

Manually and Solenoid Operated Directional Valve

Segment A
DG4V-2 10 Design
DG2/17/21V-2 10 Design
ISO4401 Size 02;
ANSI/B93.7M-D02



Solenoid Operated Directional Valves

DG4V-2 10 Design

A

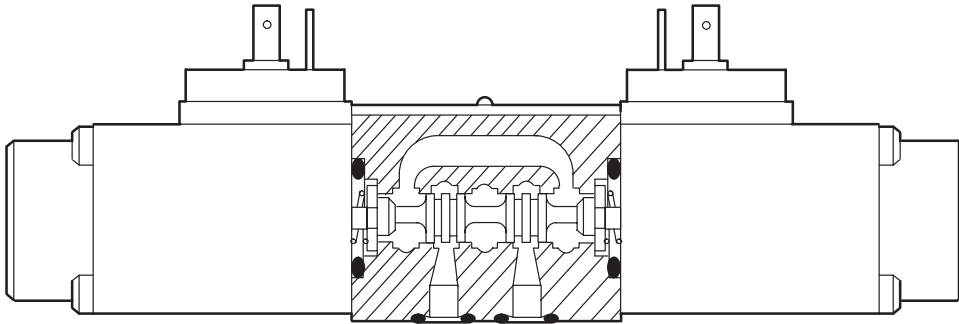
General description and application benefits

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

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

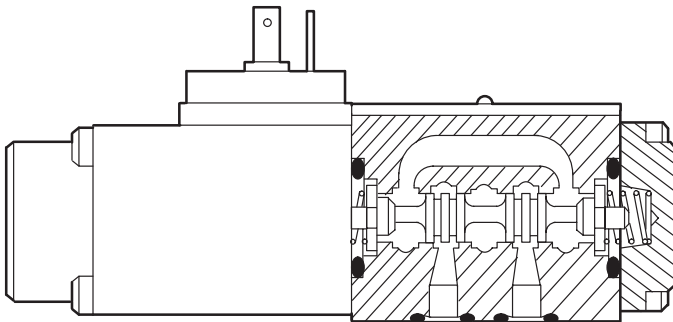
DG4V-2-2C

Double solenoid model



DG4V-2-2B

Single solenoid model



Manually Operated Directional Valve

DG2/17/21V-2 10 Design

General description and application benefits

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

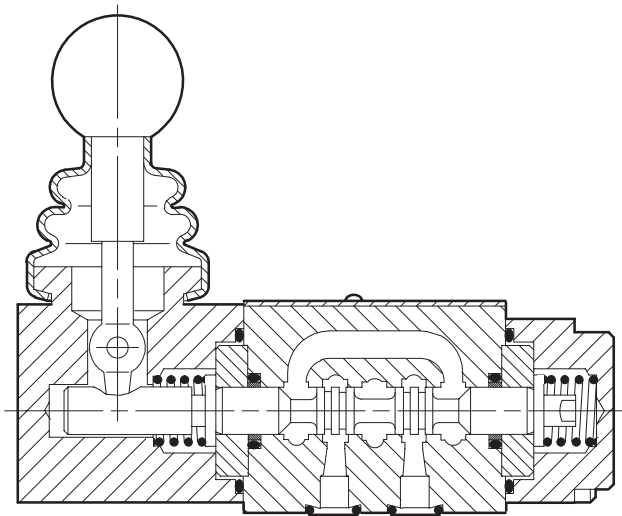
These valves are available in an ISO/DIS 4401-02-02 interface. Lever operated, roller cam and plunger operated models offer

the following application benefits:

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

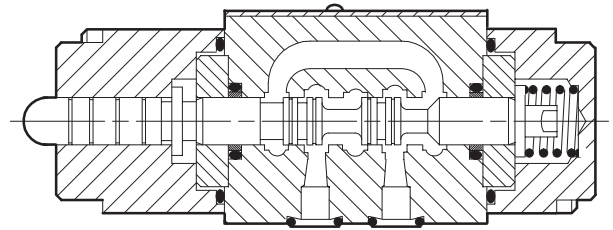
DG17V-2-**-N-10

Lever operator



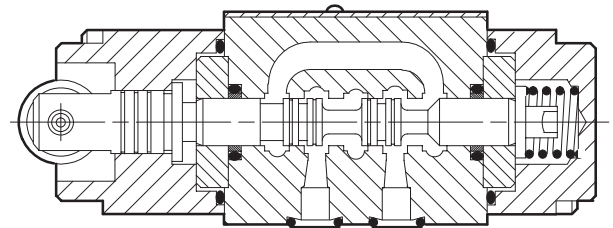
DG21V-2-24A-10

Plunger operator



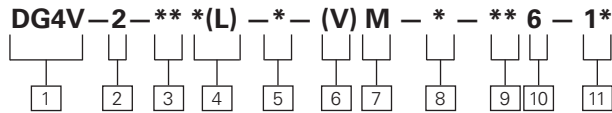
DG2V-2-24A-5-10

Cam operator



Model Code

A



1 Model Series

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

2 Interface

- 2 – ISO/DIS 4401-02-02

3 Spool type

Refer page 6 for spool type

4 Spool spring arrangement

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

5 Manual Override.

- Omit if Not required
- Z – No override

6 Solenoid energization identity

- Blank – None
- V – Solenoid “A” is at port “A” end and/or solenoid “B” is at port “B” end, independent of spool type

NOTE: Type “8” spool valves conform to both U.S. and European solenoid designations. When ordering an “8” spool, designate a “V” in the model code.

7 Flag symbol

- M – Electrical options and features

8 Coil type

- U – ISO4400, DIN43650 connector
- U1 – ISO4400 with fitted DIN plug
- U11 – ISO4400 with fitted rectifier plug with indicator light
- U12 – ISO4400 with fitted rectifier plug
- KU – Flying leads from top of the solenoid
- KUP4 – Junior timer (amp) connector
- KUP6 – Flying lead with deutsch connector

KUP9 – Flying lead with amp connector

9 Coil rating

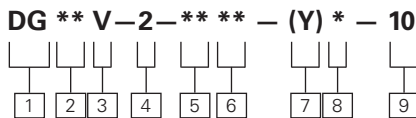
- DJ – 98V DC 42 watt
- DP – 125V DC 25 watt
- EJ – 196V DC 43 watt
- G – 12V DC 38 watt
- H – 24V DC 38 watt
- HL – 24V DC 32 watts 220V DC

10 Tank port rating

- 6 – 160 bar tank pressure rating

11 Design

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



1 Model Series

- D – Directional valve
- G – Subplate/manifold mounted

2 Operator type

- 2 – Roller/cam operated
- 17 – Lever operated
- 21 – Plunger operated

3 Pressure rating

- V – 250 bar (3600 psi)

4 Interface

- 2 – ISO/DIS 4401-02-02

5 Spool type

- 2 – Closed center (all ports)
- 6 – Closed center (P only)
- 8 – Tandem center (P to T)
- 24 – Closed center (all ports)

6 Spool spring arrangement

- A – Spring offset, end-to-end
- AL – Same as “A” but left hand build
- B – Spring centered, end to center
- BL – Same as 'B' but left hand build
- C – Spring centered
- CL – Same as “C” but left hand build
- N – No-spring detented
- NL – Same as “N” but left hand build

7 Roller orientation (DG2V)

- Omit if not required
- Y – Horizontal

8 Tank pressure rating

- 5 – 100 bar (1438 psi)

9 Design

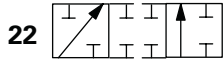
Subject to change. Installation dimensions same for designs 10 thru 19.

Functional Symbols

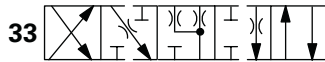
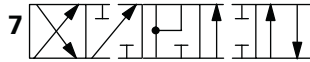
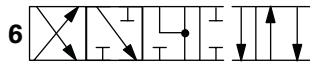
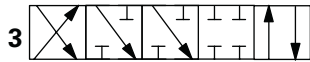
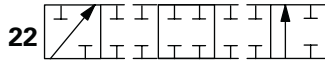
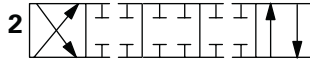
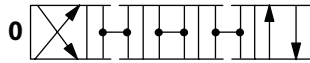
Spool Options for DG4V-2

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

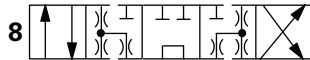
DG4V-2-*N(V) valves:



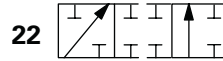
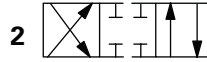
DG4V-2-*C(V) valves



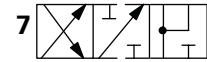
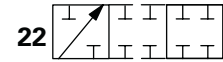
DG4V-2-8 CV valves



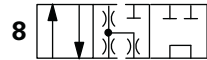
DG4V-2-*A(V) valves



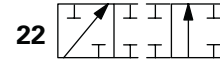
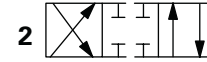
DG4V-2-*B(V) valves



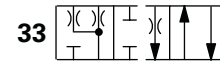
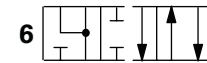
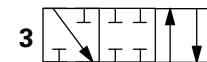
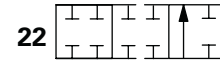
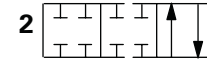
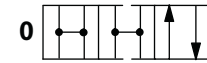
DG4V-2-8 BLV valves



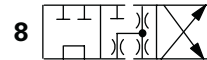
DG4V-2-*AL(V) valves



DG4V-2-*BL(V) valves



DG4V-2-8 BV valves



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

Functional Symbols

Spool Options for DG2/17/21V-2

A

Spool Options	Model	Basic Valve Symbol	Usable Spool Options
	DG17V-2-**-A		2, 24
DG17/2/21V-2-**-A	DG17V-2-**-AL		2, 24
"2"	DG2V-2-**-A		2, 24
"24"	DG2V-2-**-AL		2, 24
DG17V2-**-C/N	DG21V-2-**-A		2, 24
"2"	DG21V-2-**-AL		2, 24
"6"	DG17V-2-**-C		2, 6, 8
"8"	DG17V-2-**-CL		2, 6, 8
	DG17V-2-**-N		2, 6, 8
	DG17V-2-**-NL		2, 6, 8

Full flow
 Restricted flow

▲ Transient condition only

Operating Data

A

DG4V-2

Pressure limits: P, A and B ports: using 25W solenoid coils using 12W solenoid coil type HL T port	250 bar (3600 psi) 165 bar (2400 psi) 160 bar (2300 psi)
Flow rating: Full power (25W) coil Low power (12W) coil, type HL	30 l/min (7.9 USgpm) 20 l/min (5.3 USgpm)
Relative duty factor	Continuous; ED = 100%
Type of protection Coils with ISO 4400 connector fitted correctly IEC 947 class IP65 Coil winding Class H Coil encapsulation Class F	Type of protection IEC 947 class IP65 Class H Class F
Permissible voltage fluctuation: Maximum Minimum	110% rated 90% rated
Typical response times at 100% rated volts measured from application/removal of voltage at conditions: flow rate P-A, B-T pressure Spool type 2C full stroke: energizing de-energizing, no suppression de-energizing, diode suppression Spool type 2C to flow opening/closing point: energizing de-energizing, no suppression de-energizing, diode suppression	30 l/min (7.9 USgpm) 125 bar (1800 psi) 45 ms 30 ms 110 ms 25 ms 25 ms 100 ms
Power consumption, DC solenoids at rated voltage and 20°C (68°F): Type DJ, 98V Type EJ, 198V Type G, 12V Type H, 24V Type HL, 24V, low power	25W 25W 25W 25W 12W
Hydraulic fluids	
Filtration requirements	Refer to appendix
Temperature limits	
Mass, approximate Single solenoid valve Double solenoid valve	0,93 kg (2.1 lb.) 1,3 kg (2.9 lb.)
Installation data: Mounting attitude	No restrictions except for no-spring detented model DG4V-2-*N. It should be mounted with the spool axis horizontal. This model type may be affected by severe vibration or shock, especially if a solenoid is not held energized.

Operating Considerations

1. Dependent on the application and system filtration, any sliding spool valve if held shifted under pressure for long periods of time, may stick and not move readily due to fluid residue formation. It may need to be cycled periodically to prevent this from happening.
2. Surges of fluid in a common tank line serving two or more valves can be of sufficient magnitude to cause inadvertent shifting of these valves. This is particularly critical in no-spring detented models. Separate drain lines are recommended.

DG17/21/2V-2

Performance data is typical with fluid at 36 cSt (168 SUS) and 50° C (122° F)

Pressure limits:	P, A, B T	250 bar (3600 psi) 100 bar (1500 psi)
Flow rating, max		30 l/min (7.9 USgpm)
Actuation forces	DG17V-2-*C(L) DG17V-2-*A(L) DG17V-2-*N(L) DG2V-2 DG21V-2	25-40N (6-9 lbf.) 25-40N (6-9 lbf.) 10-17N (2-4 lbf.) 125-160N (28-36 lbf.) 125-160N (28-36 lbf.)
Mass:	DG17V-2 DG2V-2 DG21V-2	1.02 kg (2.25 lb.) 1.00 kg (2.20 lb.) 1.00 kg (2.20 lb.)
Installation data: Mounting attitude		No restrictions except for no-spring detented model DG17V-2-*N(L). It should be mounted with the spool axis horizontal.

Performance Data

DG4V-2

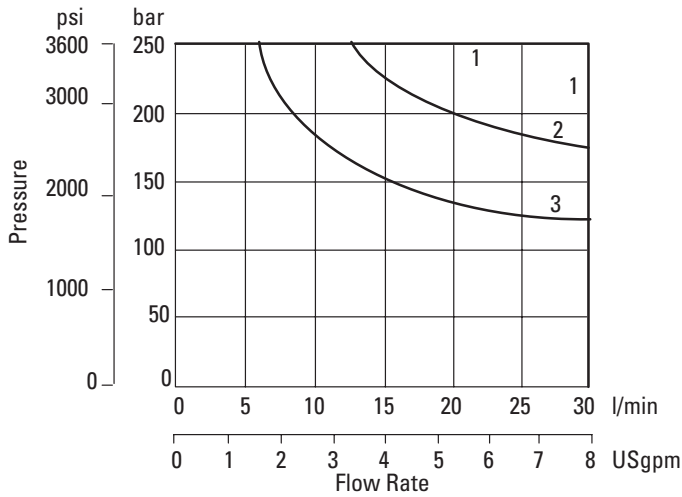
A

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

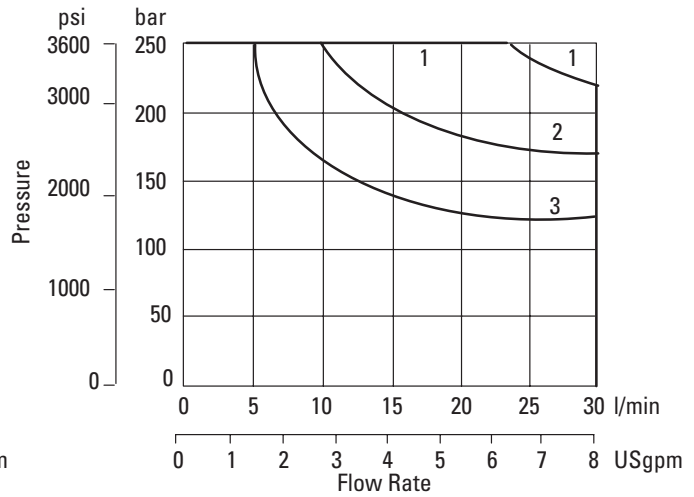
Maximum Flow Rates

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

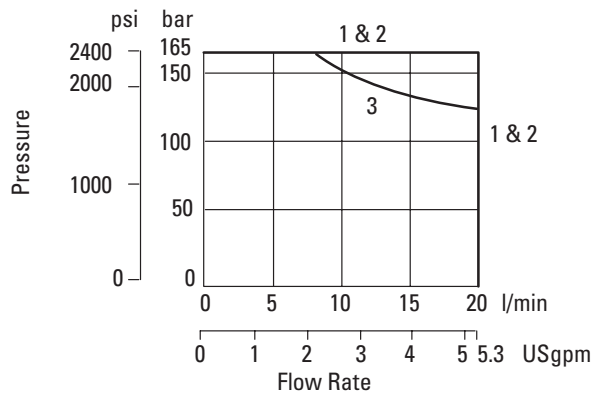
Standard, 25W coils Types G, H



Types DJ, EJ



Low Power, 12W coil Type HL



Spool Type	Curve Number
0, 2	1
7, 8	2
33, 6	3

Asymmetrical Flow Rates

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

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

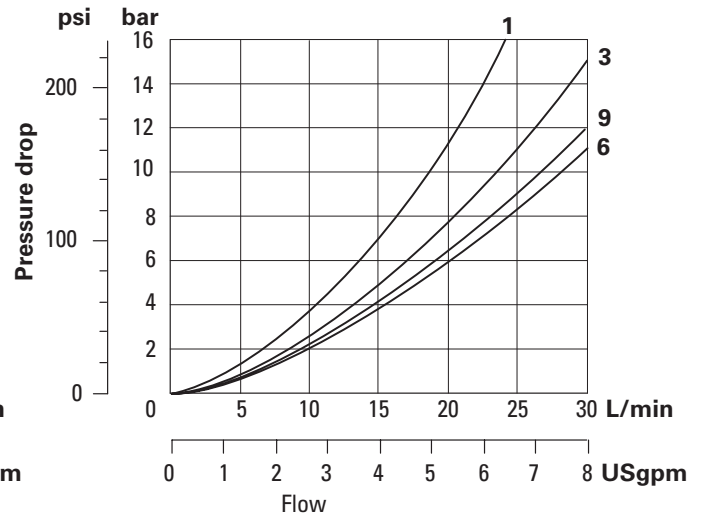
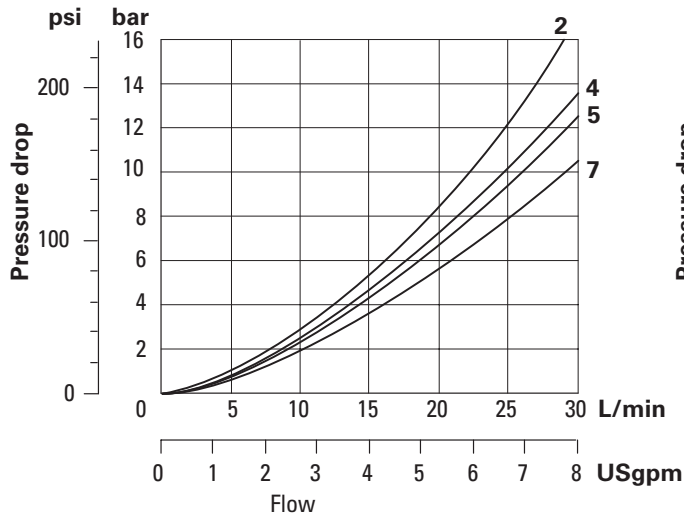
- (b) When flow rates between P-A, B-T (or P-B, A-T) are significantly different, e.g. A and B connected to a cylinder having a large differential area.

Performance Data

DG2/17/21V-2

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

A



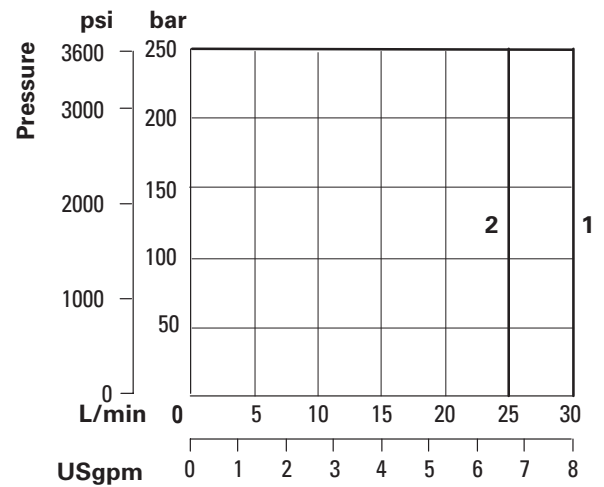
Refer to appendix for other viscosities

Pressure drops in offset positions except where otherwise indicated

Pressure Drop Curve Number

Spool/spring code	Spool offset		Spool centred	
	P → A/B	A/B → T	A/B → T	P → T
DG2V-2 & DG21V-2				
2A/(L) & 24A(L)	3	4	–	–
DG17V-2				
2A	3	4	–	–
2C	5	7	–	–
2N(L)	5	6	–	–
6C	4	6	5	–
6N	3	6	9	–
8C(L)	1	1	–	2
8N(L)	1	1	–	2

Looped Flow Malfunction



Spool/spring Code Curve Number

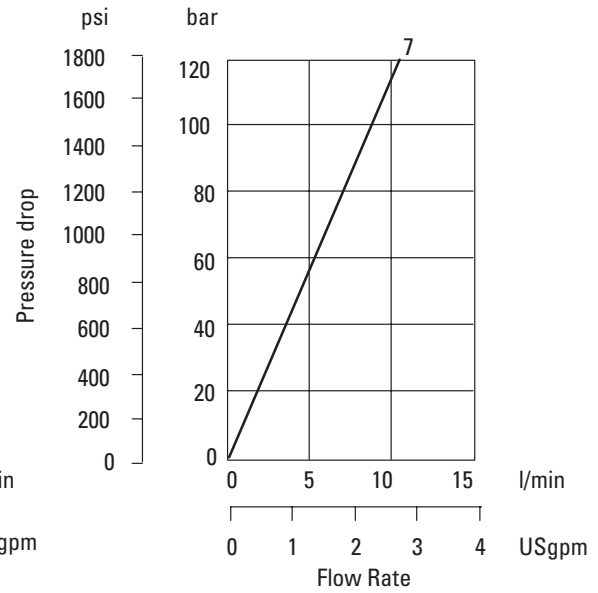
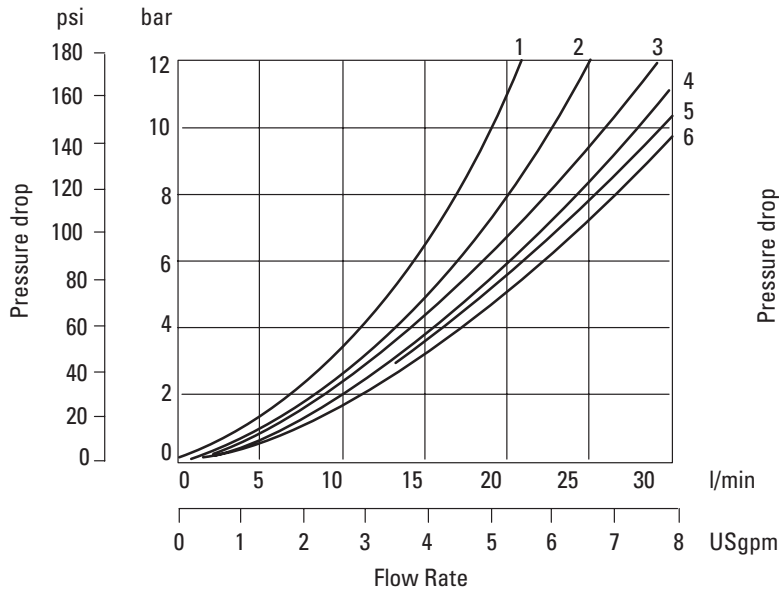
2N, 6N, & 8N	1
2A, 24A, 2C, 6C & 8C	2

Performance Data

DG4V-2

A

Pressure Drops



Refer to appendix for other viscosities

Pressure drops in offset positions except where otherwise indicated

Spool/spring arrangement	Spool positions covered	P to A	P to B	A to T	B to T	P to T	B to A or A to B
0A(L)	Both	6	6	3	3	-	-
0B(L) & 0C	De-energized	-	-	-	-	6	-
	Energized	6	6	3	3	-	-
2A(L)	Both	3	3	4	4	-	-
2B(L) & 2C	Energized	4	4	5	5	-	-
2N	Both	4	4	5	5	-	-
6B(L) & 6C	De-energized	-	-	4	4	-	-
	Energized	3	3	5	5	-	-
7B(L) & 7C	De-energized	3	3	-	-	-	3
	Energized	4	4	4	4	-	-
8B(L) & 8C	All	1	1	1	1	2	-
33B(L) & 33C	De-energized	-	-	7	7	-	-
	Energized	4	4	5	5	-	-

Installation Dimensions

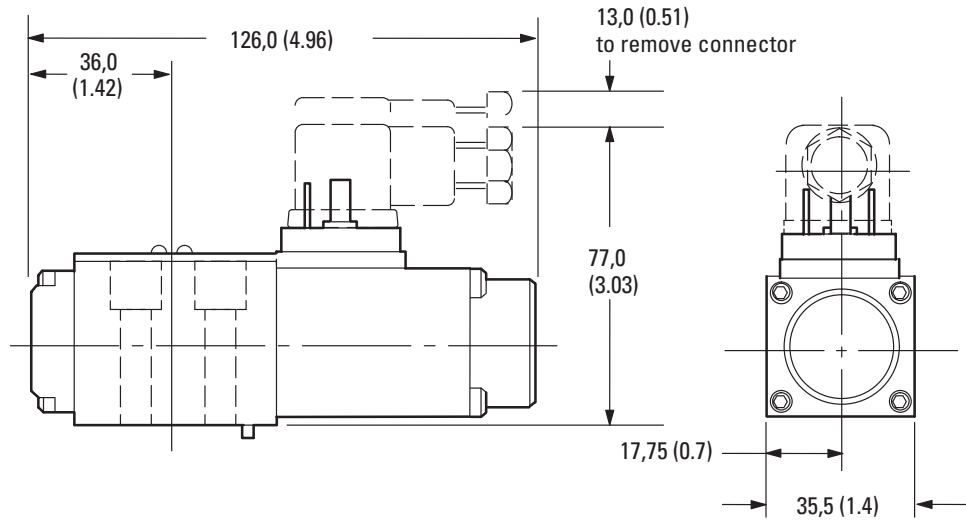
DG4V-2

Dimensions shown in mm (inches)

Single solenoid models

DG4V-2-A(L)
DG4V-2-B(L)

Spring offset

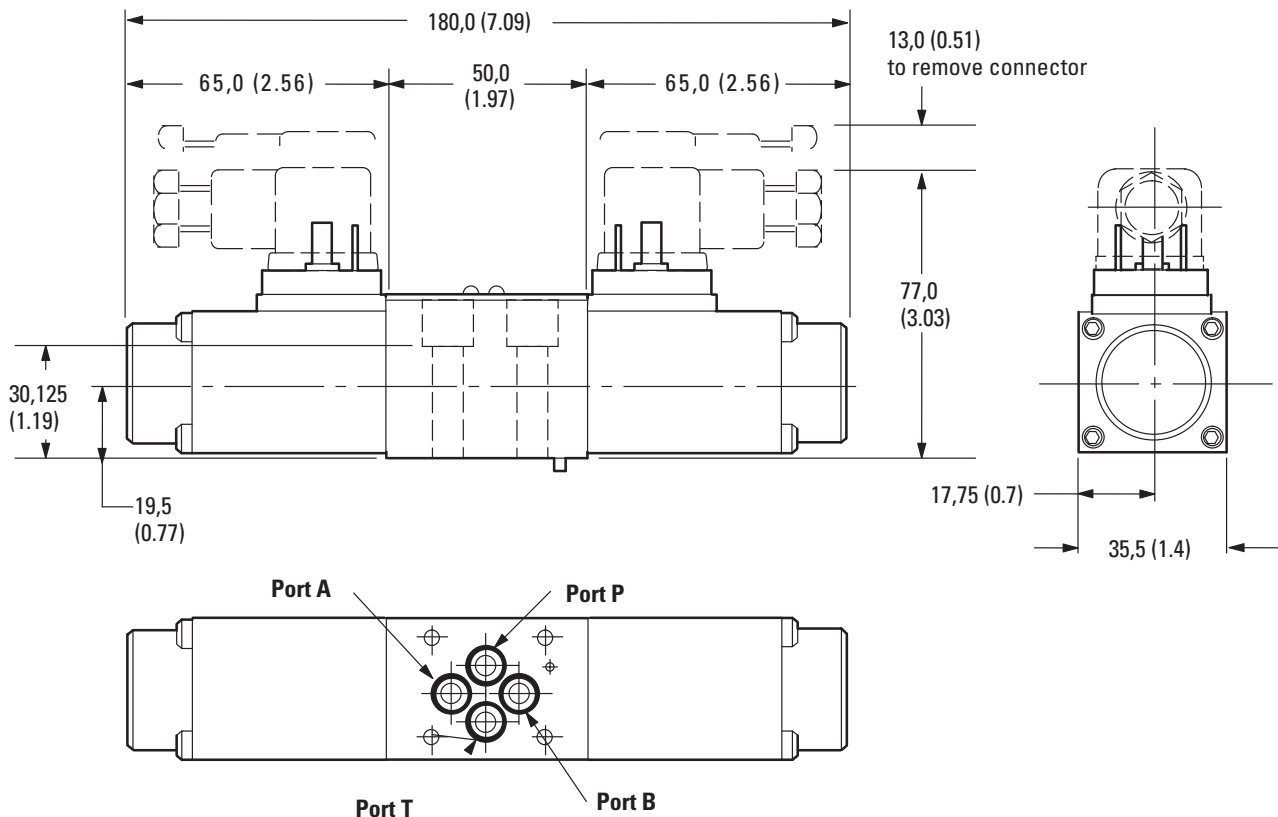


Dimensions are shown for standard connectors. For connectors with rectifiers and/or LED this dimension varies up to 84,0 (3.31) maximum.

Refer to double solenoid models below for port designations.

Double solenoid models

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



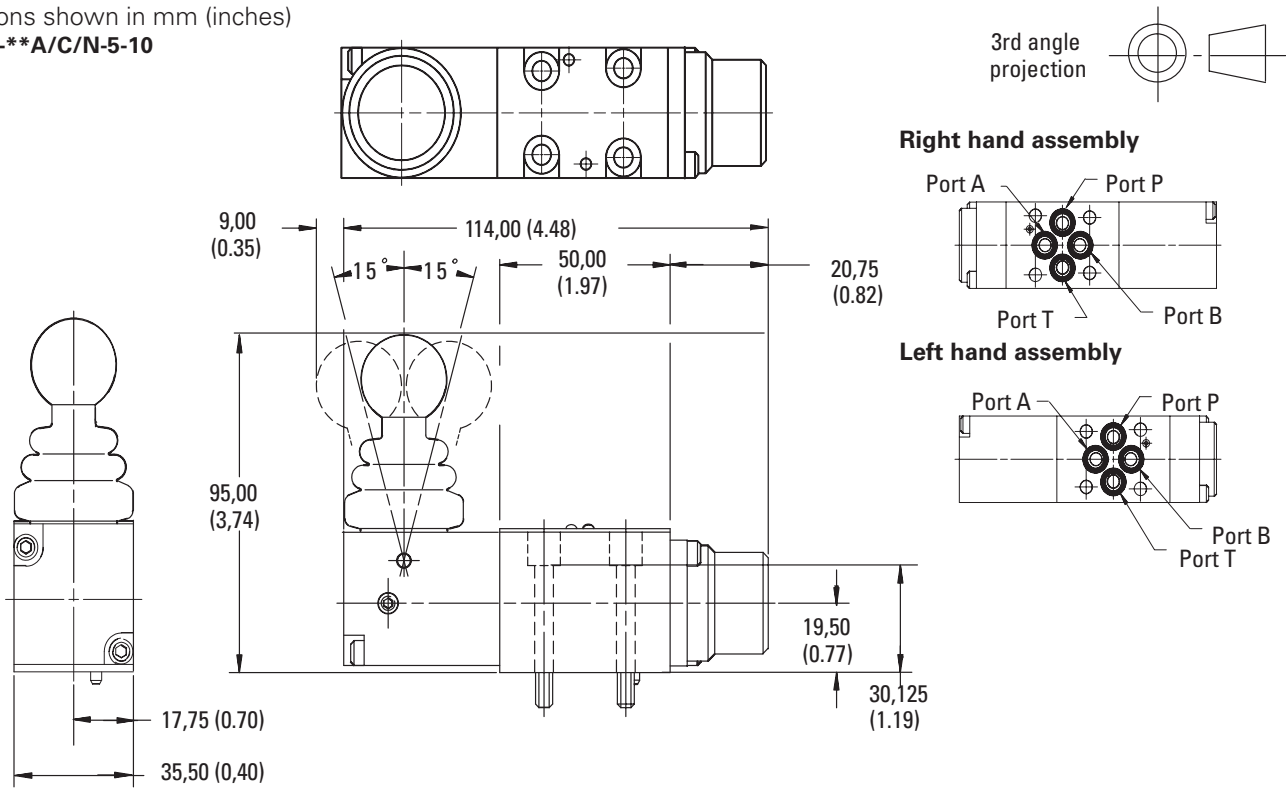
Installation Dimensions

DG2/17/21-V

A

Dimensions shown in mm (inches)

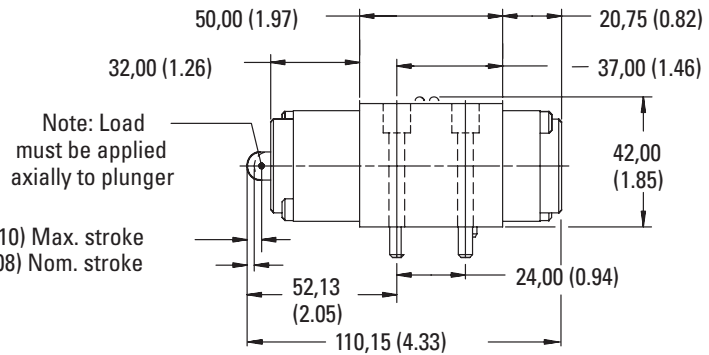
DG17V-2-**A/C/N-5-10



DG21V-2-**A-5-10

Plunger operated

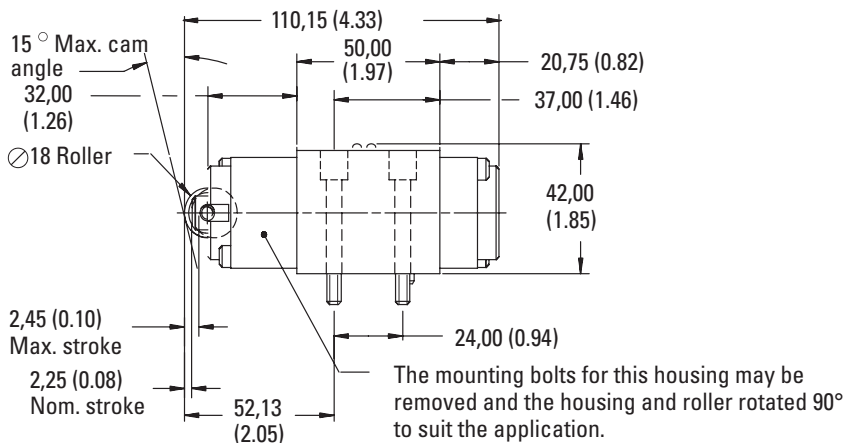
(Dimensions not shown are same as DG17V-2, above)



DG2V-2-**A-(Y)-5-10

Cam operated

(Dimensions not shown are same as DG17V-2, above)



Electrical Plugs and Connectors

ISO 4400 (DIN 43650)

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

The cable entry on these plugs can be repositioned to 90° intervals by reassembly of the contact holder relative to the plug housing.

The cable entry is PG 11 for cable Ø6-10 mm (0.24" to 0.39" dia).

Connectors w/o indicator lights

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

Connectors with LED

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

Connectors with rectifier

Coil code	AC input voltage 50/60 Hz	Connector with rectifier NO LED		Connector with rectifier with LED	
		Gray (sol. A)	Black (sol. B)	Gray (sol. A)	Black (sol. B)
DJ	110/120V	873761	873760	873778	873777
EJ	220/240V	873776	873775	873780	873779

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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