)									
Pilot choke and stroke adjust. on cyl. 'B'	175,6 (6.91)										134,2 (5.28)
(With reducer)											
Without pilot choke or stroke adjustment	175,6 (6.91)	326,1 (12.83)	193,5 (7.61)	98,8 (3.88)	108,8 (4.28)	200,0 (7.87)	220,0 (8.66)	146,5 (5.76)	156,5 (6.16)	131,0 (5.15)	
Stroke adjust on cyl. 'B'											
Pilot choke and stroke adjust. on cyl. 'B'	215,6 (8.48)	401,5 (15.80)									134,2 (5.28)

Pilot choke DGMFN-3-Y-A2W-B2W-41

Pilot choke increases the amount of time to shift the mainstage spool, lowering the possibility of large flow transients in the circuit. It is adjusted by backing off locknuts and turning adjusting screws inward to decrease rate of spool travel and outward to increase spool travel rate. See spool control modifications in model code.

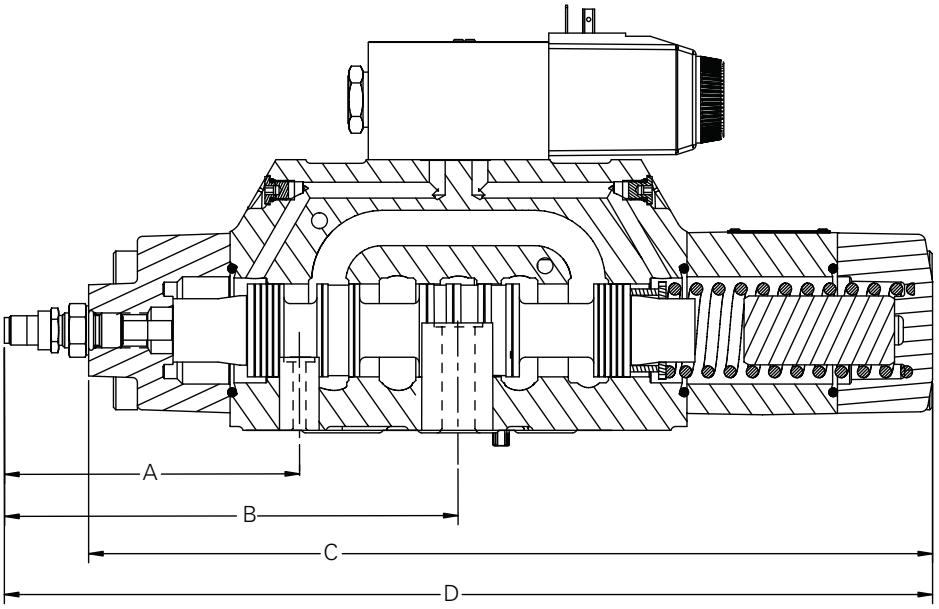
Stroke adjustment

Stroke adjustment limits movement of the mainstage spool. Backing off the jamnut and turning the adjusting screw inward decreases spool stroke. See spool control modifications in model code.

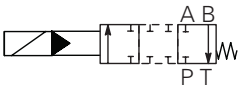


Installation dimensions

Valve for Safety Circuit Application (35A Spool)



Main Stage Hydraulic Symbol

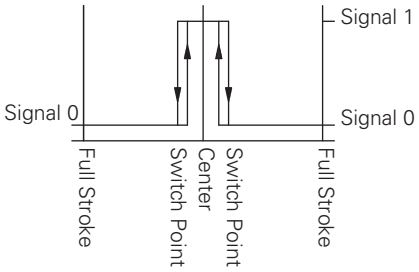


Model	B	B	C	D	Leakage P-A	Flow curve
	mm (in)	mm (in)	mm (in)	mm (in)	cc/min (in3/min)	Available upon request
DG5V5-35A	118.5 (4.67)		234.7 (9.24)	262.1 (10.32)	Available upon request	See DG5V7 catalog
DG5V7-35A		152.1 (5.99)	252.1 (9.92)	286.6 (11.28)	Available upon request	Available upon request
DG5V8-35A		151.7 (5.97)	346.0 (13.62)	380.5 (14.98)	156 (9.5)	Available upon request
DG5V10-35A		230.7 (9.10)	443.4 (17.46)	476.3 (18.8)	Available upon request	

DG5V-8 with main stage spool monitoring switch "PC*" or "PD*" Models (LVDT Style Switch)
Millimeters (inches)

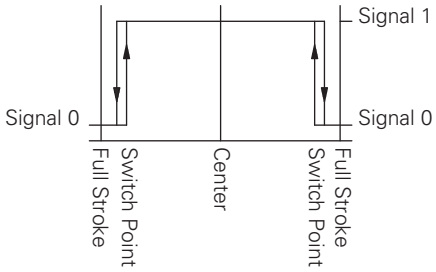
Specifications	
Supply Voltage (Vs)	24VDC ± 20%
(Full Wave Bridge with Capacitor)	
Reverse Polarity Protection	MAX. 300V Installed
Ripple Voltage	10%
Current consumption	40mA Approx.
Outputs	NC Contact Positive
	(No Short Circuite Protection)
Sensing Distance (offset position)	5.85 to 6.15 mm
Sensing Distance (from center position)	± 0.35 to 0.65 mm
Hysteresis	≤0.06 mm
Output voltage	
Signal 0	< 1.8V
Signal 1	Vs – 2.5V
Output Current	<400mA at Input +20%
Environmental Protection	IP65 (With Mounted Plug)
Operating Temperature Range	-20°C to +85°C
Max. Operating Pressure	315 bar (4500 psi)
CE Declaration of Conformity No.	00 02 002 9 93
P-Channel, Contact Positive	
Attention: EMC only ensured when using screened cables and screened plug casing.	

Typical "PCA/PCB" output (for sensing center position)



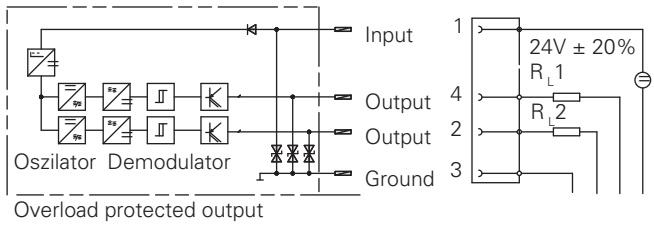
Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

Typical "PDA/PDB" output (for full shift sensing)



Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

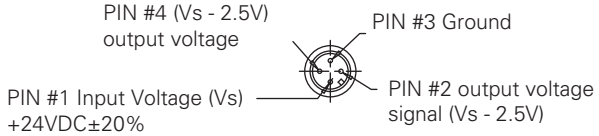
Electrical schematic and Mating connector detail



Overload protected output

R L1, R L 2 = e.g. Coil Resistance of the switch relay >/ = 60 OHMS

Connector detail



General description

Pilot valves are identified in the model code by the following letters: “S” Standard or “H” High Performance. The pilot valves can be ordered to match a variety of mainstage spool types and valve bodies.

The chart below shows ordering information for each pilot valve. For example, to order a High Performance pilot “H” with a Spring Offset mainstage “A”, use the following model code: DG4V-3- 2A-M-*-60

Valve model code:	Main stage spool type	Pilot valve model code
High performance/standard	All except 4 & 8	DG4V-3-2A-M-*-60
DG5V-8-H-*A-*-M-*-10	4A & 8A only	DG4V-3-2AL-VM-*-60
	4AL & 8AL only	DG4V-3-2A-VM-*-60
	All except 4 & 8	DG4V-3-6B-M-*-60
DG5V-8-H-*B-*-M-*-10	4B & 8B only	DG4V-3-6BL-VM-*-60
	4BL & 8BL only	DG4V-3-6B-VM-*-60
	All except 4 & 8	DG4V-3-6C-M-*-60
DG5V-8-H-*C-*-M-*-10	4C & 8C only	DG4V-3-6C-VM-*-60
	All except 4 & 8	DG4V-3-7C-M-*-60
DG5V-8-H-*D-*-M-*-10	4D & 8D only	DG4V-3-7C-VM-*-60
	All except 4 & 8	DG4V-3-6F-M-*-60
DG5V-8-H-*F-*-M-*-10	4F & 8F only	DG4V-3-6FL-VM-*-60
	4FL & 8FL only	DG4V-3-6F-VM-*-60
	All except 4 & 8	DG4V-3-6N-M-*-60
DG5V-8-H-*N-*-M-*-10	4N & 8N only	DG4V-3-6N-VM-*-60

Minimum pilot pressure requirements

	Pilot pressure bar (psi)	
Spool type	A, B, C, F, N Models	D Models
Closed center	10 (150)	P to A: 12 (175) P to B: 21 (300)
Open center	5 (75)	P to A: 10 (150) P to B: 10 (150)

ISO4401 Size 08; ANSI/B93.7M-D08
DG19V-8 10 Design

Air controlled pilot operated directional valve

DG19V-8 10

General description

The Size 8 Directional Control Valve serves as a control valve package. It offers directional control, pilot pressure reducers, pilot chokes, and main stage stroke adjustment to control the flow. The valves are generally used to control large flows up to 700 l/min (185 USgpm) at 350 bar (5000 psi) and provide low pressure drops. The range includes:

- DG18V-3-60
- D03 pilot valve 210 bar (3000 psi) tank line rating.

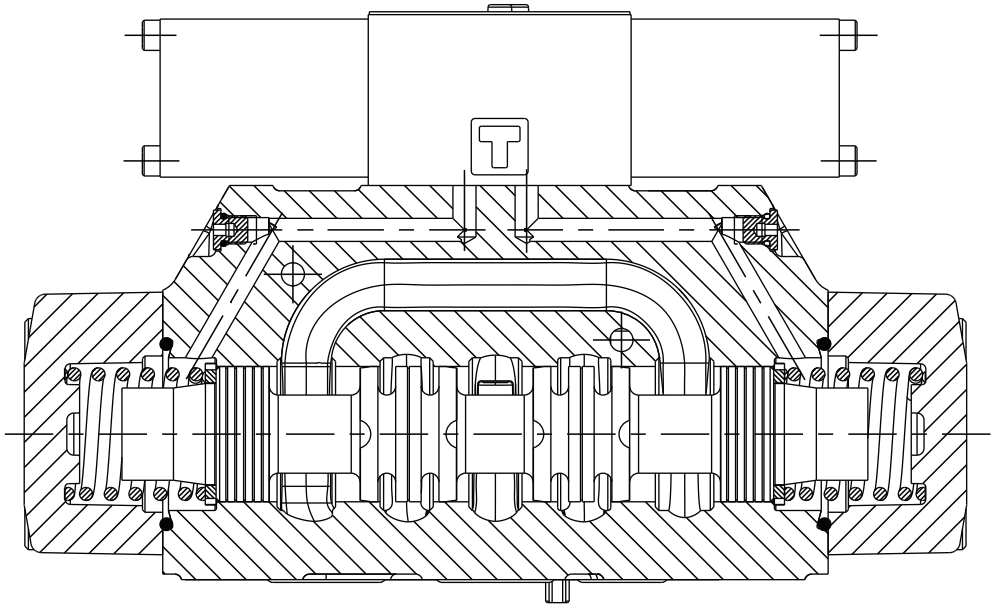
Each valve contains a mainstage spool which is positioned in the valve by special arrangement. The four arrangements are:

- Spring offset - For single stage operation, one spring returns spool to an offset position. For two–stage operation, springs and washers are removed from main stage and offset action is obtained from pilot valve.
- Spring centered - Spring and washer are located on both ends of main stage spool to control centering.
- No–spring detented - Springs and washers are provided so that in the event of pilot pressure failure, the main spool will spring center.

Features and benefits

- A “mini-system” capability with wide variety of spool and spring arrangements, stroke and pilot choke adjustments, integral check valves and port orifices.
- Suitable for demanding industrial or mobile applications by providing for reliable operations.
- Endurance tested to 10 million cycles and fatigue tested without failure to ensure highest reliability.
- Fatigue testing performed to NFPA specifications to ensure the highest reliability in applications requiring high flows and pressure.
- Solid cast body and cored passages for maximum strength and minimal pressure drop.

Section through spool bore center-line



(F*) - DG3V - 8 - - ** - (*) - (*) - 10

1 2 3 6 7 8 9

1 Seals

Blank	Standard seals
F3	Seals for fire resistant fluids.
F6	Seals for water glycol.

2 Directional control valve

DG3V	Subplate mounted; pilot operated remote operator. Pressure rating 350 bar (5000 psi) for all ports.

3 Valve size

8	Valve size CE TOP 8, NFPA D08

5 Spool types

Please refer functional symbols on page 7 for spool types.

6 Spool spring arrangement

Blank	No spring
A	Spring offset to cylinder 'A'
C	Spring centered
D	Pressure centered

8 Spool control modifications

Blank	None
1	Stroke adjustment (both ends) (available on C & Blank (no spring) models)
2	Pilot choke adjustment (available on all models)
3	Pilot choke and stroke adjusters (both ends) (available on C & B lank (no spring) models)
7	Stroke adjusters on cylinder A end only (available on A, C & Blank (no spring) models)
8	Stroke adjusters on cylinder 'B' end only (available on A, C, & Blank (no spring) models)
27	If both are required (available on A, C, & Blank (no spring) models)

9 Check valve in pressure port

Blank	None
K	0,35 bar (5 psi) check
Q	2,42 bar (35 psi) check
R	3,45 bar (50 psi) check
S	5,20 bar (75 psi) check

10 Design number

Subject to change. Installation dimensions remain as shown for design numbers 10 through 19.

V-E

Model codes

DG5V-8 Solenoid controlled pilot operated directional valves

(F*)-DG5V-8 - * - - * - ** - (**) - (*) - P - (E) - (T) - (*) - (V) M - * ** * * - (L) - (*) - ** - 10**

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

1 Special seals

(Omit if not required.)

F3 Seals for fire resistant fluids.

F6 Seals for water glycol.

2 Pilot valve type

H CETOP 3, High performance

3 Spool types

Please refer functional symbols on page 7 for spool types.

4 Spool spring arrangement

A Spring offset, end to end (P to B when shifted)

AL Spring offset, end to end, left hand build (P to A when shifted)

B Spring centered, single solenoid (P to B when shifted).

BL Spring centered, single solenoid, left hand build (P to A when shifted)

C Spring centered, dual solenoid

N Two-position detented

5 Manual override option

Blank Plain override in solenoid end(s) only

H Water-resistant manual override on solenoid end(s)▲

Z No override in non-solenoid end of single-solenoid valves.

▲ No override in non-solenoid end of single-solenoid valves.

6 Spool control

Omit None required

1 Stroke adjustment both ends (not available on "D" pressure centered, models)

2 Pilot choke adjustment

3 Pilot choke adjustment and stroke adjustment both ends (not available on "D" pressure centered, models)

7 Stroke adjustment on 'A' port end (not available on "D", pressure centered models)

8 Stroke adjustment on 'B' port end

27 Pilot choke adjustment and stroke adjustment on "A' port end (not available on "D", pressure centered, models)

28 Pilot choke adjustment and stroke adjustment on 'B' port end

8 Main stage spool monitoring switch

Blank None

PPA Offset sensing proximity switch "A" port end (not available on "D", pressure centered, and 1/3/7/27, stroke adjust models)

PPB Offset sensing proximity switch "B" port end (not available on 1/3/8/28, stroke adjust models)

PPD Offset sensing proximity switch both ends (not available on "D", pressure centered, and 1/3/7/8/27/28, stroke adjust models)

Note The spool position monitoring switch shown on this technical document is CE marked and certified and complies to European Standard EN 61000-6-4: 2001 (Emissions) for Class A and European Standard EN 61000-6-2: 2001 (Immunity).

9 External pilot pressure

E External pilot pressure.

Blank For internal pilot pressure models.

10 Internal pilot drain

T Internal pilot drain to 'T' port.

Blank For external pilot drain models.

11 Check valve in pressure port

(Omit if not required.)

K 0,35 bar (5 psi) check

S 5,20 bar (75 psi) check

12 Solenoid energization identity

Blank Standard arrangement for ANSI B93.9 (i.e. energize solenoid A to follow flow P to A).

V Solenoid identification determined by position of solenoid (i.e. solenoid A at port A end/solenoid B at port B end).

Note 4 and 8 type spools are always V. Solenoid energization identity is independent of mainstage porting.

(F*)-DG5V-8 - * - - * - ** - (**) - (*) - P - (E) - (T) - (*) - (V) M - * ** * * - (L) - (*) - ** - 10**

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

13 **Flag symbol**

M	Electrical options and features

14 **Coil type**

U	ISO4400, DIN43650 connector
U1	ISO4400 fitted with PG11 plug
KU	Top exit flying lead (150mm)
KUP4	Junior timer (Amp) connector
KUP5	Integral Deutsch connector
FPM4	4-Pin micro - (12mm) brad Harrison connector
KUPM4L	Integral M12, 4-Pin connector
FW	Flying lead with 1/2" NPT thread wiring housing
FTW	Fly. Lead wired terminal block & 1/2" NPT thread wiring housing
FPA3W	Fly. Lead, 3 Pin connector & 1/2" NPT thread wiring housing
FPA5W	Fly. Lead, 5 pin connector & 1/2" NPT thread wiring housing

15 **Indicator lights**

Blank	None
L	Solenoid indicator light• •Flying lead coil type only

16 **Surge suppressor damper**

(DC voltages only, omit if not required)
Refer DG4V3 catalog for more options

17 **Coil voltage**

See electrical information on page 9 for voltages available. Others available upon request.

B	110V AC 50Hz/120V AC 60 Hz
D	220V AC 50 Hz/240V AC 60 Hz
G	12V DC
H	24V DC
Note	Refer DG4V3 catalog for more options

18 **Design number**

V-E

General description

DG5V-8 models are two stage directional control valves having an integrally mounted wet armature solenoid pilot valve. These valves are generally used to control the movement of a work cylinder or the rotation of a fluid motor.

Pressure centered models

Designated by ''D'' under spring/spool arrangement in model code.

This option provides faster, more positive spring centering time by use of pilot pressure to center the spool. The valve spool is returned to center position when pilot pres sure is applied at both ends of the spool. The centering springs are used in addition to pilot pressure to ensure positive centering of spool.

If pilot pres sure fails or falls below the required minimum, the spool will spring return to the center position. Pilot pres sure is not available through the use of and integral check valve. Pressure centered valves have a drain port ''W'' and must have provisions for this feature.

Note: Pressure centered valves require a pilot valve which directs pilot oil to connections "X" and "Y" of the valve at the same time pressure centering is desired. The centering time depends on the rate of pressure rise in the pilot chamber.

Spring offset models

Designated by ''A'' under spring/spool arrangement in model code.

Spring offset model has an internal spring which returns the spool to offset position when the pilot connection ''X'' is open to tank. Pilot connection ''Y'' becomes a drain connection and must be pioped directly to tank at atmospheric pressure through a surge-free tank line. Back pressure at this connection would cause valve to malfunction.

Caution: Spring offset models contain a high assembled spring load. Call Eaton Service for disassembly instructions.

Spring centered models

Designated by ''C'' under spring/spool arrangement in model code. A spring and washer arrangement is used on both ends of the spool. If control pressure is removed, the valve will go to center position due to spring force.

No-spring models

Designated by a ''Blank'' under spring/spool arrangement in model code. When the solenoid is deenergized, the spool returns to the last position attained.

Performance Characteristics

Spring centered, pressure centered and spring offset models require continuous pilot pressure to maintain shifted position. Spring centered models return valve spool to center position by centering springs when pilot pressure fails or falls below minimum requirement.

Shift times

Shift times are defined as the time from pilot pressure application/removal to the point of the s tart of a pressure rise/ decline in appropriate port.

Caution: Flow conditions of the spring centered position must be selected with care, both for the effect on the direction of the flow, and the pilot pres sure. (The "9" main spool will not ensure sufficient pilot pressure in the center position for internal pilot pressure models).

Pressure centered models:

Valve spool is returned to center position by pilot pressure, when pilot pressure is removed. If pilot pressure fails or falls below the required minimum, the valve spool will spring return to center position. (At spring centered valve flow rates).

Caution: Surges of oil in a common tank line serving these and other valves can be sufficient enough to cause inadvertent shifting of these valves. This is very critical in the no-spring detented valves. Separate tank lines or a vented manifold with a continuous downward path to tank is necessary.

Note: Any sliding spool valve, if held for long periods of time, may s tick and not spring return due to fluid residue formation and therefore, should be cycled periodically to prevent this from happening.

Shifting action

The pilot valve solenoids of spring centered, pressure centered, and spring offset models must be energized continuous ly to keep the main stage spool in the shifted position. No-spring detented models only need to be energized momentarily (for approximately 0.1 second).

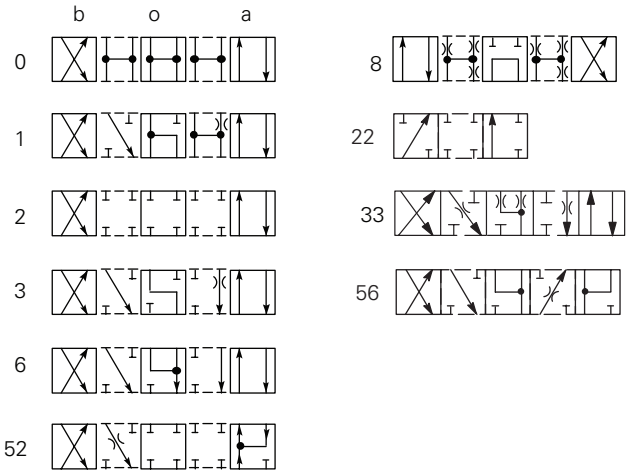
Spring centered and pressure centered models return the valve spool to the center position when both solenoids are de-energized or pilot pres sure fails or falls below minimum requirements. Spring offset models return the spool to the offset position by pilot pres sure when the solenoid is de-energized.

When no-spring detented models are de-energized, the pilot and main spools remain in their las t position as long as there are no unusual shock, vibration, or pressure transients, and the spool axis is horizontal. If pilot pressure fails or falls below minimum requirements, the main spool will spring center (at spring centered flow rates), but will not drift to a reversal of flow position. The pilot stage will remain in the detented position.

When used as other than a normal 4–way valve, consult your Eaton representative.

Spool types

Shown in 3-position form, plus 2 transients.



Notes:

1. In the detailed and simplified symbols on this and the previous pages, the transient positions are omitted for simplicity.

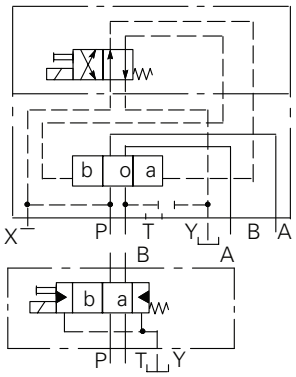
2. In certain 2-position valves, the “o” position becomes an additional transient, i.e. in DG5V-8-*A(L) and DG5V-8-*N valves.

Your Eaton representative can provide further details.

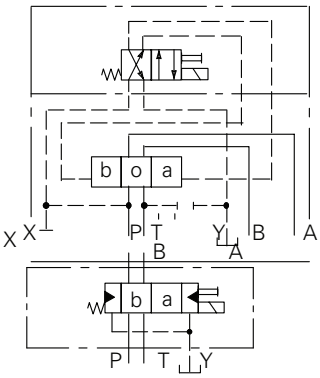
DG5V-8, Solenoid controlled, pilot operated models

Comprehensive and simplified symbols shown configured for external pilot supply and internal drain

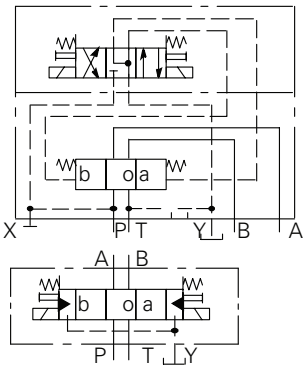
Spring offset, end-to-end, DG5V-8-*A



Spring offset, end-to-end, opposite hand, DG5V-8-*AL



Spring centered, DG5V-8-*C



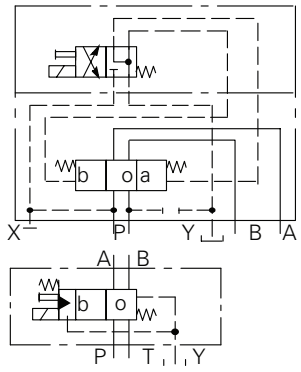
DG5V-8 Options

The following are shown in a DG5V-8-*C example:

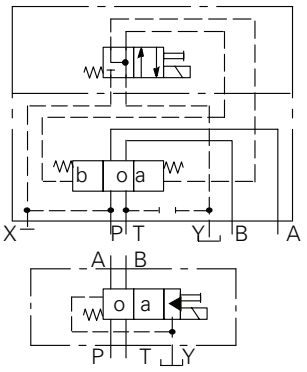
1. Pilot choke module
2. Stroke adjusters, at either or at both ends (shown at both ends in example)
3. External pilot connection
4. Internal drain

One or more options can be built into any DG5 series valve.

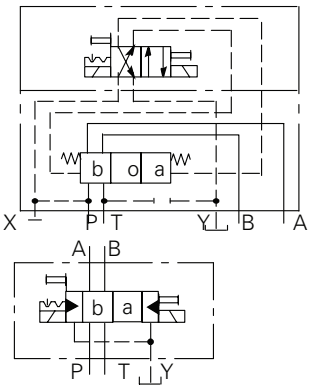
Spring offset, end-to-center DG5V-8-*B

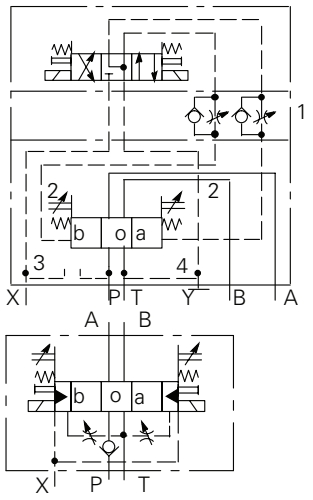


Spring offset, end-to-center, opposite hand DG5V-8-*BL



Detented, DG5V-8-*N





Maximum pressures:		
DG3V-8 valves; ports:		
P, A, B and T *	350 bar (5000 psi)	210 Bar
Y §	350 bar (5000 psi)	210 Bar
DG5V-8 valves, (externally drained)		
P, A, B, T and X *	350 bar (5000 psi) ▲	210 Bar
Y §	350 bar (5000 psi)	210 Bar
DG5V-8 valves, (internally drained)		
P, A, B and X	350 bar (5000 psi) ▲	210 Bar
T §	350 bar (5000 psi)	210 Bar
Maximum flow without mal-function (DG3V-8 and DG5V-8)	700 L/min (185 Usgpm)	32 Usgpm
Pilot pressures	See "Pilot Pressures" on page 191	

Electrical information:		
Voltage ratings, DG5V valves	See 17 in "Model code" on page 170	
Voltage limits, DG5V valves:		
Maximum voltage	See "Temperature limits", on page 175	
Minimum voltage	90% of rated voltage	
Power consumption, DG5V valves with AC solenoids:	**Initial VA rms**	**Holding VA rms**
Dual-frequency coils at 50 Hz, types "B" and "D"	265	49
Dual-frequency coils at 60 Hz, types "B" and "D"	260	48
Power consumption, DG5V valves with DC solenoids	30W at rated voltage and 200C (680F)	
Relative duty factor, DG5V valves	Continuous; ED = 100%	
Type of protection, DG5V valves:		
ISO 4400 coils with plug fitted correctly	IEC 144 class IP65	
Junction box	IEC 144 class IP65 (NEMA 4)	
Coil winding	Class H	
Lead wires (coil types "F****")	Class H	
Coil encapsulation	Class F	

Note: For information on pilot valves please refer segment B, C, D of the catalog.

▲ The DG5V, 10 design two-stage valves have been designed to satisfy the needs of most applications.

Consult your Eaton representative about an alternative model if:

a) Valves are required to remain pressurized for long periods without frequent switching, and /or

b) Back pressure on the drain port of externally drained models (or the tank port of internally drained models) is required to rise above 350 bar (5000 psi).

* The method for verifying the rated fatigue pressure of the complete unit conforms to NFPA/T2.6.1 R1-1991 (Catalog C/90), Fluid Power Systems and Products method for verifying the fatigue pressure rating of the pressure containing envelope.

§ Internal drain models drain the pilot valve through the tank port of the mainstage. External drain models drain the pilot valve through the "Y' port of the mainstage. To provide proper operation without malfunction, the pilot pressure must always exceed tank or drain line pressure by the minimum pilot pressure required per valve and spool type (see charts on page 16). Tank or drain line surges which would reduce this differential are to be avoided as they may cause the mainstage to shift. Mainstage tank pressure is limited to the tank line rating of the pilot valve on internally drained models (with "T" included in the model code). Internal drains may be used with all models except pressure centered "D" models. Pressure centered models must be externally drained through "Y" and "W" ports. To achieve the maximum tank line rating of 350 bar (5000 psi) of the mainstage, an external pilot drain must be used and it is recommended that a separate line be provided directly to the tank.

Operating data

Pressure drop characteristics	See page 176, 177

Response times, DG5V valves:

Typical values for a DG5V-8-2C-E spring centered, externally piloted valve under standard test conditions and operating with 150 L/min (40 USgpm) at 350 bar (5000 psi).

Coil rating:	Pilot pressure, bar (psi):	Time, ms ◆ Energizing	De-energizing
110V 50 Hz	15 (218)	75	40
	50 (730)	50	40
	150 (2180)	40	40
	210 (3000)	40	40
	250 (3600)	40	40
24V DC	15 (218)	90	45 ▲
	50 (730)	65	45 ▲
	150 (2180)	55	45 ▲
	210 (3000)	55	45 ▲
	250 (3600)	55	45 ▲

◆ From applying a signal at the solenoid until the main-stage spool completes its travel.

▲ In pure switched circuit conditions, devoid of the effects of any suppression diodes and full-wave rectifiers.

Temperature limits:	
Fluid temperature limits	See appendix
Ambient temperature limits:	See appendix
Minimum ambient, all valves	-20°C (-4°F)
Maximum ambients, DG5V valves with coils listed in 12 in "model code" two pages back, and under conditions stated below:	
Dual-frequency coils:	
at 50 Hz and 107% of rated voltage	65°C (150°F)
at 50 Hz and 110% of rated voltage	65°C (150°F)
at 60 Hz and 107% of rated voltage	65°C (150°F)
at 60 Hz and 110% of rated voltage	65°C (150°F)
Single-frequency (50 Hz) coils at 50 Hz and 110% of rated voltage	65°C (150°F)
DC coils at 110% of rated voltage	70°C (158°F)

Installation dimensions:	
Valves	See page 181 to 189
Mass (weight), basic models:	**kg (lb) approx.**
DG3V-8-*A(L)	10,0 (22.0) ◆
DG3V-8-*/*B(L)/*C	7,3 (16.1) ◆
DG5V-8-*A/B (AC voltages)	8,4 (18.5) ◆
DG5V-8-*A/B (DC voltages)	8,5 (18.7) ◆
DG5V-8-*C/N (AC voltages)	8,7 (19.2) ◆
DG5V-8-*C/N (DC voltages)	9,1 (20.0) ◆

◆ Add 1,1 kg (2.4 lb) when pilot chock adjustment is fitted.

Note: For information on pilot valves please refer segment B, C, D of the catalog.

Typical with mineral oil at 36 cSt (168.6 SUS) and a specific gravity of 0.87.

Maximum flow rates

Performance based on full power solenoid coils warm and operating at 90% rated voltage.

Pressure drop & malfunction flow

The following table lists the appropriate pressure drop curve and malfunction flow curve between ports for each spool type. Use the following example to determine pressure drop for a selected spool.

Example: Find the pressure drop from P→B for type 7 spool. Using the table find numeral 7 in the spool type column. To the right of numeral 7 find the reference curve 2 (from pressure drop curve chart at bottom of page) under P→B column. The pressure drop from P→B for type 7 spool would be obtained on curve 2. Likewise, the malfunction for numeral 7 would be found on curve 1 (from malfunction flow curve chart at bottom of page).

	Pressure drop curve number					Malfunction flow curve number
Spool type	P → A	B → T	P → B	A → T	P → T in center	
0	2	2	2	2	3	1
1	1	2	1	3	2	3
2	1	2	1	1	–	2
3	1	2	1	4	–	2
6	1	3	1	4	–	1
8	4	3	4	2	5	1
33	1	3	1	2	–	2
35	See page 191					
52	2	–	4	4	–	1

1. Figures in the pressure drop chart give approximate pressure drop (ΔP) when passing 473 l/min (125 USgpm) flow (Q) of 35 cSt (164 SUS) fluids(s) having .865 specific gravity.

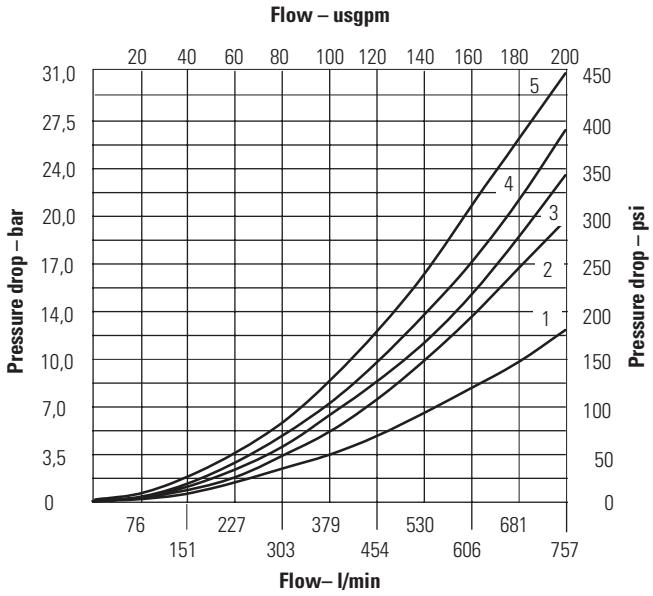
2. For any other flow rate (Q_1), the pressure drop (ΔP_1) will be approximately: $\Delta P_1 = P(Q_1/Q)^2$.

3. For any other viscosity(s), the pressure drop (ΔP), will change as follows:

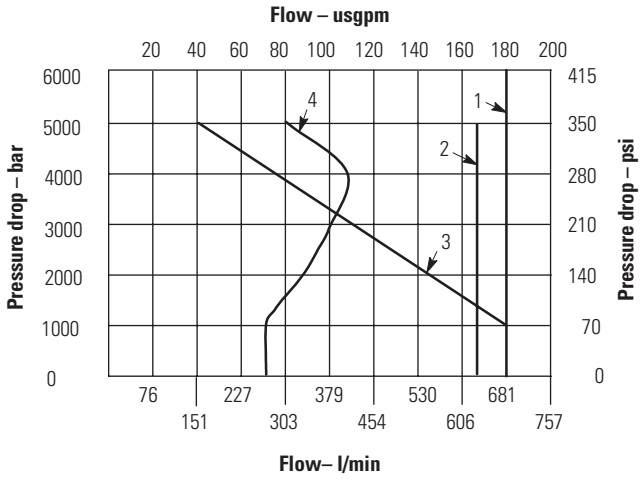
Viscosity cSt (SUS)	14 (17.5)	20 (97.8)	43 (200)	54 (251)	65 (302)	76 (352)	85 (399)
% of PΔ (Approx.)	81	88	104	111	116	120	124

4. For any other specific gravity (G_1), the pressure drop (ΔP_1) will be approximately: $\Delta P1 = \Delta P(G_1/G)$.

Pressure drop curves



Malfunction flow curves



Performance data

DG3V-8 Model

V-E

Response time

The response time shown in the charts are defined as the time between pilot pressurization/ de-pressurization and the initial change in the inlet port pressure.

Spring centering times @ Rated flow & pressure

Spool type	Time
Closed center	.040 sec.
Open center	.050 sec.

Centering times for pressure centered valves @ rated pressure (a to p or b to p)

ee malfunction flow curves on page 7.

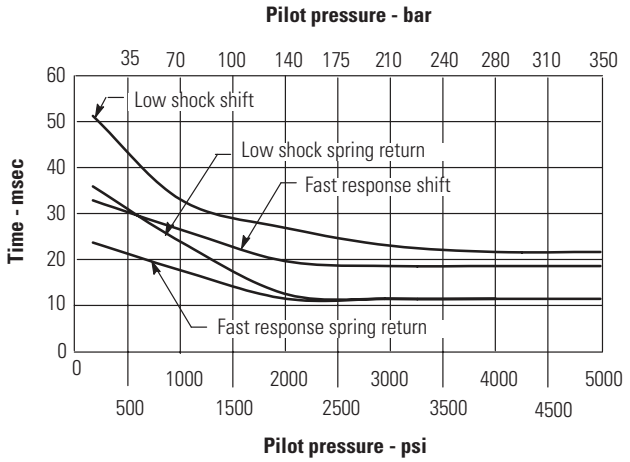
350 bar (5000 psi)
350 bar (5000 psi)
350 bar (5000 psi)
nforms to NFPA/T2.6.1 R1-1991 e fatigue pressure rating of the

Integral check valves

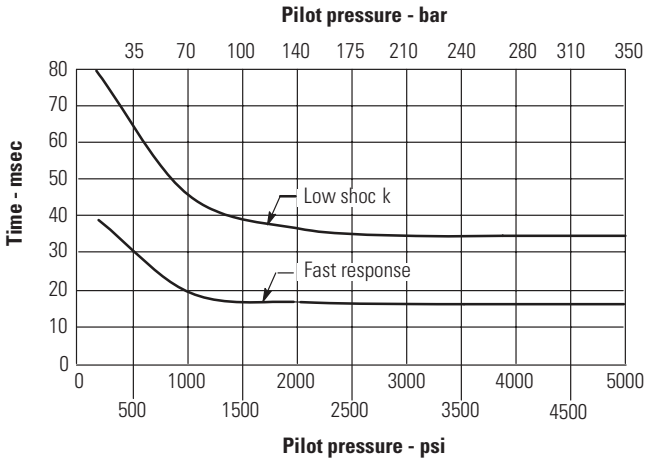
For internal pilot pressure, an integral pressure port check valve is available. This back pressure will be present at the cylinder ports. The pilot pressure generated is the total of: P → T drop through the valve in center condition, pressure drop through the check valve, plus the pressure at the tank port.

To prevent load drop, a check valve in the pressure port can be used to prevent reverse flow from a cylinder port to the pressure port.

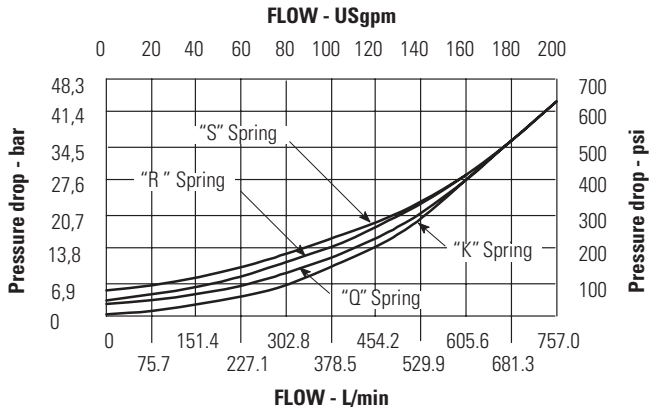
Offset to Offset



Center to Offset



Pressure drop across check valve



Pressure drop & malfunction flow

The following table lists the appropriate pressure drop curve and malfunction flow curve between ports for each spool type. Use the following example to determine pressure drop for a selected spool.

Example: Find the pressure drop from P → B for type 7 spool. Using the table find numeral 7 in the spool type column.

To the right of numeral 7 find the reference curve 2 (from pressure drop curve chart at bottom of page) under P → B column.

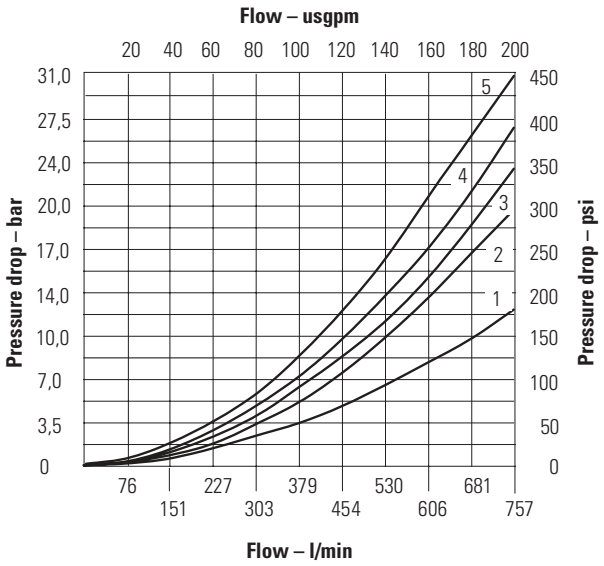
The pressure drop from P → B for type 7 spool would be obtained on curve 2. Likewise, the malfunction for numeral 7 would be found on curve 1 (from malfunction flow curve chart at bottom of page).

1. Figures in the pressure drop chart give approximate pressure drop (ΔP) when passing 473 l/min (125 USgpm) flow (Q) of 35 cSt (164 SUS) fluids(s) having .865 specific gravity.
2. For any other flow rate(Q^1), the pressure drop (ΔP_1) will be approximately $\Delta P_1 = \Delta P(Q_1/Q)^2$.
3. For any other viscosity(s), the pressure drop (ΔP), will change as follows:
4. For any other specific gravity (G1), the pressure drop (ΔP_1) will be approximately: $\Delta P_1 = \Delta P(G_1/G)$.

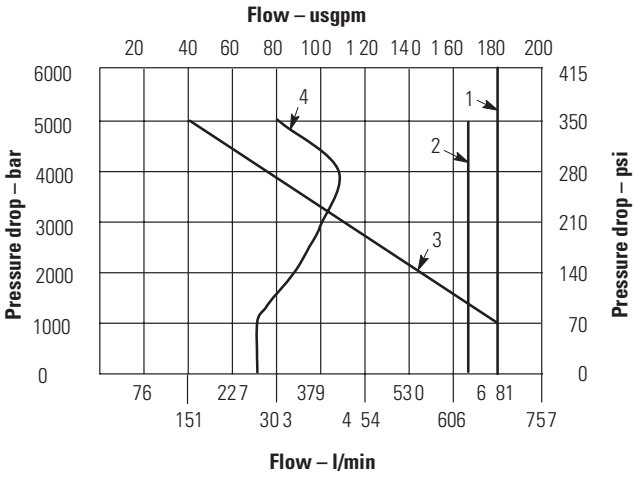
	Pressure drop curve number					Malfunction flow curve number
Spool type	**P → A**	**B → T**	**P → B**	**A → T**	**P → T in center**	
0	2 →	2 →	2 →	2 →	3 →	1
1	1	2	1	3	2	3
2	1	2	1	1	–	2
3	1	2	1	4	–	2
6	1	3	1	4	–	1
8	4	3	4	2	5	1
33	1	3	1	2	–	2
35A	See page 191					
52	2	–	4	4	–	1

Viscosity cSt (SUS)	**14 (75)**	**32 (150)**	**43 (200)**	**54 (250)**	**65 (300)**	**76 (350)**	**86 (400)**
% of PΔ (Approx.)	93	111	119	126	132	137	141

Pressure drop curves



Malfunction flow curves



V-E

Performance data

DG5V-8 Model

V-E

Response times

Response times are defined as the time from solenoid energization/de-energization to the point of the start of a pressure rise/decline in appropriate port.

Solenoid energizing

Spring centered, pressure centered and spring offset DG5V-8 types must be energized continuously. No-spring detented DG5V-8 type may be energized momentarily. Pressure centered and spring centered DG5V-8 types return valve spool to center position when both solenoids are de-energized.

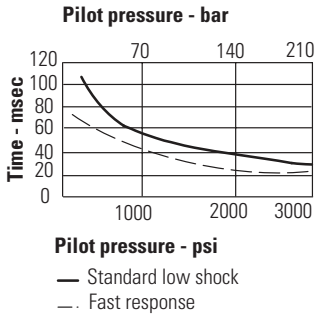
Mounting position

No–spring detented valves must be installed with the longitudinal axis horizontal for good machine reliability. The mounting position of spring centered and spring offset models is unrestricted provided that the pilot pressure supply is maintained as required. (Spring offset valves do not have a spring in the main spool section).

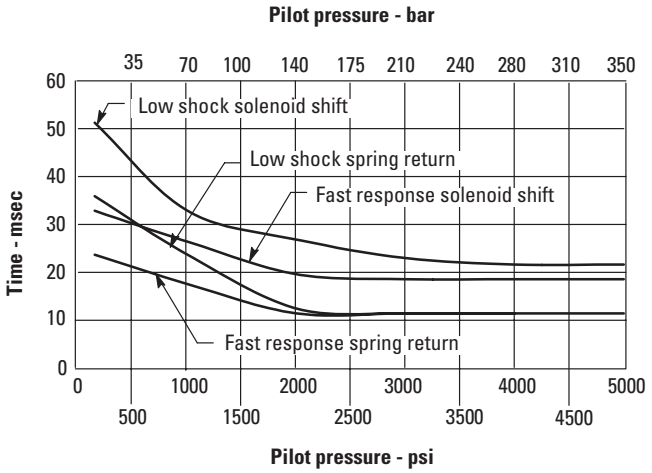
Spring centering times @ rated flow & pressure

Spool Type	Time
Closed Center	.040 sec.
Open Center	.050 sec.

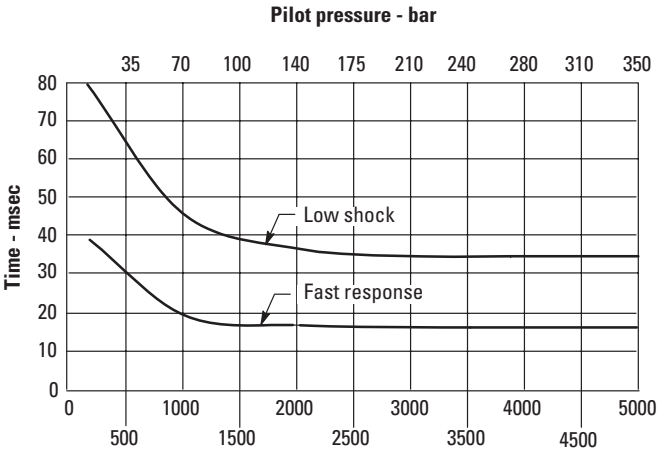
Centering times for pressure centered valves @ rated pressure (A to P or B to P)



Offset to Offset



Center to Offset

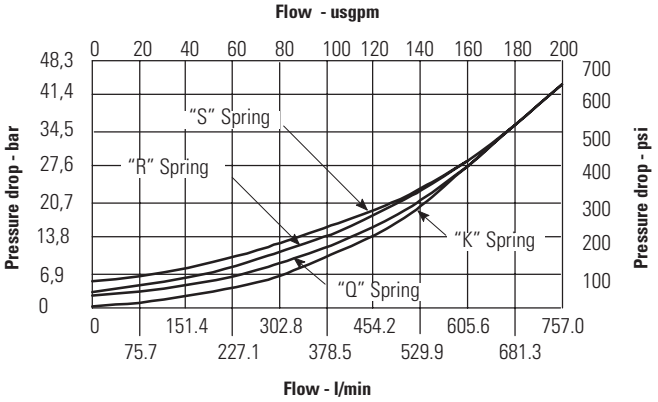


Integral check valves

For internal pilot pressure, an integral pressure port check valve is required for internally piloted valves with open center spools (0,1,4,8 & 9). The pilot pressure generated is the total of: P → T drop through the valve in center condition, pressure drop through the check valve, plus the pressure at the tank port.

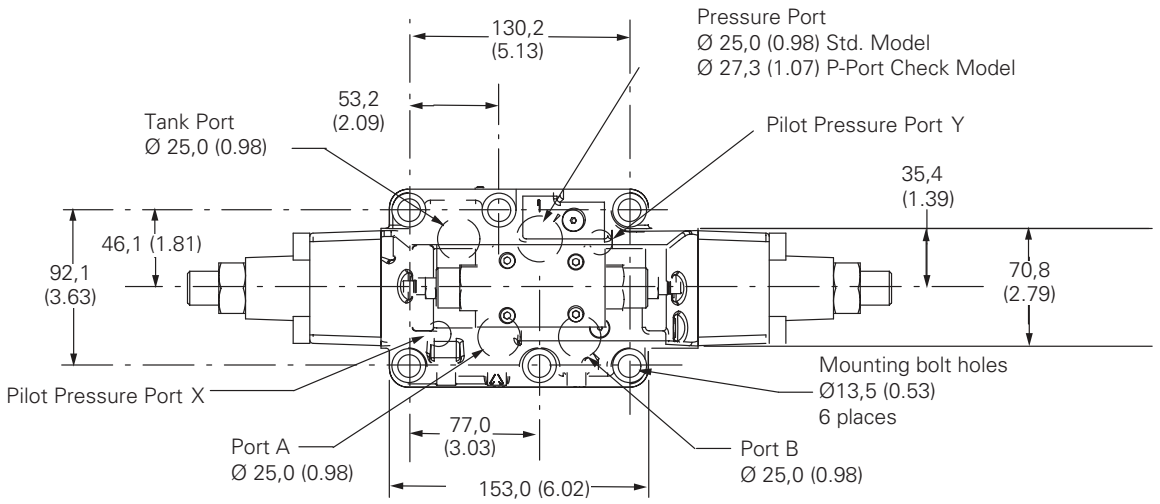
For proper operation, total pressure drop must be greater than the minimum required pilot pressure (see chart). To prevent load drop, a check valve in the pressure port can be used to prevent reverse flow from a cylinder port to pressure port. If using as reverse flow check, maximum reverse pressure is limited to 210 bar (3000 psi).

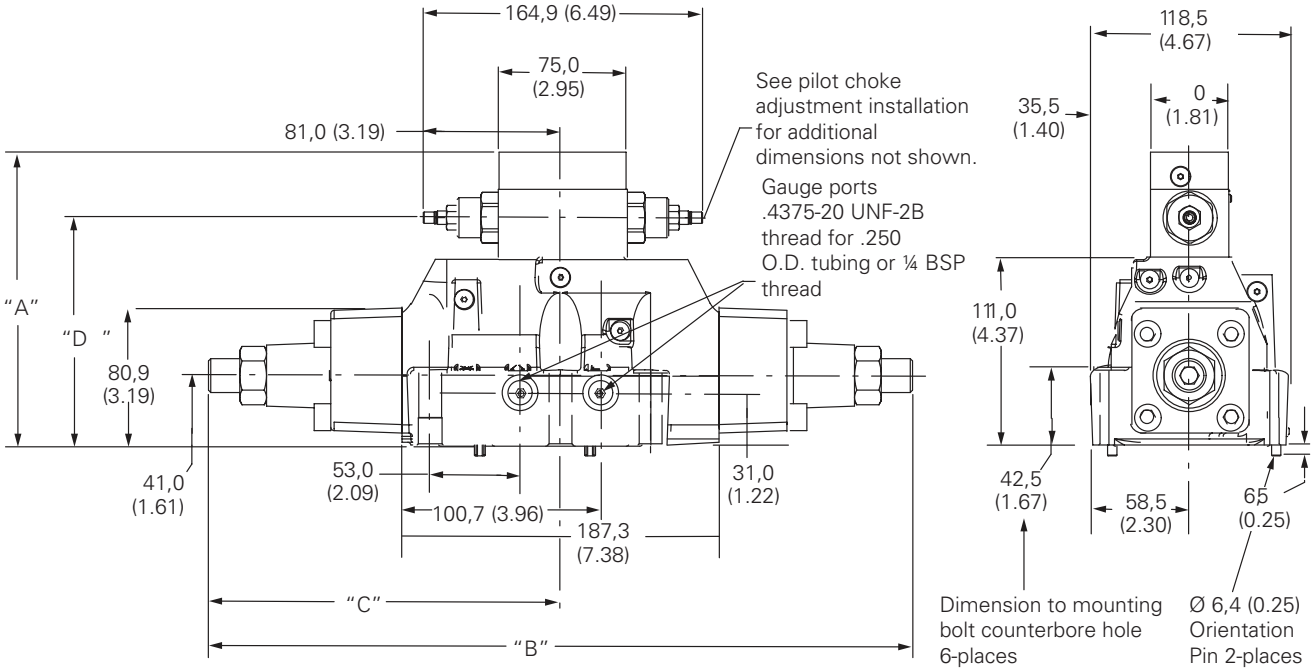
Pressure drop across check valve



V-E

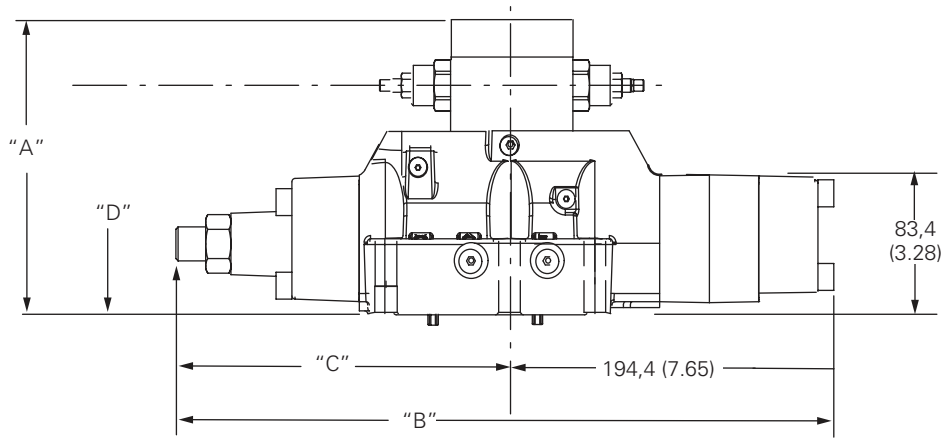
Installation dimensions





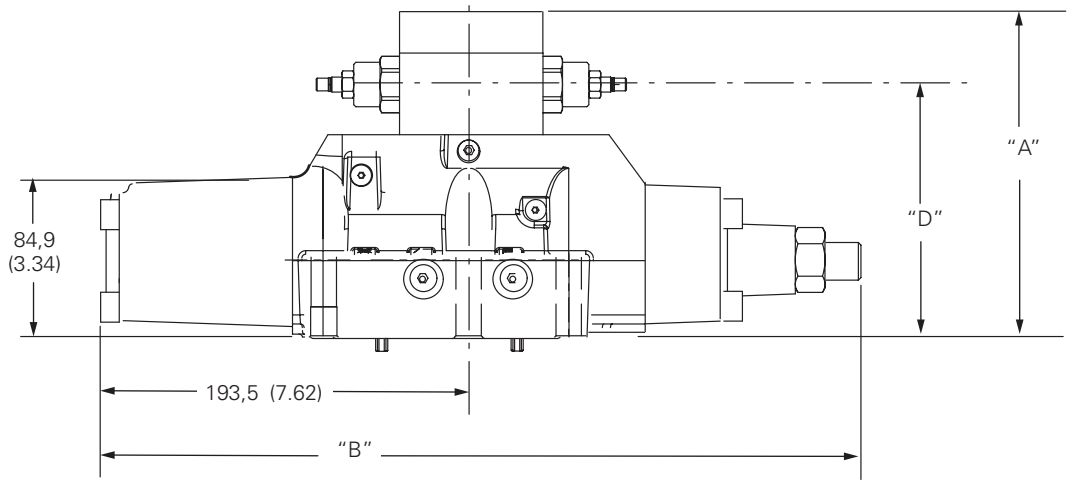
Spool control modifications	"A" dimension	"B" dimension	"C" dimension	"D" dimension (pilot choke adjustment)
Without pilot choke or stroke adjustment	133,0 (5.23)	265,3 (10.44)	132,6 (5.22)	–
Stroke adjustment (both ends)	133,0 (5.23)	415,9 (16.37)	208,0 (8.18)	–
Pilot choke adjustment	173,0 (6.81)	265,3 (10.44)	132,6 (5.22)	134,2 (5.28)
Stroke adjustment on cyl. 'A'	133,0 (5.23)	340,6 (13.40)	208,0 (8.18)	–
Stroke adjustment on cyl. 'B'	133,0 (5.23)	340,6 (13.40)	132,6 (5.22)	–
Pilot choke and stroke adjustment on cyl. 'A'	173,0 (6.81)	340,6 (13.40)	208,0 (8.18)	134,2 (5.28)
Pilot choke and stroke adjustment on cyl. 'B'	173,0 (6.81)	132,6 (5.22)	134,2 (5.28)	134,2 (5.28)
Pilot choke and stroke adjustment (both ends)	173,0 (6.81)	415,9 (16.37)	208,0 (8.18)	134,2 (5.28)

DG3V-8-(L)-*-*-10 spring offset model
Millimeters (inches)



Spool control modifications	"A" dimension	"B" dimension	"C" dimension	"D" dimension (pilot choke adjustment)
Without pilot choke or stroke adjustment	133,0 (5.23)	265,3 (10.44)	132,6 (5.22)	–
Without pilot choke or stroke adjustment (left-hand build)	133,0 (5.23)	326,9 (12.87)	194,4 (7.65)	134,2 (5.28)
Pilot choke adjustment	173,0 (6.81)	265,3 (10.44)	132,6 (5.22)	134,2 (5.28)
Stroke adjustment on cyl. 'A' (left-hand build)	133,0 (5.23)	402,3 (15,83)	208,0 (8.18)	–
Stroke adjustment on cyl. 'B'	133,0 (5.23)	340,6 (13.40)	132,6 (5.22)	–
Pilot choke and stroke adjustment on cyl. 'A' (left-hand build)	173,0 (6.81)	340,6 (13.40)	208,0 (8.18)	134,2 (5.28)
Pilot choke and stroke adjustment on cyl. 'B'	173,0 (6.81)	340,6 (13.40)	132,6 (5.22)	134,2 (5.28)

DG3V-8-D-*-*-10 pressure centered model
Millimeters (inches)

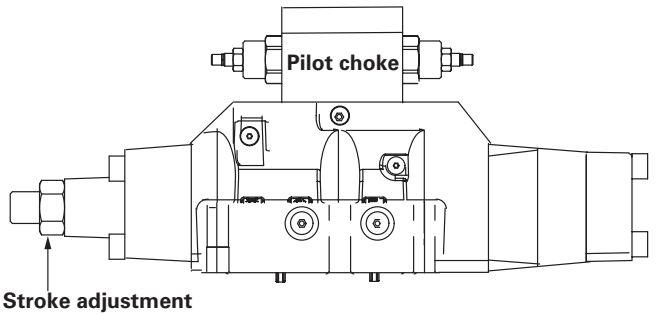


Pilot choke DGMFN-3-Y-A2W-B2W-41

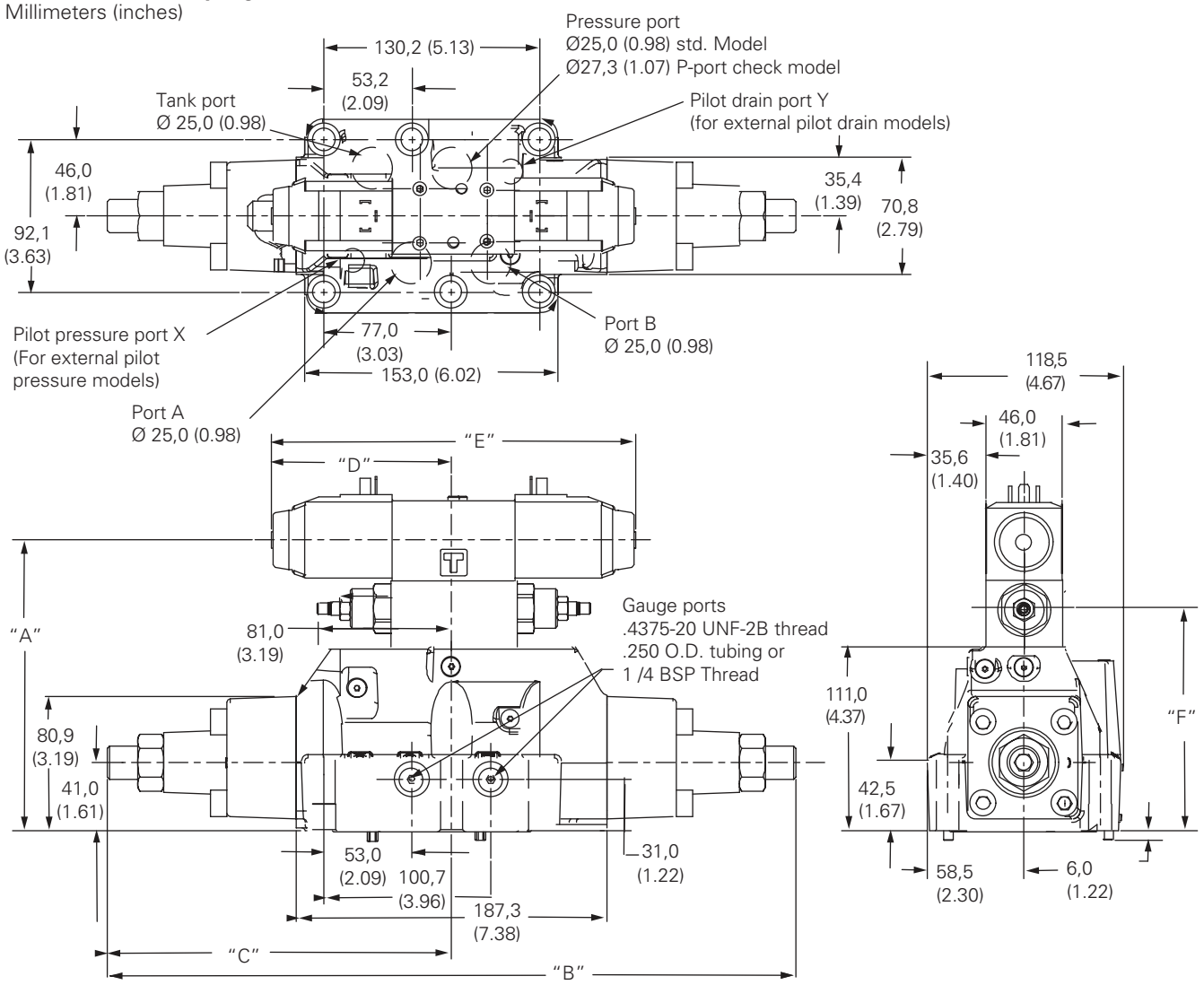
Pilot choke increases the amount of time to shift the mainstage spool, lowering the possibility of large flow transients in the circuit. It is adjusted by backing off locknuts and turning adjusting screws inward to decrease rate of spool travel and outward to increase spool travel rate. See spool control modifications in model code.

Stroke adjustment

Stroke adjustment limits movement of the mainstage spool. Backing off the jamnut and turning the adjusting screw inward decreases spool stroke. See spool control modifications in model code.).



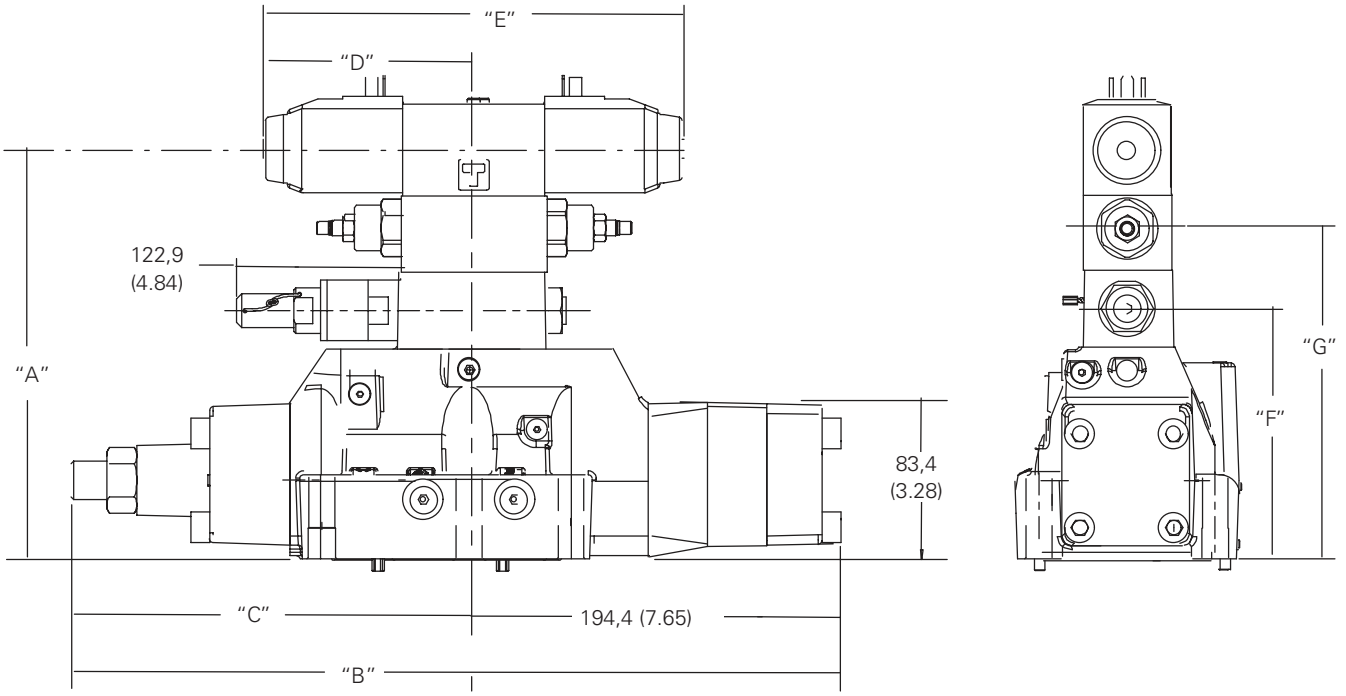
DG5V-8 H-*-M-*-10 spring centered model
Millimeters (inches)



Spool control modifications	Dimensions "A"	"B"	"C"	"D" AC Sol.	"D" DC Sol.	"E" pilot Dual solenoid AC Sol.	"E" pilot Dual solenoid DC Sol.	"E" pilot Single solenoid AC Sol.	"E" pilot Single solenoid DC Sol.	"G" Pilot choke
Without pilot choke or stroke adjustment	135,6 (5.33)	265,3 (10.44)	132,6 (5.22)							
Stroke adjustment (both ends)		415,9 (16.37)	208,0 (8.18)							
Pilot choke adjustment			132,6 (5.22)							134,2 (5.28)
Stroke adjust. on cyl. 'A'	135,6 (5.33)	340,6 (13.40)	208,0 (8.18)	98,8 (3.88)	108,8 (4.28)	200,0 (7.87)	220,0 (8.66)	146,5 (5.76)	156,5 (6.16)	
Stroke adjust on cyl. 'B'			132,6 (5.22)							
Pilot choke and stroke adjust. on cyl 'A'			208,0 (8.18)							
Pilot choke and stroke adjust. on cyl. 'B'	175,6 (6.91)		132,6 (5.22)							134,2 (5.28)
Pilot choke and stroke adjust. on both ends		415,9 (16.37)	208,0 (8.18)							

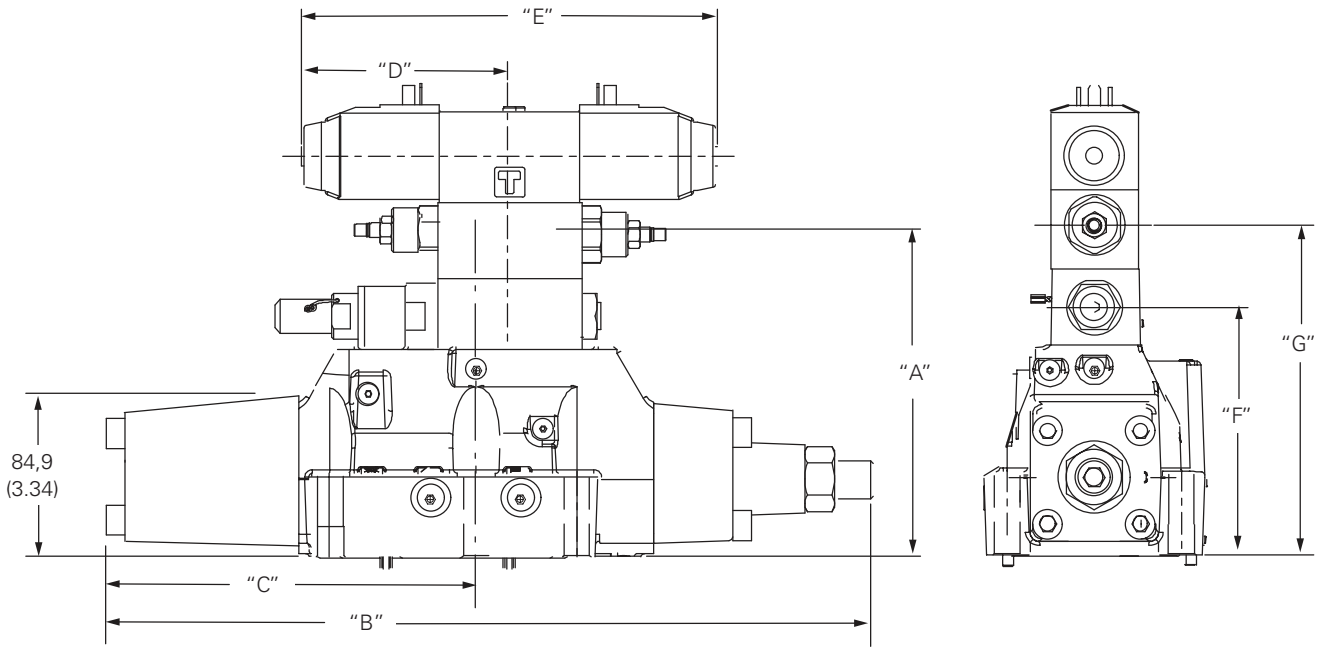
Installation dimensions

DG5V-8-A(L)-*-*-10 Spring offset model
Millimeters (inches)



Spool control modifications	Dimensions "A"	"B"	"C"	"D" AC Sol.	"D" DC Sol.	"E" pilot Dual solenoid AC Sol.	"E" pilot Dual solenoid DC Sol.	"E" pilot Single solenoid AC Sol.	"E" pilot Single solenoid DC Sol.	"F" Reducer module	"G" Pilot Choke
Without pilot choke or stroke adjustment	175,6 (6.91)	265,3 (10.44)	132,6 (5.22)	98,8 (3.88)	108,8 (4.28)	200,0 (7.87)	220,0 (8.66)	146,5 (5.76)	156,5 (6.16)	134,2 (5.28)	-
Stroke adjustment (both ends)		415,9 (16.37)	208,0 (8.18)								
Pilot choke adjustment	215,6 (8.48)	265,3 (10.44)	132,6 (5.22)								134,2 (5.28)
Stroke adjust. on cyl. 'A'	175,6 (6.91)	340,6 (13.40)	208,0 (8.18)								
Stroke adjust on cyl. 'B'			132,6 (5.22)								
Pilot choke and stroke adjust. on cyl 'A'	215,6 (8.48)		208,0 (8.18)								
Pilot choke and stroke adjust. on cyl. 'B'			132,6 (5.22)								134,2 (5.28)
Pilot choke and stroke adjust. on both ends		415,9 (16.37)	208,0 (8.18)								

DG5V-8-D-*-*-10 Pressure centered model
Millimeters (inches)



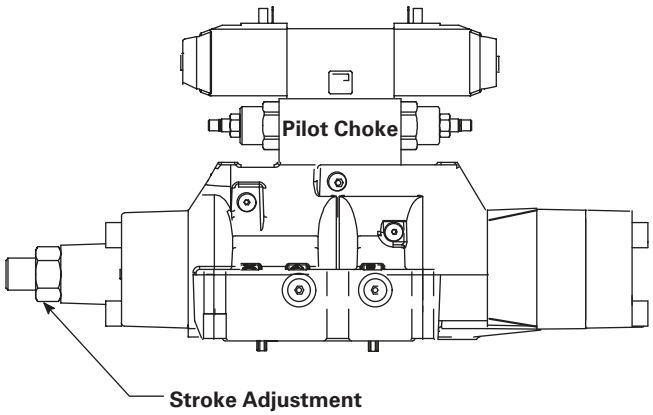
Spool control modifications	"A"	"B"	"C"	"D" AC Sol.	"D" DC Sol.	"E" pilot Dual solenoid AC Sol.	"E" pilot Dual solenoid DC Sol.	"E" pilot Single solenoid AC Sol.	"E" pilot Single solenoid DC Sol.	"F" Reducer module	"G" Pilot Choke
				Dimensions							
Without pilot choke or stroke adjustment	135,6 (5 33)	326,1 (12.83)	193,5 (7.61)	98,8 (3.88)	108,8 (4.28)	200,0 (7.87)	220,0 (8.66)	146,5 (5.76)	156,5 (6.16)	-	
Stroke adjust on cyl. 'B'											
Pilot choke and stroke adjust. on cyl. 'B'	175,6 (6.91)	401 5 (15.80)									134,2 (5.28)
(With reducer)											
Without pilot choke or stroke adjustment	175,6 (6.91)	326,1 (12.83) 401,5 (15.80)	193,5 (7.61)	98,8 (3.88)	108,8 (4.28)	200,0 (7.87)	220,0 (8.66)	146,5 (5.76)	156,5 (6.16)	131,0 (5.15)	
Stroke adjust on cyl. 'B'											
Pilot choke and stroke adjust. on cyl. 'B'	215,6 (8.48)										134,2 (5.28)

Pilot choke

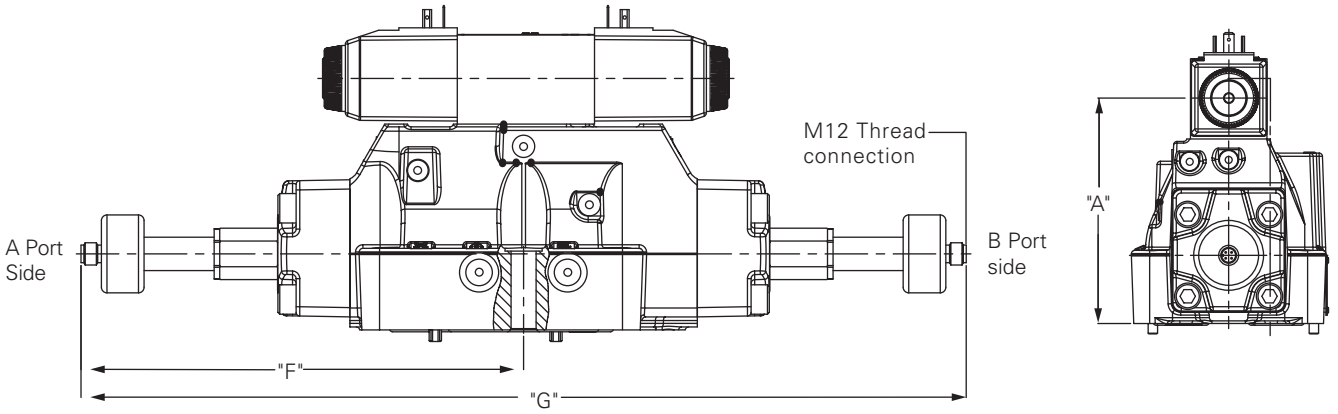
DGMFN-3-Y-A2W-B2W-41 Pilot choke increases the amount of time to shift the mainstage spool, lowering the possibility of large flow transients in the circuit. It is adjusted by backing off locknuts and turning adjusting screws inward to decrease rate of spool travel and outward to increase spool travel rate. See spool control modifications in model code.

Stroke adjustment

Stroke adjustment limits movement of the mainstage spool. Backing off the jamnut and turning the adjusting screw inward decreases spool stroke. See spool control modifications in model code.



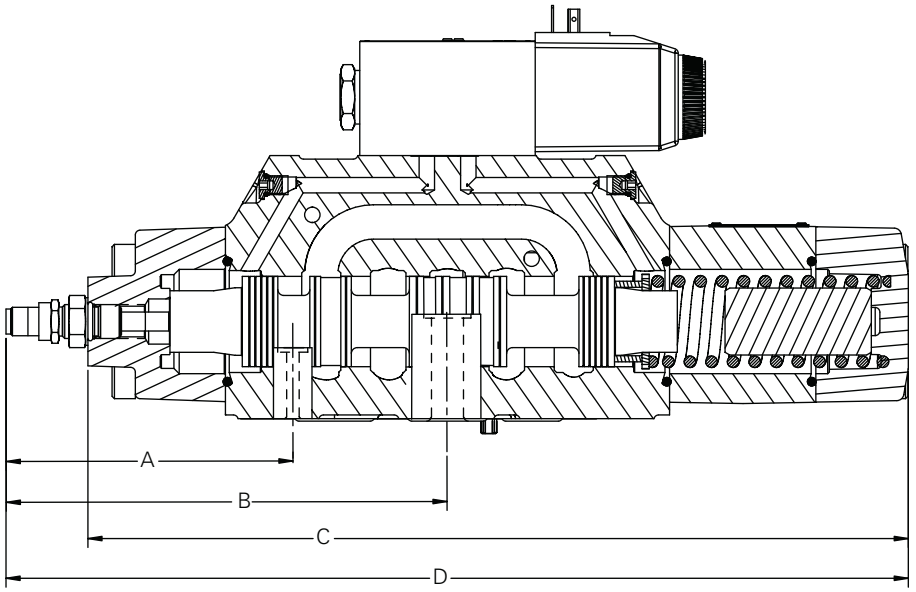
DG5V-8 with main stage spool monitoring switch "PC*" or "PD*" models (LVDT style switch)
Millimeters (inches)



Model code	"A" Dimension	"F" Dimension	"G" Dimension
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-PCA/PDA-(*)-(V)M-*-10	135.6[5.34]	238.7[9.40]	371.3[14.62]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-PCA/PDA-(*)-(V)M-*-10	175.6[6.91]	238.7[9.40]	371.3[14.62]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-2-PCA/PDA-(*)-(V)M-*-10	175.6[6.91]	238.7[9.40]	371.3[14.62]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-2-PCA/PDA-(*)-(V)M-*-10	215.6[8.49]	238.7[9.40]	371.3[14.62]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-8-PCA/PDA-(*)-(V)M-*-10	135.6[5.34]	238.7[9.40]	446.6[17.58]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-8-PCA/PDA-(*)-(V)M-*-10	175.6[6.91]	238.7[9.40]	446.6[17.58]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-28-PCA/PDA-(*)-(V)M-*-10	175.6[6.91]	238.7[9.40]	446.6[17.58]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-28-PCA/PDA-(*)-(V)M-*-10	215.6[8.49]	238.7[9.40]	446.6[17.58]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-PCB/PDB-(*)-(V)M-*-10	135.6[5.34]	132.7[5.22]	371.3[14.62]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-PCB/PDB-(*)-(V)M-*-10	175.6[6.91]	132.7[5.22]	371.3[14.62]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-2-PCB/PDB-(*)-(V)M-*-10	175.6[6.91]	132.7[5.22]	371.3[14.62]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-2-PCB/PDB-(*)-(V)M-*-10	215.6[8.49]	132.7[5.22]	371.3[14.62]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-7-PCB/PDB-(*)-(V)M-*-10	135.6[5.34]	208.0[8.19]	446.6[17.58]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-7-PCB/PDB-(*)-(V)M-*-10	175.6[6.91]	208.0[8.19]	446.6[17.58]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-27-PCB/PDB-(*)-(V)M-*-10	175.6[6.91]	208.0[8.19]	446.6[17.58]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-27-PCB/PDB-(*)-(V)M-*-10	215.6[8.49]	208.0[8.19]	446.6[17.58]
DG5V-8-H-(B)-*D-(*)-PCB/PDB-(*)-(V)M-*-10	135.6[5.34]	193.5[7.62]	432.1[17.01]
DG5V-8-H-R-(B)-*D-(*)-PCB/PDB-(*)-(V)M-*-10	175.6[6.91]	193.5[7.62]	432.1[17.01]
DG5V-8-H-(B)-*D-(*)-2-PCB/PDB-(*)-(V)M-*-10	175.6[6.91]	193.5[7.62]	432.1[17.01]
DG5V-8-H-R-(B)-*D-(*)-2-PCB/PDB-(*)-(V)M-*-10	215.6[8.49]	193.5[7.62]	432.1[17.01]

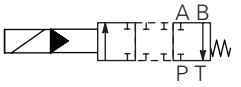
Installation dimensions

Valve for safety circuit application (35A Spool)



DG5V with PPA Switch Option Shown

Main Stage Hydraulic Symbol



Model	A	B	C	D	Leakage P-A	Flow curve
	mm (in)	mm (in)	mm (in)	mm (in)	cc/min (in3/min)	
DG5V5-35A	118.5 (4.67)		234.7 (9.24)	262.1 (10.32)	Available upon request	Available upon request
DG5V7-35A		152.1 (5.99)	252.1 (9.92)	286.6 (11.28)	Available upon request	See DG5V7 catalog
DG5V8-35A		151.7 (5.97)	346.0 (13.62)	380.5 (14.98)	156 (9.5)	Available upon request
DG5V10-35A		230.7 (9.10)	443.4 (17.46)	476.3 (18.8)	Available upon request	Available upon request

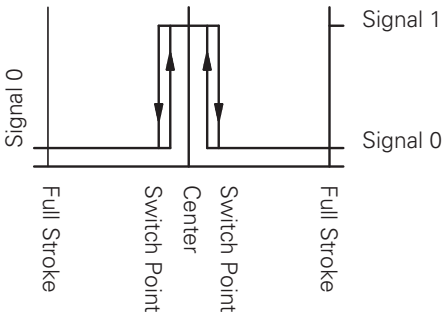
DG5V-8 with main stage spool monitoring switch "PC*" or "PD*" models (LVDT Style Switch)

Millimeters (inches)

Specifications	
Supply Voltage (Vs) (Full wave bridge with capacitor)	24VDC ± 20%
Reverse polarity protection	MAX. 300V Installed
Ripple voltage	10%
Current consumption	40mA Approx.
Outputs	NC Contact positive (no short circuite protection)
Sensing distance (offset position)	5.85 to 6.15 mm
Sensing distance (from center position)	± 0.35 to 0.65 mm
Hysteresis	≤0.06 mm
Output voltage	
Signal 0	< 1.8V
Signal 1	Vs – 2.5V
Output Current	<400mA at Input +20%
Environmental Protection	IP65 (With Mounted Plug)
Operating Temperature Range	-20°C to +85°C
Max. Operating Pressure	315 bar (4500 psi)
CE Declaration of Conformity No.	00 02 002 9 93
P-Channel, Contact Positive	

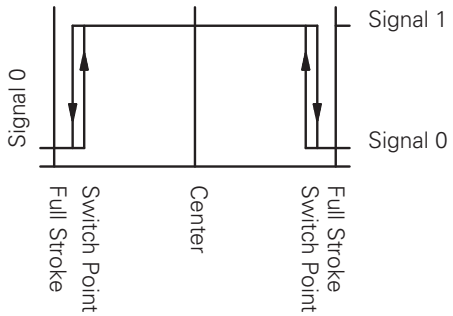
Attention: EMC only ensured when using screened cables and screened plug casing.

Typical "PCA/PCB" output (for sensing center position)



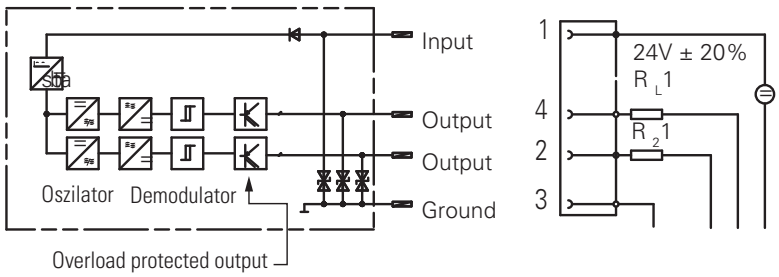
Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

Typical "PDA/PDB" output (for full shift sensing)

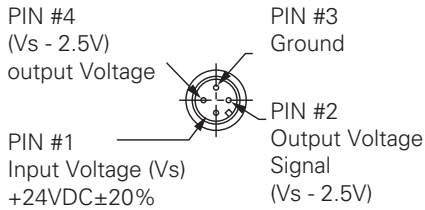


Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

Electrical schematic and mating connector detail



Connector detail



R_L1, R_L2 = e.g. Coil Resistance of the switch relay >/ = 60 OHMS

Pilot valves

General description

Pilot valves are identified in the model code by the following letters: “S” Standard or “H” High Performance. The pilot valves can be ordered to match a variety of mainstage spool types and valve bodies.

The chart below shows ordering information for each pilot valve. For example, to order a High Performance pilot “H” with a Spring Offset mainstage “A”, use the following model code: DG4V-3- 2A-M-*-60

Valve model code: High performance/standard	Main stage spool type	Pilot valve model code
DG5V-8-H-*A-*-M-*-10	All except 4 & 8	DG4V-3-2A-M-*-60
	4A & 8A only	DG4V-3-2AL-VM-*-60
	4AL & 8AL only	DG4V-3-2A-VM-*-60
DG5V-8-H-*B-*-M-*-10	All except 4 & 8	DG4V-3-6B-M-*-60
	4B & 8B only	DG4V-3-6BL-VM-*-60
	4BL & 8BL only	DG4V-3-6B-VM-*-60
DG5V-8-H-*C-*-M-*-10	All except 4 & 8	DG4V-3-6C-M-*-60
	4C & 8C only	DG4V-3-6C-VM-*-60
DG5V-8-H-*D-*-M-*-10	All except 4 & 8	DG4V-3-7C-M-*-60
	4D & 8D only	DG4V-3-7C-VM-*-60
DG5V-8-H-*F-*-M-*-10	All except 4 & 8	DG4V-3-6F-M-*-60
	4F & 8F only	DG4V-3-6FL-VM-*-60
	4FL & 8FL only	DG4V-3-6F-VM-*-60
DG5V-8-H-*N-*-M-*-10	All except 4 & 8	DG4V-3-6N-M-*-60
	4N & 8N only	DG4V-3-6N-VM-*-60

Spool type	Pilot pressure bar (psi)	
	A, B, C, F, N Models	D Models
Closed center	10 (150)	P to A: 12 (175)
		P to B: 21 (300)
Open center	5 (75)	P to A: 10 (150)
		P to B: 10 (150)

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