DG4V-3 70 Design

ISO4401 Size 03;
ANSI/B93.7M-D03

Powering Business Worldwide

Solenoid Operated Directional Valve

DG4V-3-70 Design

D

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 solidstate 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

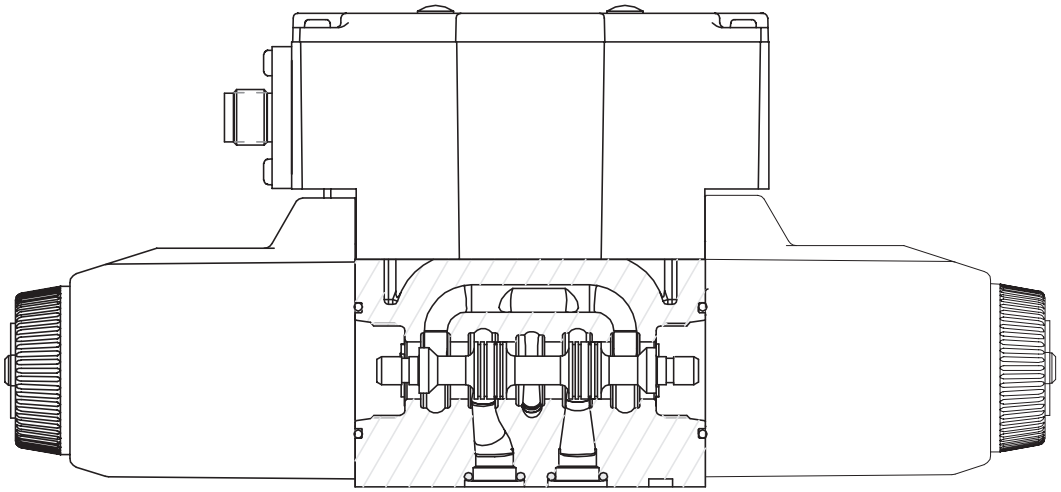
IP 65 rated protection from low pressure water jets from all directions. IP 67 rated, water immersion tested.

EMC qualified to EN 61326 CE certified, CE mark on the valve.

Electrical

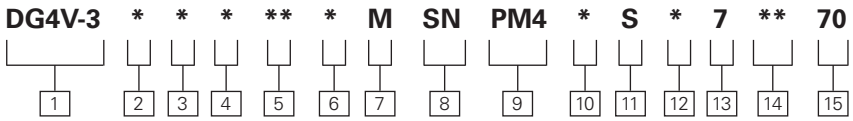
- 24 VDC operation only
- M12 connection.
- Coil control options, described on page 9:
  - A-option, direct connection from the M-12 connector to each coil. (Model code pos 9)
  - Z-option, On Board Switching amplifier.

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

Model Code



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 4

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

P – Plain overrides in solenoid ends only (standard)
H – Waterproof override in solenoid ends only
W – Twist and lock manual override (not available in "F6" models)
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 Tank Pressure Rating

7 – 210 Bar

14 Orifice Plugs

NP – No Port Orifices (standard)
P** – Orifice in "P" port
A** – Orifice in "A" port
B** – Orifice in "B" port
T** – Orifice in "T" port

Sizes (the "" above):**
03 – 0.30 orifice dia
06 – 0.60 orifice dia
08 – 0.80 orifice dia
10 – 1.00 orifice dia
13 – 1.30 orifice dia
15 – 1.50 orifice dia
20 – 2.00 orifice dia
23 – 2.30 orifice dia
25 – 2.50 orifice dia
30 – 3.00 orifice dia
35 – 3.50 orifice dia.

15 Design Number

70 – Design Number

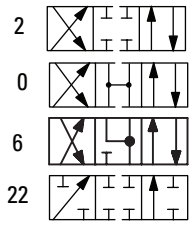
D

Functional Symbols

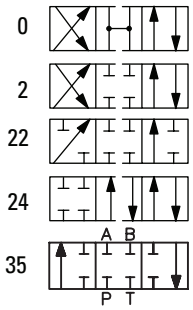
Spool Options

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

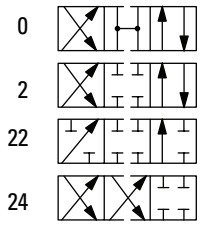
DG4V-3(S)-*N(V)



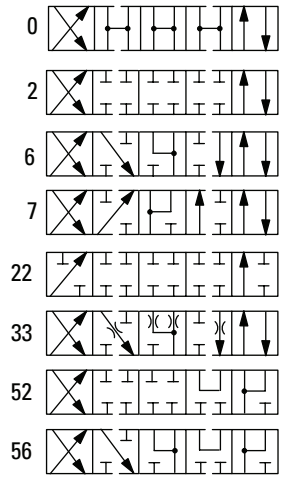
DG4V-3(S)-*A(V)



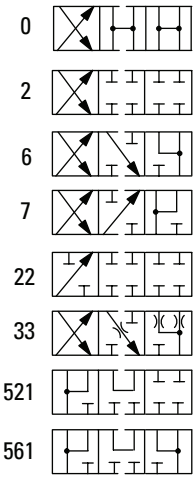
DG4V-3(S)-*AL(V)



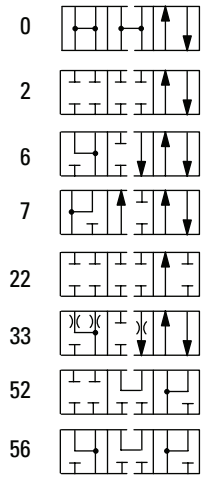
DG4V-3(S)-*C(V)



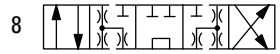
DG4V-3(S)-*B/F(V)



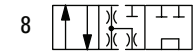
DG4V-3(S)-*BL/FL(V)



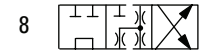
DG4V-3(S)-8C(V)



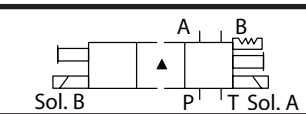
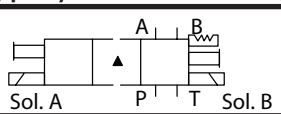
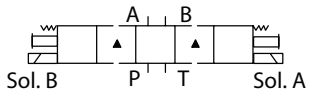
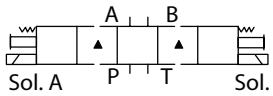
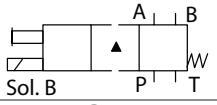
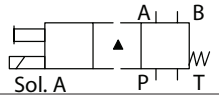
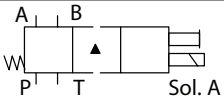
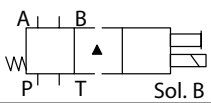
DG4V-3(S)-8BL(V)



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



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

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.

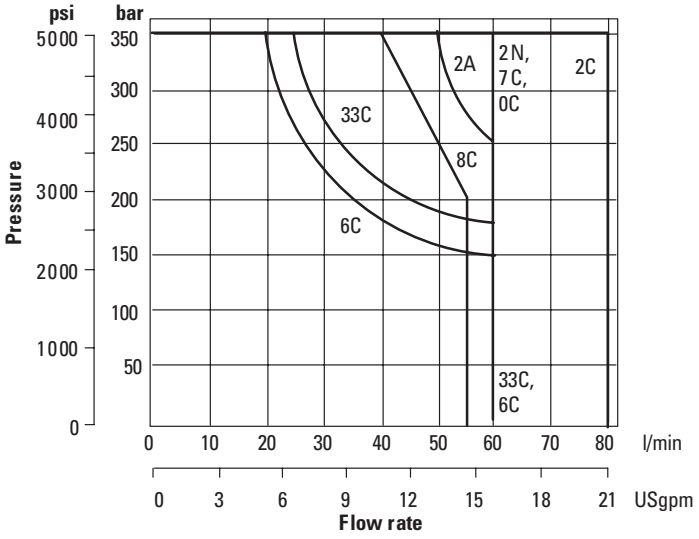
Performance Data

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

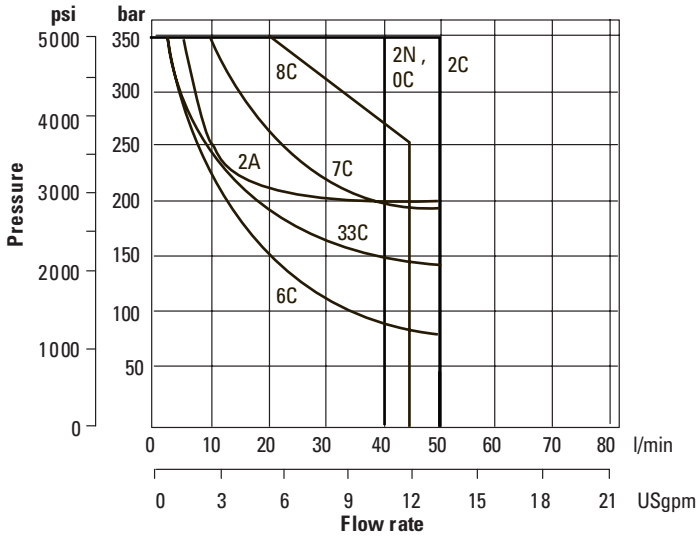
Maximum flow rates

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

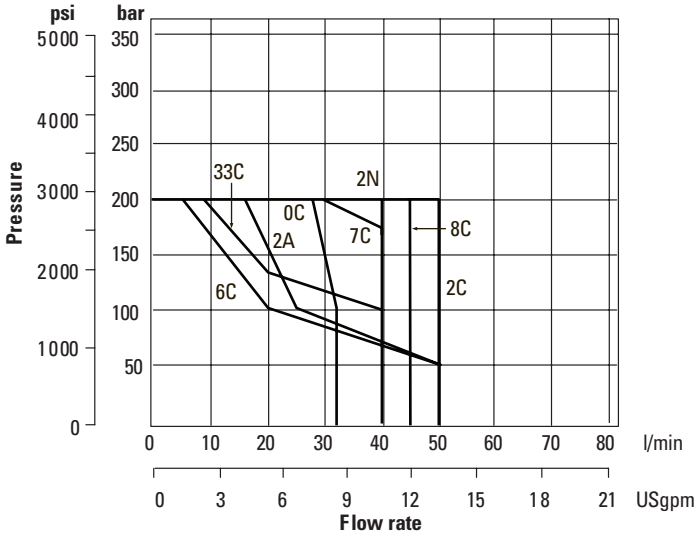
H Type Solenoid- 30W



HL Type Solenoid- 18W- (Optional)

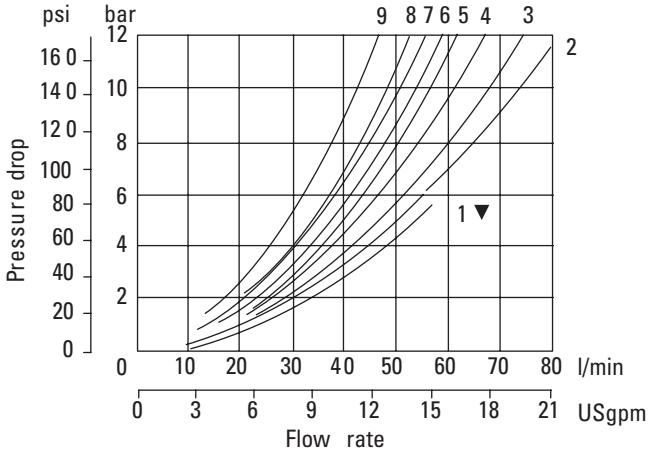


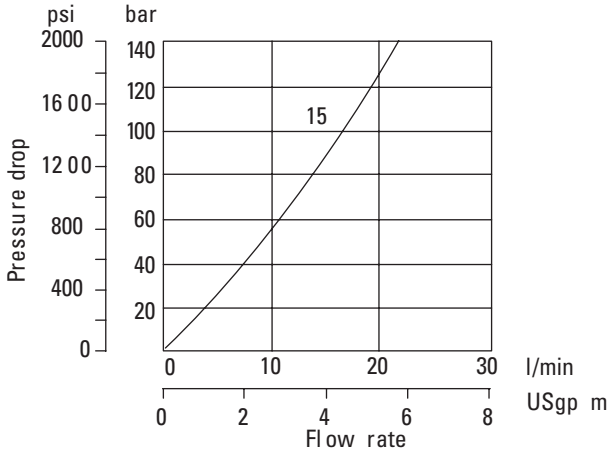
HM Type Solenoid- 10W- (Optional)



Pressure Drop Performance

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	B-A or 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	-	-
7B(L), 7C, 7F	De-energized	6 ▲	6 ■	-	-	-	7❍
	Energized	4	4	3	3	-	-
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

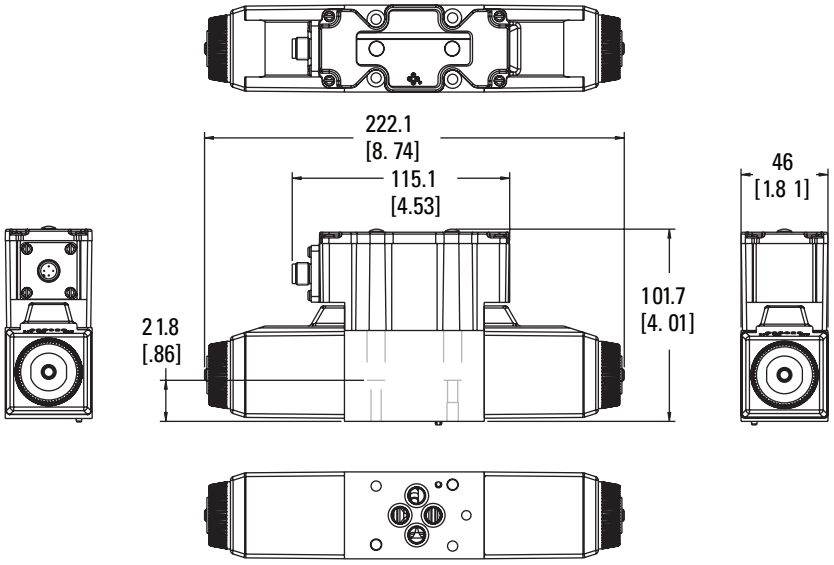
For other viscosities, pressure drops approximate to:

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

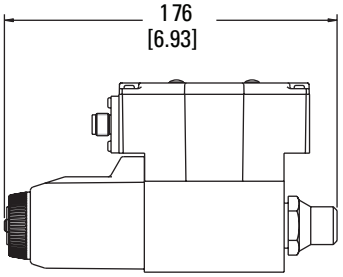
A change to another specific gravity will yield an approximately proportional change in pressure drop.

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

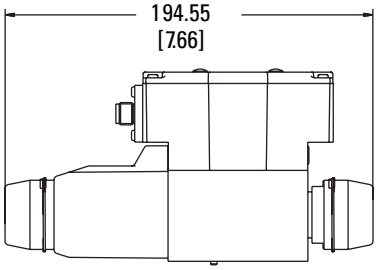
Installation
Dimensions



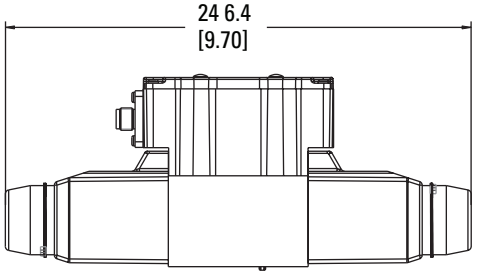
DG4V-3-*__C/N__-*-*M-PM4*S-***7-70



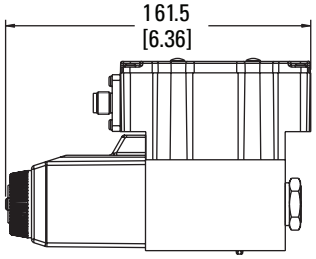
DG4V-3-**A/B/F(L)-__P2__-*M-PM4*S-***7-70



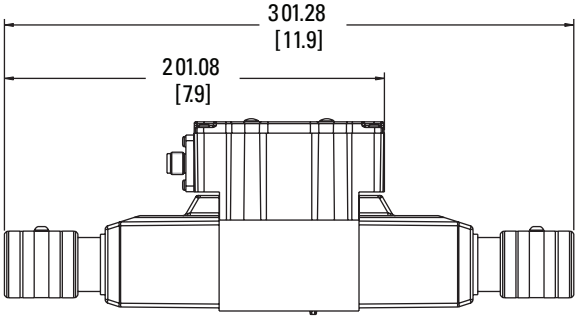
DG4V-3-*A/B/F(L)-__H2__-*M-PM4*S-***7-70



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



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



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

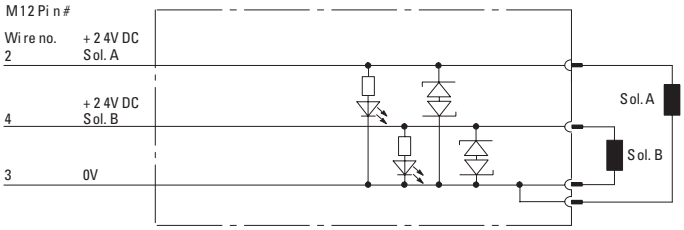
Electrical Specifications

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.

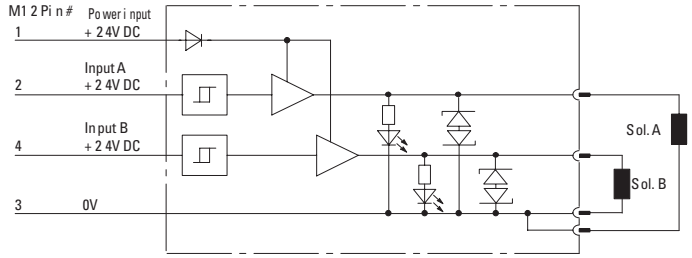
Protection network for inductive loads protects the (machine control) switch from high voltages and speeds the de-energizing of the solenoid.



Z-Option

Switching Amplifier on Board shown to the right.

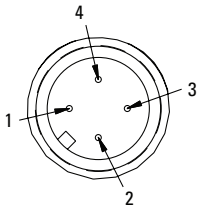
The circuit on the Z-option is reverse polarity protected. The output is short circuit protected. In case of a shorted solenoid, the amplifier will remove the voltage from it. When the short is removed the amplifier will restart automatically.



ELECTRICAL DATA:

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

M12 Connection



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.

CONTROL OPTION	PIN NUMBER	CONNECTION REF DESTINATION
PM4AS	1	No Connection
"A" Option	2	Power, Solenoid on B-Port Side
	3	Common, Sol A & B-
	4	Power, Solenoid on A-Port Side
PM4ZS	1	Power Supply
"Z" Option	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.

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 interferance.

Eaton
Hydraulics Group USA
14615 Lone Oak Road
Eden Prairie, MN 55344
USA
Tel: 952-937-9800
Fax: 952-294-7722
www.eaton.com/hydraulics

Eaton
Hydraulics Group Europe
Route de la Longeraie 7
1110 Morges
Switzerland
Tel: +41 (0) 21 811 4600
Fax: +41 (0) 21 811 4601

Eaton
Hydraulics Group Asia Pacific
Eaton Building
4th Floor, No.7 Lane280 Linhong Rd.
Changning District
Shanghai 200335
China
Tel: (+86 21) 5200 0099
Fax: (+86 21) 2230 7240

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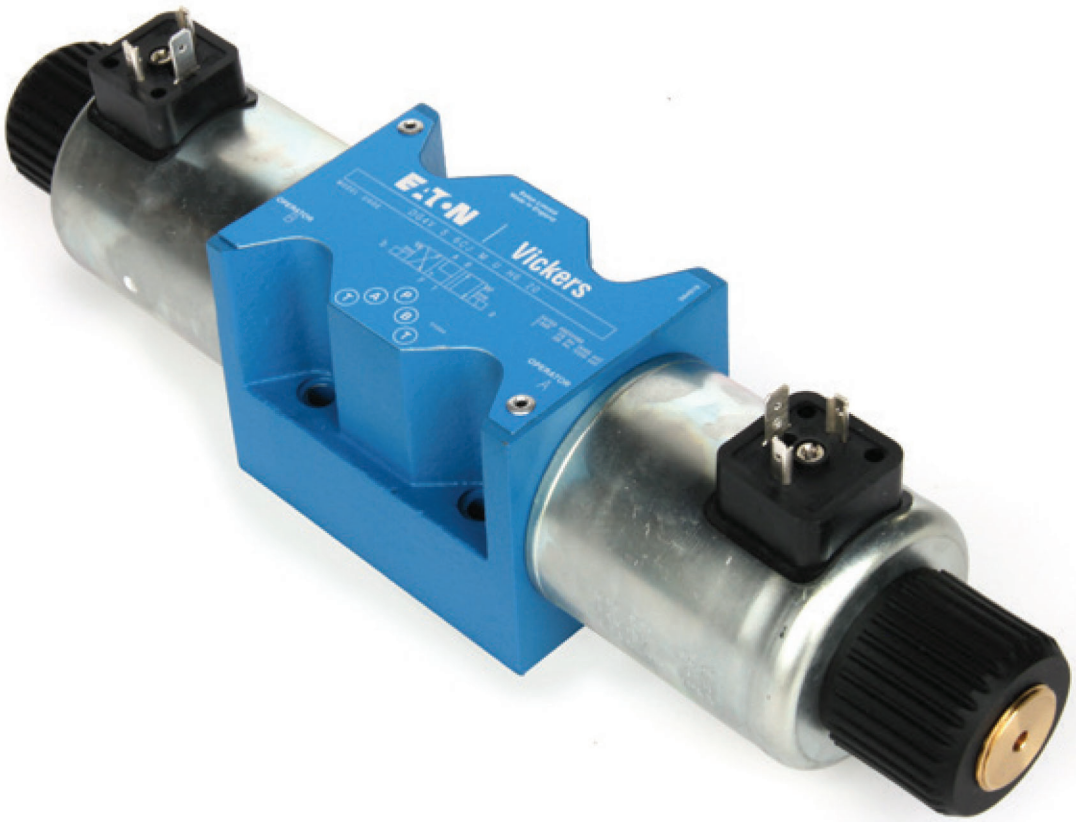
Powering Business Worldwide

DG4V-5 20 Design

ISO4401 Size 05;
ANSI/B93.7M-D05



Powering Business Worldwide

Solenoid Operated Directional Valve

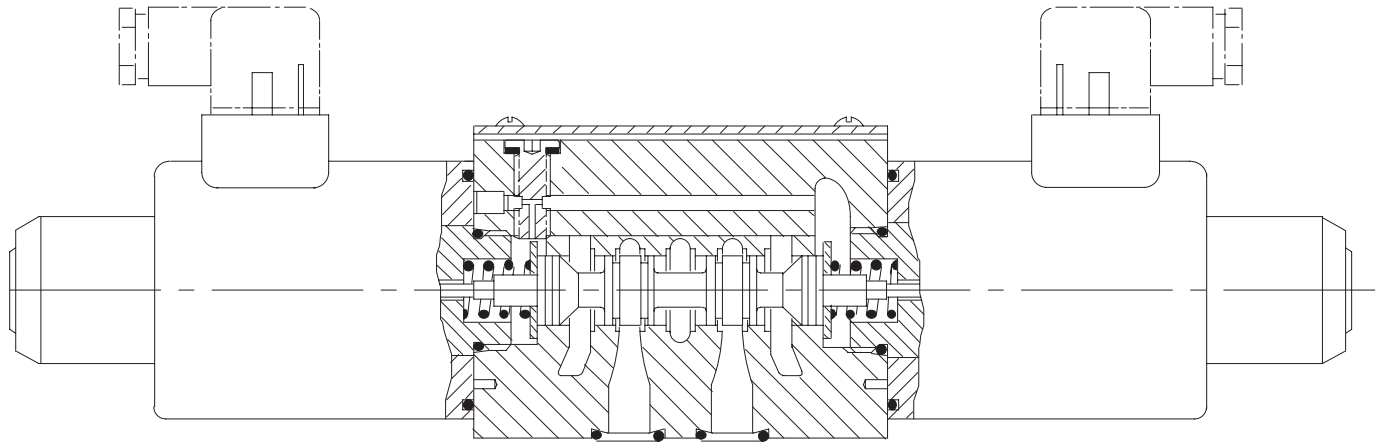
DG4V-5-20 Design

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.

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.



Model Code

(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 single-solenoid 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 4.

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
KUM5LD3 – M12 connector with diod lights
KUP10 – Flying leads metri-pack connector (male)
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
DJ – 98V DC (42W)
EJ – 196V DC (43W)
EO – 205V DC (43W)
KK – 48V AC 50HZ
NN – 24V AC 50HZ

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 Spool speed control

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 A.11, "Spool Speed Control Orifice"

G

Functional Symbols

Spool Options

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

23

DG4V-5-*AL valves

0

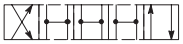
2

22

23

DG4V-5-*C valves

0



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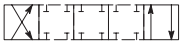

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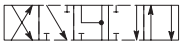
6



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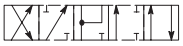

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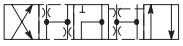

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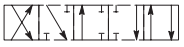

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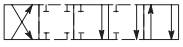

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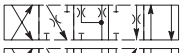

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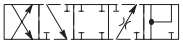

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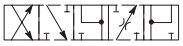

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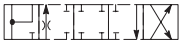

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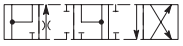

DG4V-5-*B valves

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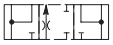
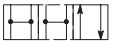
521

561



DG4V-5-*BL valves

0



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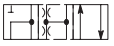

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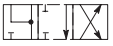
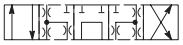
561

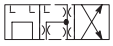


DG4V-5-8CV valves



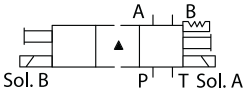
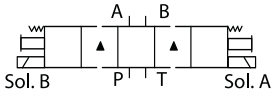
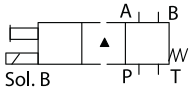
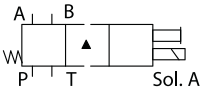
DG4V-5-8BLV valves

DG4V-5-8BV valves



G

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 condition only

Operating Data

Feature	DG4V-5	
Pressure Limits		
P, A and B ports	315 bar (4500 psi)	
T port: T_A	120 bar (1750 psi) for AC Sol.	
T_B	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	
Permissable 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 3.

Orifice Kit

Orifice kits must be ordered separately, part number 02-350116. Kit comprises 1 off each as per code 13 on page 3:

***** 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.

Operating Data

Spool Position Indicator Models

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

DC model type "S7"

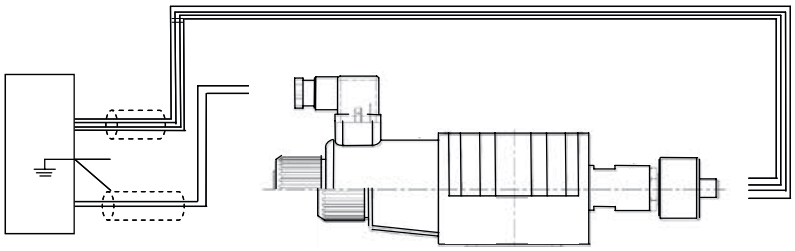
This product has been designed and tested to meet specific standards outlined in the European Electromagnetic Compatibility Directive (EMC) 2004/108/EC. For instructions on installation requirements to achieve effective protection levels see this leaflet and the Installation Wiring Practices for Vickers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

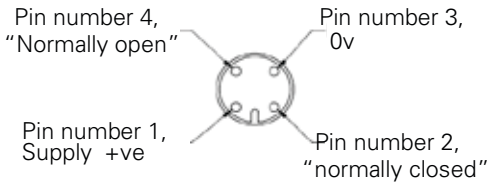
⚠ Electromagnetic Compatibility (EMC).

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
Pin 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

Wiring Connections

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





Customer protective ground connection

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.

Performance Data

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:

1. 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.
2. Valves with type 22 spools having flow from P to A or B, the other being blocked. T is drained at all times.
3. 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.
4. Valves with type 23 spools having single flow from A or B to T, P and the other service port being blocked.

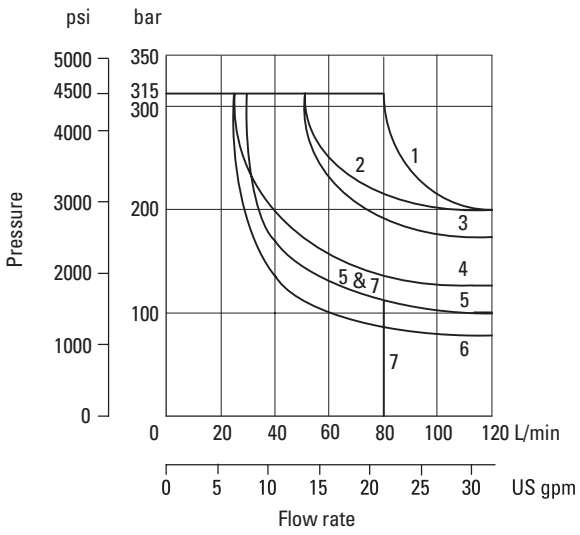
Consult Eaton with application details if any of the following are required:

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

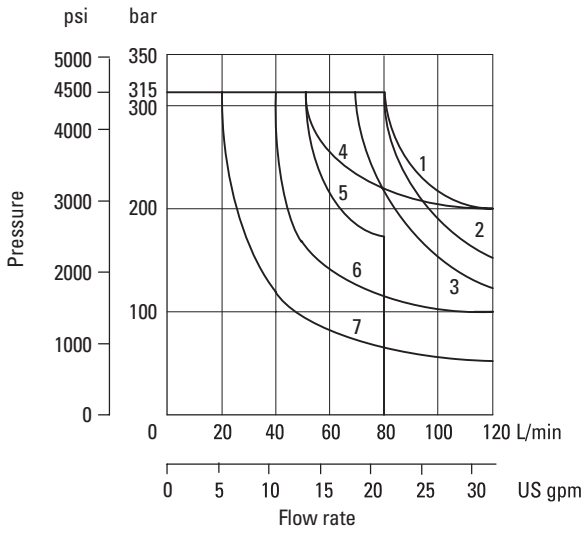
b) Substantially different simultaneous flow rates between P to A or B and B or A to T.

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



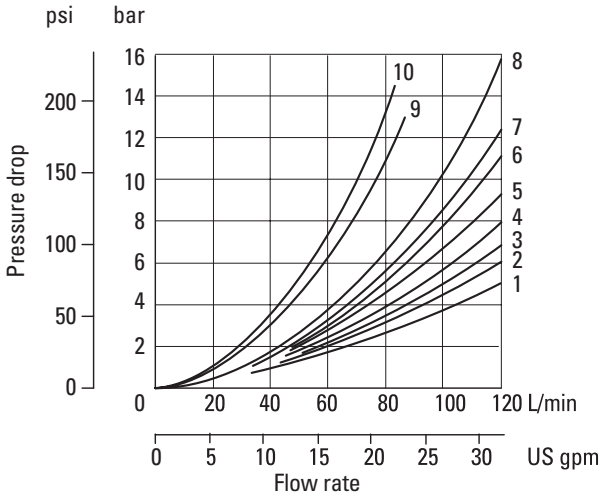
DC Solenoid Valves

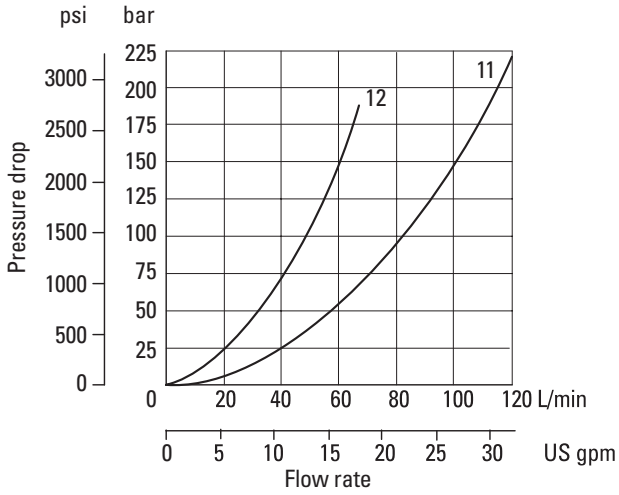


Spool/spring code	AC valve graph curve	DC valve graph curve
0A(L)	3	2
0B(L) & 0C	2	4
1B(L) & 1C	6	7
2A(L)	3	2
2B(L), 2C & 2N	1	1
3B(L), 3C, 6B(L) & 6C	4	6
6N	3	3
7B(L) & 7C	1	1
8B(L) & 8C	7	5
11B(L), 11C & 22A(L)	6	7
23A(L)	5	6
31B(L) & 31C	4	6
33B(L), 33C	3	6
52B(L), 52C, 56BL, 56C, 521B, 521C, 561B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

Performance Data

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





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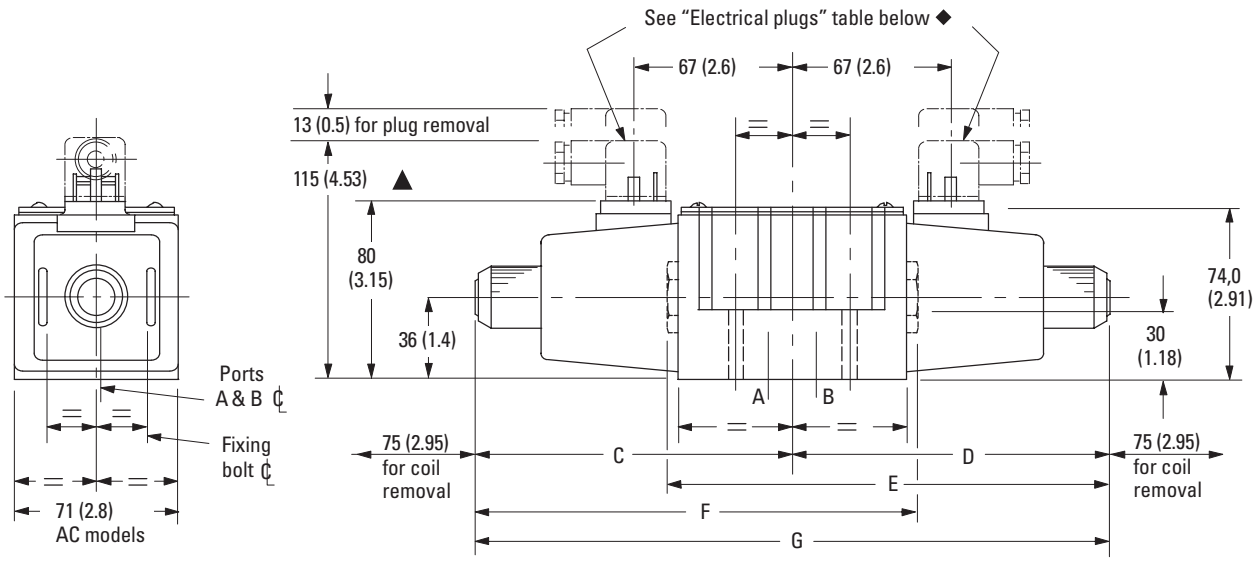
Spool/spring code	Spool positions covered	P to A	P to B	A to T	B to T	P to T	A to B or B to A
0A(L)	Both	2	2	4	5	–	–
0B(L) & 0C	De-energized	–	–	–	–	3t	–
	Energized	1	1	6	7	–	–
1B(L) & 1C	De-energized	–	–	–	–	6u	–
	Energized	1	2	6	4	–	–
2A(L)	Both	3	3	5	6	–	–
2B(L) & 2C	All	2	2	4	5	–	–
2N	Both	3	3	5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

t A and B blocked u A blocked m B blocked ▪ P blocked

Installation Dimensions in mm (inches)

AC Solenoid Models

3rd angle projection



▲ May vary according to plug source.

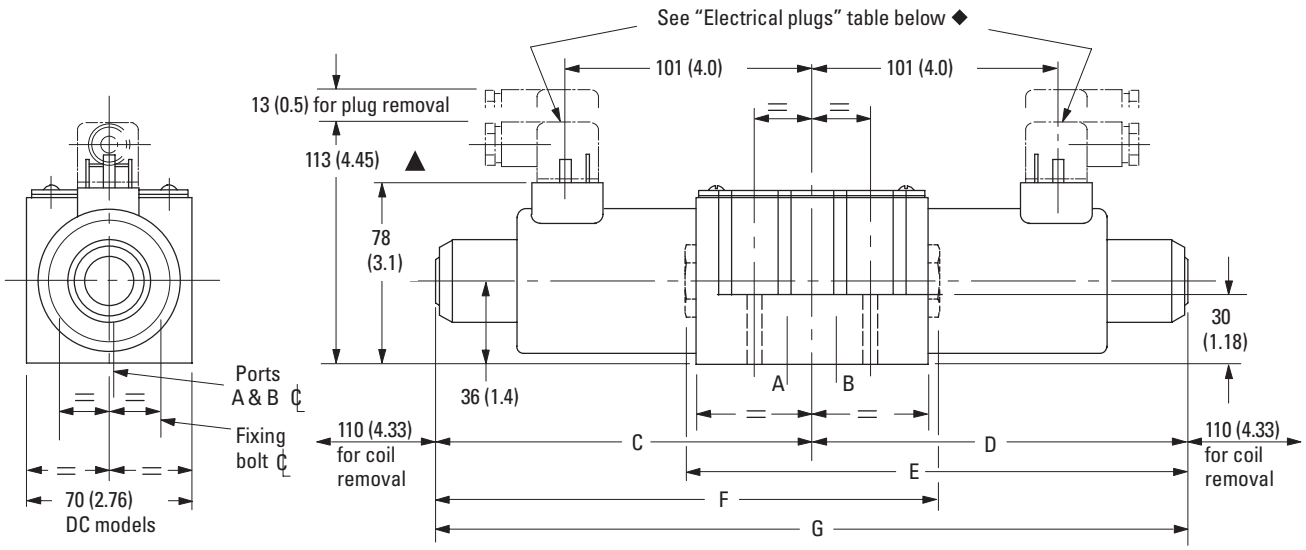
◆ The cable entry can be repositioned at 90° intervals from the position shown. This is done by reassembling the contact holder into the appropriate position inside the plug housing.

Model	Solenoid at:	C	D	E	F	G
DG4V-5-*A(L)/B(L)(-Z)-(V)M	Port A end	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



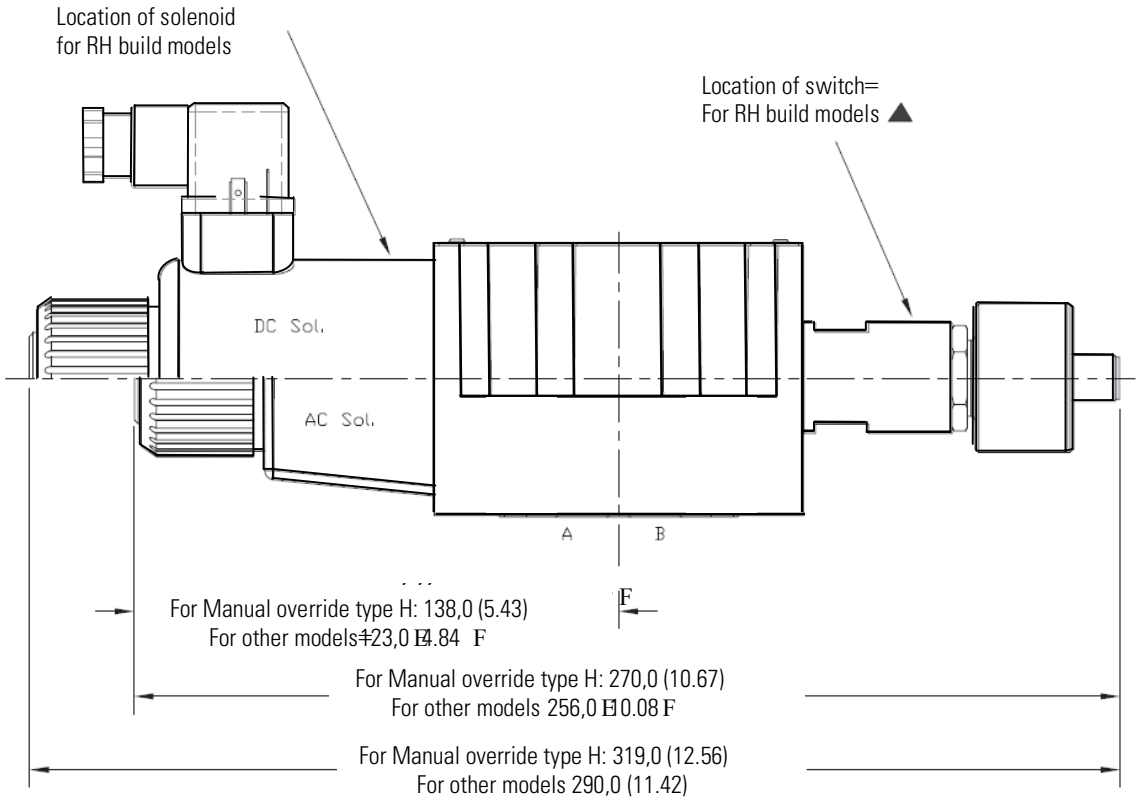
▲ May vary according to plug source.

◆ 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 6

Electrical Plugs and Connectors

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.

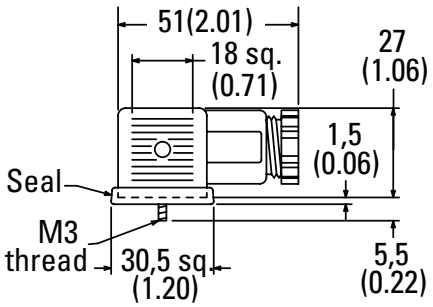
Connectors with and without indicator lights are available (order separately):

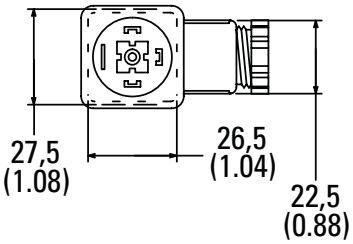
Ø6–10 mm (0.24–0.40)

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.

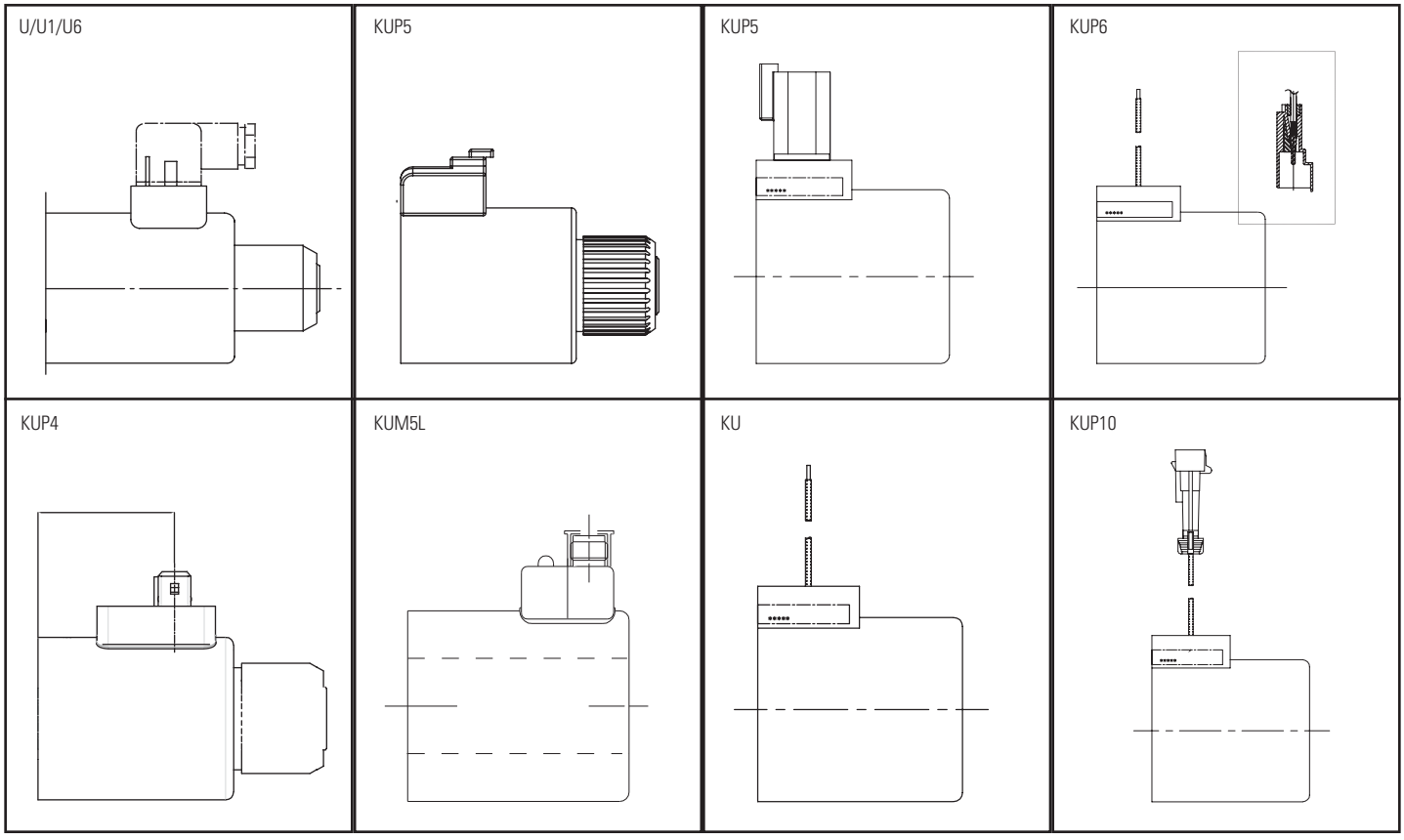




G

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



Eaton
Hydraulics Business USA
14615 Lone Oak Road
Eden Prairie, MN 55344
USA
Tel: 952-937-9800
Fax: 952-294-7722
www.eaton.com/hydraulics

Eaton
Hydraulics Business Europe
Route de la Longeraie 7
1110 Morges
Switzerland
Tel: +41 (0) 21 811 4600
Fax: +41 (0) 21 811 4601

Eaton
Hydraulics Group Asia Pacific
Eaton Building
4th Floor, No. 3 Lane 280 Linhong Rd.
Changning District
Shanghai 200335
China
Tel: (+86 21) 5200 0099
Fax: (+86 21) 5200 0400

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DG5V-7 30 Design & DG3V-7 20

ISO4401 Size 07;
ANSI/B93.7M-D07

Powering Business Worldwide

Pilot Operated Directional Valve

DG3V-7-30 Design

Solenoid Controlled Pilot Operated Directional Valve

DG5V-7-50 Design

General description

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

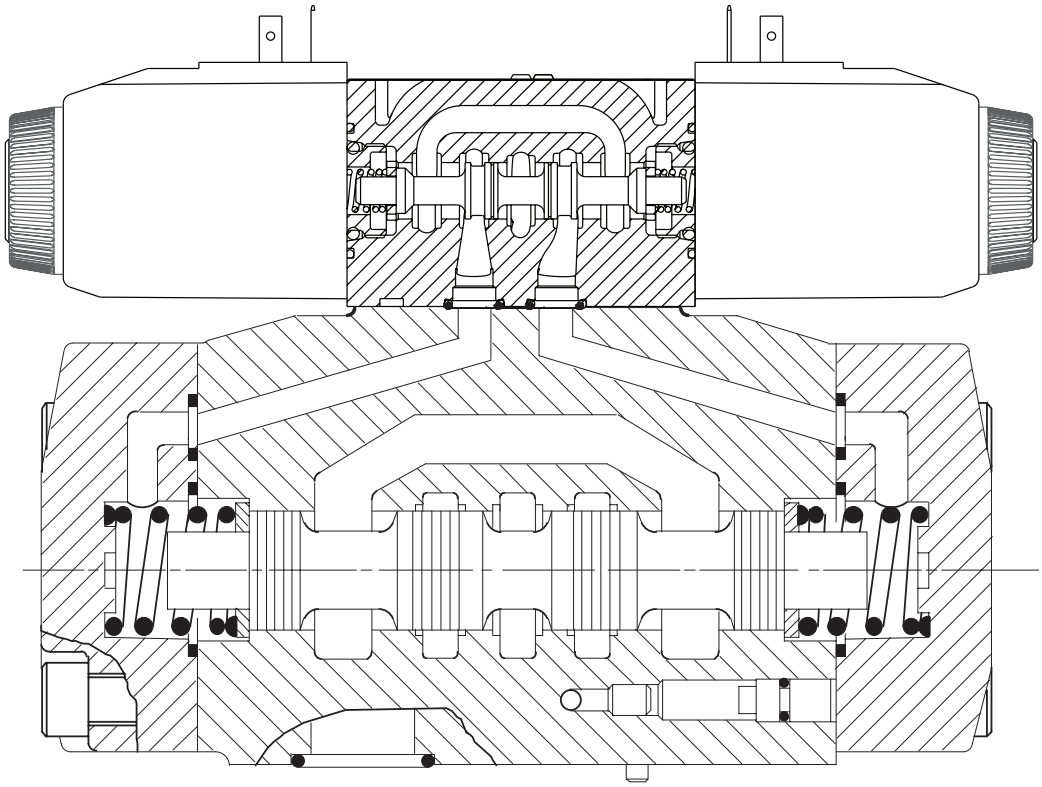
Two series of valves, DG5V solenoid controlled, pilot operated and DG3V pilot operated models are available with a wide selection of spools. These include meter-in and meter-out spools and a regeneration type that can obviate extra valves essential in traditional circuit arrangements.

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

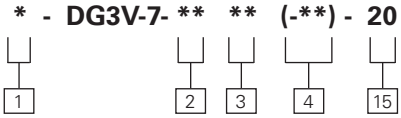
- High pressure and flow capability for maximum cost-effectiveness.
- Low headloss to minimize power wastage.
- Low shock characteristics to maximize machine life.
- Facility to change solenoid coils without disturbing the hydraulic envelope.
- The many optional features, particularly for DG5V valves,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



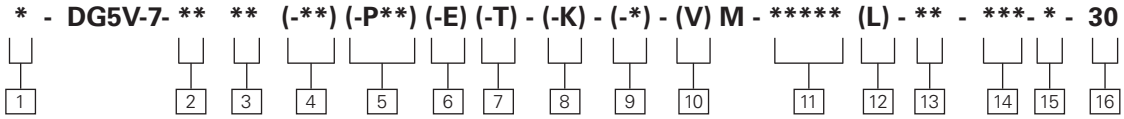
Model Code

DG3V-7 30 Series, Pilot Operated Directional Valves

For pilot operated valves:



For solenoid controlled, pilot operated valves:



1 **Fluid Compatibility**

Blank – Standard BUNA-Nitrile 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, end-tocenter (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 "7" combined ▼

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 6

◆ Not applicable to models shown in the "Spring offset, end-to-center" section on page 6

■ 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

PCD – Center sensing switch on "A" port end and double offset sensing ■ switch on "B" port end

PPA – Offset sensing proximity switch "A" port end

PPB – Offset sensing proximity swtich "B" port end

PPD – Offset sensing proximity switch both ends ■

* 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**

Omit for internal pilot supply

E – Valve configured for external pilot supply to port X

7 **Internal Pilot Drain, DG5V Valve Option**

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 end(s) ▲

W – Twist & lock override in solenoid ends •

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 main-stage 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.

11 **Solenoid Type Connection(s)**

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

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 singlesolenoid valves

FPA5W – Fly. lead, 5 pin connector & 1/2" NPT thread wiring housing

I

Model Code (Cont...)

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.

I

Application Notes

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.

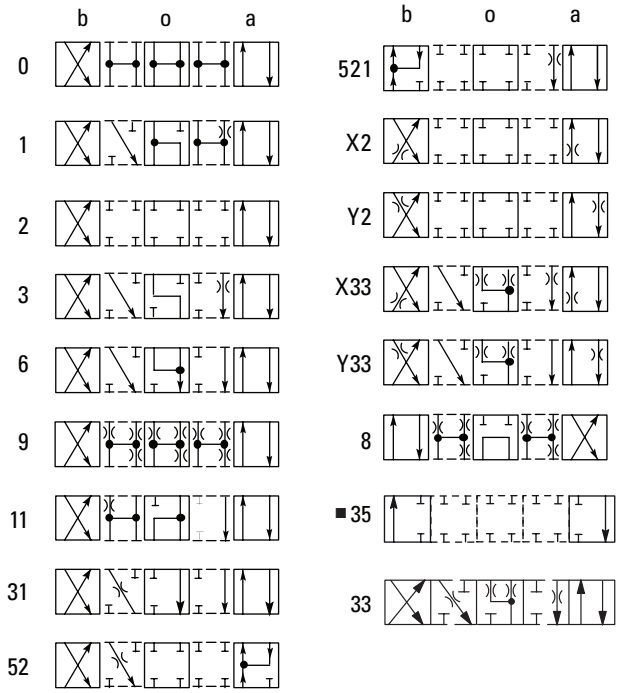
b. Surges of fluid in a common drain line serving two or more valves can be of sufficient magnitude to cause inadvertent shifting of the spools. It is recommended that circuit protection be used, such as separate drain lines.

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 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.

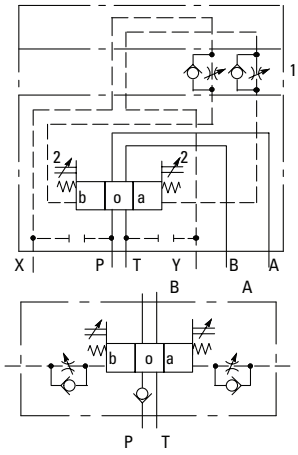
■ Only 35A available

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)

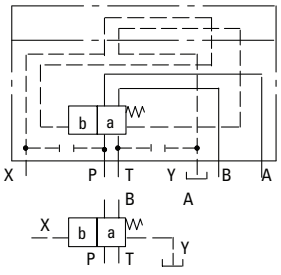
One or more options can be built into any DG3 series valve.



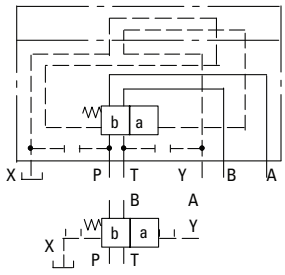
DG3V-7 Pilot Operated Models

Comprehensive and simplified symbols.

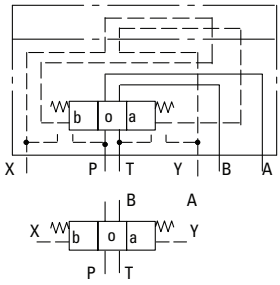
Spring Offset, End-to-End, DG3V-7-*A



Spring Offset, End-to-End, Opposite Hand, DG3V-7-*AL



Spring Centered, DG3V-7-*C

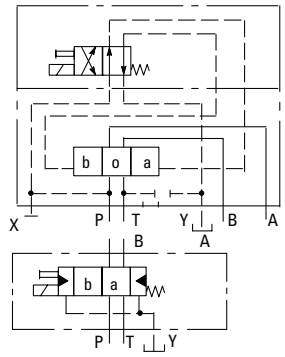


Functional Symbols

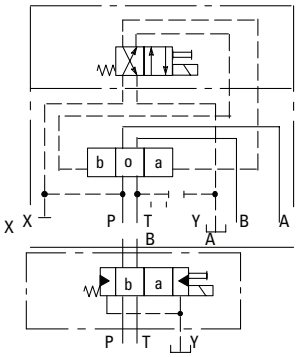
DG5V-7, Solenoid Controlled, Pilot Operated Models

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

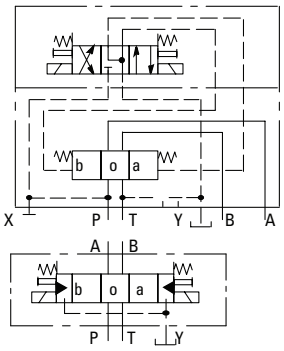
Spring Offset, End-to-End, DG5V-7-*A



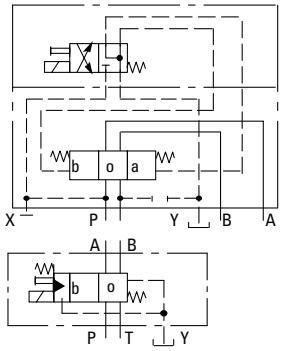
Spring Offset, End-to-End, Opposite Hand, DG5V-7-*AL



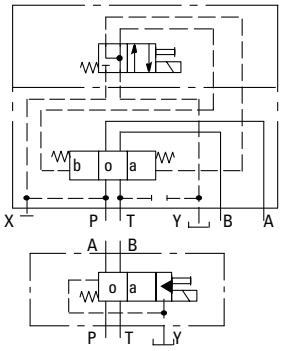
Spring Centered, DG5V-7-*C



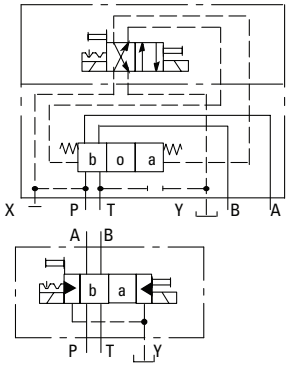
Spring Offset, End-to-Center DG5V-7-*B



Spring Offset, End-to-Center, Opposite Hand DG5V-7-*BL



Detented, DG5V-7-*N

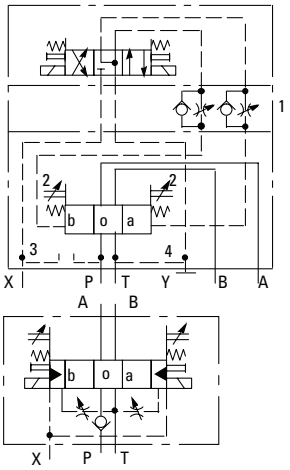


DG5V-7 Options

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 9

▲ 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 12	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:		
Center-to-end	7.28 cm3 (0.44 in3)	
End-to-end	14.56 cm3 (0.88 in3)	
Voltage ratings, DG5V valves	See 14 in "Model Code" on page 4	
Voltage limits, DG5V valves:		
Maximum voltage	See "Temperature limits", on page 8	
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	

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

Operating Data

Pressure drop characteristics	See page 9, 10

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):	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 110% of rated voltage	65°C (150°F)
DC coils at 110% of rated voltage	70°C (158°F)

INSTALLATION DIMENSIONS:

Valves	See page 11, 12, 13
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) ◆

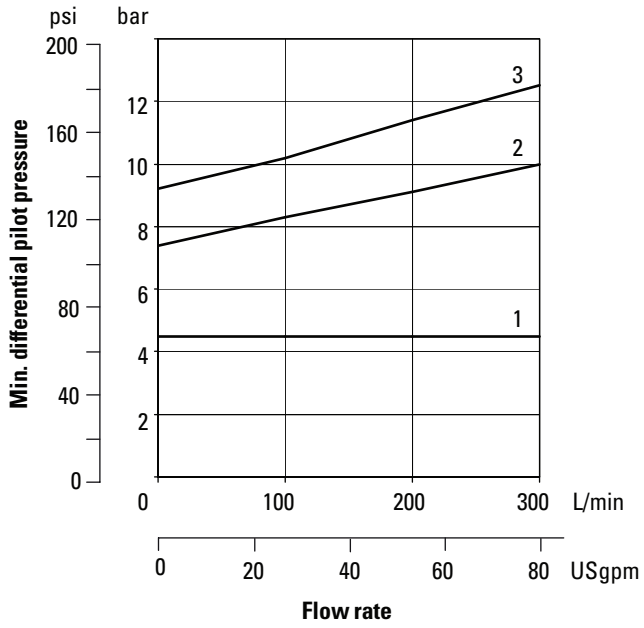
◆ Add 1,1 kg (2.4 lb) when pilot chock adjustment is fitted.

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

Performance Data

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.

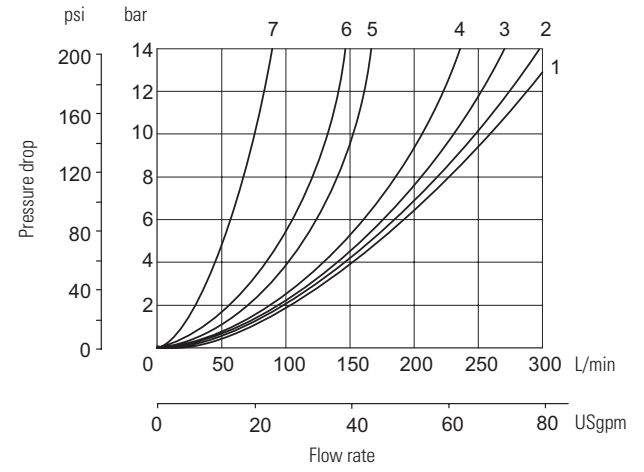


Spool Types	0	1	2	3	4	6	8	9	11	31	33	52	X*	Y*
Curve ref.	1	1	3	3	1	2	1	1	1	3	3	3	3	3

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.



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	-

■ Ports A and B plugged. ▼ Port A plugged. ▲ Selected P to A.
• Port B plugged. ◆ Selected P to B.

Pressure Drop Characteristics

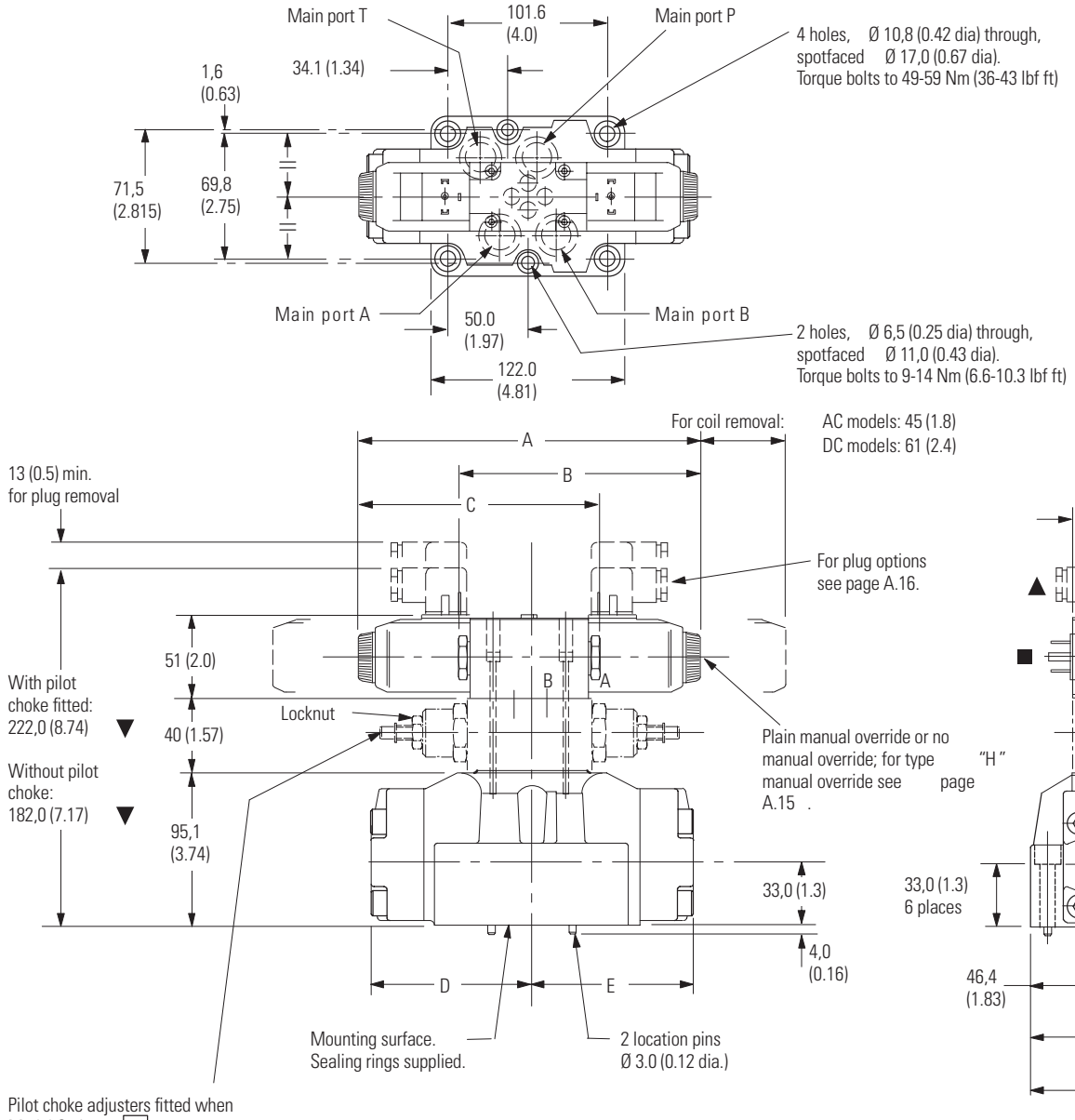
The following typical pressure drops (△p) at flow rates (Q) are based on standard test conditions, using oil of 0,865 specific gravity. Except where otherwise stated, for any other flow rate (Q1) the pressure drop (△p1) will be approximately $\triangle p1 = \triangle p\ (Q1/Q)^2$.

Installation Dimensions

Millimeters (inches)

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 16
For solenoid identification see page 16
For stroke adjusters see page 15



Pilot choke adjusters fitted when Model Code 4 = 2, 3, 27 or 28. To adjust, turn locknut counter-clockwise, then turn screw clockwise to slow down rate of spool travel, or counter-clockwise to increase the rate. Retighten locknut to 25-30 Nm (18-22 lbf ft).

▼ May vary according to plug source.

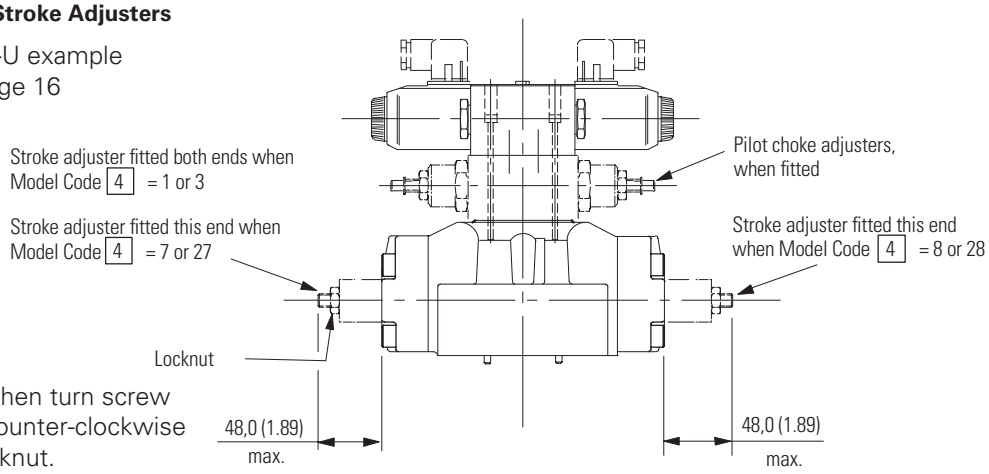
■ Alternative plug positions by loosening knurled nut counter-clockwise, turning coil and re-tightening nut.

▲ 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.

Installation Dimensions

Solenoid Controlled Models with Stroke Adjusters

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



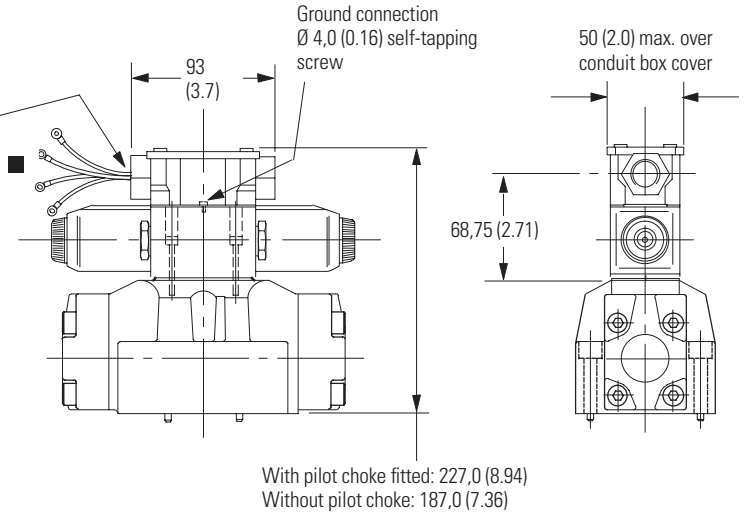
To Adjust:

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 16

Available also with other options shown above and on previous page.



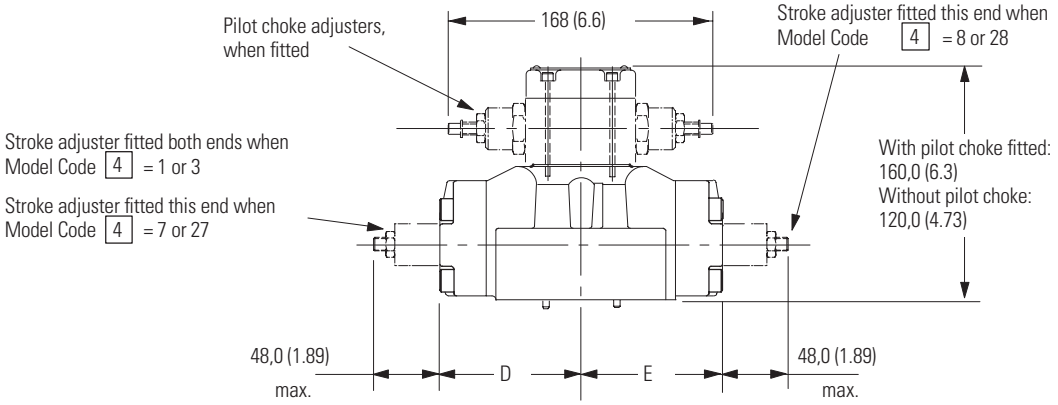
M20-6H x 1,5 thread for F(T)J options, or 1/2" NPT for F(T)W options, at both ends. Closure plug fitted at one end.
For other options see 10 & 11 in "Model Code", eight pages back, and under "NFPA Connector---" and "Terminal Strip and Lights" sections, two pages on.

■ Ref. "Model Code": 9

Codes "FW": 2 lead wires for each solenoid, approx. 150 (6.0) long.
M3 (#6) terminals provided for customer connection.
Codes "FTW": Valve supplied with lead wires connected into terminal strip suitable for M3 (#6) terminals provided for customer connection.

Pilot Operated Models with Optional Pilot Choke and/or Stroke Adjusters

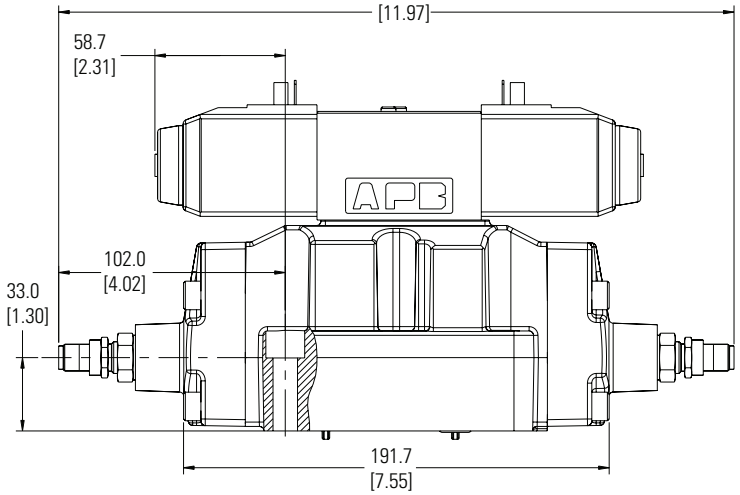
DG3V-7-**(-2)(-**) examples



Installation Dimensions

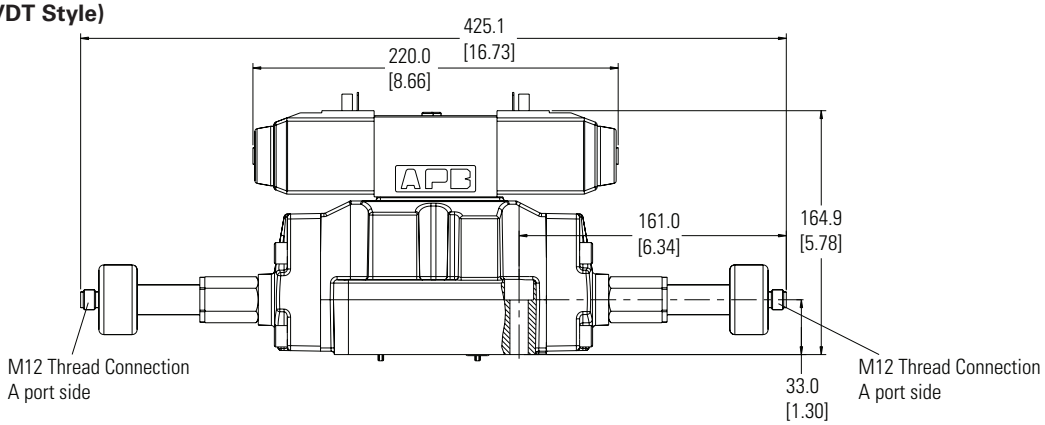
DG5V-7 with Main Stage Spool Monitoring Switch "PPA", "PPB" or "PPD" Models (Proximity Switch)

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 I.3)	Spool types	Solenoid identity at: Main port "A" end	Main port "B" 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	- B	A -
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)	–	–	220 (8.7)	–	–	97,0 (3.82)	97,0 (3.82)
DG5V-7-*D	200 (7.8)			220 (8.7)			131,0 (5.16)	97,0 (3.82)

■ Not types "8" or "8" spools.

I

Electrical Information

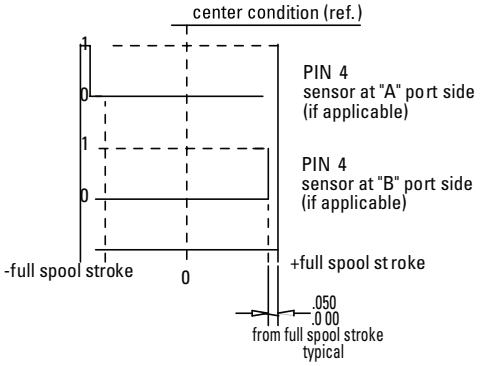
Main Stage Spool Monitoring Switch (Proximity Switch)

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%

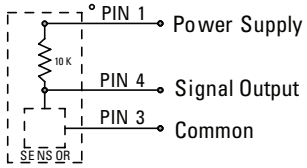
Electrical information shown in this window is for offset sensing,
Proximity Switch "PPA" , "PPB" or "PPD" Models

Functional Diagram - Spring Offset

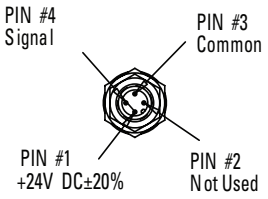


0= voltage at pin 4 0.5V min.
1= voltage at pin 4 (Vs –2.2V) min.

Output Circuit Wiring Instructions



Connector Detail



Electrical Information

Main Stage Spool Monitoring Switch (LVDT Style)

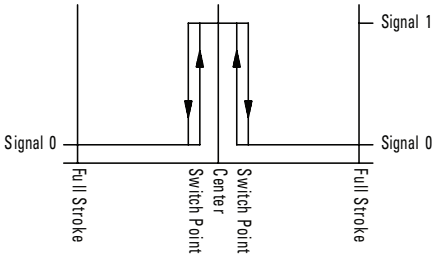
SPECIFICATIONS

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!

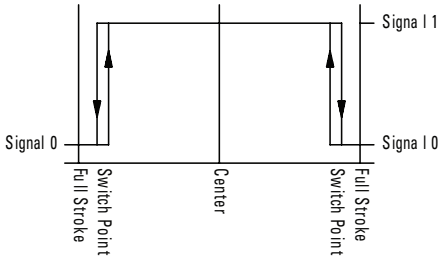
Electrical information shown in this window is for offset sensing, Proximity Switch "PPA" , "PPB" or "PPD" Models

TYPIC AL "PC A/PCB" OUTPUT
(FOR SENSING CENTER POSITION)



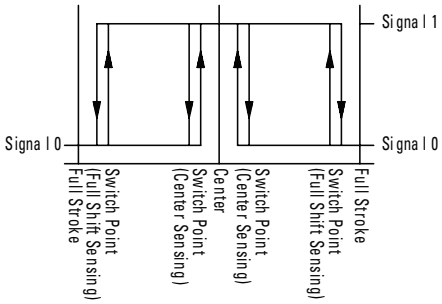
Signal 0 = V oltage at pin 2/4 < 1 .8 V
Signal 1 = V oltage at pin 2/4 > (Vs – 2.5V)

TYPIC AL "PD A/P DB" OUTPUT
(FOR FULL SHIFT SENSING)



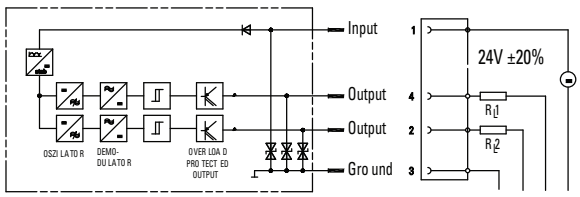
Signal 0 = V oltage at pin 2/4 < 1 .8V
Signal 1 = V oltage at pin 2/4 > (Vs – 2.5V)

TYPICAL "PCD" OUTPUT
(FOR CENT ER SE NSING 'A' PORT END,
FULL SHIFT SENSING 'B' PORT END)



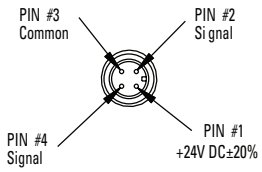
Signal 0 = Voltage at pin 2/4 < 1 .8V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

Electrical Schematic and Mating Connector Detail



R_L1, R_L2 = e.g. Coil Resistance of the switch relay >/= 60 OHMS

Connector Detail



Eaton
Hydraulics Group USA
14615 Lone Oak Road
Eden Prairie, MN 55344
USA
Tel: 952-937-9800
Fax: 952-294-7722
www.eaton.com/hydraulics

Eaton
Hydraulics Group Europe
Route de la Longeraie 7
1110 Morges
Switzerland
Tel: +41 (0) 21 811 4600
Fax: +41 (0) 21 811 4601

Eaton
Hydraulics Group Asia Pacific
Eaton Building
4th Floor, No.7 Lane280 Linhong Rd.
Changning District
Shanghai 200335
China
Tel: (+86 21) 5200 0099
Fax: (+86 21) 2230 7240

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Powering Business Worldwide

DG3V-10 11 Design and DG5V-10 11 Design

ISO4401 Size 10;
ANSI/B93.7M-D10

Powering Business Worldwide

Solenoid Controlled Pilot Operated Directional Valve

DG5V-10 11 Design

General Description

The Eaton size 10 Directional Control Valve serves as a control valve package. This package is generally used to control large flows, to 1100 l/min (290 USgpm).

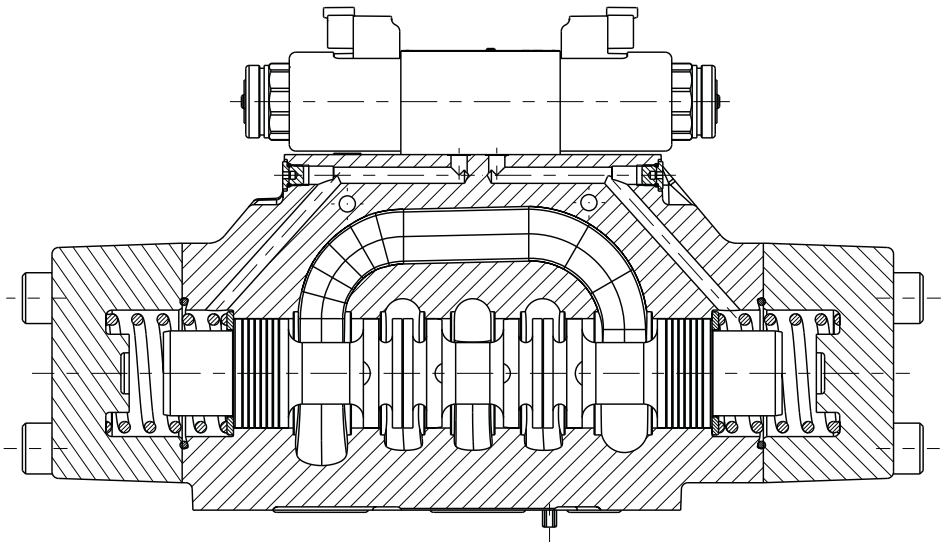
Each valve contains a mainstage spool which is positioned by one of three arrangements:

- Spring offset - For single stage operation, one spring returns the spool to an offset position. For two–stage operation, the spring and washer are removed from the main stage and offset action is obtained from the pilot valve.
- Spring centered - The spring and washer are located on both ends of the main stage spool to control centering.
- Detented - Spool position is determined by a detent in the pilot valve. Should pilot pressure be lost, the main stage spool will spring to center.

Features and Benefits

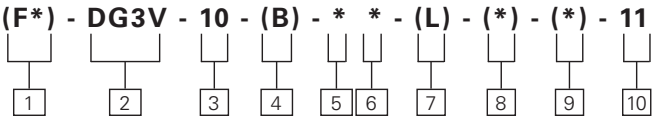
- The size 10 Directional Valve is designed and manufactured by Eaton, which has over 70 years of experience as the global leader in fluid power and motion control.
- Endurance tested to 10 million cycles and fatigue tested to NFPA specifications without failure to ensure the highest reliability in applications requiring high flows and pressure.
- This control valve package offers a wide variety of spools and spring, pilot choke adjustments, integral check valves and port orifices to meet most system requirements. High force solenoids and centering springs assure consistent shifting through a wide range of pressure and silting extremes.
- Electrical options including coil types, connections, and wiring housings allow full compatibility and reliable performance in any system application.
- Plain, waterproof, and lockable manual override options are available to facilitate system troubleshooting or servicing.The DG5V models are functionally interchangeable with previous size 10 design valves. Should size constraints prevent physical interchangeability (along length axis), an EN503 option is available.

K



Model Codes

DG3V-10



1 Special Seals

(Omit if not required)

F3 – Seals for fire resistant fluids.

F6 – Seals for water glycol.

2 Directional Control Valve

DG3V – Subplate mounting; pilot operated, remote operator. Pressure rating 350 bar (5000 psi) for P, A & B ports. (See pressure tabulation below.)

3 Valve Size

10 – Valve size CETOP 10, ISO 4401-10, NFPA D10

4 Gauge Ports

Blank – 4375-20 UNF-2B Thread

B – 1/4 BSP Thread

5 Spool Types

Please refer functional symbols of page 6 for spool types.

6 Spool/Spring Arrangement

Blank – No spring

A – Spring offset to cylinder 'A'

C – Spring centered

(See spool/spring combinations below)

7 Left Hand Build

L – 'A' Models only, omit if not required.

8 Spool Control Modifications

(Omit if not required)

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 & Blank (no spring) models)

7 – Stroke adjusters on cylinder 'A' end only (available on AL, 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)

28 – If both are required (available on AL left hand build, C & Blank (no spring) models)

9 Check Valve in Pressure Port

Omit if not required.

K – 0.3 bar (5 psi) check

Q – 2.4 bar (35 psi) check

R – 3.4 bar (50 psi) check

S – 5.2 bar (75 psi) check

10 Design Number

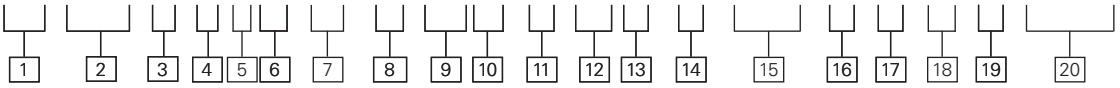
Subject to change. Installation dimensions remain as shown for design numbers 10 through 19.

K

Model Codes

DG5V-10

(F*) - DG5V -10 - * - * ** - (**) - (*) - * (E) - (T) - (*) - (V) M - ***** - (L) - (*) - ** - 11 - (EN***)**



1 Special Seals

(Omit if not required)

F3 – Seals for fire resistant fluids.

F6 – Seals for water glycol.

2 Directional Control Valve

DG5V – Subplate mounting; solenoid controlled; pilot operated. Pressure rating 350 bar (5000 psi) for P, A, & B ports.

3 Valve Size

10 – Valve size CETOP 10, ISO 4401-10, NFPA D10

4 Pilot Valve Type

H – Cetop 3 mounting pattern, High performance

M - Cetop 3 mounting pattern, Environment specified solenoid

5 Spool Types

Please Refer functional Symbols on page 6 for Spool types

6 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 centered, single solenoid (P to B when operated) ■

BL – As "B" but left-hand build (P to A when operated) ■

C – Spring centered

N – Two-position detented

7 Manual Override Options

omit if not required.

Blank – Plain override in solenoid end(s) only ▲

H – Water-resistant manual override on solenoid end(s) ▲

W – Twist & lock override in solenoid ends

Z – No override at either end

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

8 Spool Control

Blank – None

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 "7" combined

28 – "2" and "8" combined

Omit if not required

9 Spool Monitoring Switch

Blank – None

PCA – Center sensing switch on "A" port end (not available on 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)

PPA – Offset sensing proximity switch "A" port end (not available on 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 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).

10 External Pilot Pressure

E – External pilot pressure. Omit for internal pilot pressure models.

11 Internal Pilot Drain

T – Internal pilot drain to 'T' port. Omit for external pilot drain models.

12 Check Valve in Pressure Port

Blank – None

K – 0.3 bar (5 psi) check

Q – 2.5 bar (35 psi) check

R – 3.5 bar (50 psi) check

S – 5.0 bar (75 psi) check

13 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.

14 Heading Electrical Flag Symbol

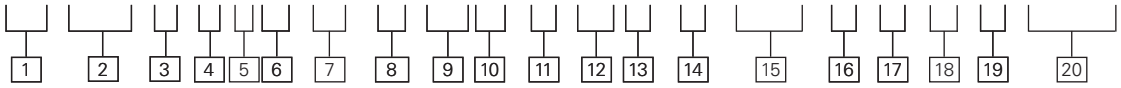
M – Features and options for pilot valve.

K

Model Codes (Contd.)

DG5V-10

(F*) - DG5V -10 - * - * ** - (**) - (*) - * (E) - (T) - (*) - (V) M - ***** - (L) - (*) - ** - 11 - (EN***)**



15 Coil Type

U – ISO 4400 (DIN 43650)
U1 – ISO4400 fitted with PG11 plug
U6 – ISO4400 with fitted DIN plug with lights
FPA3W – Flying lead, 3 pin connector & 1/2" NPT thread wiring housing
FPA5W – Flying lead, 5 pin connector & 1/2" NPT thread wiring housing
FTW – Flying lead, wired terminal block & 1/2" NPT thread wiring housing
FW – Flying lead with 1/2" NPT thread wiring housing
KU – Top exit flying lead
KUP4 – Junior timer (AMP) connector
KUP5 – Moulded deutsch connector

16 Solenoid Indicator Lights

Omit if not required

L – Solenoid indicator lights▲

▲Flying lead coil type only)

17 Surge Suppressor/ Damper

DC voltages only, omit if not required.

D – Bi-directional Zener diode ("M" pilot only)
D1 – Diode Positive Bias
D2 – Diode Negative Bias
D7 – Transzorb type

18 Coil Voltage Identification Letter

B – 110V AC 50Hz/120V AC 60 Hz
BL – 110V 50Hz/120V 60 Hz
D – 220V AC 50Hz/240V AC 60 Hz
ER – 120V AC 60 Hz ▲
ES – 240V AC 60 Hz ▲
G – 12V DC
GL – 12V DC
H – 24V DC
HL – 24V DC 18 watt
HM – 24V DC 8 watt
DS – 28V DC

19 Design Number

Subject to change.
Installation dimensions same for -10 thru -19 design.

20 Special Modification

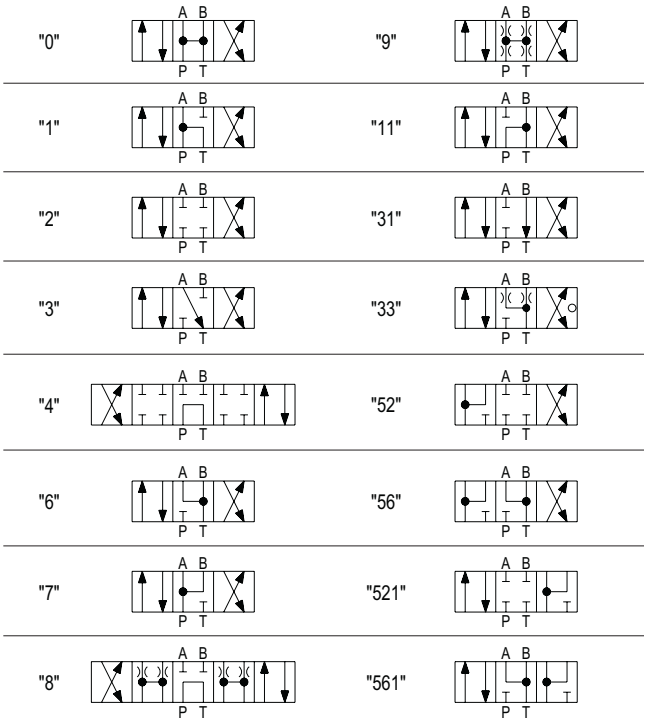
Blank – None

K

Functional Symbols

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-10-*A(L) and DG5V-10-*N valves.

Your Eaton representative can provide further details.

Spool/Spring Arrangement

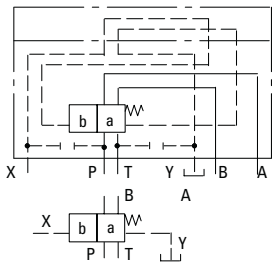
The table below provides spool/spring arrangements that are available on all DG3V-10 and DG5V-10 valves.

Spool/Spring Arrangement	Spool Type
A-Spring Offset	0,2,6,9,33
B-Spring Centered with sol. ''A'' removed	0,1,2,3,4,6,7,8,9,11,31,33
C-Spring Centered **N**-No Spring Detented	0,1,2,3,4,6,7,8,9,11,31,33, 52,56,521,561

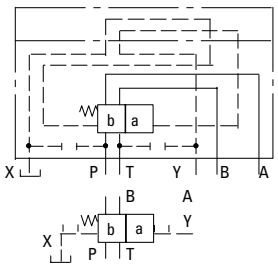
DG3V-10 Pilot Operated Models

Comprehensive and simplified symbols.

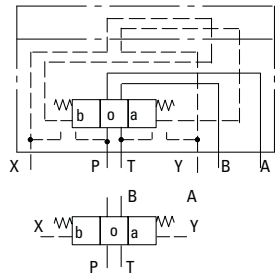
Spring Offset, End-to-End, DG3V-10-*A



Spring Offset, End-to-End, Opposite Hand, DG3V-10-*AL



Spring Centered, DG3V-10-*C

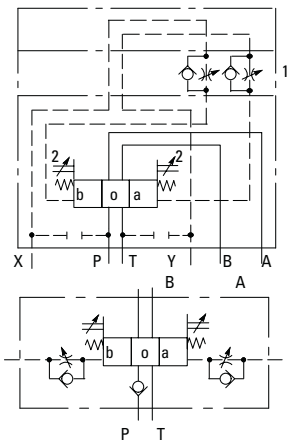


DG3V-10 Options

The following are shown in a DG3V-10-*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.



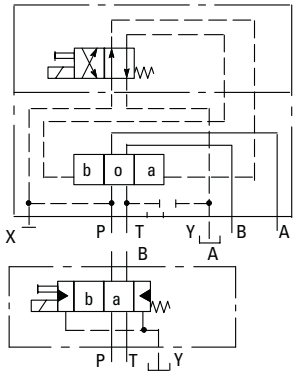
Functional Symbols

DG5V-10

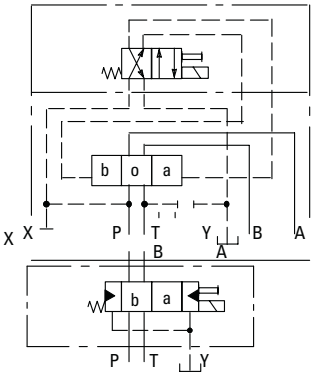
DG5V-10, Solenoid Controlled, Pilot Operated Models

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

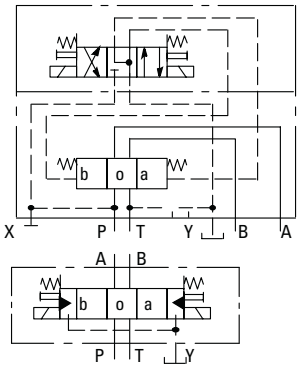
Spring Offset, End-to-End, DG5V-10-*A



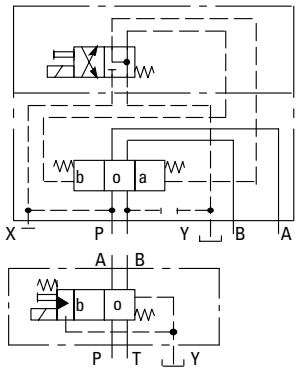
Spring Offset, End-to-End, Opposite Hand, DG5V-10-*AL



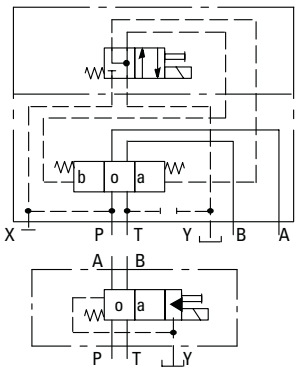
Spring Centered, DG5V-10-*C



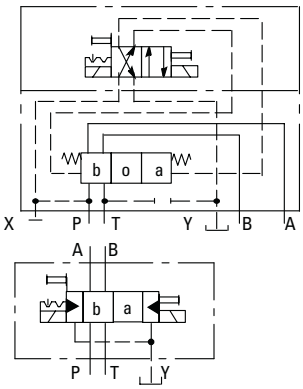
Spring centered - single solenoid DG5V-10-*B



Spring centered - single solenoid Opposite Hand DG5V-10-*BL



Detented, DG5V-10-*N

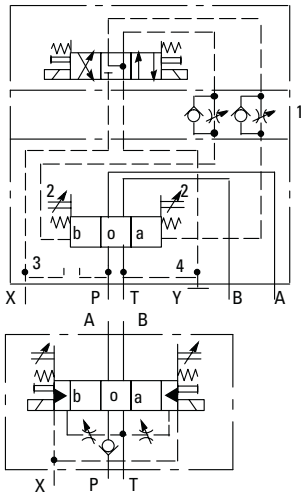


DG5V-10 Options

The following are shown in a DG5V-10-*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.



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Operating Data

Maximum pressures:

DG3V-10 valves; ports:	
P, A, B*	350 bar (5000 psi)
X, Y & T	210 bar (3000 psi)
DG5V-10 valves, (externally drained)	
P, A, B and X *****	350 bar (5000 psi) ▲
T & Y §	210 bar (3000 psi)
DG5V-10 valves, (internally drained)	
P, A, B and X	350 bar (5000 psi) ▲
T & Y §	210 bar (3000 psi)
Maximum flow without mal-function (DG3V-10 and DG5V-10)	1100 L/min (290 Usgpm)
Pilot pressures	See "Pilot Pressures" on page 20

Electrical information:

Voltage ratings, DG5V valves	See 22 in "Model Code" on page 5	
Voltage limits, DG5V valves:		
Maximum voltage	See "Temperature limits", on page 9	
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^{0}C (68^{0}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	

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 210 bar (3000 psi).

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* 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). To achieve the maximum tank line rating of 210 bar (3000 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 11, 12, 13 and 14

Response times, DG5V valves:

Typical values for a DG5V-10-2C-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
AC	10 (145)	50	50
	100 (1450)	45	50
	210 (3000)	35	50
DC	10 (145)	80	75 ▲
	100 (1450)	65	75 ▲
	210 (3000)	55	75 ▲

◆ 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 15 to 20
Mass (weight), basic models:	**kg (lb) approx.**
DG3V-10-*A(L)	10.0 (22.0)
DG3V-10-*/*B(L)/*C	7.3 (16.1)
DG5V-10-H/M-*C-M-*-11 SERIES	42 (95)
ADDED FOR STROKE ADJUSTMENT(S)	0.7 (1.5)

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

Power Limits/Performance Characteristics

Power Limits @ 10 bar (150 psi) Pilot Pressure

3 Position Valve & Spring Centered

	Pressure - bar (psi)				
Spool Types	70 (1000)	140 (2000)	210 (3000)	280 (4000)	350 (5000)
	L/min (USgpm)				
2, 3, 6, 7, 33 & 52	1100 (290)	1078 (285)	1022 (270)	832 (220)	757 (200)
9	1100 (290)	1040 (275)	719 (190)	662 (175)	473 (125)
0, 4 & 8	946 (250)	889 (235)	851 (225)	757 (200)	662 (175)
1 & 11	946 (250)	681 (180)	454 (120)	321 (85)	321 (85)
2 Position (Spring Offset Mainstage)					
0, 2, 6, 9 & 33	1100 (290)	1078 (285)	1022 (270)	832 (220)	757 (200)
1, 11	946 (250)	681 (180)	454 (120)	321 (85)	321 (85)

Performance Characteristics

Shifting Action

Spring centered and spring offset models must be piloted continuously to maintain the shifted position. Detent no-spring models may be energized momentarily (approximately 0.1 second).

Spring centered models return valve spool to center position when solenoids are de-energized.

Spring offset models return spool to offset position by pilot pressure when solenoids are de-energized.

CAUTION: Spring offset models contain no offset springs in the main stage and are hydraulically offset via spring offset pilots. When pilot pressure falls below the minimum shift pressure, the main stage spool is free to float.

When detented models are de-energized, the pilot and main spools remain in the last position attained, provided there is no shock, vibration, unusual pressure transients and the spool axis is horizontal.

If pilot pressure fails or falls below the minimum, the main spool will spring center (at spring centered flow rates) and cannot drift to reversal of flow (pilot stage remains in detented position).

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 pressure. (The "9" main spool will not ensure sufficient pilot pressure in the center position.)

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 type 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 stick and not spring return due to fluid residue formation and therefore, should be cycled periodically to prevent this from happening.

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

Performance Data

DG3V-10 Model

Pressure Drop

The following table lists the appropriate pressure drop curve between ports for each spool type. Use the following example to determine pressure drop for a selected spool.

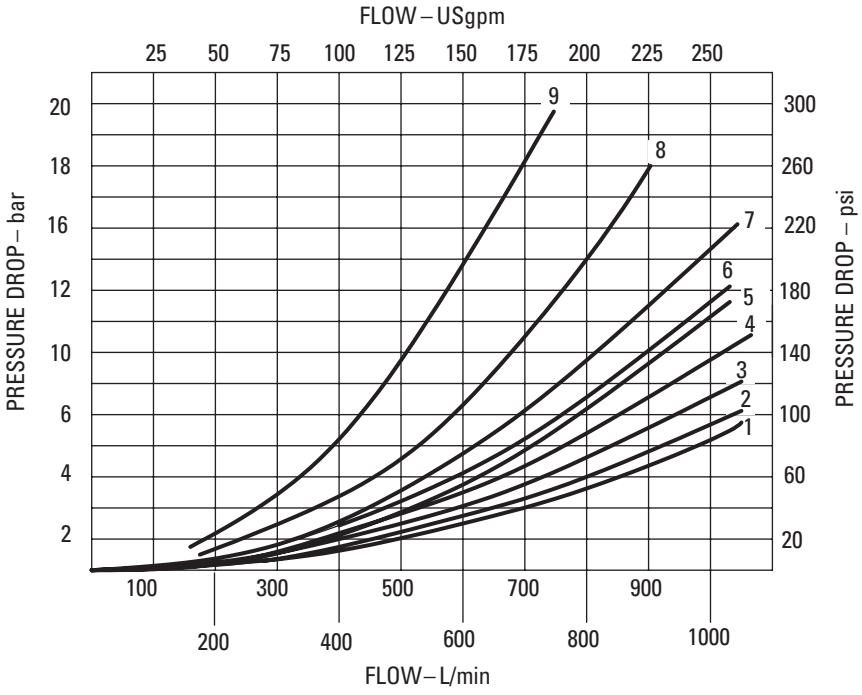
Example: Find the pressure drop from P→B for type 7 spool. Using the table find numeral 7 in the spool type column. To the right of numeral 7 find the reference curve 5 (from pressure drop curve chart at bottom of page) under P→B column.

The pressure drop from P→B for type 7 spool would be obtained on curve 5.

Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T On Center
0	5	5	5	6	4
1	2	2	5	6	7
2	1	2	1	1	–
3	2	2	5	1	–
4	7	9	7	9	8
6	1	5	1	5	–
7	5	3	5	3	–
8	3	3	3	3	6
9	1	2	1	1	–
33	1	2	1	1	–
52	3	■	3	3	–

■ Contact your Eaton representative.

Pressure Drop Curves



1. Figures in the pressure drop chart give approximate pressure drop (△P) 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 ($\triangle P_1$) will be approximately: $\triangle P_1 = \triangle P(Q_1/Q)^2$.
3. For any other viscosity(s), the pressure drop (△P), will change as follows:

Viscosity

cSt (SUS)	14 (17.5)	32 (97.8)	43 (200)	54 (251)	65 (302)	76 (352)	86 (399)
% of ΔP (Approx.)	81	88	104	111	116	120	124

4. For any other specific gravity (G1)*, the pressure drop ($\triangle P_1$) will be approximately: $\triangle P_1 = \triangle P(G_1/G)$.

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Performance Data

DG5V-10 Model

Pressure Drop

The following table lists the appropriate pressure drop curve between ports for each spool type. Use the following example to determine pressure drop for a selected spool.

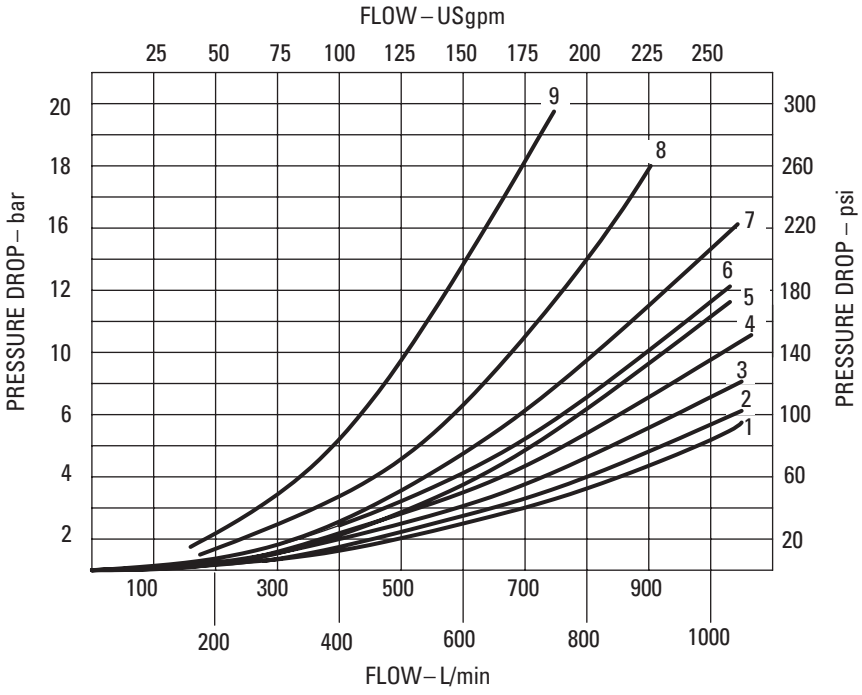
Example: Find the pressure drop from P→B for type 7 spool. Using the table find numeral 7 in the spool type column. To the right of numeral 7 find the reference curve 5 (from pressure drop curve chart at bottom of page) under P→B column.

The pressure drop from P→B for type 7 spool would be obtained on curve 5.

Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T On Center
0	5	5	5	6	4
1	2	2	5	6	7
2	1	2	1	1	–
3	2	2	5	1	–
4	7	9	7	9	8
6	1	5	1	5	–
7	5	3	5	3	–
8	3	3	3	3	6
9	1	2	1	1	–
33	1	2	1	1	–
52	3	■	3	3	–

■ Contact your Eaton representative.

Pressure Drop Curves



1. Figures in the pressure drop chart give approximate pressure drop (△P) 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 ($\triangle P_1$) will be approximately: $\triangle P_1 = \triangle P(Q_1/Q)^2$.
3. For any other viscosity(s), the pressure drop (△P), 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

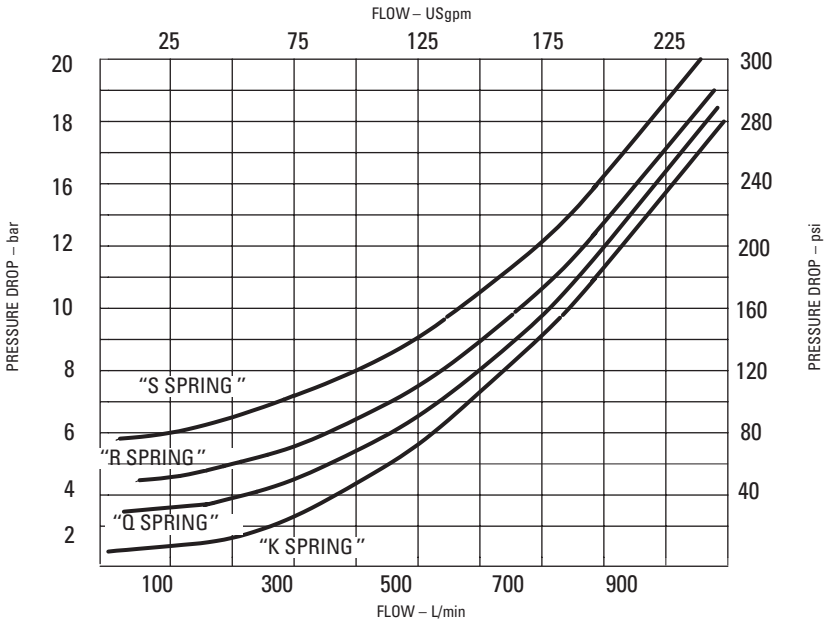
4. For any other specific gravity (G1)*, the pressure drop ($\triangle P_1$) will be approximately: $\triangle P_1 = \triangle P(G_1/G)$.

Integral Check Valves for DG5V-10

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,the pressure drop through the check valve, plus the pressure at the tank port.

For proper operation, the 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



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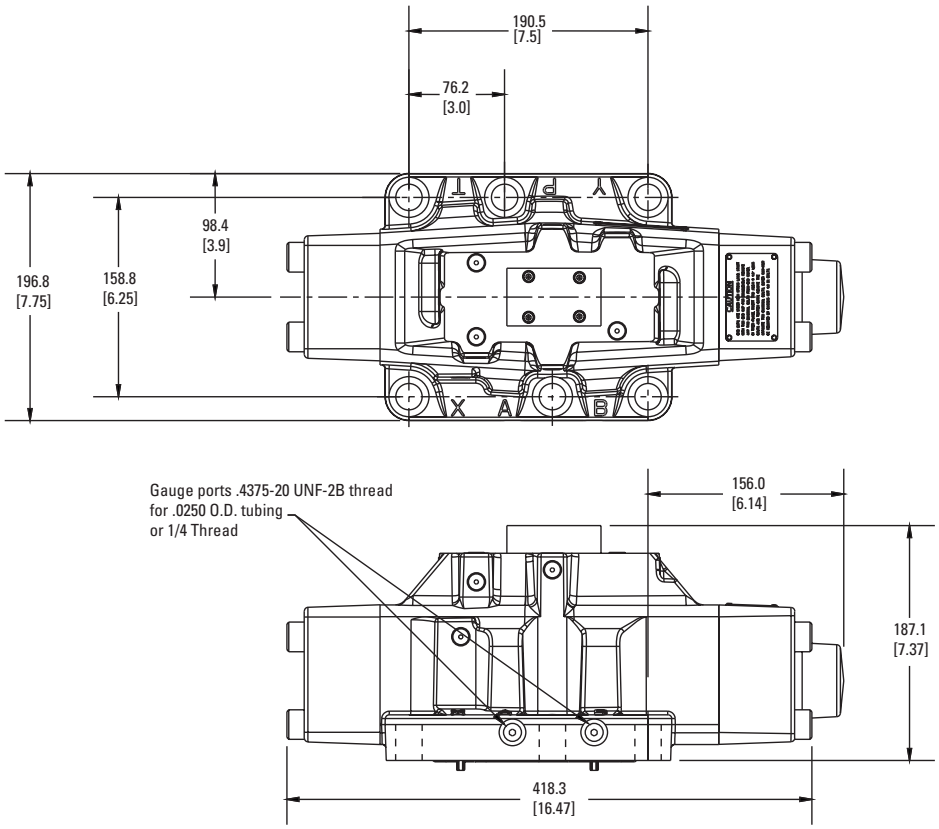
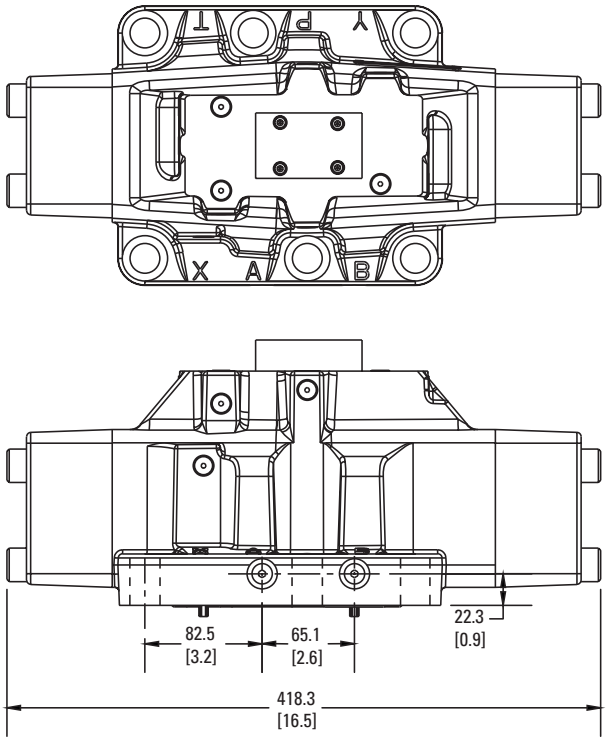
Installation Dimensions

DG3V-10 Spring Centered & Spring Offset Models

Millimeters (inches)



DG3V-10-*A-11 Series



DG3V-10-*C-11 Series

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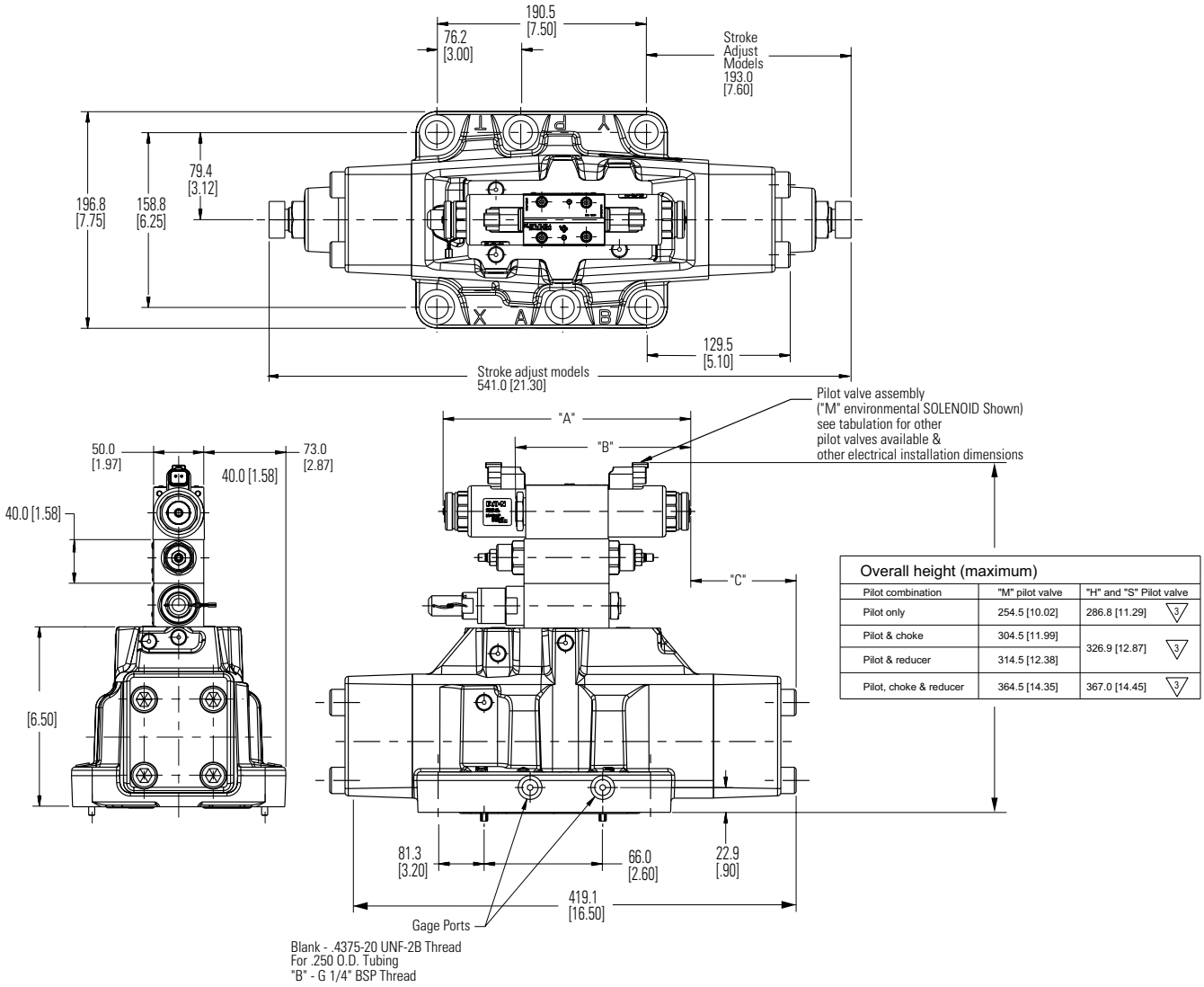
Installation Dimensions

DG5V–10–*–(R)–**
Spring Centered Models

Millimeters (inches)



Overall height (maximum)

Pilot combination	"M" pilot valve	"H" and "S" Pilot valve
Pilot only	254.5 [10.02]	286.8 [11.29] ▽3
Pilot & choke	304.5 [11.99]	326.9 [12.87] ▽3
Pilot & reducer	314.5 [12.38]	
Pilot, choke & reducer	364.5 [14.35]	367.0 [14.45] ▽3

DG5V-10-*-11 Models

Installation Dimension Table

"B" Dimension		"C" Dimension		"D" Dimension	
''AC''	''DC''	''AC''	''DC''	''AC''	''DC''
200.0 (7.87)	220.0 (8.66)	146.0 (5.75)	156.0 (6.14)	107.8 (4.24)	97.8 (3.85)

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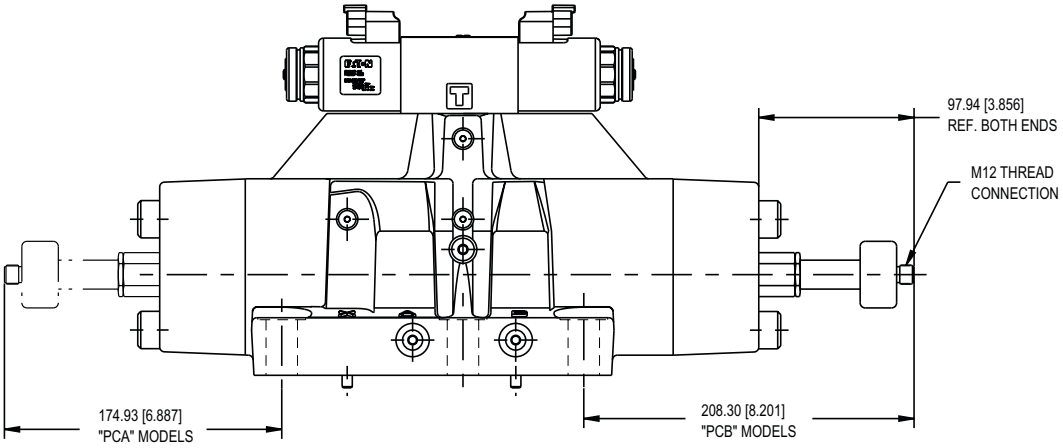
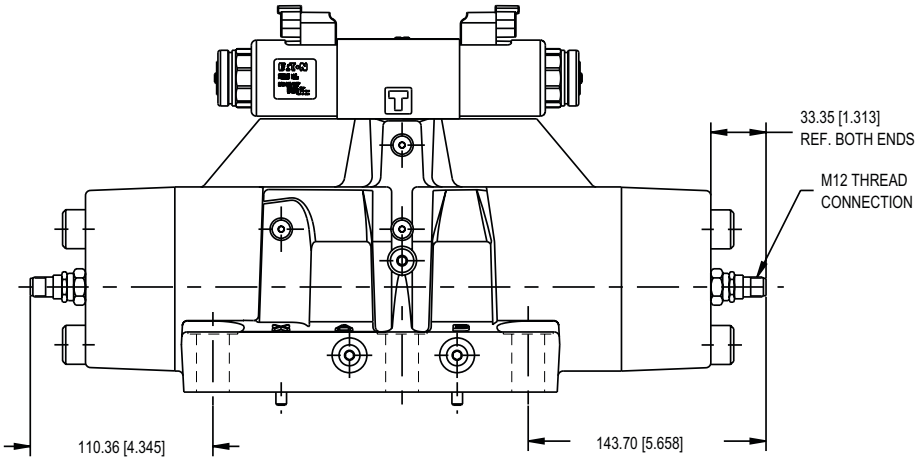
Installation Dimensions

Valves with spool position monitoring (PCA/PCB/PPA/PPB/PPD)



Center sensing switch on "B" port end shown



Offset Sensing Proximity Switch
("PPD" Model Shown)

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DG5V-10 with Main Stage Spool Monitoring Switch "PC*" or "PD*" Models (LVDT Style Switch)

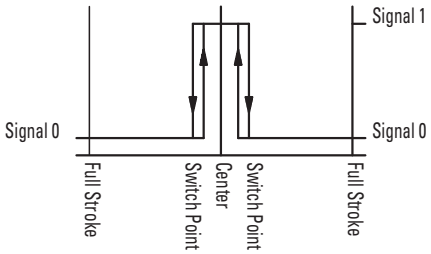
Millimeters (inches)

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 Signal 1	 < 1.8V 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	

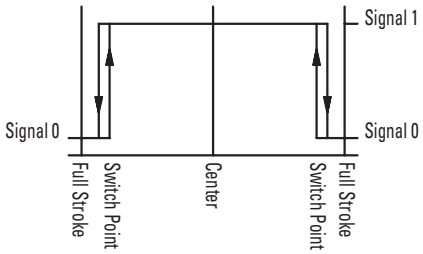
ATTENTION: EMC ONLY ENSURED WHEN USING SCREENED CABLES AND SCREENED PLUG CASING.

TYPICAL "PCA/PCB" OUTPUT
(FOR SENSING CENTER POSITION)



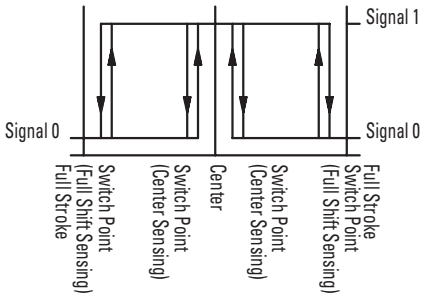
Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

TYPICAL "PDA/PDB" OUTPUT
(FOR FULL SHIFT SENSING)



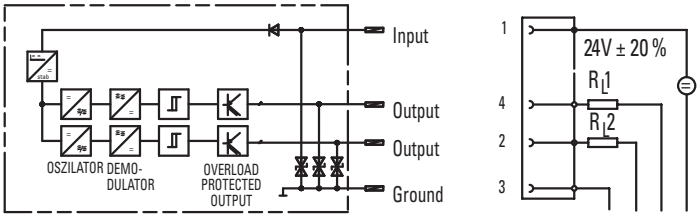
Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

TYPICAL "PCD" OUTPUT
(FOR CENTER SENSING 'A' PORT END,
FULL SHIFT SENSING 'B' PORT END)



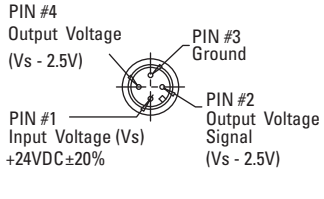
Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

Electrical Schematic and Mating Connector Detail



R_L1,R_L2 = e.g. Coil Resistance of the switch relay >/ = 60 OHMS

Connector Detail



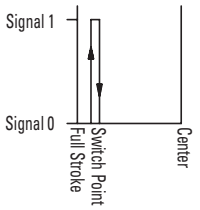
DG5V-10 with Main Stage Spool Monitoring Switch "PPA", "PPB" or "PPD" Models (Proximity Switch)

Millimeters (inches)

Specifications	
Supply Voltage (Vs):	10 to 30 Vdc
Supply Current (Is):	8mA at 24Vdc (Plug Load Current)
Supply Over-Voltage Rating:	35Vdc Continuous
Supply Reverse Polarity Rating:	-35Vdc (With No Shorts)
Short Circuit Tolerance:	Continuous Short Between any Two Pins
High Potential Test, Pin to Case:	300Vdc
Electromagnetic Compatibility:	ISO 7637 Parts 0 and 1 Worst Case and Immunity to Radiated Electromagnetic Fields, 10KHz to 1GHz per SAE J1113/25 SEP 95
Pins to Case Resistance:	> 50 MEGOHMS
Load Dump Tolerance:	80Vdc PEAK, 400ms 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") of Full Stroke
Hysteresis:	0.25 mm (.010") Max.
Rise/Fall Time:	6.5/1.5 Microsec Rl = 820 OHM, Cl = 20 pF @ 8Vdc
Output Leakage Current:	10 mA Max
Output Voltage High:	+Vs – 2.2Vdc Min
Output Load Current:	200mA Max
Operating Pressure:	350 bar (5000 psi)
Operating Temperature:	-40° to 110°C
Humidity:	0% to 100%

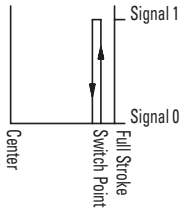
ATTENTION: EMC ONLY ENSURED WHEN USING SCREENED CABLES AND SCREENED PLUG CASING.

TYPICAL "PPA" OUTPUT



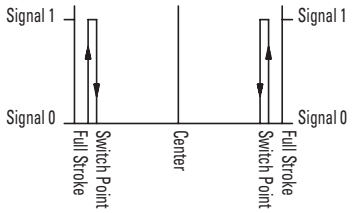
Signal 0 = Voltage at pin 4 = 0V
Signal 1 = Voltage at pin 4 > (Vs – 2.2V)

TYPICAL "PPB" OUTPUT

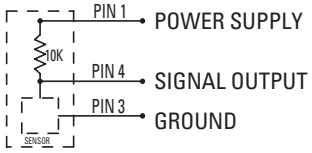


Signal 0 = Voltage at pin 4 = 0V
Signal 1 = Voltage at pin 4 > (Vs – 2.2V)

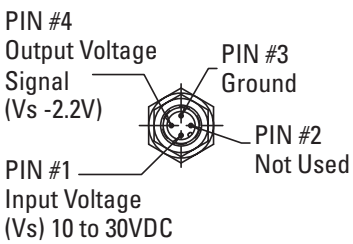
TYPICAL "PPD" OUTPUT



Output Circuit Wiring Instuctions



Connector Detail



Pilot Valves Data

General Description

Pilot valves are identified in the model code by the following letters: "M" Mobile style - high performance and "H" High Performance. The pilot valves can be ordered to match a variety of mainstage spool types and valve bodies.

The charts below shows ordering information for each pilot valve. For example, to order a "H" - high performance pilot with a spring centered mainstage ''C'', use the following model code: DG4V-3-6C

Valve Model Code: High Performance	Main Stage Spool Type	Pilot Valve Model Code
DG5V-10-H/M-(R)-*A-*	All except 4 & 8	DG4V-3(M)-2A-*
	4 & 8 only	DG4V-3(M)-2AL-VM-*
DG5V-10-H/M-(R)-*AL-*	All except 4 & 8	DG4V-3(M)-2AL-*
	4 & 8 only	DG4V-3(M)-2A-VM-*
DG5V-10-H/M-(R)-B-*	All except 4 & 8	DG4V-3(M)-6B-*
	4 & 8 only	DG4V-3(M)-6BL-VM-*
DG5V-10-H/M-(R)-*BL-*	All except 4 & 8	DG4V-3(M)-6BL-*
	4 & 8 only	DG4V-3(M)-6B-VM-*
DG5V-10-H/M-(R)-*C-*	All except 4 & 8	DG4V-3(M)-6C-*
	4 & 8 only	DG4V-3(M)-6C-VM-*
DG5V-10-H/M-(R)-*N-*	All except 4 & 8	DG4V-3(M)-6N-*
	4 & 8 only	DG4V-3(M)-6N-VM-*

Minimum Pilot Pressure Requirements (when operating at 210 bar (3000 psi) maximum)

Spool Type	Flow l/min (USgpm)	Shifting P to A bar (psi)		Shifting P to B bar (psi)	
		Pressure Centered Models	All Other Models	Pressure Centered Models	All Other Models
All Spools	0	5 (75)	5 (75)	14 (200)	5 (75)
0, 4, 8 & 9	946 (250)	5 (75)	5 (75)	14 (200)	5 (75)
2, 3, 6 & 33	946 (250)	10 (150)	10 (150)	27,5 (400)	10 (150)

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

K

Notes

Notes

Eaton
Hydraulics Group USA
14615 Lone Oak Road
Eden Prairie, MN 55344
USA
Tel: 952-937-9800
Fax: 952-294-7722
www.eaton.com/hydraulics

Eaton
Hydraulics Group Europe
Route de la Longeraie 7
1110 Morges
Switzerland
Tel: +41 (0) 21 811 4600
Fax: +41 (0) 21 811 4601

Eaton
Hydraulics Group Asia Pacific
Eaton Building
4th Floor, No.7 Lane280 Linhong Rd.
Changning District
Shanghai 200335
China
Tel: (+86 21) 5200 0099
Fax: (+86 21) 2230 7240

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Powering Business Worldwide

DG3V-8 & DG5V-8 10 Design

ISO4401 Size 08;
ANSI/B93.7M-D08

Powering Business Worldwide

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.
- DG5V-8-H - DG4V-3-60 high performance D03 pilot valve 210 bar (3000 psi) tank line rating.

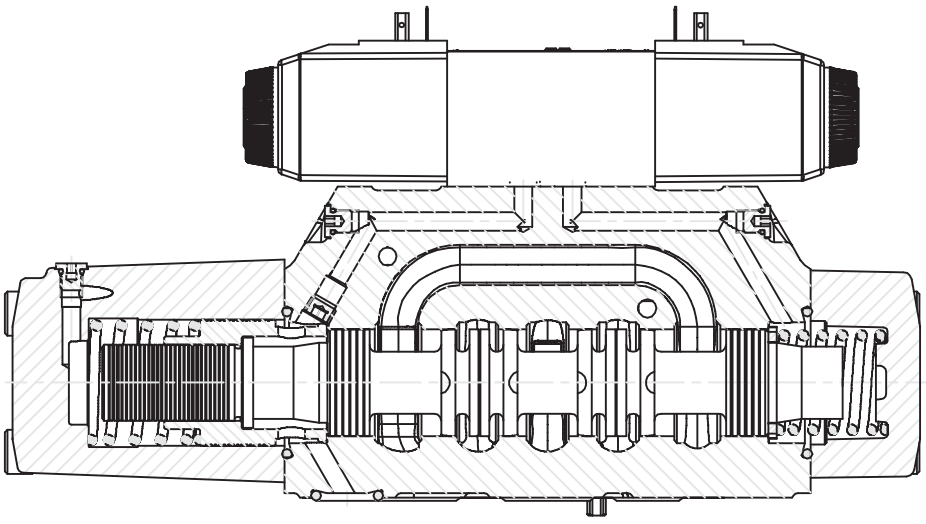
Each valve contains a mainstage spool which is positioned in the valve by special arrangement. The four arrangements are:

- 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 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.
- 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, and lockable manual override options are available to facilitate system troubleshooting or servicing.

J



SECTION THROUGH SPOOL BORE CENTERLINE

Model Codes

DG3V-8 Remote Pilot Operated Directional Valves

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

1 2 3 4 5 6 7 8 9

1 Special Seals

BLANK – None
F3 – Seals for fire resistant fluids.
F6 – Seals for water glycol.

2 Directional Control Valve

DG3V – Subplate mounting; pilot operated-remote operator. Pressure rating 350 bar (5000 psi) for all ports. (See minimum pilot pres sure requirements on page 6.

3 Valve Size

8 – Valve size CE TOP 8, NFPA D08

4 Gauge Ports

Blank – .4375-20 UNF-2B Thread
B – 1/4 B SP Thread

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

7 Left Hand Build

L – A Models only, omit if not required.

8 Spool Control Modifications

BLANK – None
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 & B lank (no spring) models)
7 – Stroke adjusters on cylinder A end only (available on A, C & B lank (no spring) models)
8 – Stroke adjusters on cylinder 'B' end only (available on A, C, & B lank (no spring) models)
27 – If both are required (available on A, C, & B lank (no spring) models)
28 – If both are required (available on AL left hand

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.

J

Model Codes

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

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 Gauge Ports

Blank – 4375-20 UNF-2B Thread

B – 1/4 BSP Thread

4 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 operated)

AL – As "A" but left-hand build (P to A when operated)

B – Spring offset, end-tocenter (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-8-*C valves by alternating pilot supply to one port (X or Y) and permanently draining the other.

6 Manual Override Option

Blank – Plain override in solenoid end(s) only ▲

H – Water-resistant manual override on solenoid end(s) ▲

W – Twist & lock override in solenoid ends

Z – No override at either end

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

7 Spool Control

Blank – None

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 "7" combined ▼

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 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. Omit for internal pilot pressure models.

10 Internal Pilot Drain

T – Internal pilot drain to 'T' port.

Omit for external pilot drain models.

11 Check Valve in Pressure Port

(Omit if not required.)

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

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.

13 Flag Symbol

M – Electrical options and features

14 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

FW – Flying lead with 1/2" NPT thread wiring housing

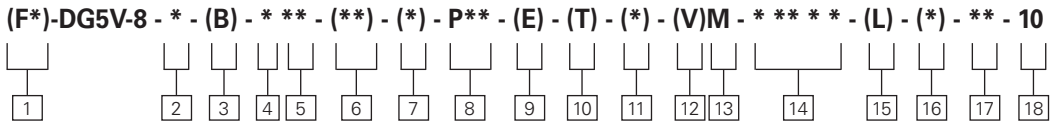
FTW – Fly. lead wired terminal block & 1/2" NPT thread wiring housing

FPA3W – Fly. lead, 3 Pin connector & 1/2" NPT thread wiring housing

FPA5W – Fly. lead, 5 pin connector & 1/2" NPT thread wiring housing

J

Model Codes (Contd.)



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)
D1 – Diode positive bias
D2 – Negative bias
D7 – Transorb type

17 Coil Voltage

See electrical information on page 9 for voltages available. Others available upon request.
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

J

Application Notes

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 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.

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.

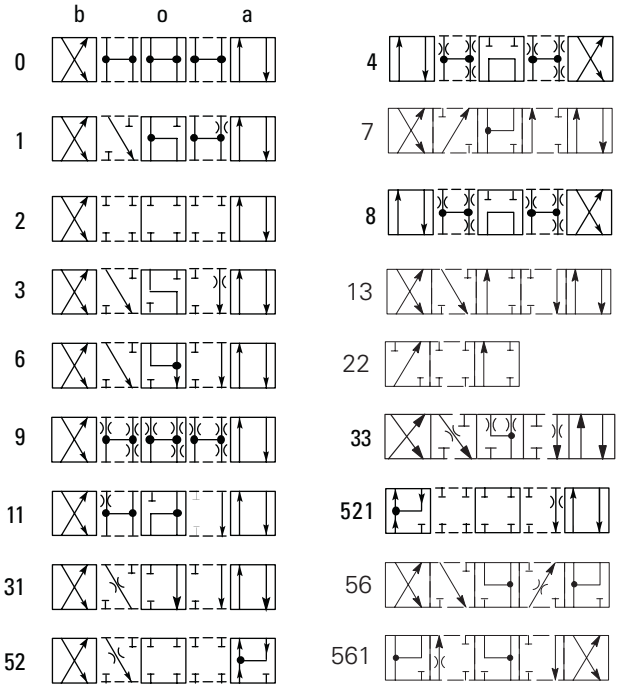
J

Functional Symbols

Spool Type and Center Position

Spool Types

Shown in 3-position form, plus 2 transients.



Notes:

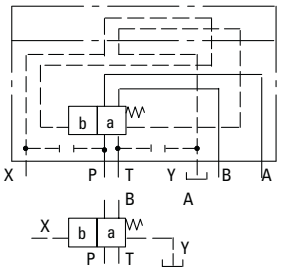
1. In the detailed and simplified symbols on this and the previous pages, the transient positions are omitted for simplicity.
2. In certain 2-position valves, the "o" position becomes an additional transient, i.e. in DG5V-8-*A(L) and DG5V-8-*N valves.

Your Eaton representative can provide further details.

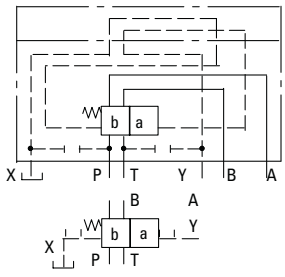
DG3V-8 Pilot Operated Models

Comprehensive and simplified symbols.

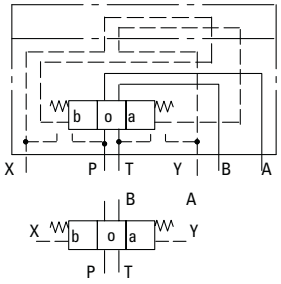
Spring Offset, End-to-End, DG3V-8-*A



Spring Offset, End-to-End, Opposite Hand, DG3V-8-*AL



Spring Centered, DG3V-8-*C

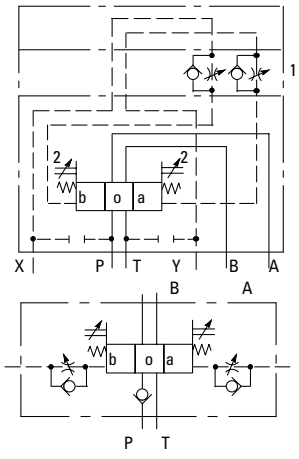


DG3V-8 Options

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.



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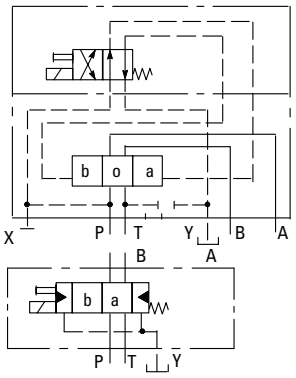
Functional Symbols

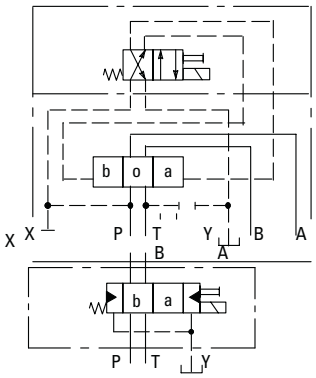
DG5V-8, Solenoid Controlled, Pilot Operated Models

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

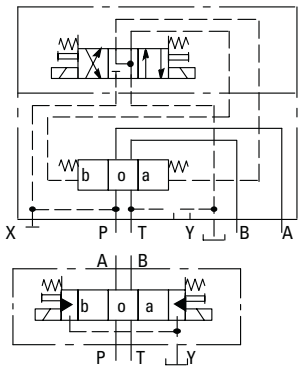
Spring Offset, End-to-End, DG5V-8-*A



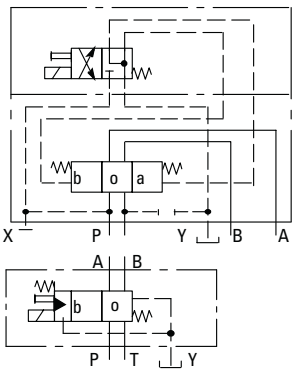
Spring Offset, End-to-End, Opposite Hand, DG5V-8-*AL



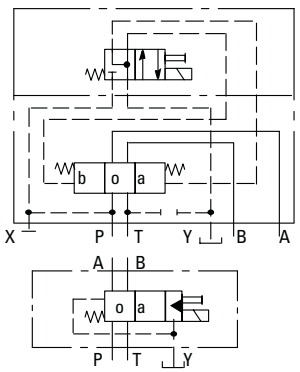
Spring Centered, DG5V-8-*C



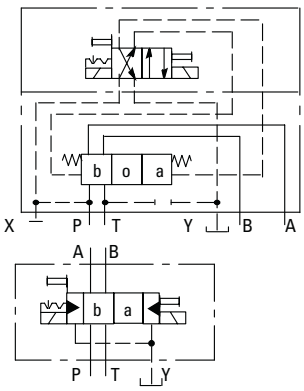
Spring Offset, End-to-Center DG5V-8-*B



Spring Offset, End-to-Center, Opposite Hand DG5V-8-*BL



Detented, DG5V-8-*N

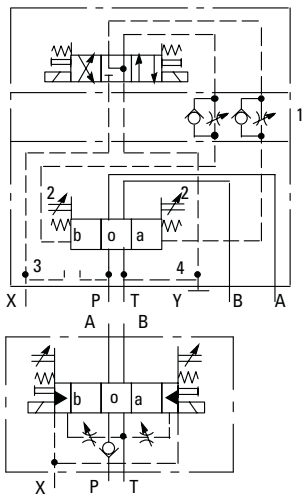


DG5V-8 Options

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.



Operating Data

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 §	350 bar (5000 psi)
DG5V-8 valves, (internally drained)	
P, A, B and X	350 bar (5000 psi) ▲
T §	350 bar (5000 psi)
Maximum flow without mal-function (DG3V-8 and DG5V-8)	700 L/min (185 Usgpm)
Pilot pressures	See "Pilot Pressures" on page 28

ELECTRICAL INFORMATION:

Voltage ratings, DG5V valves	See 17 in "Model Code" on page 5	
Voltage limits, DG5V valves:		
Maximum voltage	See "Temperature limits", on page 10	
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	

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.

Pressure drop characteristics	See page 11, 12

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 110% of rated voltage	65°C (150°F)
DC coils at 110% of rated voltage	70°C (158°F)

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INSTALLATION DIMENSIONS:

Valves	See page 16 to 25
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.

Performance Data

DG3V – 8 Models

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).

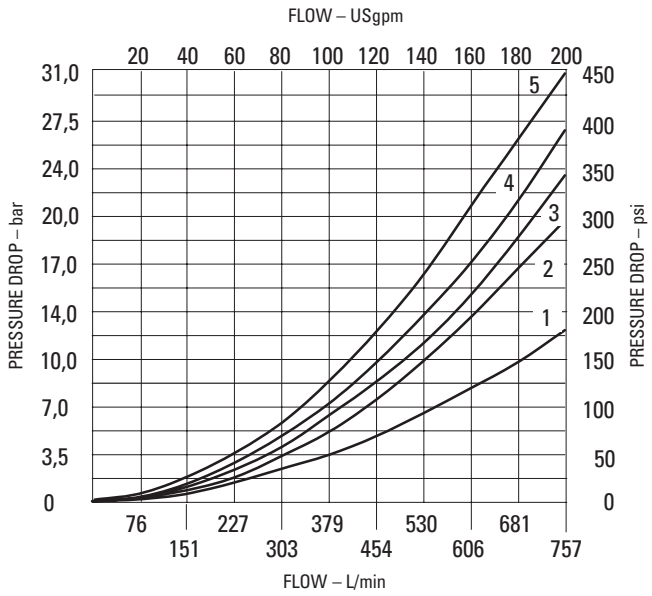
Spool Type	Pressure Drop Curve Number P→A	B→T	P→B	A→T	P→T in Center	Malfunction Flow Curve Number
0	2	2	2	2	3	1
1	1	2	1	3	2	3
11	1	3	1	1	3	3
2	1	2	1	1	–	2
3	1	2	1	4	–	2
31	1	3	1	1	–	2
4	4	3	4	2	5	3
6	1	3	1	4	–	1
7	2	2	2	1	–	1
8	4	3	4	2	5	1
9	2	3	2	2	28 bar 400 psid) @ 189 L/min (50 USgpm)	4
33	1	3	1	2	–	2
35	See page 28					
52	2	–	4	4	–	1
521	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:

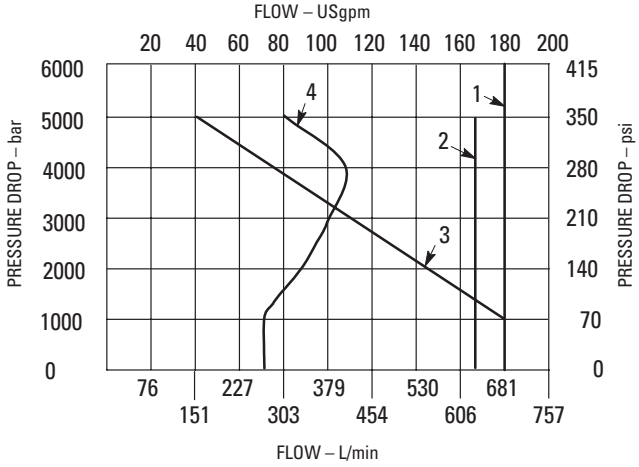
Viscosity cSt (SUS)	14 (17.5)	20 (97.8)	43 (200)	54 (251)	65 (302)	76 (352)	85 (399)
% of PΔ (Approx.)	81	88	104	111	116	120	124

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

Pressure Drop Curves



Malfunction Flow Curves



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Performance Data

DG3V-8 Model

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.

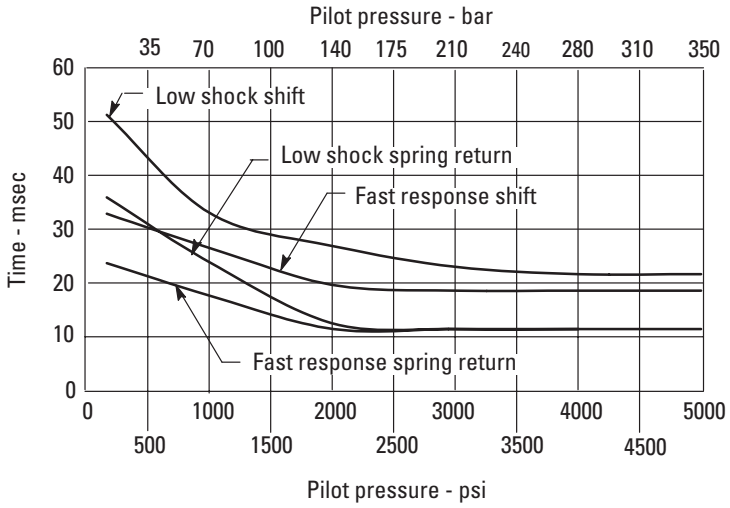
SPRING CENTERING TIMES @ RATED FLOW & PRESSURE

Spool Type	Time
Closed Center	.040 sec.
Open Center	.050 sec.

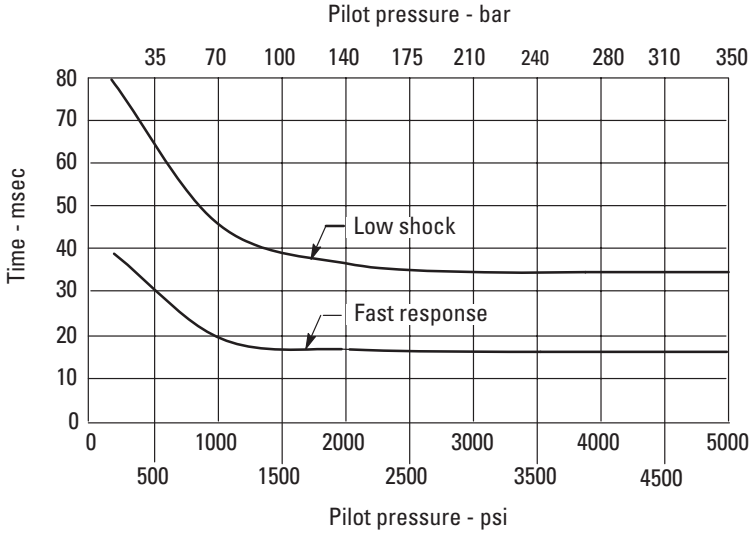
Centering Times for Pressure Centered Valves @ Rated Pressure (A to P or B to P)

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

Offset to Offset



Center to Offset

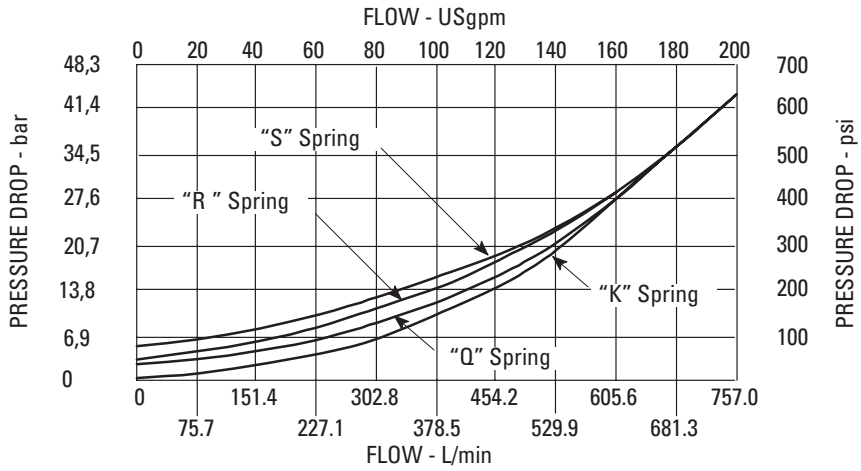


Integral Check Valves

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 Across Check Valve



Performance Data

DG5V-8 Model

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.

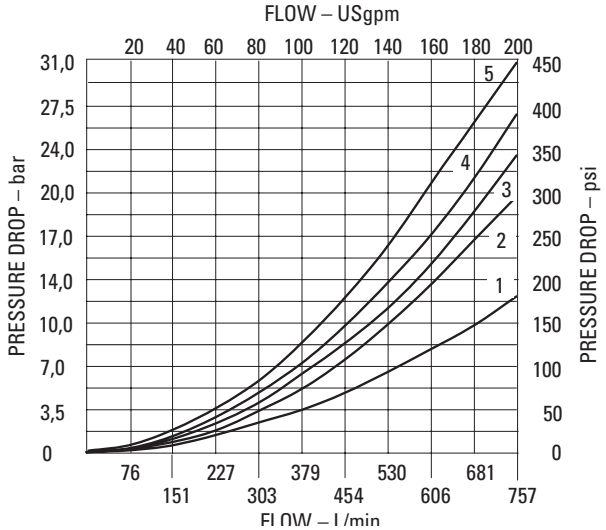
The pressure drop from P→B for type 7 spool would be obtained on curve 2. Likewise, the malfunction for numeral 7 would be found on curve 1 (from malfunction flow curve chart at bottom of page).

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: $\Delta P_1 = \Delta P(G_1/G)$.

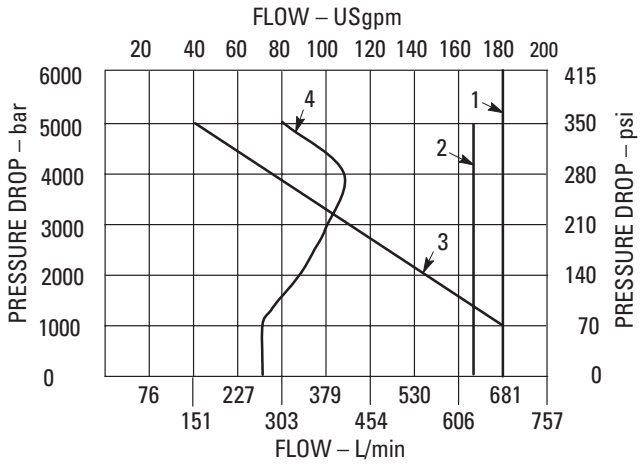
Viscosity cSt (SUS)	14 (75)	32 (150)	43 (200)	54 (250)	65 (300)	76 (350)	86 (400)
% of PΔ (Approx.)	93	111	119	126	132	137	141

SPOOL TYPE	PRESSURE DROP CURVE NUMBER					MALFUNCTION FLOW CURVE NUMBER
	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
11	1	3	1	1	3	3
2	1	2	1	1	–	2
3	1	2	1	4	–	2
31	1	3	1	1	–	2
4	4	3	4	2	5	3
6	1	3	1	4	–	1
7	2	2	2	1	–	1
8	4	3	4	2	5	1
9	2	3	2	2	28 bar (400 psid) @ 189 L/min (50 USgpm)	4
33	1	3	1	2	–	2
35A	See page 28					
52	2	–	4	4	–	1
521	2	4	4	–	–	1

Pressure Drop Curves



Malfunction Flow Curves



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Performance Data

DG5V-8 Model

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.

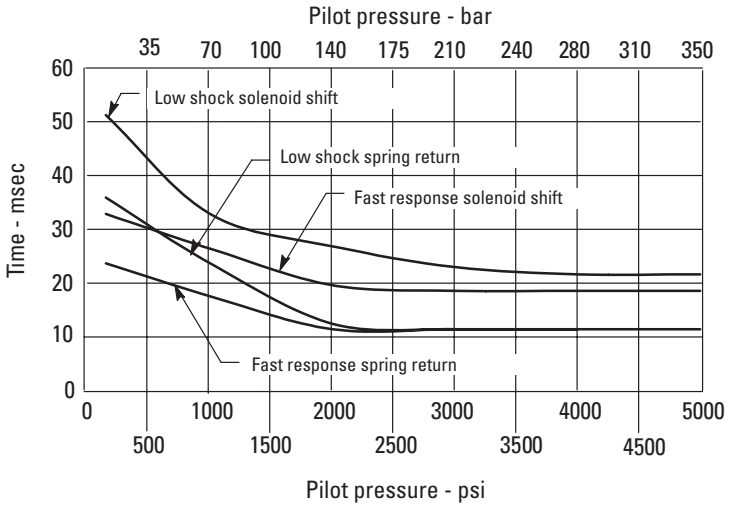
Solenoid Energizing

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).

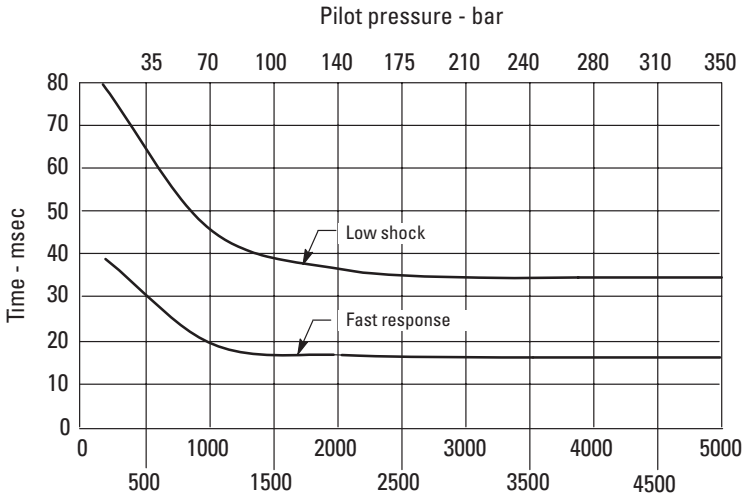
Offset to Offset



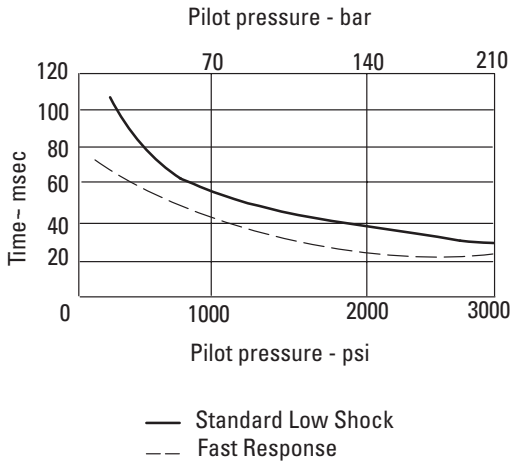
SPRING CENTERING TIMES @ RATED FLOW & PRESSURE

Spool Type	Time
Closed Center	.040 sec.
Open Center	.050 sec.

Center to Offset



Centering Times for Pressure Centered Valves @ Rated Pressure (A to P or B to P)



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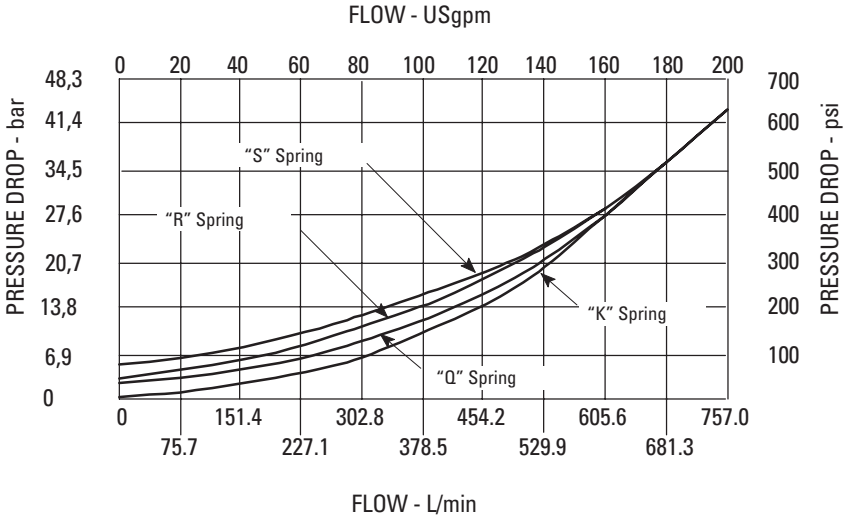
Integral Check Valves

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



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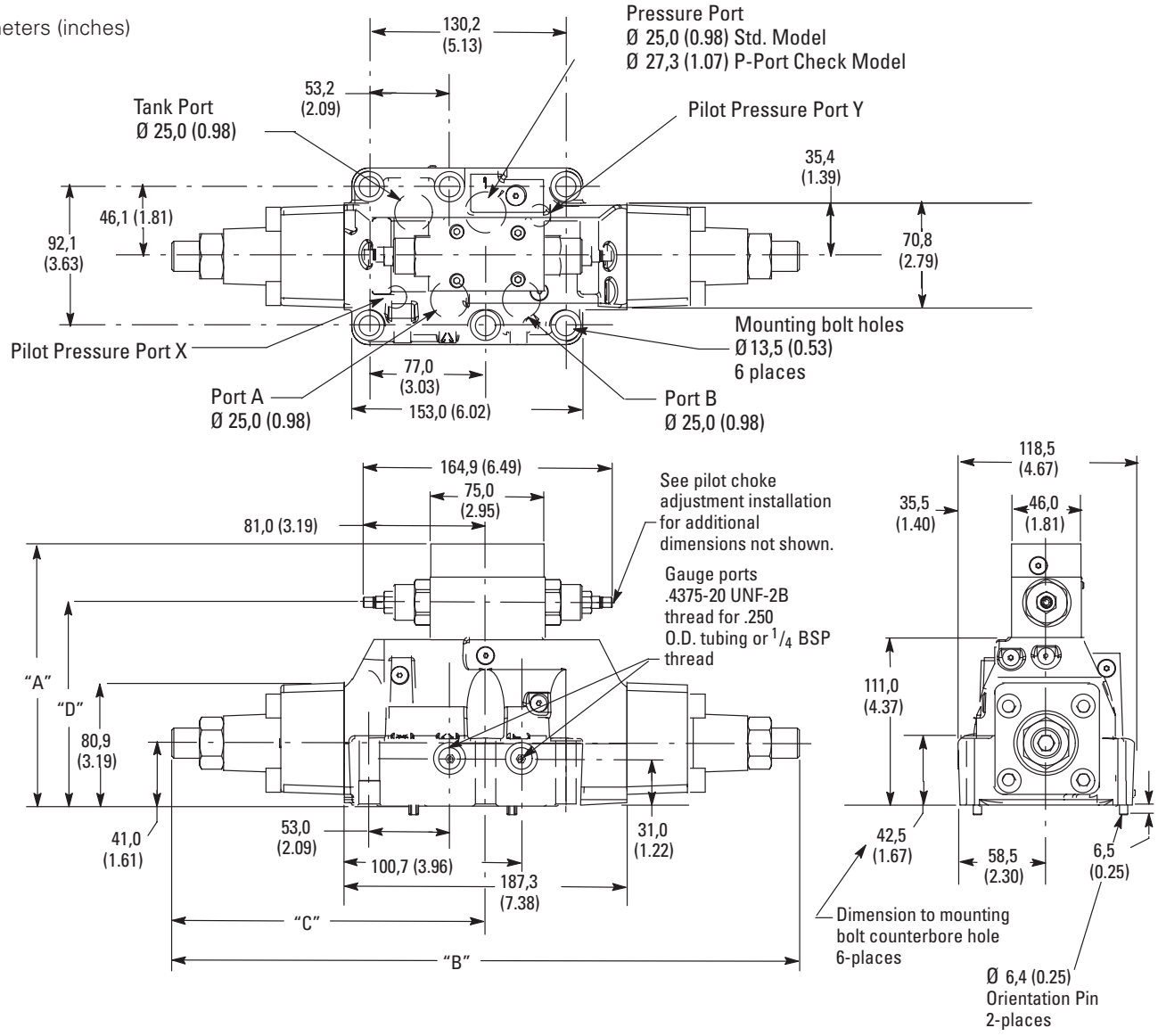
Installation Dimensions

DG3V-8-(C)-*-*-10 Spring Centered Model

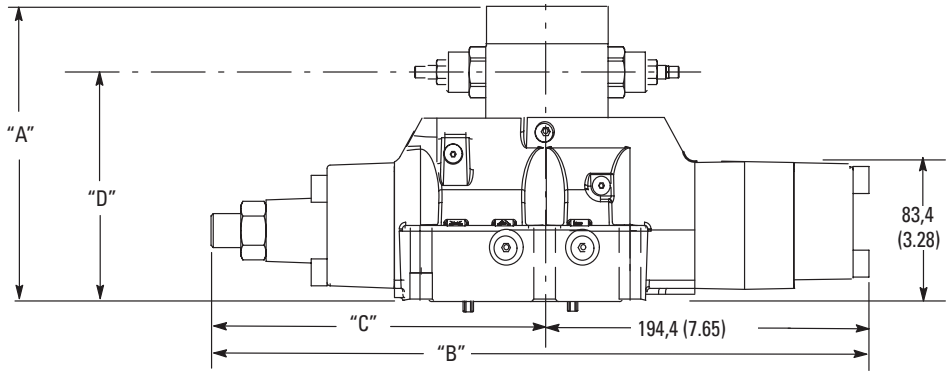
Millimeters (inches)



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)



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)

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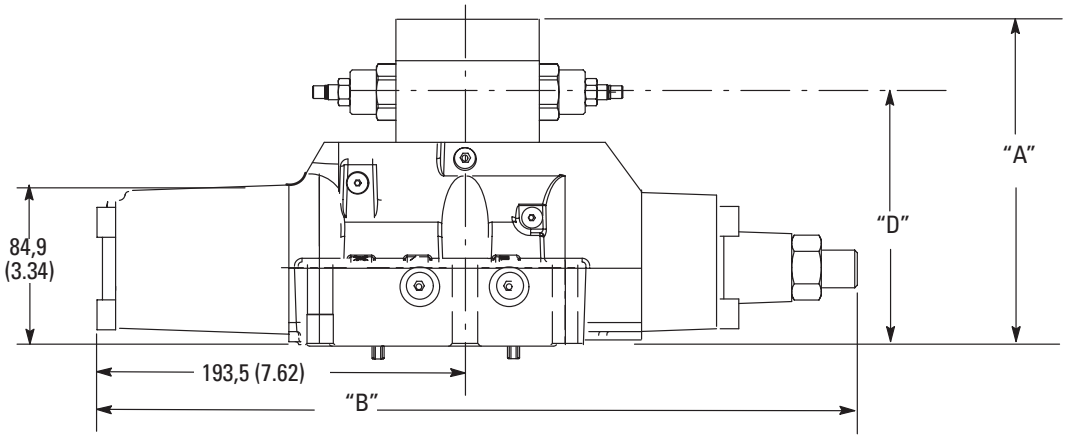
DG3V-8-D-*-*-10 Pressure Centered Model

Millimeters (inches)



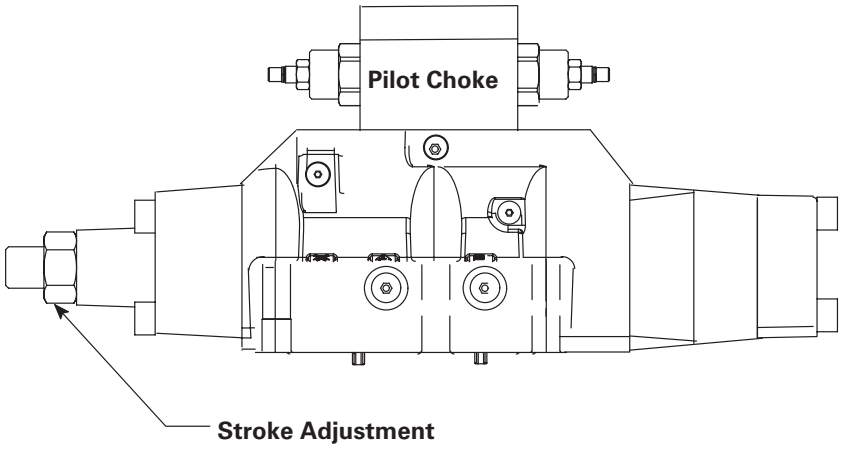
Installation Dimensions

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.).



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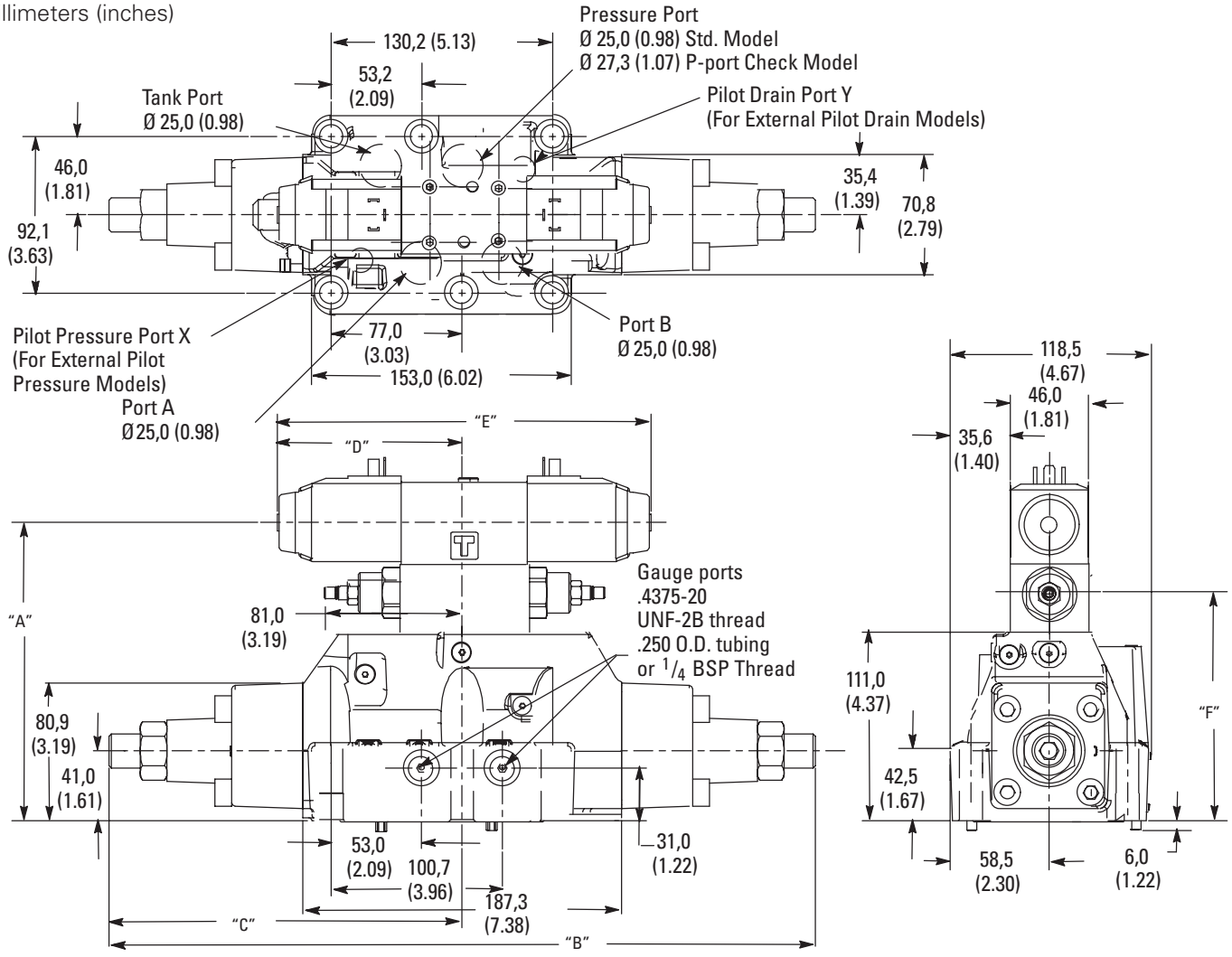
Installation Dimensions

DG5V-8 H-*-M-*-10
Spring Centered Model

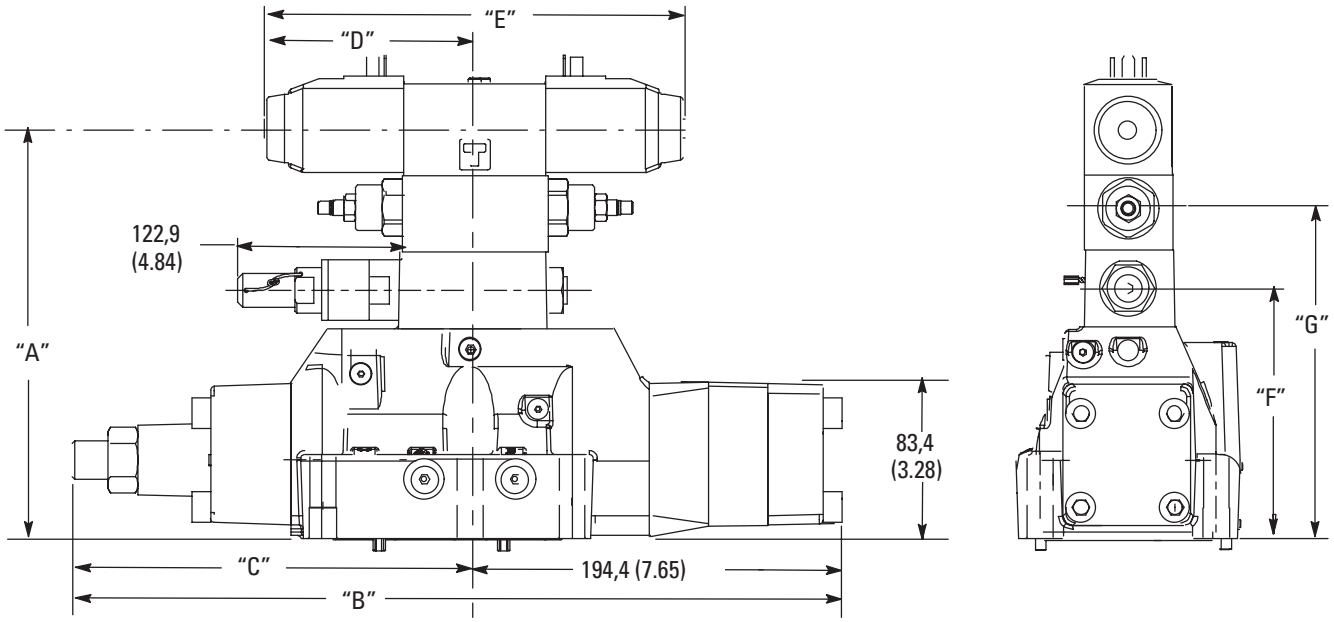
Millimeters (inches)



Spool Control Modifications	Dimensions "A"	"B"	"C"	"D"	"E" pilot						"F"
					Dual Solenoid				Single Solenoid		Pilot Choke
				AC Sol.	DC Sol.	AC Sol.	DC Sol.		AC Sol.	DC Sol.	
Without pilot choke or stroke adjustment	135,6 (5.33)	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)	-
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)		208,0 (8.18)								
Stroke adjust on cyl. 'B'		340,6 (13.40)	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)



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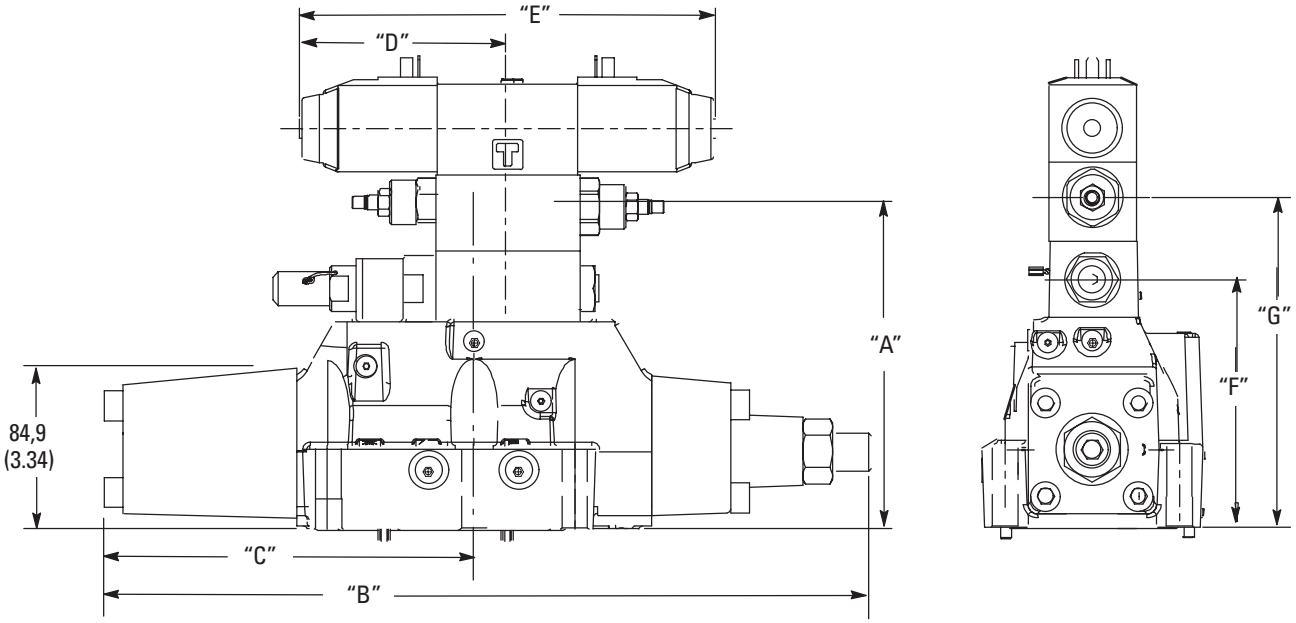
Spool Control Modifications	"A"	"B"	"C"	Dimensions "D" AC Sol.	"D" DC Sol.	"E" pilot Dual Solenoid AC Sol.	"E" pilot Dual Solenoid DC Sol.	"E" pilot Single Solenoid AC Sol.	"E" pilot Single Solenoid DC Sol.	"F" Reducer Module	"G" Pilot Choke
Without pilot choke or stroke adjustment	175,6 (6.91)	265,3 (10.44)	132,6 (5.22)								-
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)		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'		340,6 (13.40)	132,6 (5.22)								
Pilot choke and stroke adjust. on cyl 'A'			208,0 (8.18)								
Pilot choke and stroke adjust. on cyl. 'B'	215,6 (8.48)		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-D-*-*-10
Pressure Centered Model

Millimeters (inches)



Dimensions

Spool Control Modifications (without Reducer)	"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	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'		401,5 (15.80)									
Pilot choke and stroke adjust. on cyl. 'B'	215,6 (8.48)										134,2 (5.28)

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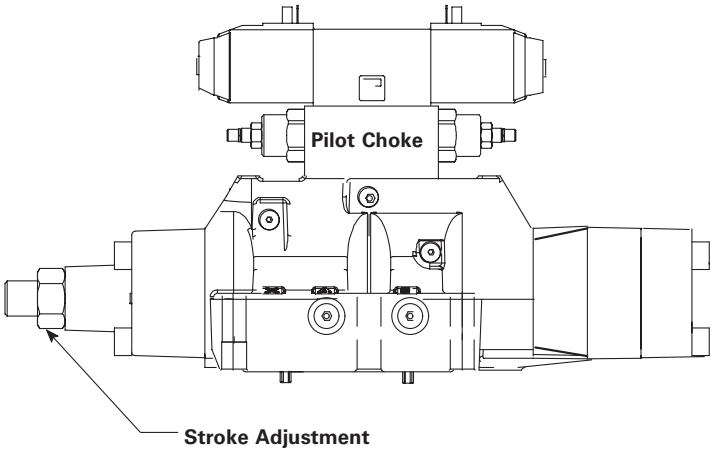
Optional Features

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.



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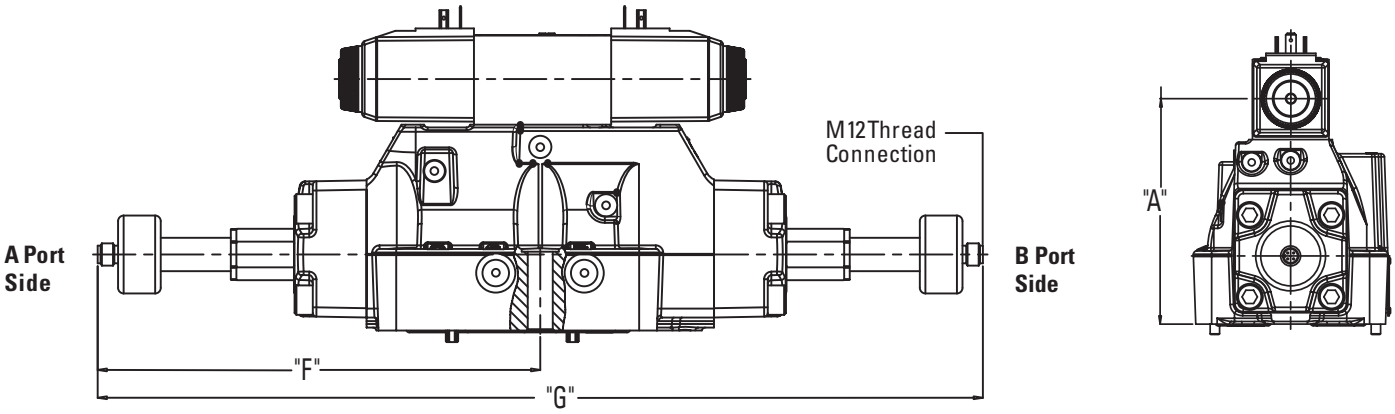
DG5V-8 with Main Stage Spool Monitoring Switch "PC*" or "PD*" Models (LVDT Style Switch)

Millimeters (inches)

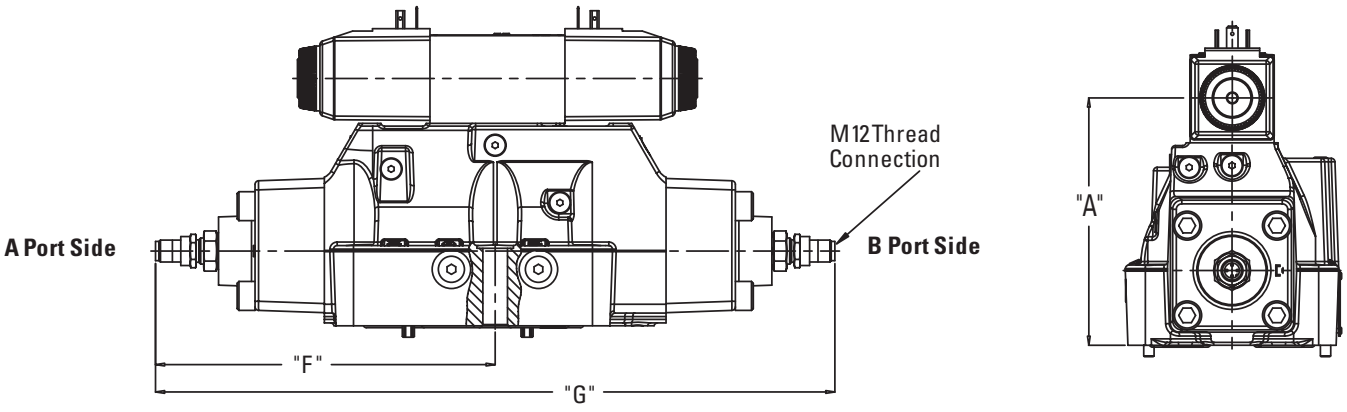


MODEL CODE	"A" DIMENSION	"F" DIMENSION	"G" DIMENSION
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-PCA/PDA-(*)-(V)M-*-10	135.6[5.34]	238.7[9.40]	371.3[14.62]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-PCA/PDA-(*)-(V)M-*-10	175.6[6.91]	238.7[9.40]	371.3[14.62]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-2-PCA/PDA-(*)-(V)M-*-10	175.6[6.91]	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)-*A/B/C/F/N(L)-(*)-PCD-(*)-(V)M-*-10	135.6[5.34]	238.7[9.40]	477.3[18.79]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-PCD-(*)-(V)M-*-10	175.6[6.91]	238.7[9.40]	477.3[18.79]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-2-PCD-(*)-(V)M-*-10	175.6[6.91]	238.7[9.40]	477.3[18.79]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-2-PCD-(*)-(V)M-*-10	215.6[8.49]	238.7[9.40]	477.3[18.79]
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

DG5V-8 with Main Stage Spool Monitoring Switch
"PPA", "PPB" or "PPD" Models (Proximity Switch)

Millimeters (inches)



MODEL CODE	"A" DIMENSION	"F" DIMENSION	"G" DIMENSION
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-PPA-(*)-(V)M-*-10	135.6[5.34]	186.2[7.33]	318.8[12.55]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-PPA-(*)-(V)M-*-10	175.6[6.91]	186.2[7.33]	318.8[12.55]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-2-PPA-(*)-(V)M-*-10	175.6[6.91]	186.2[7.33]	318.8[12.55]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-2-PPA-(*)-(V)M-*-10	215.6[8.49]	186.2[7.33]	318.8[12.55]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-8-PPA-(*)-(V)M-*-10	135.6[5.34]	186.2[7.33]	394.2[15.52]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-8-PPA-(*)-(V)M-*-10	175.6[6.91]	186.2[7.33]	394.2[15.52]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-28-PPA-(*)-(V)M-*-10	175.6[6.91]	186.2[7.33]	394.2[15.52]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-28-PPA-(*)-(V)M-*-10	215.6[8.49]	186.2[7.33]	394.2[15.52]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-PPB-(*)-(V)M-*-10	135.6[5.34]	132.7[5.22]	318.8[12.55]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-PPB-(*)-(V)M-*-10	175.6[6.91]	132.7[5.22]	318.8[12.55]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-2-PPB-(*)-(V)M-*-10	175.6[6.91]	132.7[5.22]	318.8[12.55]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-2-PPB-(*)-(V)M-*-10	215.6[8.49]	132.7[5.22]	318.8[12.55]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-7-PPB-(*)-(V)M-*-10	135.6[5.34]	208.0[8.19]	394.2[15.52]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-7-PPB-(*)-(V)M-*-10	175.6[6.91]	208.0[8.19]	394.2[15.52]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-27-PPB-(*)-(V)M-*-10	175.6[6.91]	208.0[8.19]	394.2[15.52]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-27-PPB-(*)-(V)M-*-10	215.6[8.49]	208.0[8.19]	394.2[15.52]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-PPD-(*)-(V)M-*-10	135.6[5.34]	186.2[7.33]	372.4[14.66]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-PPD-(*)-(V)M-*-10	175.6[6.91]	186.2[7.33]	372.4[14.66]
DG5V-8-H-(B)-*A/B/C/F/N(L)-(*)-2-PPD-(*)-(V)M-*-10	175.6[6.91]	186.2[7.33]	372.4[14.66]
DG5V-8-H-R-(B)-*A/B/C/F/N(L)-(*)-2-PPD-(*)-(V)M-*-10	215.6[8.49]	186.2[7.33]	372.4[14.66]
DG5V-8-H-(B)-*D-(*)-PPB-(*)-(V)M-*-10	135.6[5.34]	193.5[7.62]	379.7[14.95]
DG5V-8-H-R-(B)-*D-(*)-PPB-(*)-(V)M-*-10	175.6[6.91]	193.5[7.62]	379.7[14.95]
DG5V-8-H-(B)-*D-(*)-2-PPB-(*)-(V)M-*-10	175.6[6.91]	193.5[7.62]	379.7[14.95]
DG5V-8-H-R-(B)-*D-(*)-2-PPB-(*)-(V)M-*-10	215.6[8.49]	193.5[7.62]	379.7[14.95]

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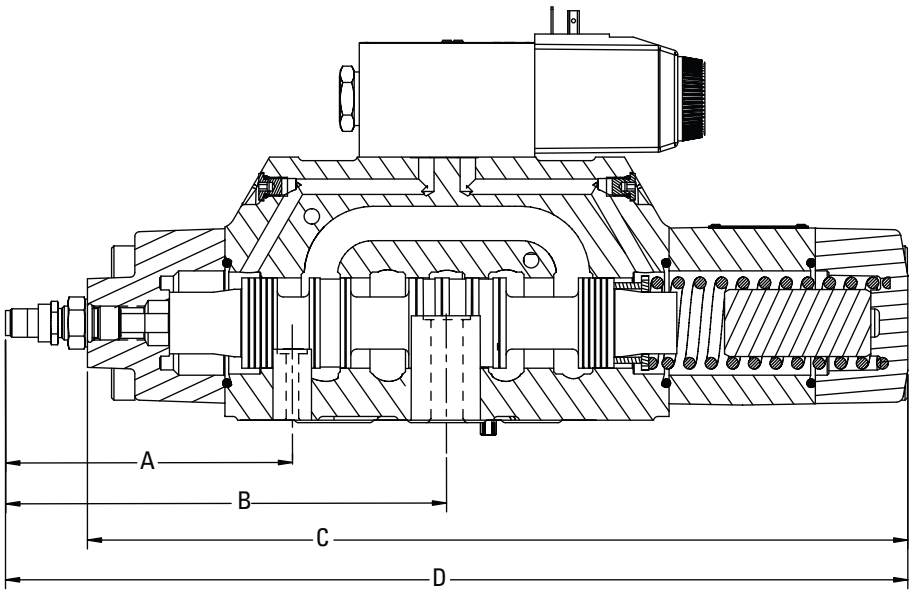
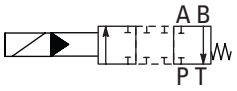
Installation Dimensions

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

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DG5V-8 with Main Stage Spool Monitoring Switch "PC*" or "PD*" Models (LVDT Style Switch)

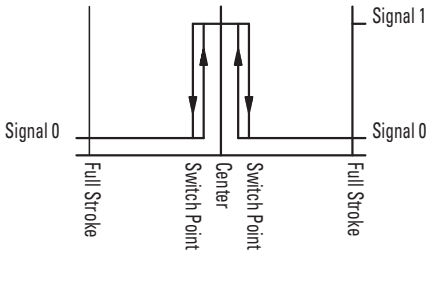
Millimeters (inches)

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 Signal 1	 < 1.8V 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	

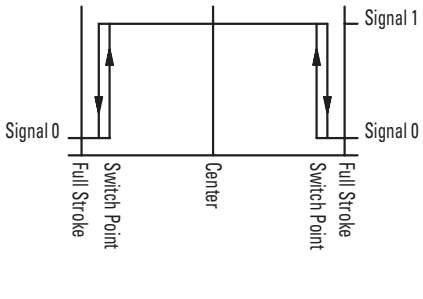
ATTENTION: EMC ONLY ENSURED WHEN USING SCREENED CABLES AND SCREENED PLUG CASING.

TYPICAL "PCA/PCB" OUTPUT
(FOR SENSING CENTER POSITION)



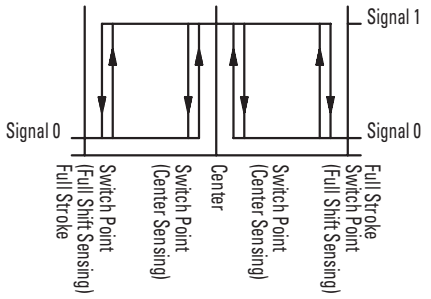
Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

TYPICAL "PDA/PDB" OUTPUT
(FOR FULL SHIFT SENSING)



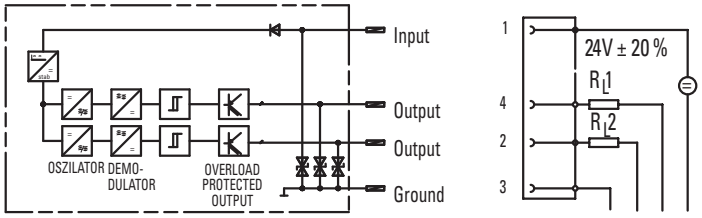
Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

TYPICAL "PCD" OUTPUT
(FOR CENTER SENSING 'A' PORT END,
FULL SHIFT SENSING 'B' PORT END)



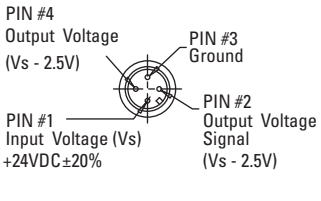
Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs – 2.5V)

Electrical Schematic and Mating Connector Detail



R_L1,R_L2 = e.g. Coil Resistance of the switch relay >/ = 60 OHMS

Connector Detail



DG5V-8 with Main Stage Spool Monitoring Switch "PPA", "PPB" or "PPD" Models (Proximity Switch)

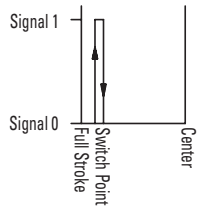
Millimeters (inches)

SPECIFICATIONS

Supply Voltage (Vs):	10 to 30 Vdc
Supply Current (Is):	8mA at 24Vdc (Plug Load Current)
Supply Over-Voltage Rating:	35Vdc Continuous
Supply Reverse Polarity Rating:	-35Vdc (With No Shorts)
Short Circuit Tolerance:	Continuous Short Between any Two Pins
High Potential Test, Pin to Case:	300Vdc
Electromagnetic Compatibility:	ISO 7637 Parts 0 and 1 Worst Case and Immunity to Radiated Electromagnetic Fields, 10KHz to 1GHz per SAE J1113/25 SEP 95
Pins to Case Resistance:	> 50 MEGOHMS
Load Dump Tolerance:	80Vdc PEAK, 400ms 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") of Full Stroke
Hysteresis:	0.25 mm (.010") Max.
Rise/Fall Time:	6.5/1.5 Microsec Rl = 820 OHM, Cl = 20 pF @ 8Vdc
Output Leakage Current:	10 mA Max
Output Voltage High:	+Vs – 2.2Vdc Min
Output Load Current:	200mA Max
Operating Pressure:	350 bar (5000 psi)
Operating Temperature:	-40° to 110°C
Humidity:	0% to 100%

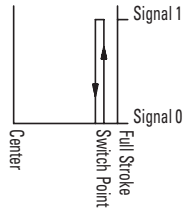
ATTENTION: EMC ONLY ENSURED WHEN USING SCREENED CABLES AND SCREENED PLUG CASING.

TYPICAL "PPA" OUTPUT



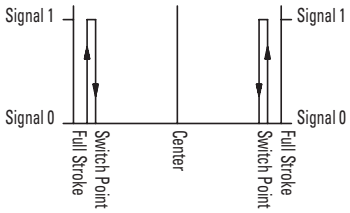
Signal 0 = Voltage at pin 4 = 0V
Signal 1 = Voltage at pin 4 > (Vs – 2.2V)

TYPICAL "PPB" OUTPUT

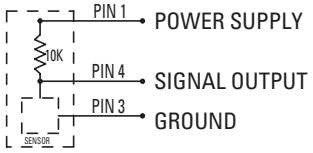


Signal 0 = Voltage at pin 4 = 0V
Signal 1 = Voltage at pin 4 > (Vs – 2.2V)

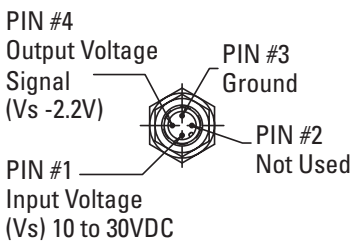
TYPICAL "PPD" OUTPUT



Output Circuit Wiring Instuctions



Connector Detail



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

MINIMUM PILOT PRESSURE REQUIREMENTS

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)

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

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Notes

Eaton
Hydraulics Group USA
14615 Lone Oak Road
Eden Prairie, MN 55344
USA
Tel: 952-937-9800
Fax: 952-294-7722
www.eaton.com/hydraulics

Eaton
Hydraulics Group Europe
Route de la Longeraie 7
1110 Morges
Switzerland
Tel: +41 (0) 21 811 4600
Fax: +41 (0) 21 811 4601

Eaton
Hydraulics Group Asia Pacific
Eaton Building
4th Floor, No.7 Lane280 Linhong Rd.
Changning District
Shanghai 200335
China
Tel: (+86 21) 5200 0099
Fax: (+86 21) 2230 7240

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