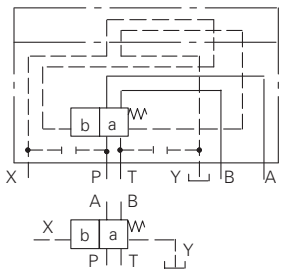
Functional Symbols

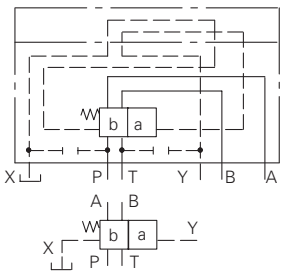
DG5V72C1TMUH750

DG3V-7, Remote Pilot operated Models
Comprehensive and simplified symbols.

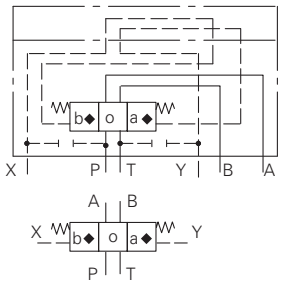
Spring Offset, End-to-End, DG3V-7-*A



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



Spring Centered, DG3V-7-*C

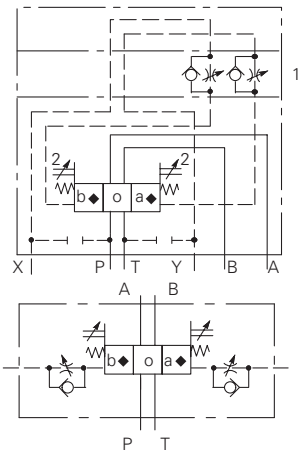


DG3V-7 Options

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

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

One or more options can be built into any DG3V-7 series valve.



Spool types : All ▲

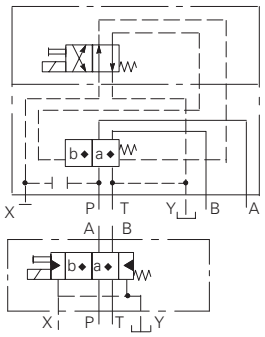
◆ "a" and "b" interchanged for spool type 8.

▲ X' and Y' spools require a stroke adjuster at one or both ends, dependent on the application, to limit stroke towards posotions "a" and/or "b".

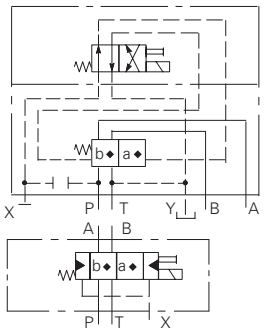
Functional Symbols

DG5V-7, Solenoid Controlled, Pilot Operated Models
Comprehensive and simplified symbols shown configured for external pilot supply and internal drain

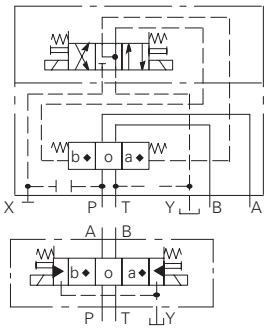
Spring Offset, End-to-End, DG5V-7-*A



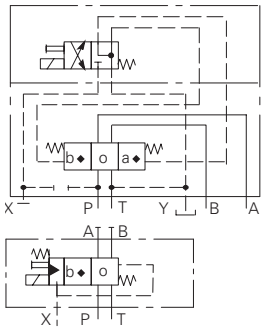
Spring Offset, End-to-End, Opposite Hand, DG5V-7-*AL



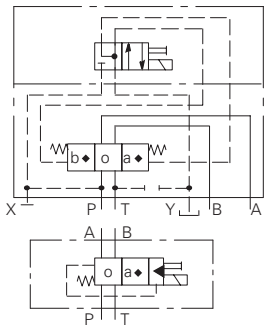
Spring Centered, DG5V-7-*C



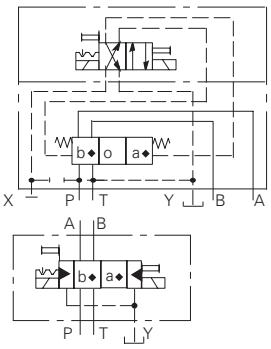
Spring Offset, End-to-Center DG5V-7-*B



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



Detented, DG5V-7-*N

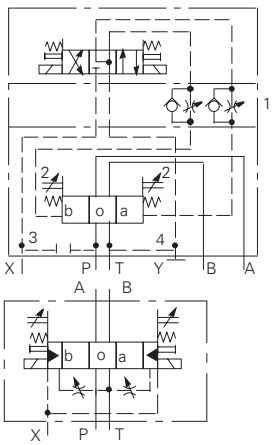


DG5V-7 Options

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

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

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



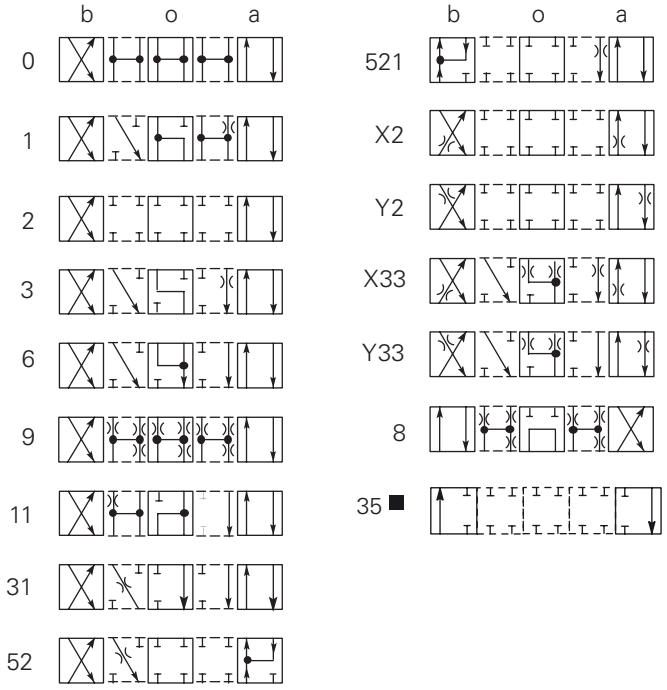
Spool types : All

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

▲ X' and Y' spools require a stroke adjuster at one or both ends, dependent on the application, to limit stroke towards posotions "a" and/or "b".

Functional Symbols

Spool Types DG3V-7 and DG5V-7
Shown in 3-position form, plus 2 transients.



Notes:

In certain 2-position valves, the "o" position becomes an additional transient, i.e. in DG5V-7-*A(L) and DG5V-7-*N valves.

■ Only 35A available

Model Codes

DG3V-7 30 Series, Remote Pilot Operated Directional Valve

DG5V-7 50 Design, Solenoid Controlled Pilot Operated Directional Valve

For Remote Pilot operated valves : (F3) - DG3V-7-* ** - (**) -30

1 2 3 4 14

For solenoid controlled, pilot operated valves:

(F3) - DG5V-7- * ** - (**) - (P) - (E) - (T) - (*) - (V) M -***** (L) - *7 - 50**

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

1 **Fluid Compatibility**

Blank = Standard BUNA-Nitrile Seals

F3 = Viton Seals

Note: For further information see "Hydraulic Fluids" section on page 13.

2 **Spool Type**

See "Functional Symbols" section on pages 7

3 **Spool Spring Arrangement**

A = Spring offset, end-to-end (P to B when operated)

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

B = Spring offset, end-to-center (P to B when operated) ■

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

C = Spring centered

N = Two-position detented

■ *DG5V option. Same function from DG3V-7-*C valves by alternating pilot supply to one port (X or Y) and permanently draining the other.*

4 **Spool Control**

1 = Stroke adjustment at both ends ▲■

2 = Pilot choke adjustment both ends

3 = "1" and "2" combined ▲■

7 = Stroke adjustment, port A end only ▼

8 = Stroke adjustment, port B end only ▼

27= "2" and "7" combined ▼

28= "2" and "8" combined

Omit if not required

▲ *Not applicable to DG5V-7-*B(L) models.*

▼ *Not applicable to models shown in the "Spring offset, end-to-center, opposite hand" section on page 6*

■ *Not applicable for spool "8" models*

5 **Main Stage Spool Monitoring Switch**

Only with "35A" spool

(Omit if not required.)

PPA - Offset sensing proximity switch "A" port end

** The spool position monitoring switch shown on this technical document is CE marked and certified and complies to European Standard EN 61000-6-4: 2001 (Emissions) for Class A and European Standard EN 61000-6-2: 2001 (Immunity).*

6 **External Pilot Supply. DG5V Valve Option**

Omit for internal pilot supply

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

Omit for external drain, which is also mandatory for 1, 8 and 9 spool-type valves

8 **Manual Override Option**

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

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

Z = No override at either end

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

9 **Solenoid Energization Indentity**

V = Solenoid "A" is at port A end of pilot valve and/or solenoid "B" at port B end independent of main-stage valve port locations or spool type; German practice.

Omit (except as noted below) for US ANSI B93.9 standard whereby solenoid "A" is that which, when energized, connects P to A in main-stage valve, and/or solenoid "B" connects P to B.

Note: Energization identities on valves with type 8 spools are identical under US and German practices. In such cases the "V" code is used.

10 **Solenoid Type/Connection(s)**

U= ISO 4400 (DIN 43650) mounting

U1=ISO4400 fitted with PG11 plug

U6=ISO4400 with fitted DIN plug with lights

KU=Top exit flying lead (150mm)

KUP4= Junior timer (Amp) connector

KUP5= Integral Deutsch Connector

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

FTW = Flying lead with 1/2" NPT thread junction box and terminal strip

■ *Some female plug connector options available separately from Eaton. Others available from electrical stockists.*

◆ *Female connector to be supplied by user.*

11 **Indicator Lights, Option for Codes FTW, in item 10.**

L = Lights fitted

Omit if lights not required

For U-code solenoids use plug with integral light.

12 **Coil Rating**

See "Operating Data" on page 11 for further information.

B = 110V AC 50 Hz/ ◆ 120V AC 60 Hz

BL = 110V AC 50 Hz/ ◆ 120V AC 60 Hz - Low Power

D = 220V AC 50 Hz/ ◆ 240V AC 60 Hz

DS = 28V DC 30 Watt

ED = 250V AC 50 Hz

G = 12V DC

GL = 12V DC 18 Watt

H = 24V DC

HL = 24V DC 18 Watt

◆ *For 60 Hz or dual frequency.*

14 **Design Number**

30 series for DG3V valves.
50 series for DG5V valves.

Subject to change.

For Mounting Subplate and Fastener Kit Options See "Supporting products" on page 11

Application Notes DG5V-7 50 Design

Pilot Pressure

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

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

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

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

Stroke Adjustment Options

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

Pilot Choke Adjustment Options

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

Control Data, General

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

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

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

Operating Data

Performance data typical under standard test conditions
which use antiwear hydraulic oil (Class L-HM) at 21 cSt (102 SUS) and 50°C (122°F).

MAXIMUM PRESSURES:

DG3V-7 valves; ports:	
P, A, B	350 bar (5000 psi)
T	300 bar (4351 psi)
X and Y	250 bar (2636 psi)
DG5V-7-(L)(-*)(-E)(-*) valves, (externally drained); ports:**	
P, A, B	350 bar (5000 psi)
T	300 bar (4351 psi)
Y	210 bar (3045 psi) *
X	250 bar (3626 psi) **
DG5V-7-(L)(-*)(-E)-T(-*) valves, (internally drained); ports:**	
P, A, B	350 bar (5000 psi)
T and Y	210 bar (3045 psi) *
X	250 bar (3626 psi) **

*Restricted by Pilot valve core tube rating

**A pressure reducer valve must be used for higher pressures.

MAXIMUM FLOW RATES, L/MIN (USGPM) AT THE MINIMUM PILOT PRESSURES, AND WITH SPOOL TYPE:

Operating Pressure in bar (psi)	50(725)	100(1450)	150(2175)	200(1900)	250(3625)	300(4351)	350(5076)
0*,2,3,6,8*,9**,31,33,52,521,X2,X33,Y2,Y33,35A	300(80)	300(80)	300(80)	300(80)	300(80)	300(80)	300(80)
1*,11*	300(80)	300(80)	300(80)	300(80)	175(47)	125(34)	70(20)

** SUBJECT TO P-T PRESSURE SATURATION.
* Open centred spools

Pilot pressures	See "Pilot Pressures" on page 12
Control (swept) volume(s), DG3V and main-stage of DG5V valves:	
Center-to-end	4.9 cm^3 (0.29 in^3)
End-to-end	9.8 cm^3 (0.60 in^3)

ELECTRICAL INFORMATION:

Coil Voltage ratings, DG5V valves	See 12 in "Model Code" on page 8	
Coil Voltage limits, DG5V valves:		
Maximum voltage	See "Temperature limits", on page 11	
Minimum voltage	90% of rated voltage	
Power consumption, DG5V valves with AC solenoids:	**Initial VA rms**	**Holding VA rms**
Single-frequency coils, 50 Hz types "A" and "C"	225	39
Dual-frequency coils at 50 Hz, types "B" and "D"	265	49
Dual-frequency coils at 60 Hz, types "B" and "D"	260	48
Power consumption, DG5V valves with DC solenoids	30W at rated voltage and 20 C (68 F)	
Relative duty factor, DG5V valves	Continuous; ED = 100%	
Type of protection, DG5V valves:		
ISO 4400 coils with plug fitted correctly	IEC 144 class IP65	
Junction box	IEC 144 class IP65 (NEMA 4)	
Coil winding	Class H	
Lead wires (coil types "F****")	Class H	
Coil encapsulation	Class F	

Operating Data

Pressure drop characteristics See page 12, 13

Response times, DG5V valves:

Typical values for a DG5V-7-2C-E-50 based on a 100% rated voltage from energisation/ de-energisation of the coil to full displacement of mainstage spool. At 150 lt/min. and 175 bar.

Coil rating:	Pilot pressure, bar (psi):	Energizing	Time, ms ◆ De-energizing
110V50Hz AC	15 (218)	60	40*
	100 (1450)	25	40*
	250 (3600)	15	40*
24V DC	15 (218)	95	60*
	100 (1450)	60	60*
	250 (3600)	50	60*

◆From applying a signal at the solenoid until the main-stage spool completes its travel.
*Based on pure switched circuit condition, devoid of effects of any suppression diodes.

TEMPERATURE LIMITS:

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

INSTALLATION DIMENSIONS:

Valves	See page 14
Mounting Surface	See page 14
Mass (weight), basic models:	**kg (lb) approx.**
DG3V-7	7,3 (16.1) ◆
DG5V-7-*A/B (AC voltages)	8,4 (18.5) ◆
DG5V-7-*A/B (DC voltages)	8,5 (18.7) ◆
DG5V-7-*C/N (AC voltages)	8,7 (19.2) ◆
DG5V-7-*C/N (DC voltages)	9,1 (20.0) ◆
◆ Add 1,1 kg (2.4 lb) when pilot chock adjustment is fitted.	
Supporting products:	
Subplate	See catalog 2425
Fastener kits	See catalog 2314 for available metric bolt kit options, i.e. BKDG7-858918 and BKDG7-858919.
Installation and start-up (commissioning):	
Mounting attitudes, DG3V series	Optional for models shown.
Mounting attitudes, DG5V series	Optional for DG5V-7-*B(L)/C/D models, but horizontal mounting is recommended for DG5V-7-*A(L)/N models
After-sales service:	
Spare-parts data for DG3 valves and main stages of DG5 valves, and pilot choke modules	Consult your local Eaton representative
Spare-parts data for DG4V-3S pilot stages of DG5 models	Ask for spares leaflet I-3886-S (minimal text, in English).

Performance Characteristics

Pilot Pressures

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

Spool Type	0	1	2	3	6	8	9	11	31	33	52	X*	Y*	35A
Minimum Differential Pilot Pressure (bar)	9	9	12	12	12	9	9	9	12	12	12	12	12	12

Pressure Drop Characteristics

The following typical pressure drops (△p) at flow rates (Q) are based on standard test conditions, using oil of 0,865 specific gravity. Except where otherwise stated, for any other flow rate (Q_1) the pressure drop (△p1) will be approximately $\triangle p1 = \triangle p\ (Q1/Q)^2$.

SPOOL TYPE	SPOOL POSITION COVERED	P-A	B-T	P-B	A-T	P-T
0	All	1	5	1	4	5
1	Energised	1	4	1	4	
	De-energised	7◆◆			4◆	8••
2	All	1	4	1	1	
3	Energised	1	4	1	4	
	De-energised				7	
6	Energised	1	5	1	4	
	De-energised		8		8	
8	All	3	3	3	7	9
9	Energised	2	5	3	3	
	De-energised	-	-	-	-	** • ••
11	Energised	1	5	1	1	
	De-energised		4◆	7◆◆		8•
31	Energised	1	5	1	1	
	De-energised		8			
33	Energised	1	5	1	3	
	De-energised		-		-	
35A	Energised		8			
	De-energised	6				
52	Energised P-A	3•		6••		
52	Energised P-B			3	2	
X2	All	*	5	*	2	
X33	Energised	*	5	*	2	
	De-energised		-		-	
Y2	All	3	11	3	8	
Y33	Energised	2	10	2	8	
	De-energised		-		-	

* 65 bar @300l/min.

** 70 bar @150l/min.

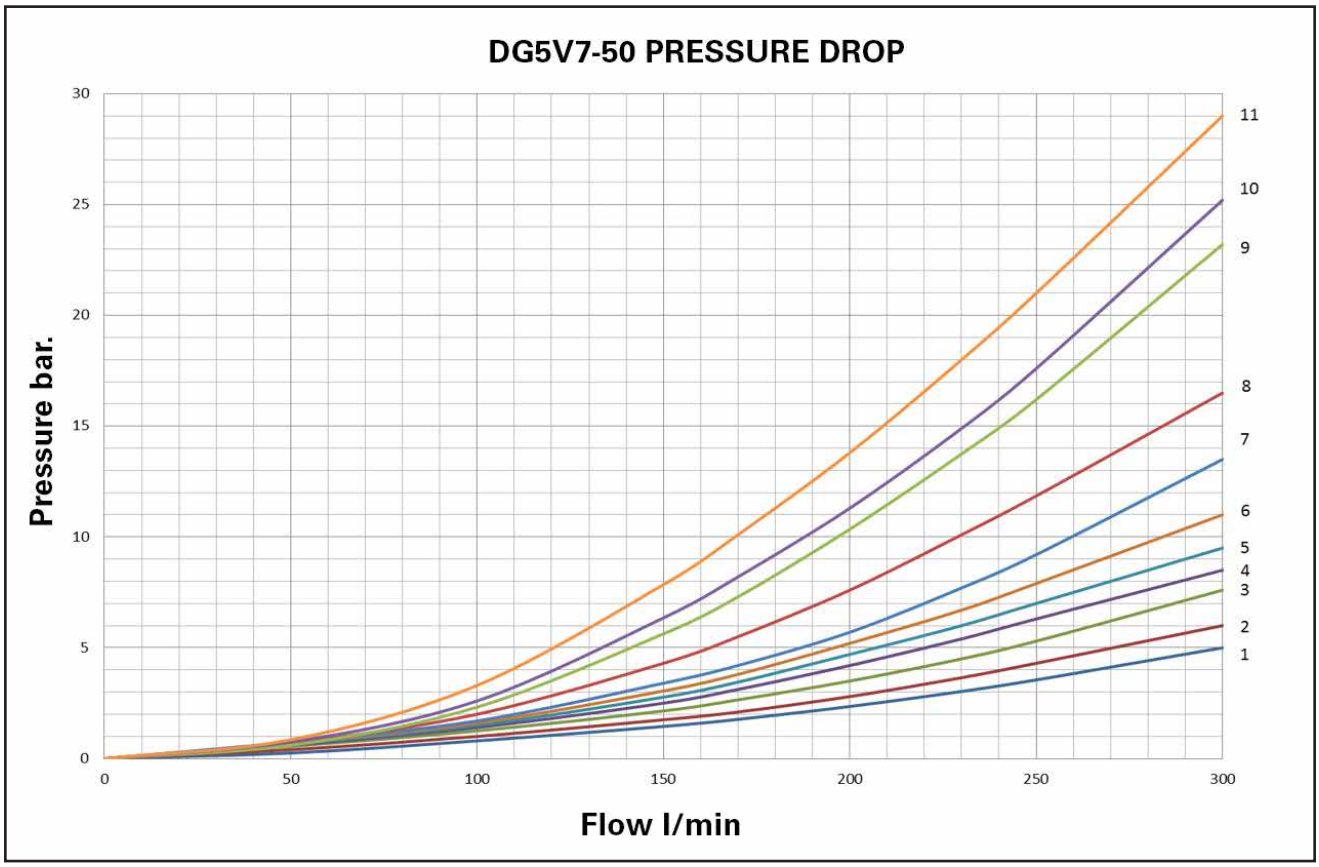
• Port B blocked

•• Port A blocked

◆ Port P blocked

◆◆ Port T blocked

Performance Characteristics



Hydraulics Fluids Contamination Control Requirements

Recommendations on Hydraulic Fluids and contamination control methods and the selection of products to control fluid condition are included in Eaton Hydraulics Fluid Recommendation 03-401-2010 rev 1

Fluid Temperatures

For petroleum oil:

Min. . . . . .. –20°C (–4°F)
Max.*. . . . . .+70°C (+158°F)

*To obtain optimum service life from both fluid and hydraulic system, 65°C (150°F) normally is the maximum temperature.

For other fluids where limits are outside those of petroleum oil, consult fluid manufacturer or Eaton representative.

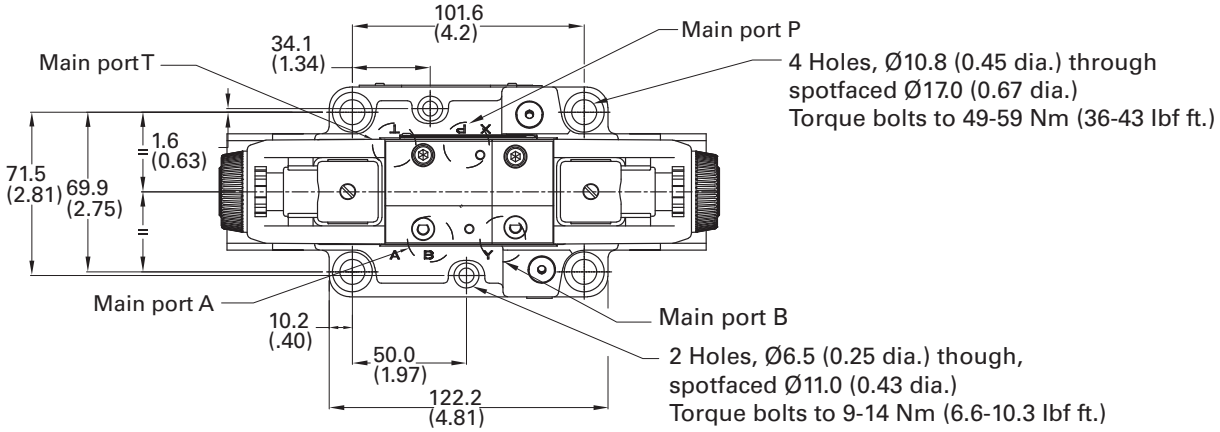
Whatever the actual temperature range, ensure that viscosities stay within those specified under "Hydraulic Fluids".

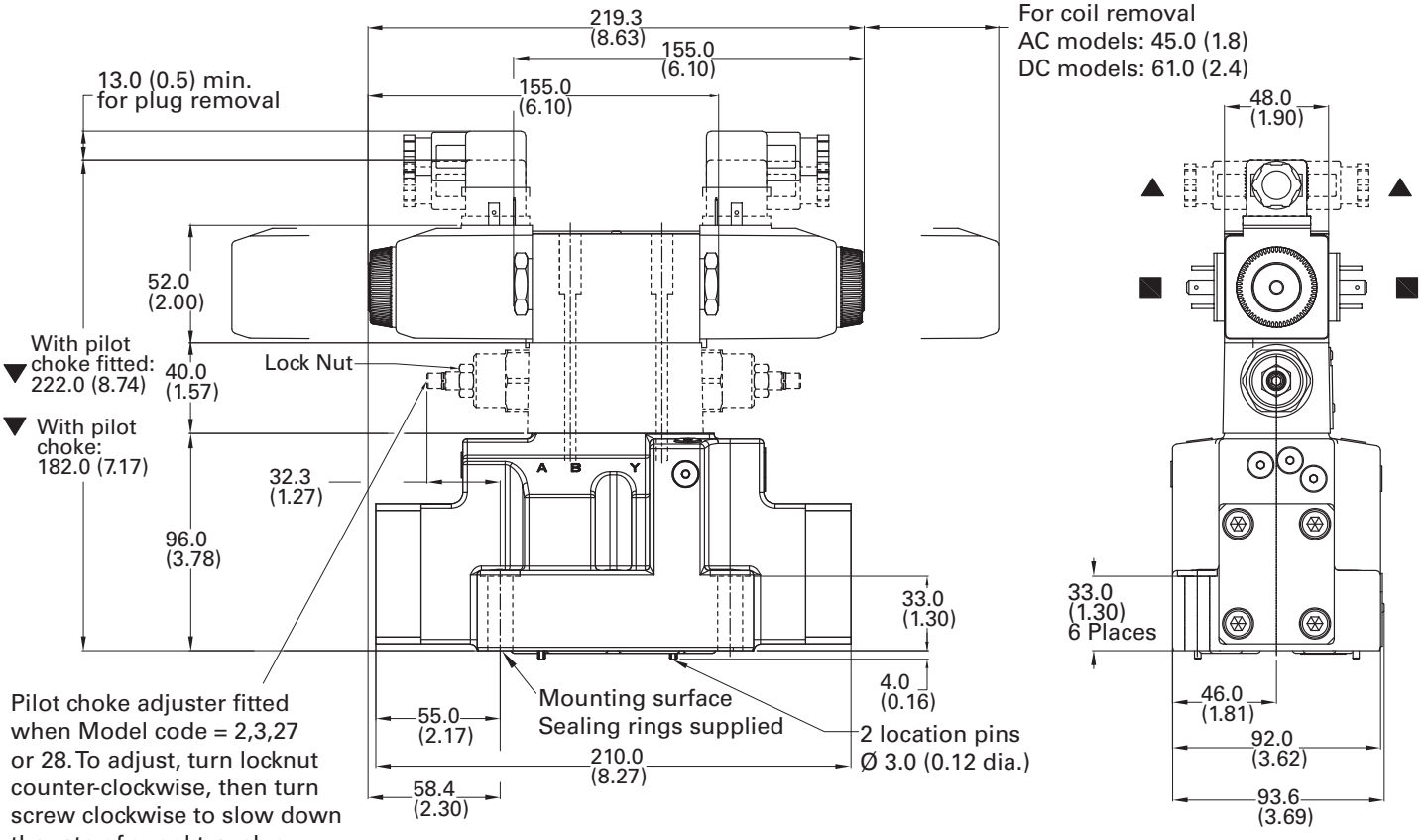
Installation Dimensions

Millimeters (inches)

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

DG5V-7–**(L)(-2)(-E)(-T)(-*)-(V)M–U example
For stroke adjusters see page 15





▼ May vary according to plug source.

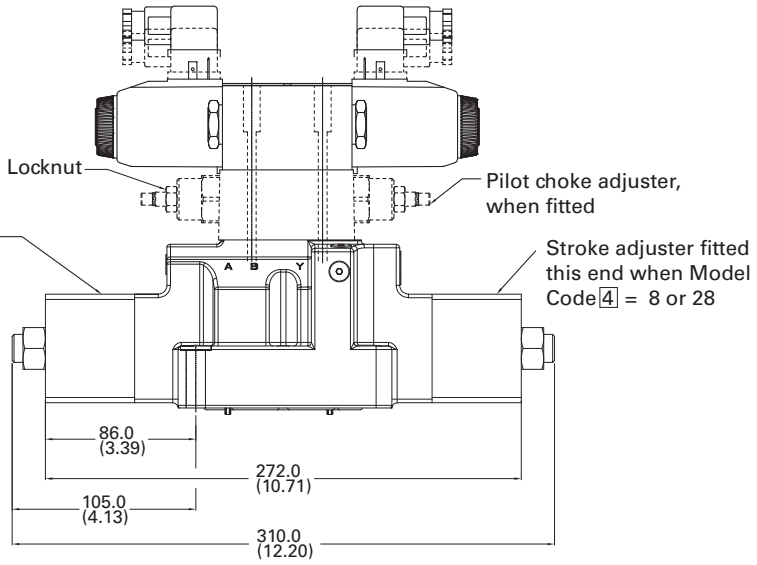
■ Alternative plug positions by loosening knurled nut counter-clockwise, turning coil and re-tightening nut.

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

Optional Features

Solenoid Controlled Models with Stroke Adjusters

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



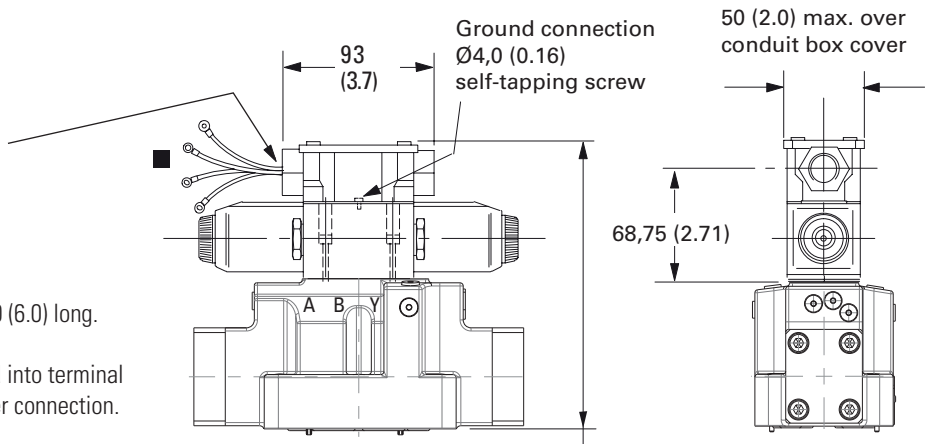
To Adjust:

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

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

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

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



1/2 NPT for F(T)W options, at both ends. Closure plug fitted at one end.
For other options see 9 & 10 in "Model Code"

■ Ref. "Model Code": 10
Codes "FW": 2 lead wires for each solenoid, approx. 150 (6.0) long. M3 (#6) terminals provided for customer connection.
Codes "FTW": Valve supplied with lead wires connected into terminal strip suitable for M3 (#6) terminals provided for customer connection.

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

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