

EATON

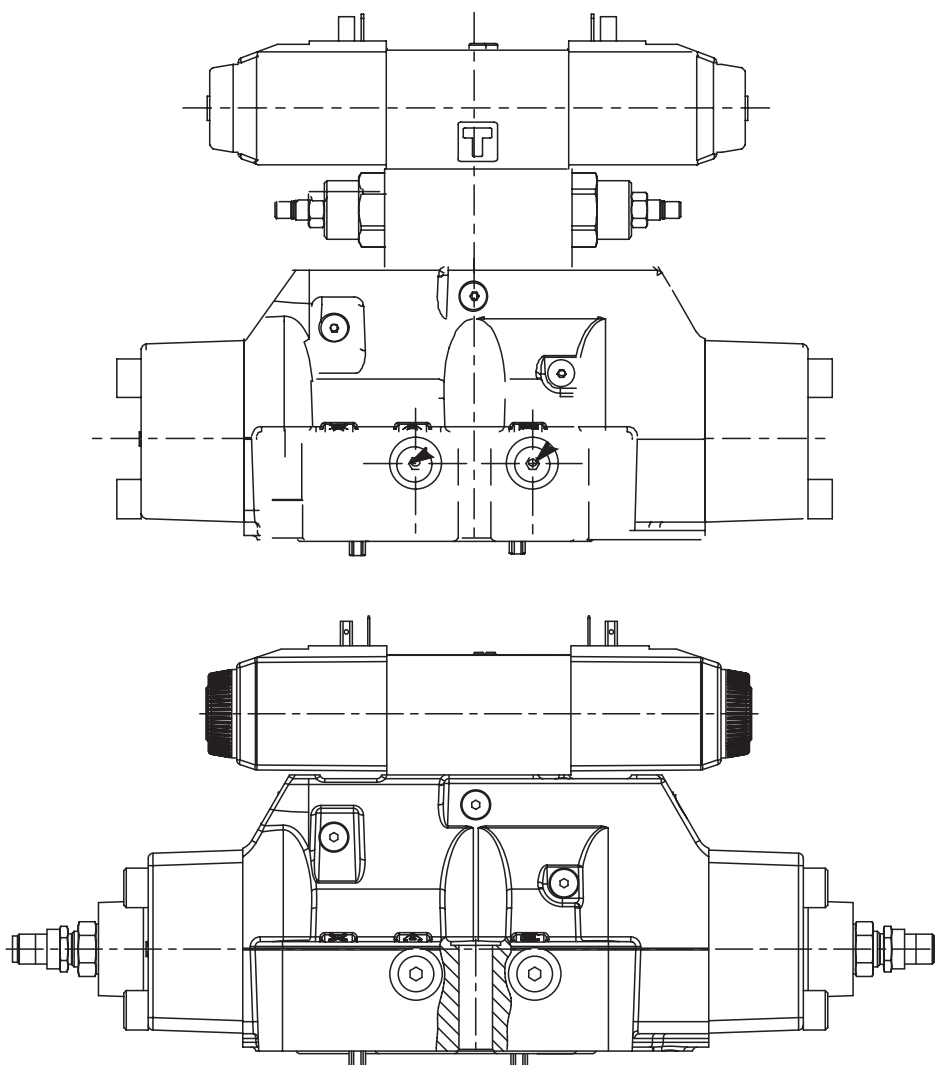
Vickers

Pilot Operated Directional Valves

Catalog

DG3V-8: 700 l/min (185
USgpm) 350 bar (5000 psi)

DG5V-8: 700 l/min (185
USgpm) 350 bar (5000 psi)
NFPA D08, ISO-4401-08,
CETOP 8



Introduction

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-S - DG4V-3S-60 standard performance D03 pilot valve 100 bar (1450 psi) tank line rating.
- DG5V-8-H - DG4V-3-60 high performance D03 pilot valve 210 bar (3000 psi) tank line rating.

Each valve contains a main-stage 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.
- The DG3V and DG5V are 100% interchangeable with previous H8 design valves.

Service Information

Refer to specific Eaton parts drawing for service parts information.

Order by literature number.

DG3V-8	5007.03/EN/0196/S
DG5V-8-*S	5007.04/EN/0196/S
DG5V-8-*H	5007.04/EN/0196/S

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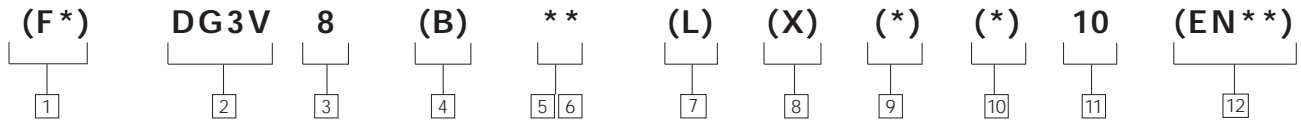
DG5V-8 Pilot Operated Directional Valves

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Model Codes

DG3V-8 Remote Pilot

Operated Directional Valves



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 all ports. (See minimum pilot pressure requirements on page 6.)

3 Valve Size

8 – Valve size CETOP 8, NFPA D08

4 Gauge Ports

Blank - .4375-20 UNF-2B Thread

B -1/4 BSP Thread

5 Spool Types

0 – Open to T all ports

1 – Open P&A to T, closed B

2 – Closed to T all ports

3 – Closed P&B, open A to T

4 – Tandem P to T, closed crossover

6 – Closed P only, open A&B to T

7 – Open P to A&B, closed T

8 – Tandem P to T, open crossover

9 – Open to T all ports over tapers

11 – Open P&B to T, closed A

31 – Closed P&A, open B to T

33 – Closed P, open A&B to T over tapers

52 – Closed center, regen. by operator 'A'

521 – Closed center, regen. by operator 'B'

521 – Closed center, regen. by operator 'B'

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521 – Closed center, regen. by operator 'B'

7 Left Hand Build

L - A Models only, omit if not required.

8 Fast Response

(Omit for standard low shock models.)

X - Not recommended for pilot-pressures above 210 bar (3000 psi).

9 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 A, C & Blank (no spring) models)

8 - Stroke adjusters on cylinder 'B' end only (available on A, C, & Blank (no spring) models)

27 - If both are required (available on A, C, & Blank (no spring) models)

28 - If both are required (available on AL left hand

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10 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

11 Design Number

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

12 Special Modifications

(Omit if not required.)

Ratings

MAX. FLOW W/OUT MALFUNCTION*	MAX. FATIGUE PRESSURE (PORTS P, A, B & T)	MAX. OPERATING PRESSURE	MAX. OPERATING PRESSURE (PORTS T & Y)	MOUNTING PATTERN
L/min (USgpm)	bar (psi)	bar (psi)		
To 700 (185)	350 (5000)	350 (5000)	350 (5000)	CETOP 8 ISO 4401 SIZE 8 NFPA D08

* See malfunction flow curves on page 7.

Model Description/Performance Characteristics

General Description

DG3V-8 models are single stage remote pilot operated directional control valves. These valves are generally used to control the direction of flow in a hydraulic circuit. This in turn would control the movement of a work cylinder or the rotation of a fluid motor.

Installation Data

Drain connection must be piped directly to tank through a surge free line so there will be no back pressure at this port.

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 pressure 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 pressure fails or falls below the required minimum, the spool will spring return to the center position. Pilot pressure is not available through the use of an integral check valve. Pressure centered valves have a drain port "W" and subplate 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 piped 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 pilot pressure is removed on no-spring models, the spool remains in the last position attained provided there is no unusual shock, vibration, pressure transients and the spool axis is horizontal.

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.

Port connections are made by mounting the valves on a subplate or manifold having mounting dimensions which conform to NFPA-D08/D10 (ISO-4401-08/10) pattern.

Shift Times

Shift times are defined as the time from pilot pressure application/removal to the point of the start 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 pressure. (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 pilot valve drain line serving these and other valves can be of sufficient magnitude to cause inadvertent shifting of these valves. This is particularly critical in the no-spring type valves. Separate drain lines or a vented drain manifold with a continuous downward path to tank is necessary. This applies to connection "Y" on spring offset valves where "Y" is piped as a drain for pressure centered models. Drain connection "W" must be piped directly to tank through a surge free line so there will be no back pressure at drain.

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.

If used as other than a normal 4-way valve, consult your Eaton representative.

MINIMUM PILOT PRESSURE REQUIREMENTS

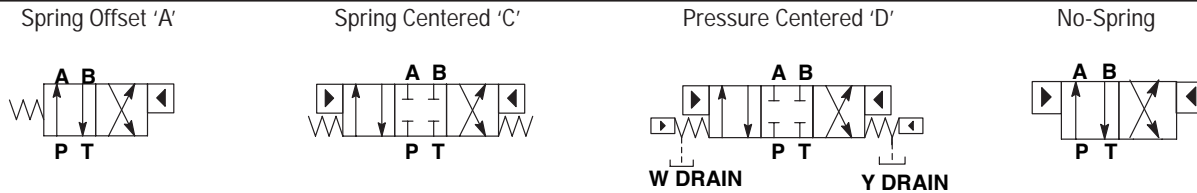
Spool Type	Pilot Pressure bar (psi) p yp	
	Blank, A, C Models	D Models
Closed center	10 (150)	P to A: 12 (175) P to B: 21 (300)
Open center	5 (75)	P to A: 10 (150) P to B: 10 (150)

Spool Type and Center Position

SPOOL TYPE AND CENTER POSITION

Spool Type	Center Position	Spool Type	Center Position	Spool Type	Center Position	Spool Type	Center Position	Spool Type	Center Position
0		3		7		11		52	(Below)
1		4	(Closed Crossover) 	8	(Open Crossover) 	31		521	(Below)
2		6		9		33			

GRAPHICAL SYMBOLS



FLOW RATINGS

Maximum flow without malfunction	See malfunction flow curves on page 7.
Maximum fatigue pressure (P, A, B & T ports)*	350 bar (5000 psi)
Maximum operating pressure (P, A, B & X ports)	350 bar (5000 psi)
Maximum operating pressure (T & Y ports)	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.

Curves

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					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
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.

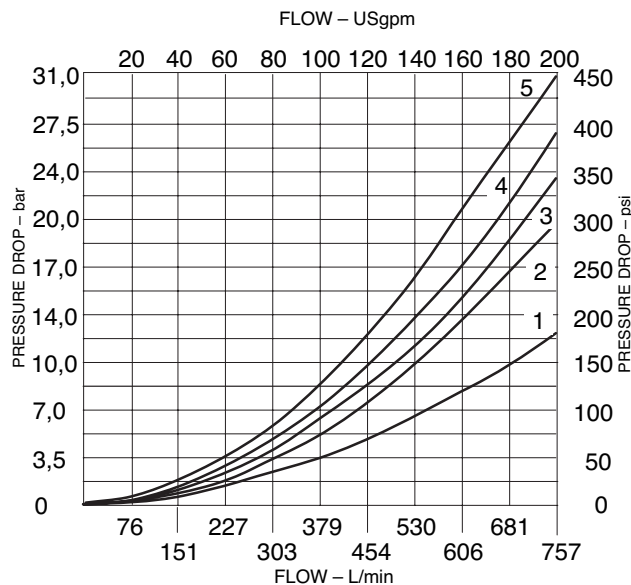
2. For any other flow rate (Q_1), the pressure drop (ΔP_1) will be approximately:
 $\Delta P_1 = P(Q_1/Q)^2$.

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

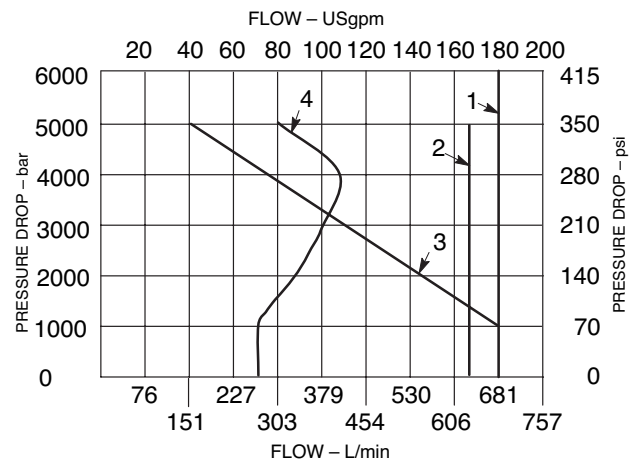
4. For any other specific gravity (G_1), the pressure drop (ΔP_1) will be approximately: $\Delta P_1 = \Delta P(G_1/G)$.

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

Pressure Drop Curves



Malfunction Flow Curves

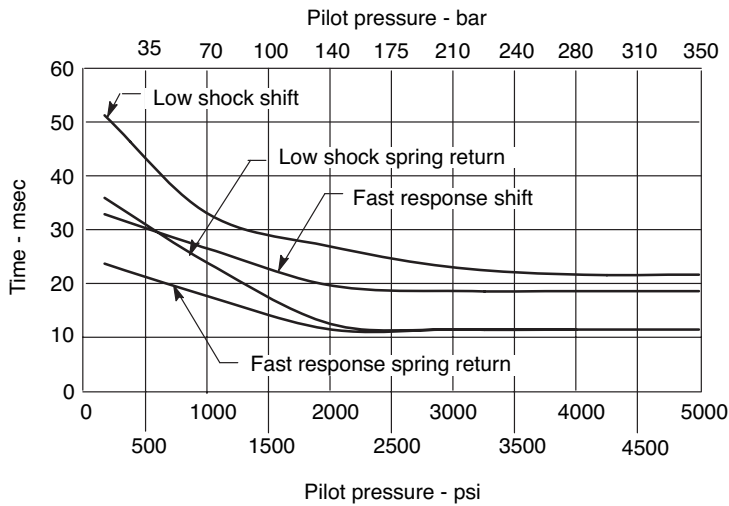


Response Time

Response Time

The response time shown in the charts are defined as the time between pilot pressurization/de-pressurization and the initial change in the inlet port pressure.

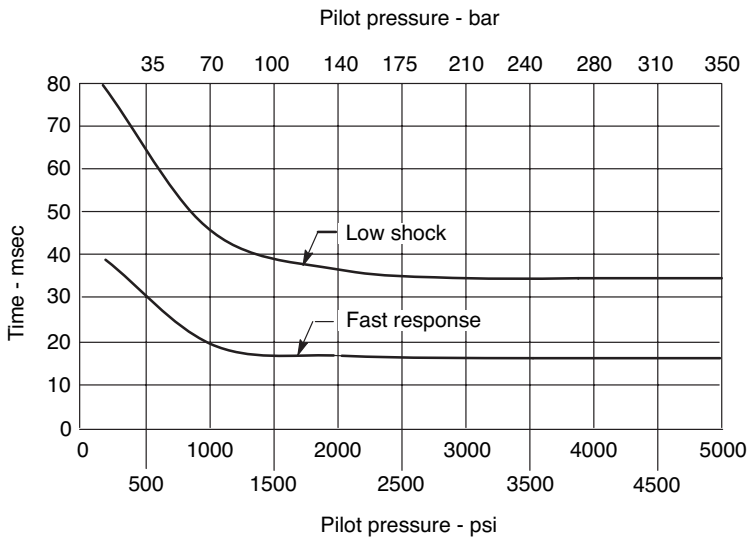
Offset to Offset



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)

See malfunction flow curves on page 7.

350 bar (5000 psi)

350 bar (5000 psi)

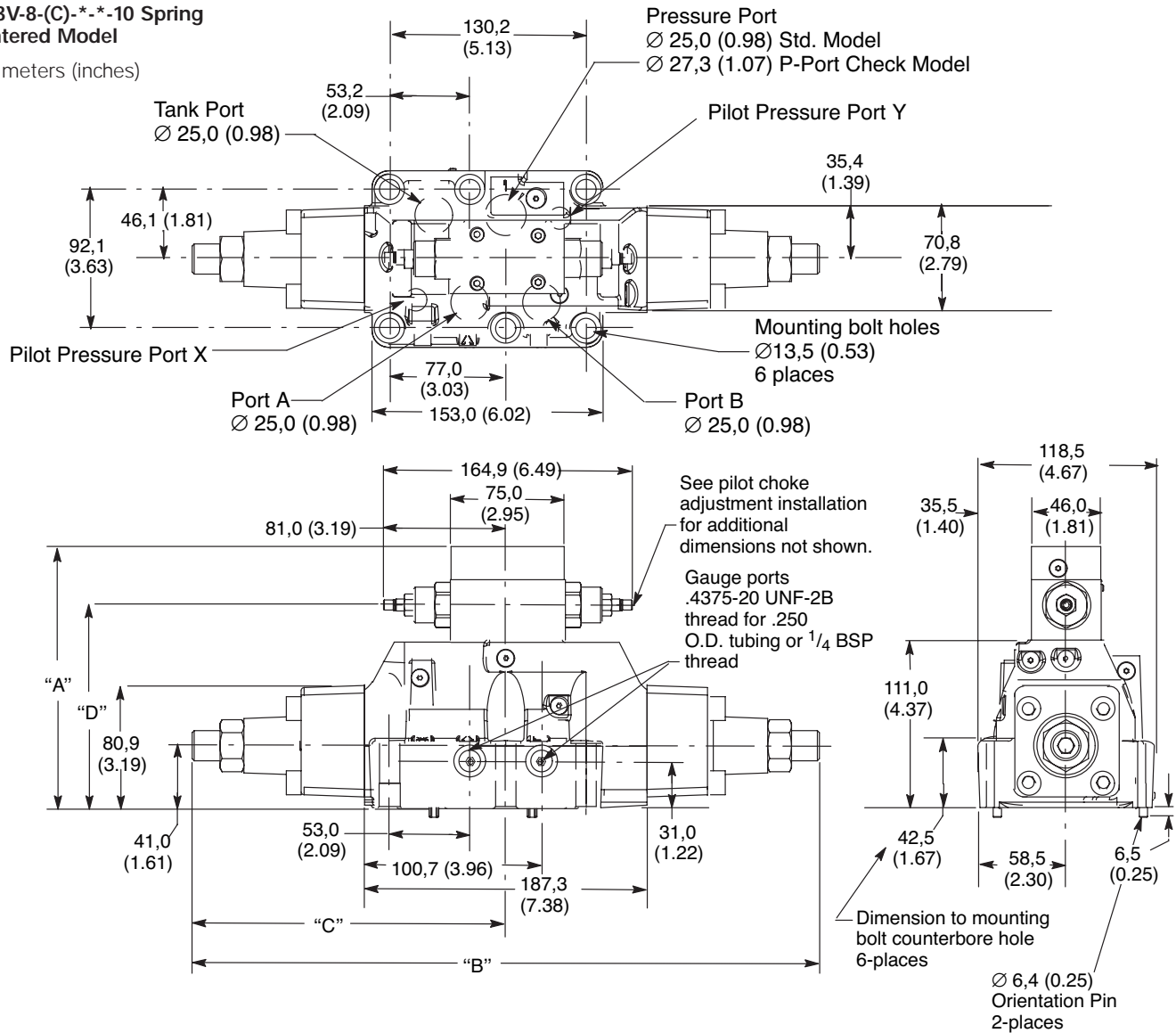
350 bar (5000 psi)

Conforms to NFPA/T2.6.1 R1-1991
at fatigue pressure rating of the

Installation Dimensions

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

Millimeters (inches)



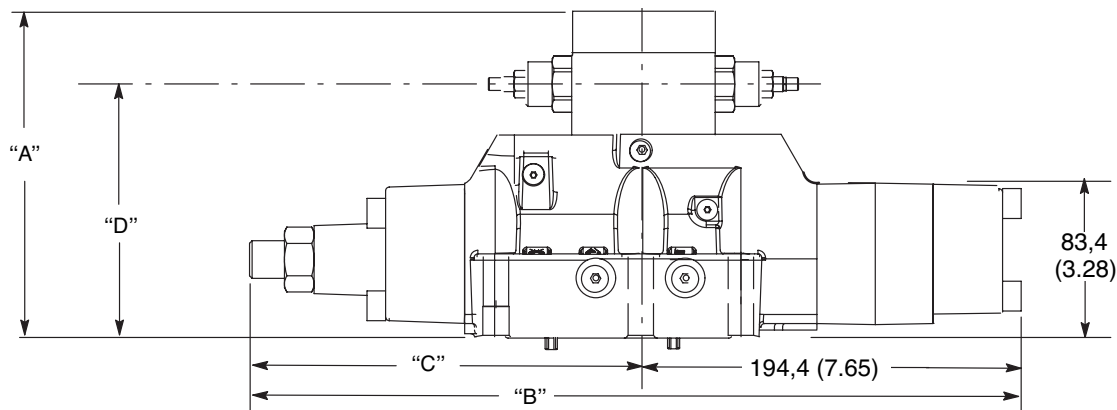
SPOOL CONTROL MODIFICATIONS

	"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)

Installation Dimensions

DG3V-8-(L)-*-*-10 Spring Offset Model

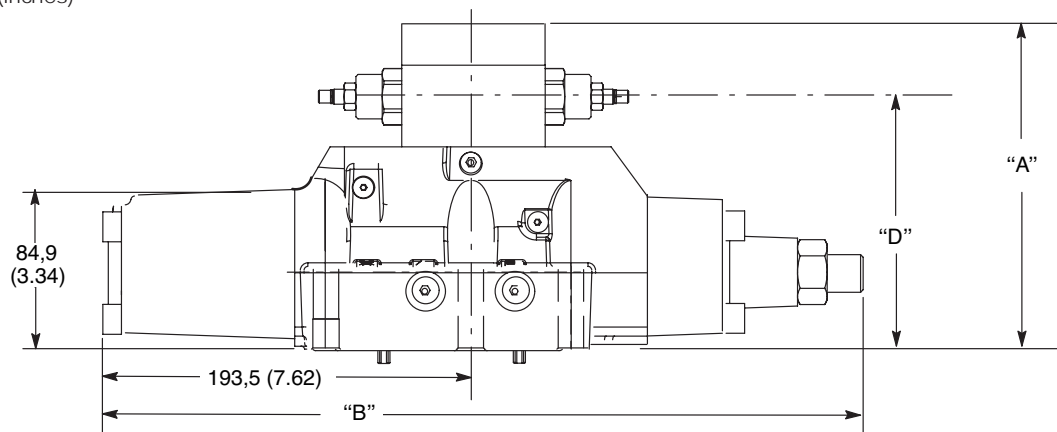
Millimeters (inches)



SPOOL CONTROL MODIFICATIONS	"A" DIMENSION	"B" DIMENSION	"C" DIMENSION	"D" DIMENSION (PILOT CHOKE ADJUSTMENT)
Without pilot choke or stroke adjustment	133,0 (5.23)	265,3 (10.44)	132,6 (5.22)	–
Without pilot choke or stroke adjustment (left-hand build)	133,0 (5.23)	326,9 (12.87)	194,4 (7.65)	134,2 (5.28)
Pilot choke adjustment	173,0 (6.81)	265,3 (10.44)	132,6 (5.22)	134,2 (5.28)
Stroke adjustment on cyl. 'A' (left-hand build)	133,0 (5.23)	402,3 (15.83)	208,0 (8.18)	–
Stroke adjustment on cyl. 'B'	133,0 (5.23)	340,6 (13.40)	132,6 (5.22)	–
Pilot choke and stroke adjustment on cyl. 'A' (left-hand build)	173,0 (6.81)	340,6 (13.40)	208,0 (8.18)	134,2 (5.28)
Pilot choke and stroke adjustment on cyl. 'B'	173,0 (6.81)	340,6 (13.40)	132,6 (5.22)	134,2 (5.28)

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

Millimeters (inches)

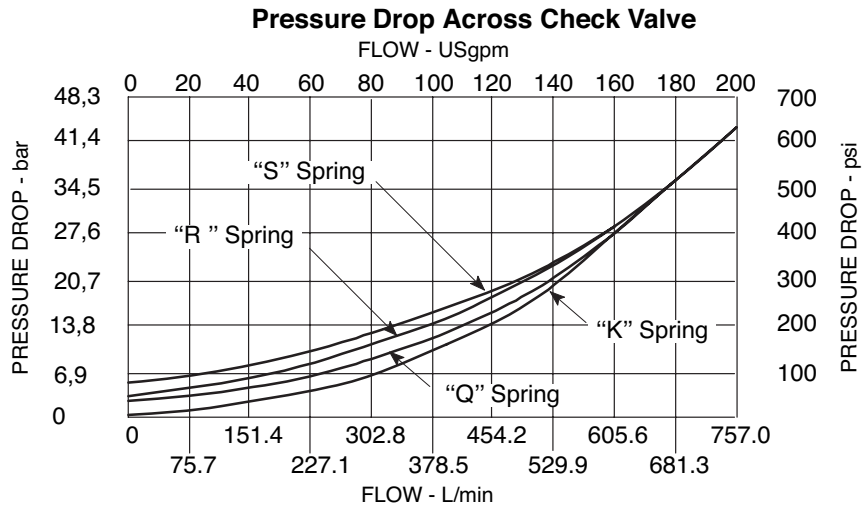


Optional Features

Integral Check Valves

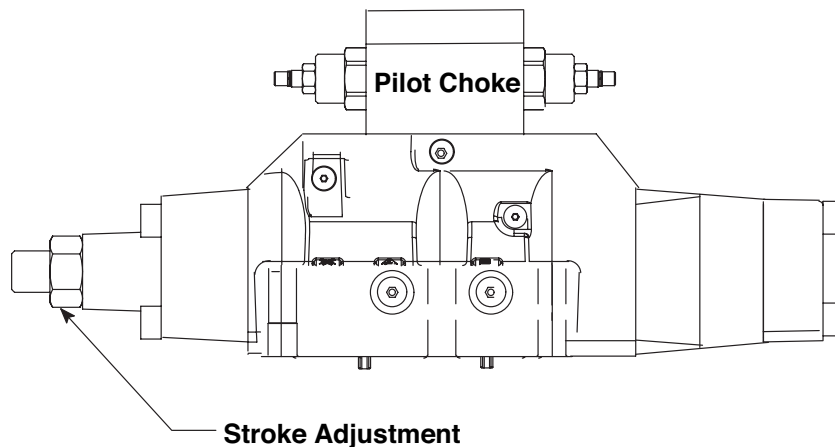
For internal pilot pressure, an integral pressure port check valve is available. This back pressure will be present at the cylinder ports. The pilot pressure generated is the total of: P→T drop through the valve in center condition, pressure drop through the check valve, plus the pressure at the tank 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.



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 lock-nuts 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

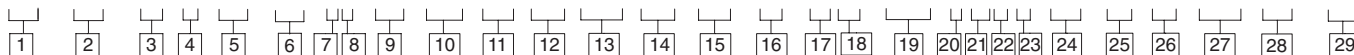
Stroke adjustment limits movement of the mainstage spool. Backing off the jamnut and turning the adjusting screw inward decreases spool stroke. See spool control modifications in model code.)

Model Codes

DG5V-8 Remote Pilot

Operated Directional Valves

(F*)-DG5V- 8 - * - (R) - (B) - ** - (L) - (*) - (X) - (*) - P** - (E) - (T) - (*) - (VM) - (S*) - * ** * * - (L) - (*) - ** - (***) - 10 - (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; pilot operated. Pressure rating 350 bar (5000 psi) for all ports. (See minimum pilot pressure requirements on p. 15.)

3 Valve Size

8 – Valve size CETOP 8, NFPA D08

4 Pilot Valve Type

H – CETOP 3, High performance

S – CETOP 3, Standard performance

5 Reducer Module

See Fast Response restriction. (Omit if not required.)

6 Gauge Ports

Blank – .4375-20 UNF-2B Thread

B – 1/4 BSP Thread

7 Spool Types

0 – Open center (all ports)

1 – Open center (P to A & T) B blocked

2 – Closed center (all ports)

3 – Open center (P & B blocked) A to T

4 – Tandem center (P to T) closed crossover

6 – Closed center (P blocked) A & B to T

7 – Open center (P to A & B) T blocked

8 – Tandem center (P to T) open crossover

9 – Open center, partial to all ports

11 – Open center (P to B & T) A blocked

31 – Closed center (P & A blocked) B to T

33 – Closed center, bleed A & B to T

52 – Closed center (All ports) regen. towards workport A

521 – Closed center (All ports) regen. towards workport B

8 Spool Spring Arrangement

A – Spring offset to 'A' port

B – Spring centered, with solenoid 'A' removed

C – Spring centered

D – Pressure centered

F – Spring offset to 'A' port, shift to center

N – No spring detented (pilot valve only)

9 Left Hand Build

L – Single solenoid models only, omit if not required.

10 Manual Override Options

Blank – Plain override in solenoid ends only

H – Waterproof override in solenoid ends only

H2 – Waterproof override in both ends of single solenoid

P2 – Plain override in both ends of single solenoid

Y – Lockable manual override in solenoid ends only (DC models only)

Z – No override in either end

11 Fast Response

X – Not recommended for pilot pressures above 210 bar (3000 psi). (Omit for standard low shock models.)

▲ When the standard performance pilot is selected and pilot pressure is above 3000 psi, the reducer module is required to limit high drain line pressure transients generated during shifting.

12 Spool Control Modifications

(Omit if not required.)

1 – Stroke adjustment (both ends) (not available on D models)

2 – Pilot choke adjustment (available on all models)

3 – Pilot choke and stroke adjusters (both ends) (not available on D models)

7 – Stroke adjusters on A port end only (not available on D models)

8 – Stroke adjusters on B port end only (available on all models)

27 – 2 and 7 combined (not available on D models)

28 – 2 and 8 combined (available on all models)

13 Main Stage Spool Monitoring Switch

(Omit if not required.)

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)

* 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).

14 External Pilot Pressure

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

15 Internal Pilot Drain

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

16 Check Valve in Pressure Port

(Omit if not required.)

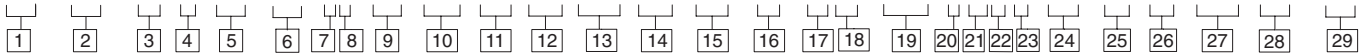
K – 0,35 bar (5 psi) check

Q – 2,42 bar (35 psi) check

R – 3,45 bar (50 psi) check

S – 5,20 bar (75 psi) check

(F*)-DG5V- 8 - * - (R) - (B) - ** - (L) - (**)- (X) - (*) - P** - (E) - (T) - (*) - (VM) - (S*) - * * * * - (L) - (*) - ** - (***) - 10- (EN***)



17 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 main-stage porting.

18 Heading Electrical Flag Symbol

M - Features and options for pilot valve.

19 Pilot Valve Monitoring Switch

S3 - Limit switch normally open, wired to electrical connector with PA/PB/PA5 (H piloted models only)

S4 - Limit switch normally closed, wired to electrical connector with PA/PB/PA5 (H piloted models only)

S5 - Limit switch normally closed, wired to electrical connector with PA/PB/PA5 (H piloted models only)

S6 - Position switch with U coils (H piloted models only)

20 Coil Type

F - Flying lead (required for wiring housing option)

KU - Top exit flying lead

P - Plug in

SP1 - Single 6.3mm spade

SP2 - Dual 6.3mm spade

U - ISO 4400 (DIN 43650)

X1 - Flameproof solenoids BASEEFA/CENELEC (S piloted models only)

X2 - Explosion proof solenoids CSA/UL (S piloted models only)

X3 - Explosion proof solenoids BASEEFA ExS (S piloted models only)

21 Electrical Connections

(F type coils only, omit if not required)

PA - Insta-plug, male receptacle only

PB - Insta-plug, male and female receptacle

PA3 - 3-pin connector

PA5 - 5-pin connector

T - Wired terminal block (wiring housing option also required)

28 Wiring Housing

W - 1/2" NPT threaded connection

J - 20mm threaded connection

G - 1/2" BSP threaded connection

23 Electrical Options

(Omit if not required)

U-type coils only

1 - Fitted connector

2 - Fitted connector and variable grommet

6 - Fitted connector with lights

24 Solenoid Indicator Lights

(Omit if not required)

25 Electrical Options

(DC voltages only, omit if not required)

D1 - Encapsulated diode (industrial applications)

D2 - Encapsulated diode (mobile applications)

D7 - Encapsulated tranzorb

26 Coil Identification Letter

See electrical information on page 25 for voltages available. Others available upon request.

27 Pilot Valve Port Orifices

(Omit if not required)

28 Design Number

29 Special Modifications

(Omit if not required)

Ratings

MAX. FLOW W/OUT MALFUNCTION*	MAX. FATIGUE PRESSURE (PORTS P, A, B & T)	MAX. OPERATING PRESSURE	MAX. OPERATING PRESSURE (PORTS T & Y)	MOUNTING PATTERN
L/min (USgpm)	bar (psi)	bar (psi)		
To 700 (185)	350 (5000)	350 (5000)	350 (5000)	CETOP 8 ISO 4401 SIZE 8 NFPA D08

* See malfunction flow curves on page 16.

Model Description/ Performance Characteristics

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 pressure 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 pressure fails or falls below the required minimum, the spool will spring return to the center position. Pilot pressure 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 piped 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 start 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 pressure. (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 stick 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 continuously 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 pressure fails or falls below minimum requirements. Spring offset models return the spool to the offset position by pilot pressure when the solenoid is de-energized.

When no-spring detented models are de-energized, the pilot and main spools remain in their last 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.

MINIMUM PILOT PRESSURE REQUIREMENTS

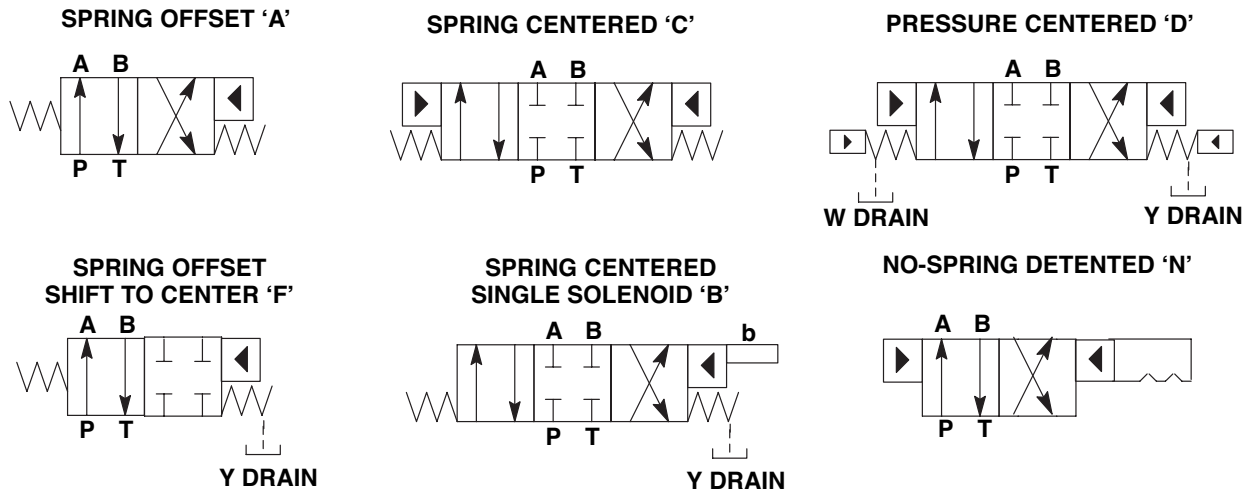
Spool Type	Pilot Pressure bar (psi)	
	A, B, C, F, N Models	D Models
Closed center	10 (150)	P to A: 12 (175) P to B: 21 (300)
Open center	5 (75)	P to A: 10 (150) P to B: 10 (150)

Spool Type and Center Position

SPOOL TYPE AND CENTER POSITION

Spool Type	Center Position	Spool Type	Center Position	Spool Type	Center Position	Spool Type	Center Position	Spool Type	Center Position
0		3		7		11		52	
1		4 (Closed Crossover)		8 (Open Crossover)		31		521	
2		6		9		33			

GRAPHICAL SYMBOLS



FLOW RATINGS

Maximum flow without malfunction	See malfunction flow curves on page 7.
Maximum fatigue pressure (P, A, B & T ports)*	350 bar (5000 psi)
Maximum operating pressure (P, A, B & X ports)	350 bar (5000 psi)
Maximum operating pressure (T & Y ports)§	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.

Curves

Pressure Drop & Malfunction Flow

The following table lists the appropriate pressure drop curve and malfunction flow curve 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:
 $\Delta P_1 = \Delta P(Q_1/Q)^2$.

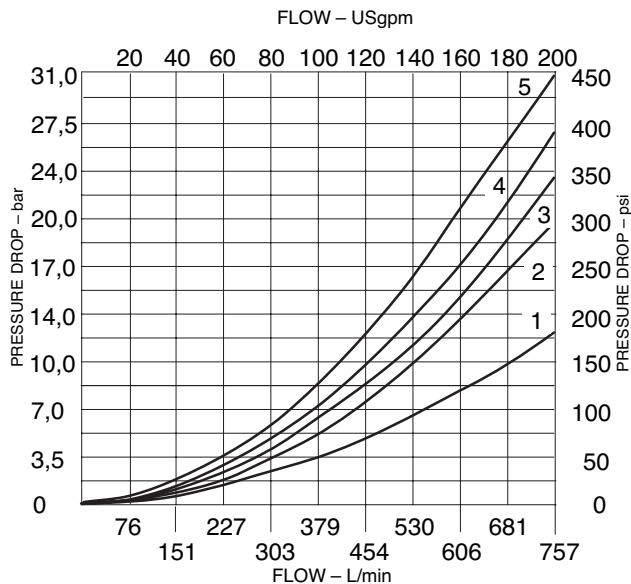
3. For any other viscosity(s), the pressure drop (ΔP), will change as follows:

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

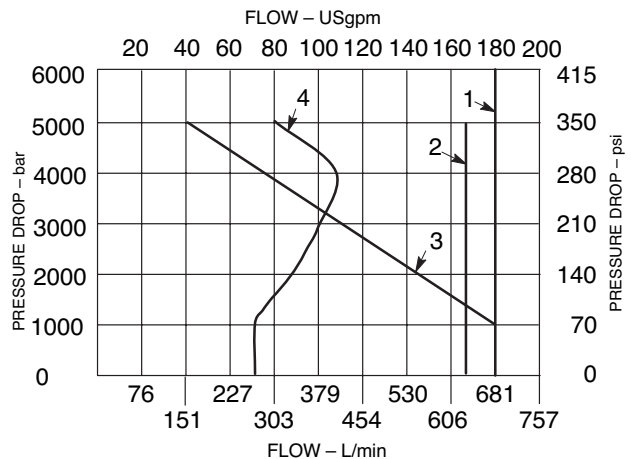
4. For any other specific gravity (G_1), the pressure drop (ΔP_1) will be approximately: $\Delta P_1 = \Delta P(G_1/G)$.

SPOOL TYPE	PRESSURE DROP CURVE NUMBER					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
52	2	–	4	4	–	1
521	2	4	4	–	–	1

Pressure Drop Curves



Malfunction Flow Curves



Shift Response Times

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.

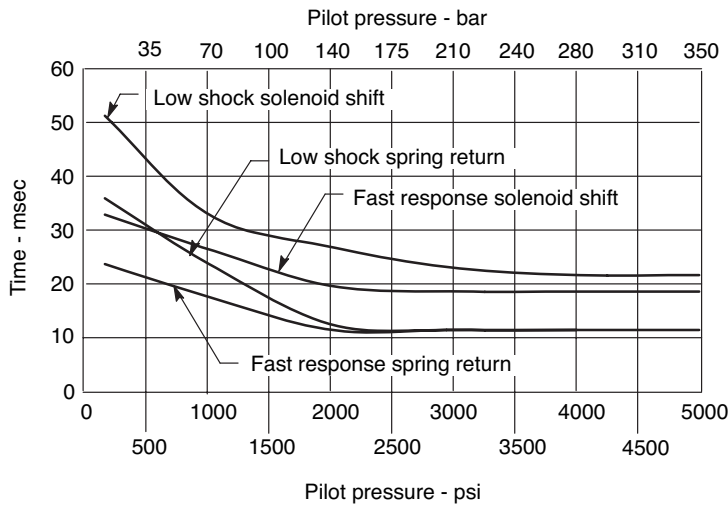
Solenoid Energizing

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.)

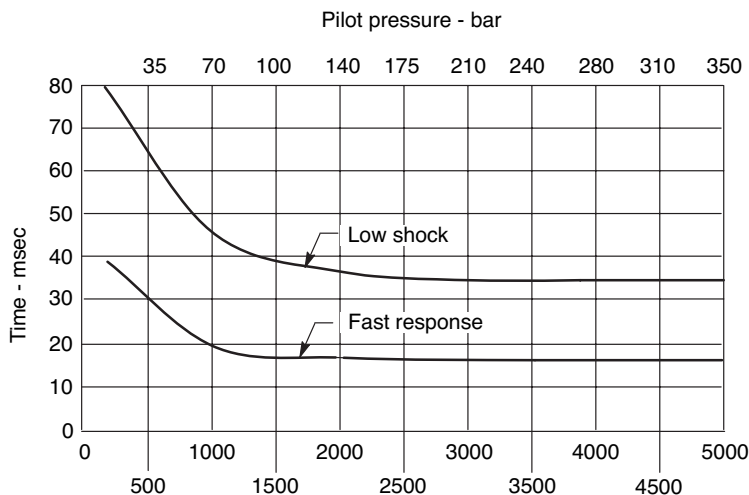
Offset to Offset



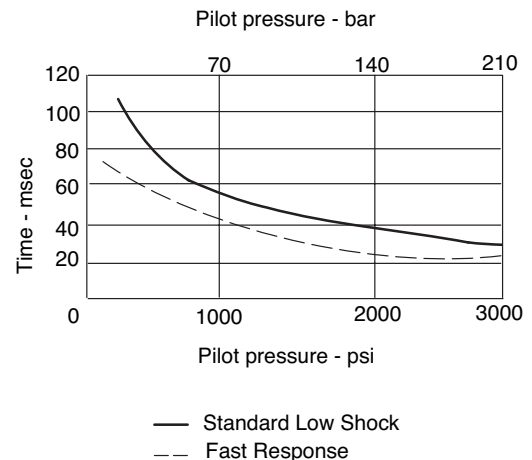
SPRING CENTERING TIMES @ RATED FLOW & PRESSURE

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)



Pilot Valves

General Description

Pilot valves are identified in the model code by the following letters: "S" Standard or "H" High Performance. The pilot valves can be ordered to match a variety of mainstage spool types and valve bodies.

The chart below shows ordering information for each pilot valve. For example, to order a High Performance pilot "H" with a Spring Offset mainstage "A", use the following model code: DG4V-3-2A-M-* -60

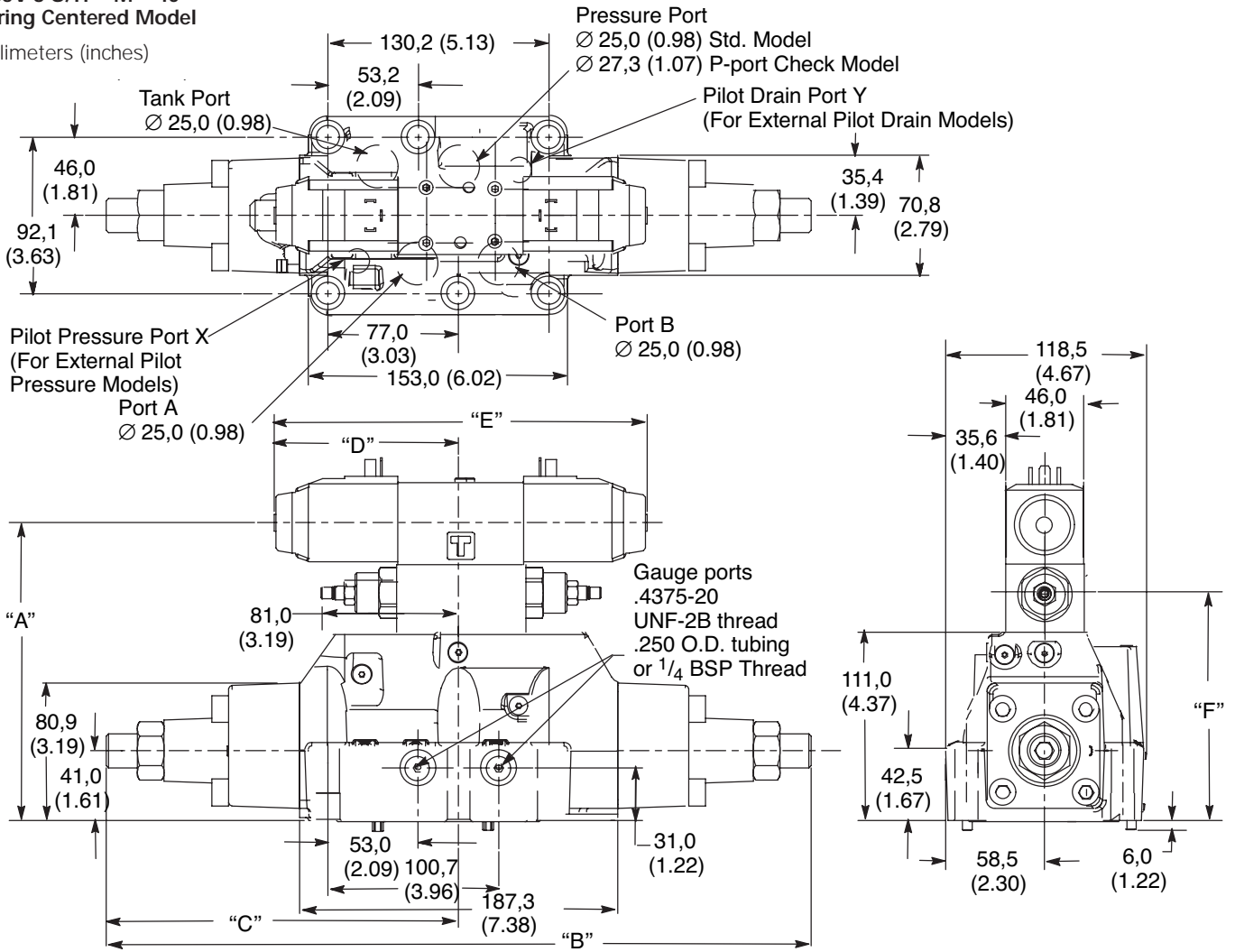
VALVE MODEL CODE:
HIGH PERFORMANCE/
STANDARD

VALVE MODEL CODE: HIGH PERFORMANCE/ STANDARD	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE
DG5V-8-S/H-*A-*M-* -10	All except 4 & 8	DG4V-3(S)-2A-M-* -60
	4A & 8A only	DG4V-3(S)-2AL-VM-* -60
	4AL & 8AL only	DG4V-3(S)-2A-VM-* -60
DG5V-8-S/H-*B-*M-* -10	All except 4 & 8	DG4V-3(S)-6B-M-* -60
	4B & 8B only	DG4V-3(S)-6BL-VM-* -60
	4BL & 8BL only	DG4V-3(S)-6B-VM-* -60
DG5V-8-S/H-*C-*M-* -10	All except 4 & 8	DG4V-3(S)-6C-M-* -60
	4C & 8C only	DG4V-3(S)-6C-VM-* -60
DG5V-8-S/H-*D-*M-* -10	All except 4 & 8	DG4V-3(S)-7C-M-* -60
	4D & 8D only	DG4V-3(S)-7C-VM-* -60
DG5V-8-S/H-*F-*M-* -10	All except 4 & 8	DG4V-3(S)-6F-M-* -60
	4F & 8F only	DG4V-3(S)-6FL-VM-* -60
	4FL & 8FL only	DG4V-3(S)-6F-VM-* -60
DG5V-8-S/H-*N-*M-* -10	All except 4 & 8	DG4V-3(S)-6N-M-* -60
	4N & 8N only	DG4V-3(S)-6N-VM-* -60

Installation Dimensions

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

Millimeters (inches)

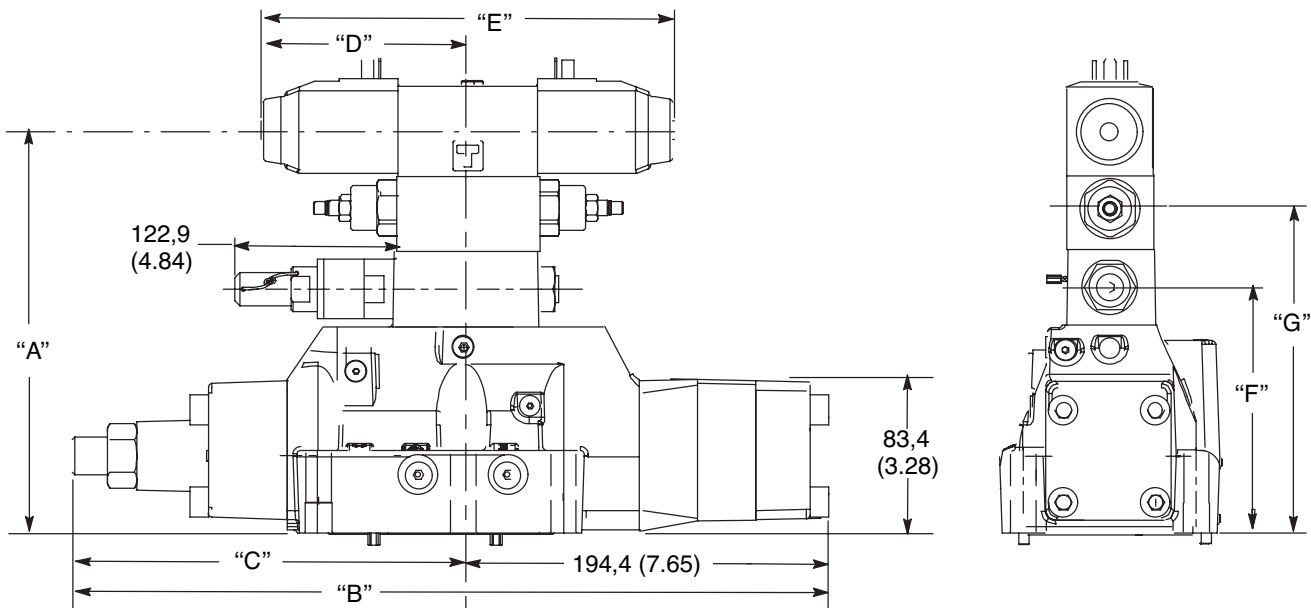


Spool Control Modifications	Dimensions									
	"A"	"B"	"C"	"D"		"E" pilot				"F"
				AC Sol.	DC Sol.	Dual Solenoid		Single Solenoid		
						AC Sol.	DC Sol.	AC Sol.	DC Sol.	
Without pilot choke or stroke adjustment	135,6 (5.33)	265,3 (10.44)	132,6 (5.22)	98,8 (3.88)	108,8 (4.28)	200,0 (7.87)	220,0 (8.66)	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)	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. 'A'	135,6 (5.33)	340,6 (13.40)	208,0 (8.18)							98,8 (3.88)
Stroke adjust on cyl. 'B'			132,6 (5.22)	-						
Pilot choke and stroke adjust. on cyl 'A'	175,6 (6.91)	340,6 (13.40)	208,0 (8.18)	98,8 (3.88)	108,8 (4.28)	200,0 (7.87)	220,0 (8.66)	146,5 (5.76)	156,5 (6.16)	134,2 (5.28)
Pilot choke and stroke adjust. on cyl. 'B'			132,6 (5.22)							
Pilot choke and stroke adjust. on both ends			415,9 (16.37)							

Installation Dimensions

DG5V-8-A(L)-*-*-10 Spring Offset Model

Millimeters (inches)

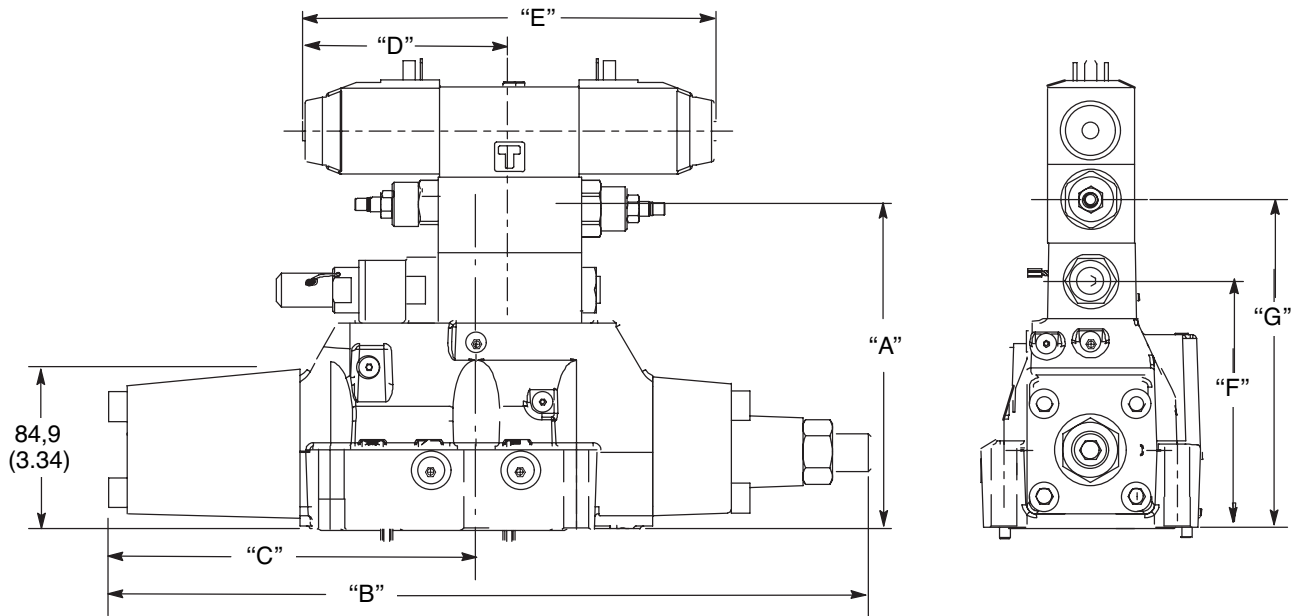


Spool Control Modifications	Dimensions										
	"A"	"B"	"C"	"D"		"E" pilot				"F" Reducer Module	"G" Pilot Choke
				AC Sol.	DC Sol.	Dual Solenoid		Single Solenoid			
						AC Sol.	DC Sol.	AC Sol.	DC Sol.		
Without pilot choke or stroke adjustment	175,6 (6.91)	265,3 (10.44)	132,6 (5.22)	98,8 (3.88)	108,8 (4.28)	200,0 (7.87)	220,0 (8.66)	146,5 (5.76)	156,5 (6.16)	134,2 (5.28)	-
Stroke adjustment (both ends)		415,9 (16.37)	208,0 (8.18)								-
Pilot choke adjustment	215,6 (8.48)	265,3 (10.44)	132,6 (5.22)								-
Stroke adjust. on cyl. 'A'	175,6 (6.91)	340,6 (13.40)	208,0 (8.18)								-
Stroke adjust on cyl. 'B'			132,6 (5.22)								-
Pilot choke and stroke adjust. on cyl 'A'	215,6 (8.48)		208,0 (8.18)								134,2 (5.28)
Pilot choke and stroke adjust. on cyl. 'B'			132,6 (5.22)								134,2 (5.28)
Pilot choke and stroke adjust. on both ends		415,9 (16.37)	208,0 (8.18)								134,2 (5.28)

Installation Dimensions

DG5V-8-D-*-*-10 Pressure Centered Model

Millimeters (inches)



Spool Control Modifications (without Reducer)	Dimensions										
	"A"	"B"	"C"	"D"		"E" pilot				"F"	"G"
				AC Sol.	DC Sol.	Dual Solenoid		Single Solenoid			
						AC Sol.	DC Sol.	AC Sol.	DC Sol.		
Reducer Module	Pilot Choke										
Without pilot choke or stroke adjustment	135,6 (5.33)	326,1 (12.83)	193,5 (7.61)	98,8 (3.88)	108,8 (4.28)	200,0 (7.87)	220,0 (8.66)	146,5 (5.76)	156,5 (6.16)	-	-
Stroke adjust on cyl. 'B'	175,6 (6.91)	401,5 (15.80)									
Pilot choke and stroke adjust. on cyl. 'B'											
(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'	215,6 (8.48)	401,5 (15.80)									
Pilot choke and stroke adjust. on cyl. 'B'											

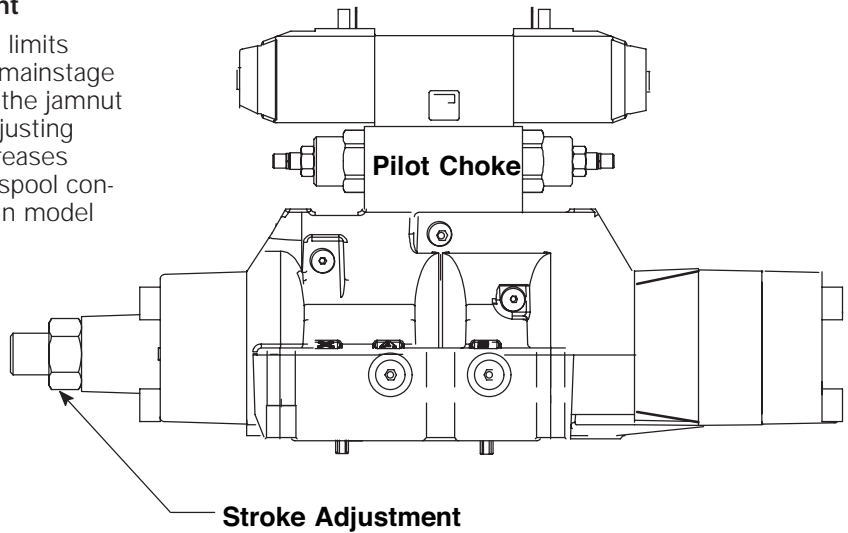
Optional Features

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 lock-nuts 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.

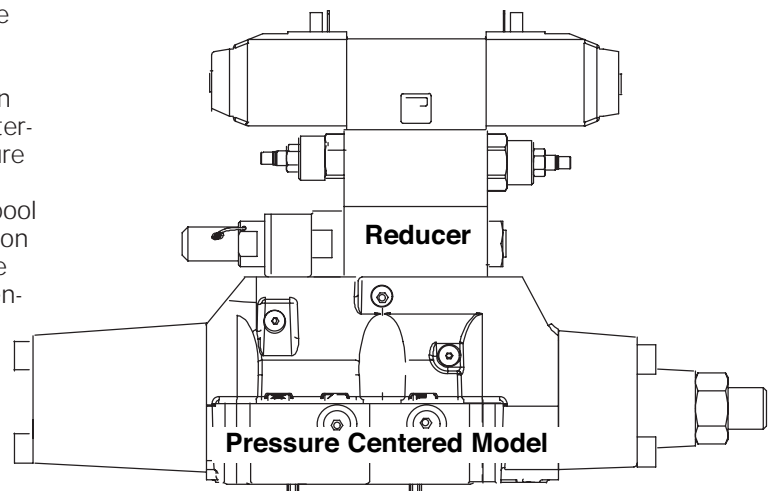


Reducer Module DGMX2-3-PP-FW-S-40-EN91

The reducer module is required for piloted models when pilot pressure exceeds 210 bar (3000 psi). These two-stage spool valves maintain a reduced outlet pressure against variations in inlet pressure. These valves are able to act as relief valves (at 50% of the maximum flow) to prevent excess pressure being developed when an actuator is subject to a reactive load.

Pressure Centered Models

This option provides faster spring centering time by using pilot pressure to center the spool. The centering springs are used in addition to pilot pressure to ensure positive centering of the spool. The valve spool is returned to center position by pilot pressure and centering springs. If pilot pressure fails or falls below the required minimum, the spool will return to center position at minimum pilot pressure flow rates for pressure centered valves.



Optional Features (continued)

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).

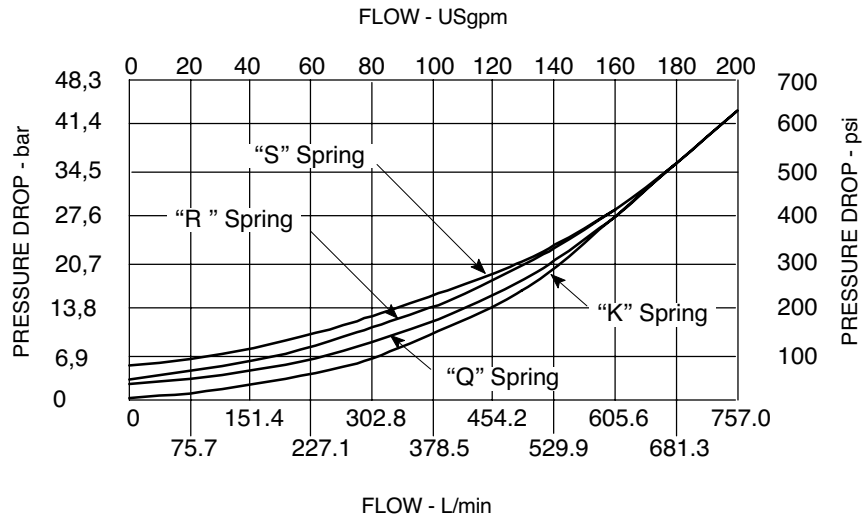
X - Fast Response

Use of this option decreases the shift time and increases the system shock generation. This requires the removal of an orifice plug within the mainstage body. It is available on all models by adding "X" to the model code. Example: DG5V-8-(*)-2C-X-(*)-10



When a standard performance pilot is selected and pilot pressure is above 3000 psi, the reducer module is required to limit high drain line pressure transients generated during shifting.

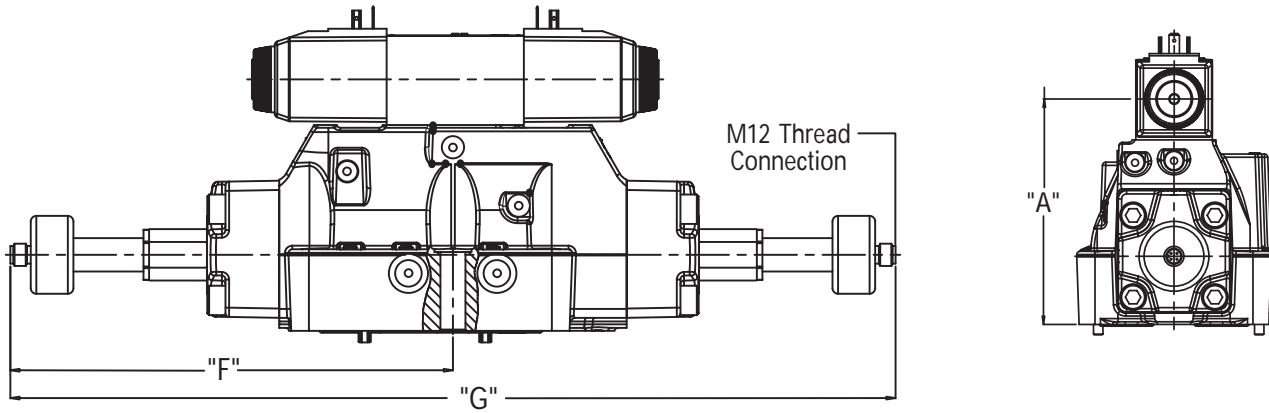
Pressure Drop Across Check Valve



Electrical Information

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/S-(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/S-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/S-(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/S-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/S-(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/S-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/S-(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/S-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/S-(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/S-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/S-(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/S-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/S-(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/S-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/S-(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/S-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/S-(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/S-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/S-(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/S-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/S-(B)-*D-(*)-PCB/PDB-(*)-(V)M-* -10	135.6[5.34]	193.5[7.62]	432.1[17.01]
DG5V-8-H/S-R-(B)-*D-(*)-PCB/PDB-(*)-(V)M-* -10	175.6[6.91]	193.5[7.62]	432.1[17.01]
DG5V-8-H/S-(B)-*D-(*)-2-PCB/PDB-(*)-(V)M-* -10	175.6[6.91]	193.5[7.62]	432.1[17.01]
DG5V-8-H/S-R-(B)-*D-(*)-2-PCB/PDB-(*)-(V)M-* -10	215.6[8.49]	193.5[7.62]	432.1[17.01]

Electrical Information (continued)

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

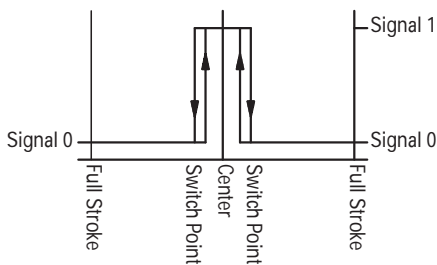
Millimeters (inches)

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 CIRCUIT PROTECTION)
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	0 °C TO +85 °C
WIRE CROSS-SECTIONAL AREA	4 X 0.5mm
TENSILE STRENGTH OF TRANSMIT CONDUIT p dyn.	315bar [4570psi]
CE DECLARATION OF CONFORMITY NO.	00 02 002 9 93
P-CHANNEL, CONTACT POSITIVE	

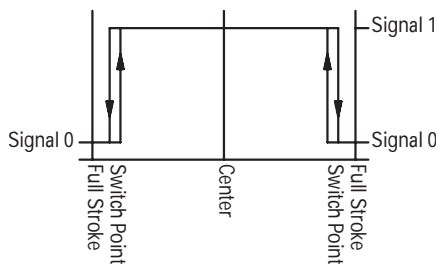
ATTENTION: EMC ONLY ENSURED WHEN USING SCREENED CABLES AND SCREENED PLUG CASING.

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



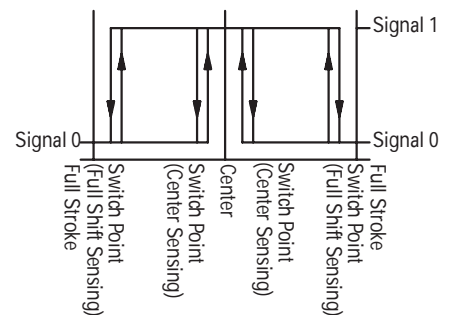
Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs - 2.5V)

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



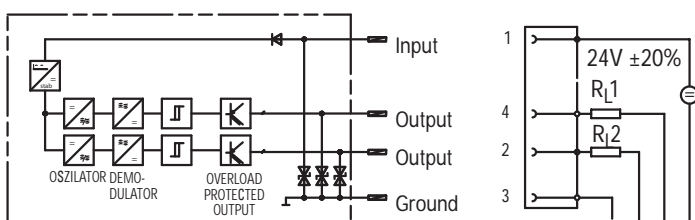
Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs - 2.5V)

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



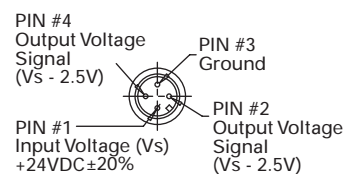
Signal 0 = Voltage at pin 2/4 < 1.8V
Signal 1 = Voltage at pin 2/4 > (Vs - 2.5V)

Electrical Schematic and Mating Connector Detail



$R_1, R_2 =$ e.g. Coil Resistance of the switch relay ≥ 60 OHMS

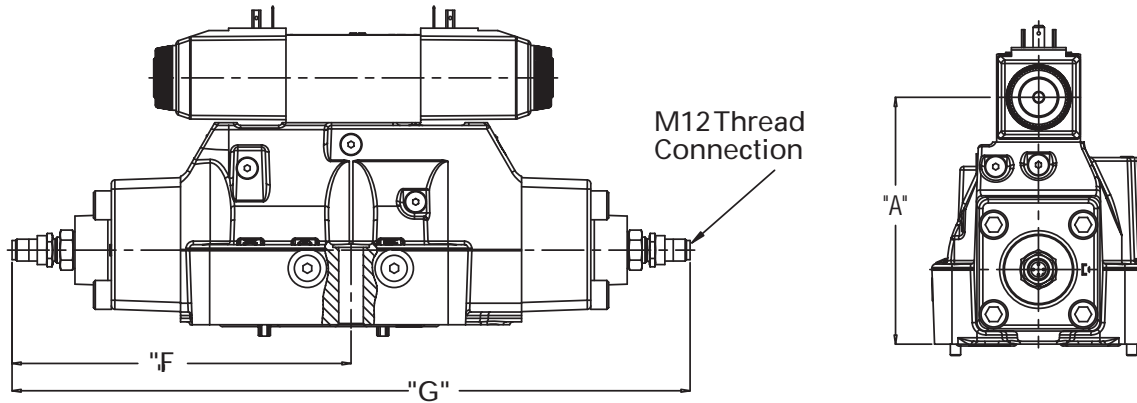
Connector Detail



Electrical Information (continued)

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/S-(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/S-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/S-(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/S-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/S-(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/S-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/S-(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/S-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/S-(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/S-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/S-(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/S-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/S-(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/S-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/S-(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/S-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/S-(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/S-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/S-(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/S-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/S-(B)-*D-(*)-PPB-(*)-(V)M-* -10	135.6[5.34]	193.5[7.62]	379.7[14.95]
DG5V-8-H/S-R-(B)-*D-(*)-PPB-(*)-(V)M-* -10	175.6[6.91]	193.5[7.62]	379.7[14.95]
DG5V-8-H/S-(B)-*D-(*)-2-PPB-(*)-(V)M-* -10	175.6[6.91]	193.5[7.62]	379.7[14.95]
DG5V-8-H/S-R-(B)-*D-(*)-2-PPB-(*)-(V)M-* -10	215.6[8.49]	193.5[7.62]	379.7[14.95]

Electrical Information (continued)

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

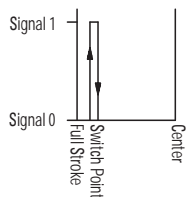
Millimeters (inches)

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 ELECTRO-MAGNETIC 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
SWITCH POINT = .050" ± .010" OF FULL STROKE	
HYSTERESIS:	.010" MAX.
SENSE TARGET:	FERROMAGNETIC STEEL, MINIMUM DIMENSIONS ARE .75" X .75" X .05" THICK
RISE/FALL TIME:	6.5/1.5 MICROSEC RI = 820 OHM, CI = 20 pF @ 8Vdc
OUTPUT LEAKAGE CURRENT:	10 mA MAXIMUM
OUTPUT VOLTAGE HIGH:	+Vs - 2.2Vdc MINIMUM
OUTPUT LOAD CURRENT:	200mA MAXIMUM
OPERATING PRESSURE:	5000 PSI RATING PER NFPA T2.6.1 7500 PSI MAX. CONNECTOR/CABLE TO WITHSTAND 5lb FORCE STRAIN ASSEMBLY TO BE CAPABLE OF 15lb/ft MIN. TORQUE APPLIED TO LOCKNUT
OPERATING TEMPERATURE:	-40° TO 230° F
HUMIDITY:	0% TO 100%

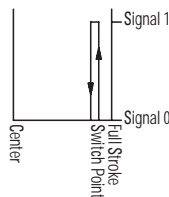
ATTENTION: EMC ONLY ENSURED WHEN USING SCREENED CABLES AND SCREENED PLUG CASING.

TYPICAL "PPA" OUTPUT



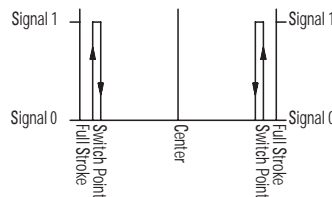
Signal 0 = Voltage at pin 4 = 0V
Signal 1 = Voltage at pin 4 > (Vs - 2.2V)

TYPICAL "PPB" OUTPUT



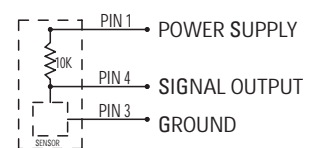
Signal 0 = Voltage at pin 4 = 0V
Signal 1 = Voltage at pin 4 > (Vs - 2.2V)

TYPICAL "PPD" OUTPUT

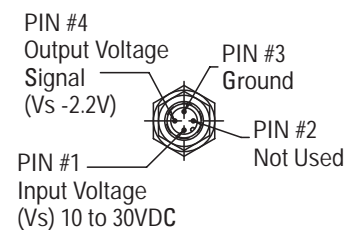


Signal 0 = Voltage at pin 4 = 0V
Signal 1 = Voltage at pin 4 > (Vs - 2.2V)

Output Circuit Wiring Instructions



Connector Detail



Electrical Information (continued)

Typical Solenoid Energizing

Solenoids identified to U.S. standards

Functional symbols related to solenoid identity "A" and/or "B" according to NFPA/ANSI standards, i.e. energizing solenoid "A" gives flow P to A, solenoid "B" gives flow P to B (as applicable).

Solenoids identified to European standards (specify "V" in model code)

Functional symbols related to solenoid identity "A" and/or "B" according to European convention i.e. solenoid "A" adjacent to "A" port, solenoid "B" adjacent to "B" port, solenoid to B (as applicable).

SOLENOID	FOR SPOOL TYPE	SOLENOID
B	All except "8"	A
A	"8" only	B

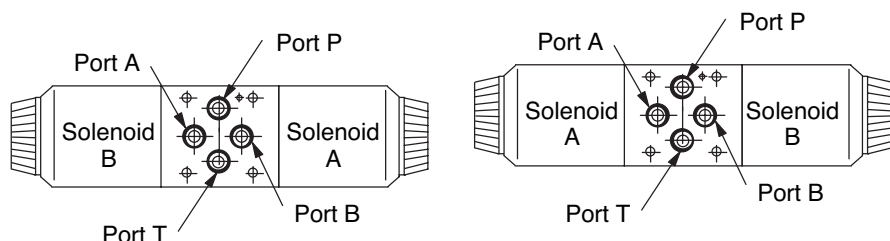
For valves with type "8" spools, solenoid identity to U.S. convention is the same as for European convention.

DG4V-3 HIGH PERFORMANCE SOLENOID COIL RATINGS

Solenoid Identification Letter	Solenoid Voltage Rating
BL	110V AC 50Hz 120V AC 60 Hz
DL	220V AC 50 Hz 240V AC 60 Hz
GL	12V DC
HL	24V DC

DG4V-3(S) STANDARD PERFORMANCE SOLENOIDS COIL RATINGS

Solenoid Identification Letter	Solenoid Voltage Rating
A	110V AC 50Hz
B	110V AC 50 Hz 120V AC 60 Hz
C	220V AC 50 Hz
D	220V AC 50 Hz 240V AC 60 Hz
G	12V DC
H	24V DC



POWER CONSUMPTION

AC solenoids (for coils listed in model code).	Initial § VA (RMS)	Holding VA (RMS)	Initial § VA (RMS)	Holding VA (RMS)
Full power coils:				
Single frequency coils AC 50 Hz	225	39	285	54
Dual frequency coils at 50 Hz	265	49	280	61
Dual frequency coils at 60 HZ	260	48	300	58
Low power coils, "BL" and "DL":				
Dual frequency coils at 50 Hz	Low power coils not usable		170	37
Dual frequency coils at 60 Hz	with DG4V-3S valves.		190	37
Power consumption, DC solenoids at rated voltage and 20 C (68 F).				
Full power coils:				
12V, model type "G"	30W	-	30W	-
24V, model type "H"	30W	-	30W	-
Low power coils:				
12V, model type "GL"	Low power coils not usable		18W	-
24V, model type "HL"	with DG4V-3S valves.		18	-

§ 1st half cycle; armature fully retracted.

Electrical Information (continued)

Models for use with ISO 4400 (DIN 43650) connectors

Millimeters (inches)

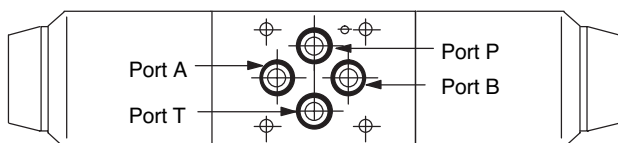
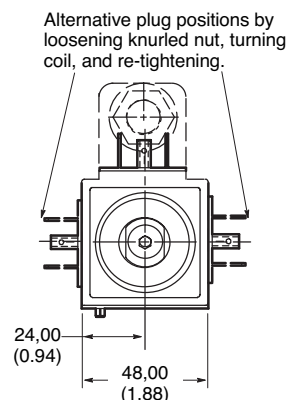
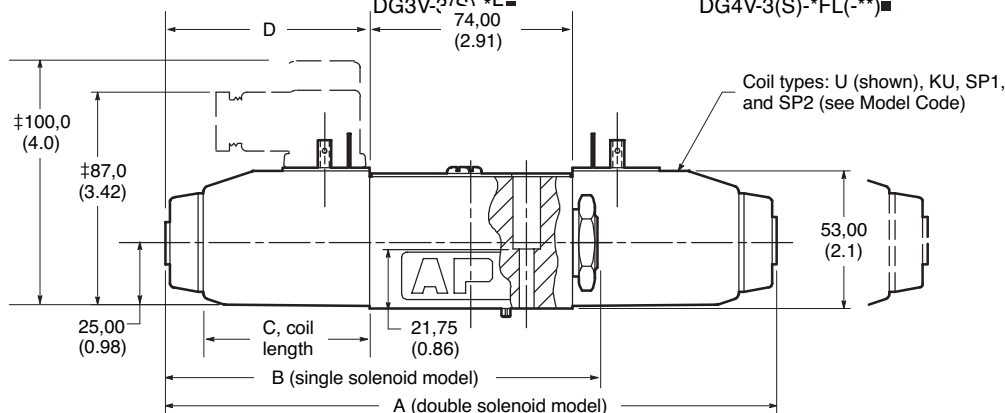


Double solenoid models
DG4V-3(S)-*C-**-*(V)M-U-**-60
DG4V-3(S)-*N-**-*(V)M-U-**-60

Single solenoid models }
DG4V-3(S)-*A-**-* }
DG4V-3(S)-*B-**-* }
DG4V-3(S)-8BL-**-* }
DG3V-3(S)-*C-**-* }
As shown

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

Solenoid and end cap interchangeable



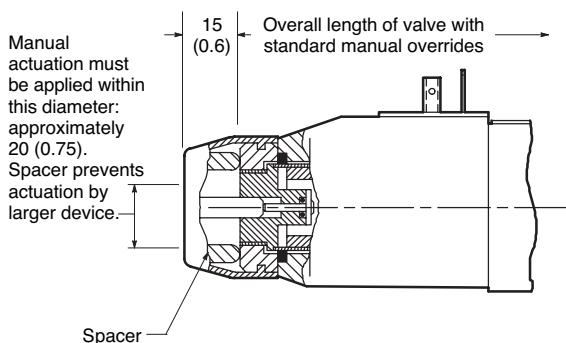
• Not applicable to type "8" spool.
 § Can vary dependent on source of plug.

MODEL TYPE	AC OR DC	A DIM.	B DIM.	C DIM.	D DIM.
All	DC =	220 (8.66)	156 (6.14)	61 (2.5)	73 (2.87)
DG4V-3	AC	200 (7.87)	146 (5.75)	51 (2.1)	63 (2.48)
DG4V-3S	AC	200 (7.87)	146 (5.75)	45 (1.7)	63 (2.48)

Water-resistant manual override on solenoid DG4V-3(S)-****(L)-H-(V)M-**-**-60

Application

General use where finger operation is required (standard manual overrides cannot be operated without using small tool).



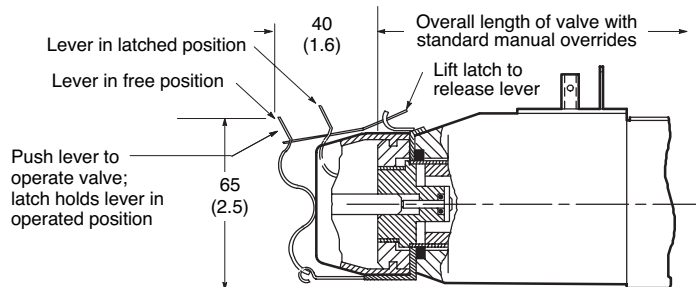
Note:
 "H" feature is not field convertible from other models; specify with order.

Latching manual override on solenoid

DG4V-3-****(L)-Y-(V)M-**-**-60
 DG4V-3S-****(L)-Y-(V)M-**-**-60, DC coil models only

Application

Stainless steel lever/latch mechanism and water-resistant seal make this feature ideal for vehicle-mounted and exposed applications requiring emergency selection of valve for a period of time in the event of electrical failure.



- Notes:
1. Opposite solenoid (on "C" and "N" double solenoid models) should not be energized while the valve is latched in selected position; AC solenoid coils will burn out under this improper usage.
 2. "Y" feature is field-convertible from "H" type manual override (omitting spacer), but is not field-convertible from other models.

Electrical Information (continued)

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

Millimeters (inches)

Double solenoid models ▲

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

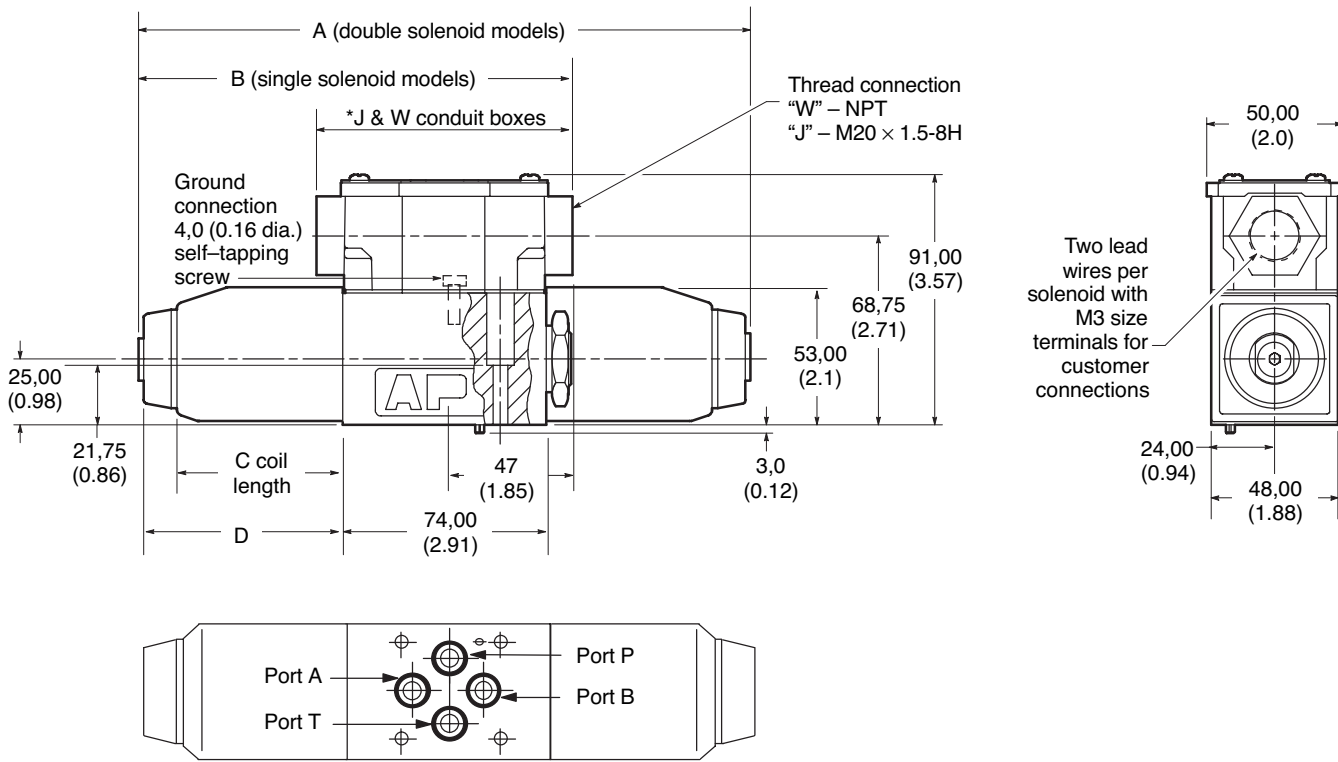
Single solenoid models ▲

DG4V-3(S)-*A(-**)*
DG4V-3(S)-*B(-**)*
DG4V-3(S)-8BL(-**)*
DG3V-3(S)-*F●

} As shown

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

} Solenoid and end cap interchanged



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

MODEL TYPE	AC OR DC	A DIM.	B DIM.	C DIM.	D DIM.
All	DC =	220 (8.66)	156 (6.14)	61 (2.5)	73 (2.87)
DG4V-3	AC	200 (7.87)	146 (5.75)	51 (2.1)	63 (2.48)
DG4V-3S	AC	200 (7.87)	146 (5.75)	45 (1.7)	63 (2.48)

• Not applicable to type "8" spool.

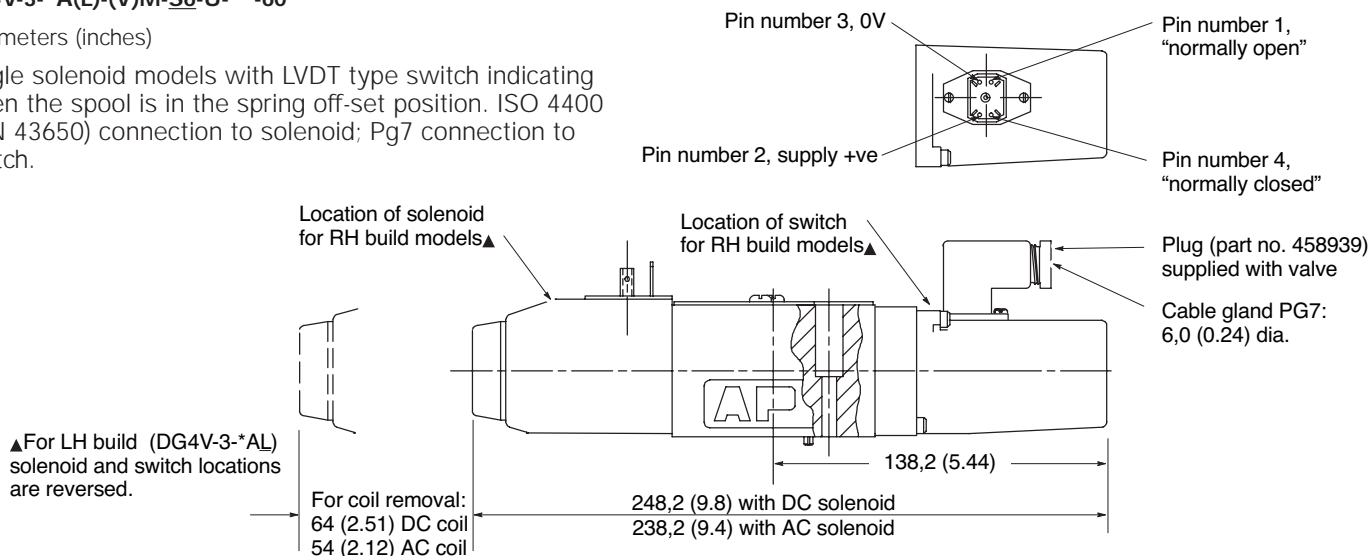
Codes "FJ" and "FW": 2 lead wires for each solenoid, approximately 150,00 (6.00) long. M3 (#6) terminals provided for customer connection.
Codes for "FTJ" and "FTW": Valve supplied with lead wires connected into terminal strip suitable for M3 (#6) terminals for customer connection.

Electrical Information (continued)

DG4V-3-*A(L)-(V)M-S6-U-**-60

Millimeters (inches)

Single solenoid models with LVDT type switch indicating when the spool is in the spring off-set position. ISO 4400 (DIN 43650) connection to solenoid; Pg7 connection to switch.

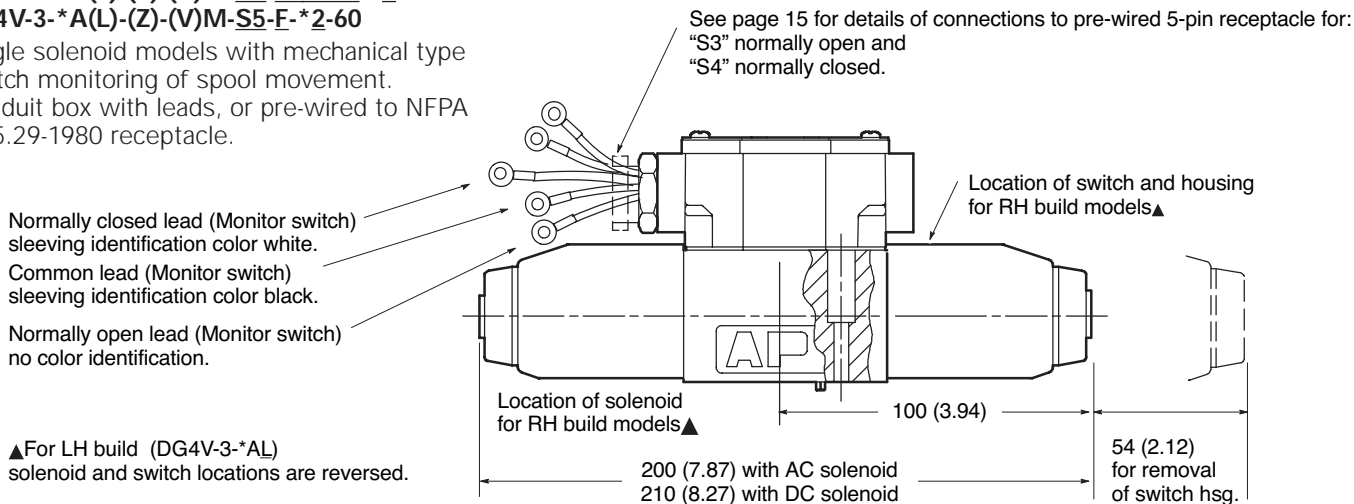


DG4V-3-*A(L)-(Z)-(V)M-S3-FPA5W-*2-60

DG4V-3-*A(L)-(Z)-(V)M-S4-FPA5W-*2-60

DG4V-3-*A(L)-(Z)-(V)M-S5-F-*2-60

Single solenoid models with mechanical type switch monitoring of spool movement. Conduit box with leads, or pre-wired to NFPA T3.5.29-1980 receptacle.



Port restrictor plugs

Restrictor plugs are available for use in ports P, T, A or B. These can be used for restricting flow or for circuit dampening. Restrictor plugs are not recommended for use above 210 bar (3000 psi) system pressure.

Typical model codes:
DG4V-3(S)-**-M-**-**-60-P08
(0.8 mm dia orifice in port P)

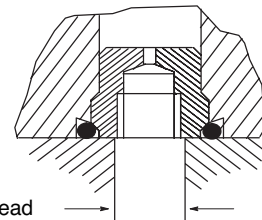
DG4V-3(S)-**-M-**-**-60-P10-A10
(1.0 mm dia orifice in ports P and A)

RESTRICTOR PLUG SELECTION TABLE

Code	Orifice diameter	Part number§
*00	Blank	694353
*03	0,30 (0.012)	694341
*06	0,60 (0.024)	694342
*08	0,80 (0.030)	694343
*10	1,00 (0.040)	694344
*13	1,30 (0.050)	694345
*15	1,50 (0.060)	694346
*20	2,00 (0.080)	694347
*23	2,30 (0.090)	694348

* = P, T, A or B, as required

§ Available in multiples of 25 per part number



M5 x 0.8-6H thread for plug extraction

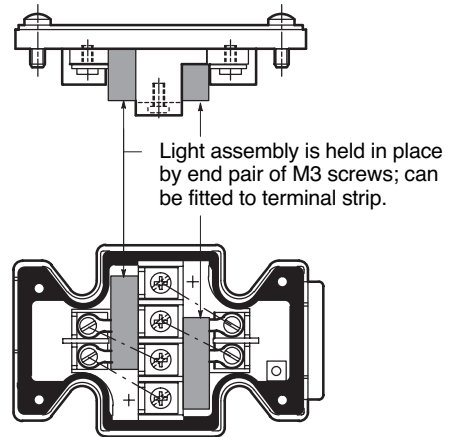
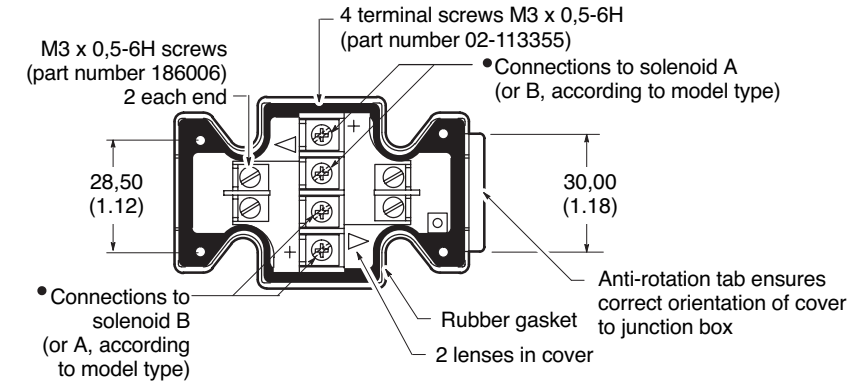
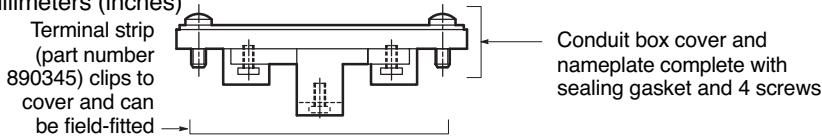
Maximum port dia in subplate/manifold block:
For steel and SG (ductile) iron: 7,0 (0.3)
For gray iron: 6,5 (0.25)

Electrical Information (continued)

Terminal Strip and Lights

For valves with type "F" coils.

Millimeters (inches)



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

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

Insta-Plug

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

Eaton 2-part "Insta-Plug" eliminates breaking electrical inputs for valve disconnect. A male half is pre-wired to the valve body. The mating plug

is inside a wire housing with external terminals for machine wire connections.

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

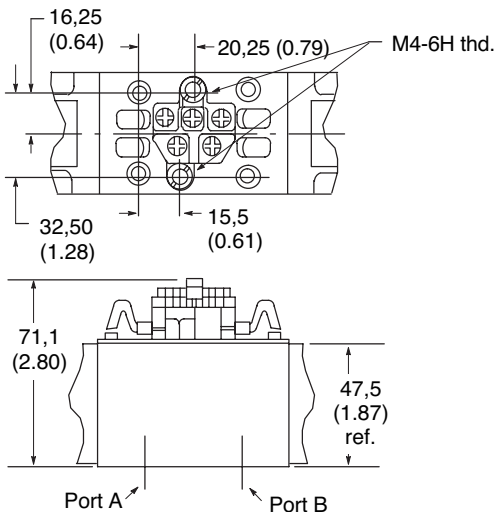
first make/last break ground connection.

The PBW configuration combines both male and female plugs in the wiring housing for a self-contained plug-in unit.

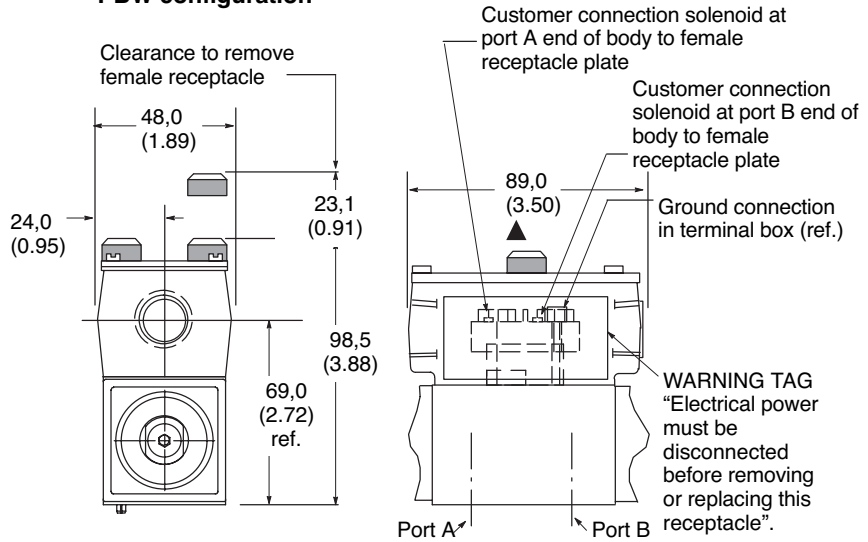
Optional solenoid indicator lights are pre-wired to the female plug. Solenoids "A" and/or "B" are identified on the wiring housing.

PA configuration

Millimeters (inches)



PBW configuration



▲ The conduit box dimensions used for the PA/PBW type connector are different from those on the other "F" type coil models.

Electrical Information (continued)

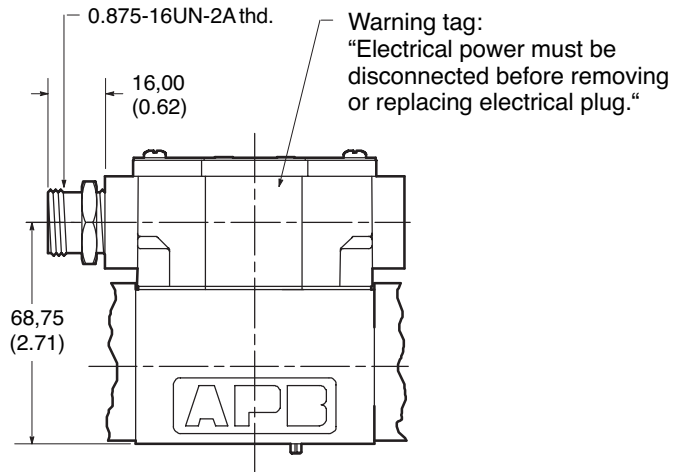
NFPA Connector T3.5.29-1980

Connection details and model type/model code references.

Millimeters (inches)

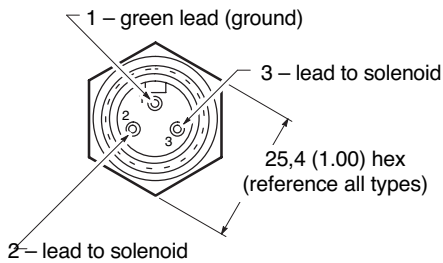
- DG4V-3(S)---FPA3W(L)-**-60
- DG4V-3(S)---FPA5W(L)-**-60
- DG4V-3---S3-FPA5W(L)-**-60
- DG4V-3---S4-FPA5W(L)-**-60

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



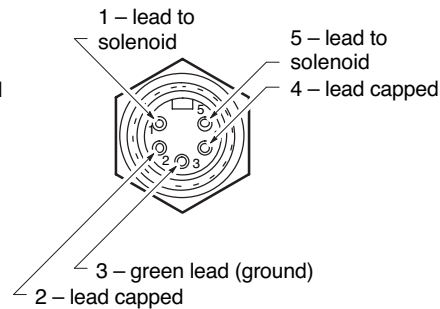
3 pin connector

Use with single solenoid valve
Key model code designations:
DG4V-3(S)-*A(L)-(**)-(V)M-FPA3W(L)
DG4V-3(S)-*B(L)-(**)-(V)M-FPA3W(L)



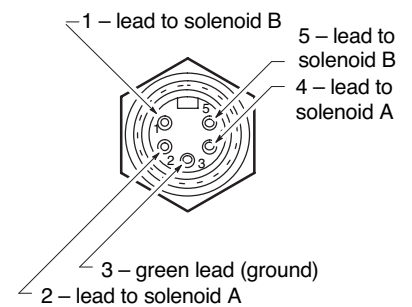
5 pin connector

Use with single solenoid valve
Key model code designations:
DG4V-3(S)-*A(L)-(**)-(V)M-FPA5W(L)
DG4V-3(S)-*B(L)-(**)-(V)M-FPA5W(L)



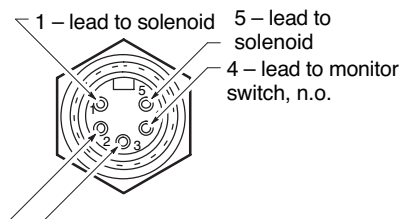
5 pin connector

Use with double solenoid valve
Key model code designations:
DG4V-3-*C/N(L)-(**)-(V)M-S4-FPA5W(L)



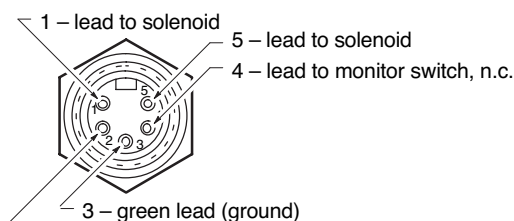
5 pin connector

Use with single solenoid valve with S3 spool position monitor switch
Key model code designations:
DG4V-3-*A(L)-(**)-(V)M-S3-FPA5W(L)



5 pin connector

Use with single solenoid valve with S4 spool position monitor switch
Key model code designations:
DG4V-3-*A(L)-(**)-(V)M-S4-FPA5W(L)



DIN 43650 Connector

Millimeters (inches)

Cable diameter range . . . Ø6–10 mm (0.24–0.40)

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

Terminals Screw type

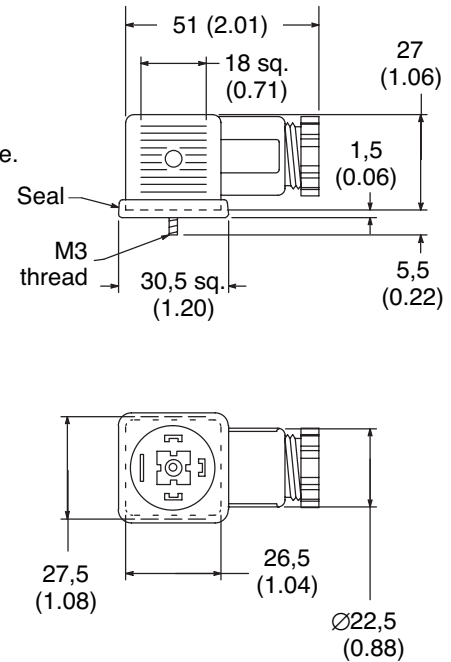
Type of protection IEC144 class IP65, when plugs are fitted correctly to the valves with interface seals (supplied with plugs) in place.

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

Use U12 or U11 type connectors with 12 and 24V DC coils if rectification is required.

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

Receptacle	Voltage (AC or DC)	Part Numbers Gray – Black – “A” sol. “B” sol.
U1 Coils without lights	—	710776 710775
U6 Coils with lights	12-24 100-125 200-240	977467 977466 977469 977468 977471 977470
U11 Rectified coils with lights	12 DC 24 DC 98-240 VDC 200-240 VDC	02-141358 02-141359 02-141360 02-141361
U12 Rectified coils without lights		02-141357



Surge Suppression Devices (For DC Valves)

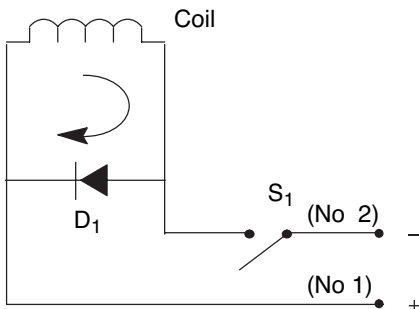
Standard diode

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

D Works only with DC voltage

D Polarity dependent

D Increases drop out time



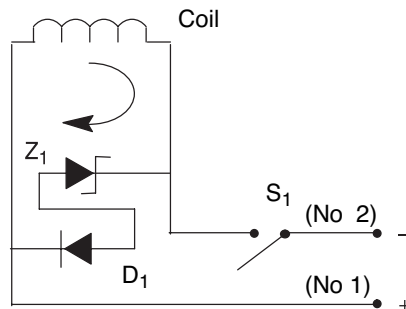
Transzorb

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

D The Zener makes exact limitation of inductive spikes.

D Works only with DC voltage

D Polarity dependent



NOTE: These surge suppression devices are “Polarity Dependent.” Proper biasing conditions must be met when installing/connecting a coil in a system.

Valve Shift and Dropout Times With and Without Surge Suppression

	Shift	Dropout
CETOP 3		
No Diode	23	60
Diode Alone	23	141
Diode/Zener	23	78
CETOP 5		
No Diode	70	50
Diode Alone	70	158
Diode/Zener	70	100

Times represent cessation/application of voltage to coil versus velocity (start/stop) of a cylinder using a single solenoid, spring offset valve (time in milliseconds).

Mounting Surface

Subplates

Subplates must be ordered separately. When a subplate is not used, a machined pad must be provided for mounting. Pad must be flat within 0,13 mm (.0005 inch) and smooth within 0,8 mm (32 microinch).

Note

"E" in subplate model code designates side ported models.

SUBPLATE

MODEL CODE	THREAD SIZE
DGVM-8-10-T12	1.062"-12UN
DGVM-8-10-T16	1.312"-12UN
DGVM-8-10-T20	1.625"-12UN
DGVM-E-8-10-T12	1.062"-12UN
DGVM-E-8-10-T16	1.312"-12UN
DGVM-8-D-10-T12	1.062"-12UN
DGVM-8-D-10-T16	1.312"-12UN

Mounting Bolts

Mounting bolts not included with subplate mounted valves or subplates for those valves. Bolts used should be grade 7 or better. Order kits to obtain correct bolts:

MOUNTING BOLT KITS

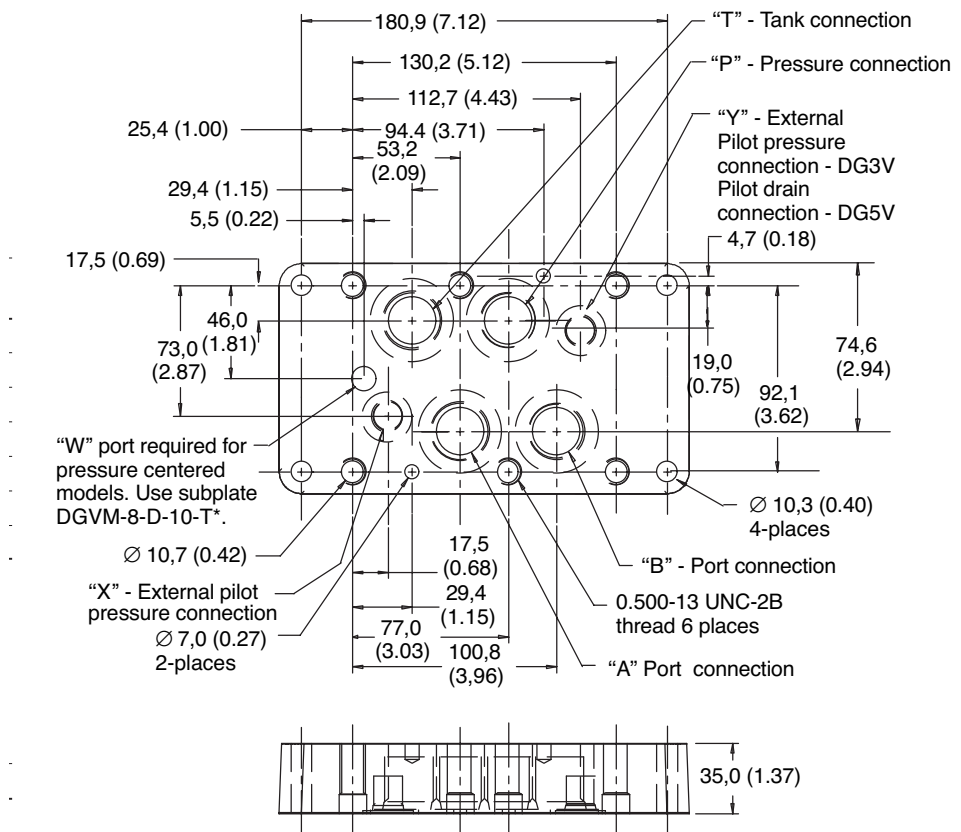
Metric	BKDG8-655M
Inch	BKDG06-635

Application Data

Fluid Cleanliness

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials, and additives for protection against wear of components, elevated viscosity, and inclusion of air.

Essential information on the correct methods for treating hydraulic fluid is included in Eaton publication 561 "Vickers Guide to Systemic Contamination Control" available from your local Eaton distributor or by contacting Eaton, Incorporated.



Recommendations on filtration and the selection of products to control fluid condition are included in 561.

Recommended cleanliness levels, using petroleum oil under common conditions, are based on the highest fluid pressure levels in the system and are coded in the chart below. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these cleanliness codes.

Eaton products, as any components, will operate with apparent satisfaction in fluids with higher cleanliness codes than those described. Other manufacturers will often recommend levels above those

specified. Experience has shown, however, that life of any hydraulic component is shortened in fluids with higher cleanliness codes than those listed below. These codes have been proven to provide a long, trouble-free service life for the products shown, regardless of the manufacturer.

Fluids and Seals

The use of synthetic, fire resistant fluids requires a valve with special seals. Add prefix "F3" to the model code when phosphate ester oil or its blend are to be used. Add prefix "F6" to the model code when water glycol or water-in-oil emulsions are to be used.

The pilot valve has "F3" seals (Viton) as standard. All internal seals of the main-stage are also "F3". Mounting face seals are standard (Buna-N). "F6" prefix denotes special seals (Nitrile) throughout the valve assembly.

Fluid Cleanliness Rating

20/18/15

Viscosity Range

75 to 600 Ssu (15 to 128 cSt)

Operating Temperature Range

-18 to 66 C (0 to 150 F)

Eaton
14615 Lone Oak Road
Eden Prairie, MN 55344
USA
Tel: 952 937-9800
Fax: 952 974-7722
www.hydraulics.eaton.com

Eaton
20 Rosamond Road
Footscray
Victoria 3011
Australia
Tel: (61) 3 9319 8222
Fax: (61) 3 9318 5714

Eaton
Dr.-Reckeweg-Str. 1
D-76532 Baden-Baden
Germany
Tel: (49) 7221 682-0
Fax: (49) 7221 682-788



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Printed in USA
Document No. V-VLDI-MC005-E
Supersedes 5007.02/EN/1197/A
June 2006