Pilot Operated Directional Valves
Catalog

DG3V-7, 20 Series, Pilot Operated
DG5V-7, 40 Series, Solenoid Controlled, Pilot Operated
ISO 4401 Size 07
Introduction

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

Two series of valves, DG5V solenoid controlled, pilot operated and DG3V pilot operated models are available with a choice of 18 different spools. These include meter-in and meter-out spools and a regeneration type that can obviate extra valves essential in traditional circuit arrangements.

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

Models include spring offset, spring centered, pressure centered and detented versions. All are available with the option of an integral P-port pilot pressure generator. DG5V valves can be arranged for internal or external pilot pressure and/or drain connections.

Features and Benefits

- High pressure and flow capability for maximum cost-effectiveness.
- Low headloss to minimize power wastage.
- Low shock characteristics to maximize machine life.
- Facility to change solenoid coils without disturbing the hydraulic envelope.

Functional Symbols

DG3V-7 Pilot Operated Models

Comprehensive and simplified symbols.

Spring Offset, End-to-End, DG3V-7-*A
Spool types: 0, 2, 6, 9, 35, 52, 521, X2, Y2

Spring Centered, DG3V-7-*C
Spool types: All

Pressure Centered, DG3V-7-*D
Spool types: All

DG3V-7 Options

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

1. Pilot choke module
2. Minimum pilot pressure generator
3. Stroke adjusters at either or at both ends (shown at both ends in example)

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

DG5V-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
Spool types: 0, 2, 6, 9, 35, 52, 521, X2, Y2

Spring Offset, End-to-End, Opposite Hand, DG5V-7-*AL
Spool types: 0, 2, 6, 9, 35, 52, 521, X2, Y2

Spring Offset, End-to-Center, DG5V-7-*C
Spool types: All

Spring Offset, End-to-Center
Models Spool types
DG5V-7-*B 0, 2, 52, 521, X2, Y2

DG5V-7-*BL 4, 8

Spring Centered, DG5V-7-*D
Spool types: All

Detented, DG5V-7-*N
Spool types: 0, 2, 6, 9, 52, 521, X2, Y2

DG5V-7 Options
The following are shown in a DG5V-7-*C example:
1. Pilot choke module
2. Minimum pilot pressure generator
3. Stroke adjusters, at either or at both ends (shown at both ends in example)
4. External pilot connection
5. Internal drain

One or more options can be built into any DG5 series valve, the only exception being that the internal drain option is not available with DG5V-7-*D (pressure centered) valves.
Symbols on Nameplates

Typical illustrations for:

DG3V-7-2D-1

DG5V-7-3C-2-E-T-K

Spool Types

Shown in 3-position form, plus 2 transients.

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

▲ The performance of the “33” and “34” spools differ only in the center position.

Your Eaton representative can provide further details.

■ Only 35A available.
## Model Codes

**DG3V-7 20 Series, Pilot Operated Directional Valves**

### For pilot operated valves:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F3-</td>
<td>DG3V-7-* ** (** -K)-2*</td>
</tr>
<tr>
<td>1</td>
<td>23 4 8 14</td>
</tr>
</tbody>
</table>

### For solenoid controlled, pilot operated valves:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F3-</td>
<td>DG5V-7-* ** (** -P**)(-E)(-T)(-K)(-V) M-*****(L)-5-4*</td>
</tr>
<tr>
<td>1</td>
<td>23 4 5 6 7 8 9 10 11 12 13 14</td>
</tr>
</tbody>
</table>

### Fluid Compatibility

- Blank = Antifriction hydraulic oil (class LHM), invert emulsion (class LHF), or water glycol (class LHC)
- F3 = As above or phosphate ester (class LHF)

**Note:** For further information see “Hydraulic Fluids” section on page A.12.

### Spool Type

See “Functional Symbols” section on pages 3-4.

### 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
- **D** = Pressure 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.

### 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

### Main Stage Spool Monitoring Switch

- **PCA** = Center sensing switch on “A” port end
- **PCB** = Center sensing switch on “B” port end
- **PDA** = Double offset sensing switch on “A” port end
- **PDB** = Double offset sensing switch on “B” port end
- **PCD** = Center sensing switch on “A” port end and double offset sensing switch on “B” port end
- **PPA** = Offset sensing proximity switch “A” port end
- **PPB** = Offset sensing proximity switch “B” port end
- **PPD** = Offset sensing proximity switch both ends

### 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.

### 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

### Solenoid Type/Connection(s)

- **U** = ISO 4400 (DIN 43650) mounting
- **FW** = 1/2 NPT thread junction box
- **FTW** = 1/2 NPT thread junction box and terminal strip
- **M** = M20 thread junction box
- **FJ** = M20 thread junction box and terminal strip
- **FPA3W** = J junction box with 3-pin male connector to NFPA T3.5.29-1980 for single-solenoid valves
- **FPA5W** = J junction box with 5-pin male connector to NFPA T3.5.29-1980 for single or double-solenoid valves

### Indicator Lights

- **L** = Lights fitted

For U-code solenoids use plug with integral light, see page A.16.

### Coil Rating

See “Operating Data” on page XX for further information.

- **A** = 110V AC 50 Hz
- **B** = 110V AC 50 Hz
- **C** = 220V AC 50 Hz
- **D** = 220V AC 60 Hz
- **G** = 12V DC

### Design Number

- **20** series for DG3V valves.
- **40** series for DG5V valves.

Subject to change. Installation dimensions unaltered for design numbers 0 to 9 inclusive.

### For Mounting Subplate and Fastener Kit Options

See “Supporting products” on page A.10.

For ISO 4400 (DIN 43650) Electrical Plugs to Suit DG5V- and DG3V-U Valves

See “Installation Dimensions” and “Electrical Plugs and Connectors” on page A.13.
Application Notes

Pilot Pressure

a. Pilot pressure must always exceed tank line pressure by at least the requisite minimum pilot pressure. This also applies when combining open-center spools (0, 1, 4, 8, 9 and 11) with internal pilot pressure, but they should be used only with externally drained valves.

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

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

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

Minimum-Pilot-Pressure Generator

Option
Can be built into the P-port to create a minimum pilot pressure differential of 0.35 bar (5 psi) where internal pilot pressure is required with open-centered spools, i.e. 0, 1, 4, 8, 9 and 11.

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 main-stage 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.
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:**

<table>
<thead>
<tr>
<th>Port</th>
<th>Maximum Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, A, B, T, X and Y</td>
<td>350 bar (5000 psi)</td>
</tr>
<tr>
<td>L</td>
<td>0.5 bar (7 psi)</td>
</tr>
</tbody>
</table>

**DG5V-7-**(L)(-*)(-*)(-*) valves, (externally drained); ports:

<table>
<thead>
<tr>
<th>Port</th>
<th>Maximum Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, A, B, T and X</td>
<td>350 bar (5000 psi)</td>
</tr>
<tr>
<td>Y</td>
<td>100 bar (1500 psi)</td>
</tr>
<tr>
<td>L</td>
<td>0.5 bar (7 psi)</td>
</tr>
</tbody>
</table>

**DG5V-7-**(L)(-*)(-E)(-*)-T(-*) valves, (internally drained); ports:

<table>
<thead>
<tr>
<th>Port</th>
<th>Maximum Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, A, B and X</td>
<td>350 bar (5000 psi)</td>
</tr>
<tr>
<td>T</td>
<td>100 bar (1500 psi)</td>
</tr>
</tbody>
</table>

Available for all except the DG5V-7-D pressure centered models.

▲ The DG5V, 40 design two-stage valves have been designed to satisfy the needs of most applications. Consult your Eaton representative about an alternative model if:

- a) Valves are required to remain pressurized for long periods without frequent switching, and/or
- b) Back pressure on the drain port of externally drained models (or the tank port of internally drained models) is required to rise above 100 bar (1500 psi).

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

<table>
<thead>
<tr>
<th>Pressure Range</th>
<th>L/MIN (USGPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 2, 3, 6, 31</td>
<td>200 (43)</td>
</tr>
<tr>
<td>3, 33, 52 or 521</td>
<td>220 (56)</td>
</tr>
<tr>
<td>1, 4, 9 or 11</td>
<td>260 (60)</td>
</tr>
<tr>
<td>8</td>
<td>300 (60)</td>
</tr>
</tbody>
</table>

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

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

**Pilot pressures** See "Pilot Pressures" on page A.11.

**Control (swept) volume(s), DG3V and main-stage of DG5V valves:**

<table>
<thead>
<tr>
<th>Volume</th>
<th>DG3V</th>
<th>DG5V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center-to-end</td>
<td>4.07 cm³ (0.25 in³)</td>
<td>8.14 cm³ (0.50 in³)</td>
</tr>
<tr>
<td>End-to-end</td>
<td>8.14 cm³ (0.50 in³)</td>
<td></td>
</tr>
</tbody>
</table>

**Voltage ratings, DG5V valves** See A.12 in "Model Code" on page A.7.

**Voltage limits, DG5V valves:**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>DG5V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum voltage</td>
<td>90% of rated voltage</td>
</tr>
</tbody>
</table>

**Power consumption, DG5V valves with AC solenoids:**

<table>
<thead>
<tr>
<th>Power Consumption</th>
<th>Initial VA rms</th>
<th>Holding VA rms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-frequency coils, 50 Hz types “A” and “C”</td>
<td>225</td>
<td>39</td>
</tr>
<tr>
<td>Dual-frequency coils at 50 Hz, types “B” and “D”</td>
<td>265</td>
<td>49</td>
</tr>
<tr>
<td>Dual-frequency coils at 60 Hz, types “B” and “D”</td>
<td>260</td>
<td>48</td>
</tr>
</tbody>
</table>

**Power consumption, DG5V valves with DC solenoids** 30 W at rated voltage and 20 C (68 F)

**Relative duty factor, DG5V valves** Continuous; ED =100%

**Type of protection, DG5V valves:**

<table>
<thead>
<tr>
<th>Protection Type</th>
<th>DG5V</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 4400 coils with plug fitted correctly</td>
<td>IEC 144 class IP65</td>
</tr>
<tr>
<td>Junction box</td>
<td>IEC 144 class IP65 (NEMA 4)</td>
</tr>
<tr>
<td>Coil winding</td>
<td>Class H</td>
</tr>
<tr>
<td>Lead wires (coil types “F****”)</td>
<td>Class H</td>
</tr>
<tr>
<td>Coil encapsulation</td>
<td>Class F</td>
</tr>
</tbody>
</table>
## Operating Data

### Pressure drop characteristics
See page A.11.

### Response times, DG5V valves:
See "Response Times" section on page A.12.

Typical values for a DG5V-7-2C-E spring centered, externally piloted valve under standard test conditions and operating with 150 L/min (40 USgpm) at 350 bar (5000 psi).

<table>
<thead>
<tr>
<th>Coil rating:</th>
<th>Pilot pressure, bar (psi):</th>
<th>Energizing</th>
<th>Time, ms ◆ De-energizing</th>
</tr>
</thead>
<tbody>
<tr>
<td>110V 50 Hz</td>
<td>15 (218)</td>
<td>120</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>50 (730)</td>
<td>45</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>150 (2180)</td>
<td>25</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>210 (3000)</td>
<td>20</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>250 (3600)</td>
<td>18</td>
<td>55</td>
</tr>
<tr>
<td>24V DC</td>
<td>15 (218)</td>
<td>130</td>
<td>65▲</td>
</tr>
<tr>
<td></td>
<td>50 (730)</td>
<td>55</td>
<td>65▲</td>
</tr>
<tr>
<td></td>
<td>150 (2180)</td>
<td>35</td>
<td>65▲</td>
</tr>
<tr>
<td></td>
<td>210 (3000)</td>
<td>30</td>
<td>65▲</td>
</tr>
<tr>
<td></td>
<td>250 (3600)</td>
<td>28</td>
<td>65▲</td>
</tr>
</tbody>
</table>

◆ From applying a signal at the solenoid until the main-stage spool completes its travel.
▲ In pure switched circuit conditions, devoid of the effects of any suppression diodes and full-wave rectifiers.

### TEMPERATURE LIMITS:

**Fluid temperature limits**
See page XXX.

**Ambient temperature limits:**
See page XXX.

**Minimum ambient, all valves**
-20°C (-4°F)

**Maximum ambient, 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 XXX

**Mounting Surface**
See catalog 2425

**Mass (weight), basic models:**
kg (lb) approx.

- DG3V-7-*/A(L) 10.0 (22.0) ◆
- DG3V-7-*/B(L)/C 7.3 (16.1) ◆
- DG3V-7-*/D 8.4 (18.5) ◆
- 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) ◆
- DG5V-7-*/D (AC voltages) 9.8 (21.6) ◆
- DG5V-7-*/D (DC voltages) 10.2 (22.5) ◆

◆ 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 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 chock 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.

Pressure Drop Characteristics
The following typical pressure drops (Δp) at flow rates (Q) are based on standard test conditions, using oil of 0.865 specific gravity. Except where otherwise stated, for any other flow rate (Q₁) the pressure drop (Δp₁) will be approximately Δp₁ = Δp (Q₁/Q)².

<table>
<thead>
<tr>
<th>Spool Type</th>
<th>Flow-Direction Curve Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>P - A  B - T  P - B  A - T  P - T</td>
</tr>
<tr>
<td>1</td>
<td>2  1  2  3  3  3</td>
</tr>
<tr>
<td>2</td>
<td>1  2  1  2  -  -</td>
</tr>
<tr>
<td>3</td>
<td>1  2  1  3  -  -</td>
</tr>
<tr>
<td>4</td>
<td>2  2  2  1  6  -</td>
</tr>
<tr>
<td>5</td>
<td>1  1  1  3  -  -</td>
</tr>
<tr>
<td>6</td>
<td>2  2  2  1  5  -</td>
</tr>
<tr>
<td>7</td>
<td>1  2  1  3  7  -</td>
</tr>
<tr>
<td>8</td>
<td>2  3  1  2  4  -</td>
</tr>
<tr>
<td>9</td>
<td>1  3  1  2  -  -</td>
</tr>
<tr>
<td>11</td>
<td>1  2  1  2  -  -</td>
</tr>
<tr>
<td>31</td>
<td>2 - 3 - 3  -  -</td>
</tr>
<tr>
<td>32</td>
<td>- 2 - 3 - 3 -</td>
</tr>
<tr>
<td>35</td>
<td>See page 17</td>
</tr>
<tr>
<td>52</td>
<td>2 - 3 - 3 -</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow Rate (L/min)</th>
<th>0 1 2 3 4 6 8 9 11 31 33 35</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSI</td>
<td>0 1 2 3 4 6 8 9 11 31 33 35</td>
</tr>
<tr>
<td>BAR</td>
<td>0 1 2 3 4 6 8 9 11 31 33 35</td>
</tr>
</tbody>
</table>

Selected P to A.

Selected P to B.

Port A plugged.

Port B plugged.

Ports A and B plugged.

DG5V-7-52BL models only.

Applicable to:

Model  Spool type  Curve correction
DG3V-7- *C  All  As drawn
DG3V-7- *D  All  Add 5 bar (73 psi)
DG5V-7- *A(L)  0, 2, 6, 9, 52, X2 & Y2  Subtract 3 bar (44 psi)
DG5V-7- *B(L)  0, 2, 6, 52▲, X2 & Y2  As drawn
DG5V-7- *C  All  As drawn
DG5V-7- *D  All  Add 5 bar (73 psi)
DG5V-7- *N  0, 2, 6, 9, 52, X2 & Y2  As drawn

▲ DG5V-7-52BL models only.
Minimum-Pilot-Pressure Generator
For valves fitted with this option, the P to A or B pressure drop derived from the graph on the previous page is increased by 3.5 bar (51 psi) at 50 L/min (13 US gpm).
At any other flow rate Q1 the total pressure drop becomes:

a. For pressures in bar and flow rates in L/min:
$$\Delta p_1 = (Q_1/50)^2$$
b. For pressures in psi and flow rates in US gpm:
$$\Delta p_1 = 51(Q_1/13.2)^2$$

Hydraulic Fluids
Materials and seals used in these valves are compatible with antiwear hydraulic oils, water-glycols, water-in-oil emulsions and non-alkyl-based phosphate esters. The extreme operating range is 500 to 13 cSt (2270 to 70 SUS) but the recommended running range is 54 to 13 cSt (245 to 70 SUS). For further technical information about fluids see “Technical Information” leaflet B-920 or I-286S.

Contamination Control Requirements
Recommendations on contamination control methods and the selection of products to control fluid condition are included in Vickers publication 9132 or 561, “Vickers Guide to Systemic Contamination Control”. The book also includes information on the Vickers concept of “ProActive Maintenance”.
The following recommendations are based on ISO cleanliness levels at 2 m, 5 m and 15 m. For products in this catalog the recommended levels are:
Up to 210 bar (3000 psi)
$$20/18/15$$
Above 210 bar (3000 psi)
$$19/17/14$$

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”.

EATON Vickers Pilot Operated Directional Valves Catalog V-VLDI-MC007-E March 2007 11
Installation Dimensions

Millimeters (inches)

Solenoid Controlled Models with ISO 4400 (DIN 43650)

Electrical Connections and Pilot Choke

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

For dimensions A, B, C, D and E see page A.15.
For solenoid identification see page A.15.
For stroke adjusters see page A.14.

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

May vary according to plug source.
Alternative plug positions by loosening
knurled nut counter-clockwise, turning
coil and re-tightening nut.

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

For plug options see page A.16.

With pilot
choke fitted:
222.0 (8.74) ▼
Without pilot
choke:
182.0 (7.17) ▼

For coil removal:
AC models: 45 (1.8)
DC models: 61 (2.4)

For dimensions A, B, C, D and E see page A.15.
For solenoid identification see page A.15.
For stroke adjusters see page A.14.
Optional Features

Solenoid Controlled Models with Stroke Adjusters
DG5V-7-***(L)(-2)(-E)(-T)(-K)(-*)-(V)M-U example
For solenoid identification see page A.15.

Solenoid Controlled Models with Junction Box having Optional Terminal Strip and Indicator Lights
DG5V-7-***(L)(-**)(-E)(-T)(-K)(-*)-(V)MF**(L) example.
For solenoid identification see page A.15.

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

M20-6H x 1.5 thread for F(T)J options, or 1/2" NPT for F(T)W options, at both ends. Closure plug fitted at one end.
For other options see [10 & 11] in “Model Code”, eight pages back, and under “NFPA Connector---” and “Terminal Strip and Lights” sections, two pages on.

Pilot Operated Models with Optional Pilot Choke and/or Stroke Adjusters
DG3V-7-**(-2)(-**) example
For dimensions D and E see page A.15.
### Optional Features

#### SOLENOID IDENTIFICATION

<table>
<thead>
<tr>
<th>Model</th>
<th>Spool types</th>
<th>Solenoid identity at: Main port “A” end</th>
<th>Solenoid identity at: Main port “B” end</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG5V-7-<em>A/B(-**)(-E)(-T)(-K)(-</em>)-M</td>
<td>All except “4” &amp; “8”</td>
<td>-</td>
<td>B</td>
</tr>
<tr>
<td>DG5V-7-<em>A/B(-**)(-E)(-T)(-K)(-</em>)-VM</td>
<td>All except “4” &amp; “8” “4” &amp; “8” only</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>DG5V-7-<em>AL/BL(-**)(-E)(-T)(-K)(-</em>)-M</td>
<td>All except “4” &amp; “8”</td>
<td>A</td>
<td>-</td>
</tr>
<tr>
<td>DG5V-7-<em>AL/BL(-**)(-E)(-T)(-K)(-</em>)-VM</td>
<td>All except “4” &amp; “8” “4” &amp; “8” only</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>DG5V-7-<em>C/D/N(-**)(-E)(-T)(-K)(-</em>)-M</td>
<td>All except “4” &amp; “8”</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>DG5V-7-<em>C/D/N(-**)(-E)(-T)(-K)(-</em>)-VM</td>
<td>All spools</td>
<td>B</td>
<td>A</td>
</tr>
</tbody>
</table>

#### DIMENSIONS

<table>
<thead>
<tr>
<th>Basic model designation</th>
<th>AC models</th>
<th>DC models</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG3V-7-*C</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>DG3V-7-*A ■</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>DG3V-7-*A(L) ■</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>DG5V-7-*A ■</td>
<td>-</td>
<td>147 (5.8)</td>
</tr>
<tr>
<td>DG5V-7-*A ■</td>
<td>-</td>
<td>147 (5.8)</td>
</tr>
<tr>
<td>DG5V-7-*B ■</td>
<td>200 (7.8)</td>
<td>-</td>
</tr>
<tr>
<td>DG5V-7-*C</td>
<td>200 (7.8)</td>
<td>-</td>
</tr>
</tbody>
</table>

■ Not types “4” or “8” spools.

#### Water-Resistant Manual Override on Solenoids

DG5V-7-M.****(L)-H valves

**Application:**
General use where finger operation is required (standard manual overrides can only be operated by using a small tool).

![Diagram of manual override](See page A.13)

Manual actuation must be applied within this diameter: approximately 20 (0.8). Spacer prevents actuation by larger device.

Note: “H” feature is not field convertible from other models; specify with order.
Electrical Information

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

Millimeters (inches)

<table>
<thead>
<tr>
<th>SPECIFICATIONS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage (Vs)</td>
<td>10 to 30 Vdc</td>
</tr>
<tr>
<td>Supply Current (Is)</td>
<td>8 mA at 24 Vdc (plus load current)</td>
</tr>
<tr>
<td>Supply Over-voltage Rating</td>
<td>35 Vdc continuous</td>
</tr>
<tr>
<td>Supply Reverse Polarity Rating</td>
<td>-35 Vdc (with no shorts)</td>
</tr>
<tr>
<td>Short Circuit Tolerance:</td>
<td>Continuous short between any two pins</td>
</tr>
<tr>
<td>High Potential Test, Pin to Case:</td>
<td>300 Vdc</td>
</tr>
<tr>
<td>Electromagnetic Compatibility:</td>
<td>ISO 7637 Parts O and I worst case and Immunity to Radiated Electromagnetic Fields, 10 KHZ to 1 GHZ per SAE J113/25 Sep 95</td>
</tr>
<tr>
<td>Pins to Case Resistance</td>
<td>50 M megohms</td>
</tr>
<tr>
<td>Load Dump Tolerance:</td>
<td>80 Vdc Peak, 400 ms Decay, with 1.5 Ohm Source Impedance</td>
</tr>
<tr>
<td>Switching Frequency:</td>
<td>0 to 3K Hz</td>
</tr>
<tr>
<td>Output:</td>
<td>Open collector PNP sourcing, normally open</td>
</tr>
<tr>
<td>Sensing Distance (offset position):</td>
<td>1.27 ± 0.25 mm (.050” ± .010”)</td>
</tr>
<tr>
<td>Hysteresis:</td>
<td>0.25 mm (.010”) M ax</td>
</tr>
<tr>
<td>Rise/Fall Time:</td>
<td>6.5/15 microsec R1=820 Ohm, C1=20 pf @ 8Vdc</td>
</tr>
<tr>
<td>Output Leakage Current</td>
<td>10µa M ax</td>
</tr>
<tr>
<td>Output Voltage High:</td>
<td>+Vs - 2.2 Vdc minimum</td>
</tr>
<tr>
<td>Output Load Current:</td>
<td>200 mA M ax</td>
</tr>
<tr>
<td>Operating Pressure:</td>
<td>350 bar (5000 psi)</td>
</tr>
<tr>
<td>Operating Temperature:</td>
<td>-40˚ to 110˚C</td>
</tr>
<tr>
<td>Humidity:</td>
<td>0 to 100%</td>
</tr>
</tbody>
</table>

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

Functional Diagram - Spring Offset
- center condition (ref.)

Output Circuit Wiring Instructions

Connector Detail

*PIN #4 Signal
*PIN #8 Common
*PIN #1 -24VDC±20%
*PIN #2 Not Used

0=voltage at pin 4 0.5V min.
1=voltage at pin 4 (Vs - 2.2V) min.
Electrical Information

DG5V-7 with Main Stage Spool Monitoring Switch
“PCA”, “PCB”, “PDA”, “PDB”, “PCD” Models (LVDT style)

Millimeters (inches)

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage (Vs)</td>
<td>24VDC +/- 20%</td>
</tr>
<tr>
<td>Reverse Polarity Protection</td>
<td>Max. 300 V Installed</td>
</tr>
<tr>
<td>Ripple Voltage</td>
<td>10%</td>
</tr>
<tr>
<td>Current Consumption</td>
<td>40 mA Approx.</td>
</tr>
<tr>
<td>Outputs</td>
<td>NC Contact Positive</td>
</tr>
<tr>
<td>Sensing Distance (offset position)</td>
<td>5.85 to 6.15 mm</td>
</tr>
<tr>
<td>Sensing Distance (from center position)</td>
<td>± 0.35 to 0.65 mm</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>&lt;= 0.06 mm</td>
</tr>
<tr>
<td>Output Voltage (No Short Circuit Protection)</td>
<td>(No Short Circuit Protection)</td>
</tr>
<tr>
<td>Signal 1</td>
<td>Vs - 2.5 V</td>
</tr>
<tr>
<td>Signal 0</td>
<td>&lt; 1.8 V</td>
</tr>
<tr>
<td>Output Current</td>
<td>&lt; 400 mA AT INPUT + 20%</td>
</tr>
<tr>
<td>Environmental Protection</td>
<td>IP65 (With Mounted Plug)</td>
</tr>
<tr>
<td>Operating Temp Range</td>
<td>-20°C to +85°C</td>
</tr>
<tr>
<td>Operating Pressure</td>
<td>315 bar (4500 psi)</td>
</tr>
<tr>
<td>CE Declaration of Conformity No.</td>
<td>00 02 002 9 93</td>
</tr>
</tbody>
</table>

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

R₁R₂ = e.g. Coil Resistance of the switch relay >= 60 OHMS
Valve for Safety Circuit Application
(35A Spool)

DG5V with PPA Switch Option Shown

<table>
<thead>
<tr>
<th>MODEL</th>
<th>A (mm/in)</th>
<th>B (mm/in)</th>
<th>C (mm/in)</th>
<th>D (mm/in)</th>
<th>LEAKAGE P-A</th>
<th>FLOW CURVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG5V5-35A</td>
<td>118.5 (4.67)</td>
<td>234.7 (9.24)</td>
<td>262.1 (10.32)</td>
<td>Available upon request</td>
<td>Available upon request</td>
<td></td>
</tr>
<tr>
<td>DG5V7-35A</td>
<td>152.1 (5.99)</td>
<td>252.1 (9.92)</td>
<td>286.6 (11.28)</td>
<td>Available upon request</td>
<td>See below</td>
<td></td>
</tr>
<tr>
<td>DG5V8-35A</td>
<td>151.7 (5.97)</td>
<td>346.0 (13.62)</td>
<td>380.5 (14.98)</td>
<td>156 (9.5)</td>
<td>Available upon request</td>
<td></td>
</tr>
<tr>
<td>DG5V10-35A</td>
<td>230.7 (9.10)</td>
<td>443.4 (17.46)</td>
<td>476.3 (18.8)</td>
<td>Available upon request</td>
<td>Available upon request</td>
<td></td>
</tr>
</tbody>
</table>

**DG5V7-35A Flow Curve**

![Flow Curve Diagram](image-url)
Plugs for ISO 4400 (DIN 43650) Type
Coil Connection

For valves with type “U” coils

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

The cable entry is Pg.11, for cable Ø 6-10 mm (0.24 to 0.39 dia).

Order separately by part number.

NFPA Connector T3.5.29-1980

DG5V-7-***—FPA3W(L) and
DG5V-7-***—FPA5W(L) models

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 mm (4.0”) long and one of 177.8 mm (7.0”) length. All wires have US Underwriters Laboratory-recognized non-solder insulated eyelet terminals. The green wire is used for the ground (earth) connection (No. 8-size screw furnished). Valves are supplied prewired.

PLUGS WITHOUT INDICATOR LIGHTS

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Color</th>
<th>Use on solenoid coil</th>
</tr>
</thead>
<tbody>
<tr>
<td>710775</td>
<td>Black</td>
<td>Sol. B</td>
</tr>
<tr>
<td>710776</td>
<td>Gray</td>
<td>Sol. A</td>
</tr>
</tbody>
</table>

Connection details and model type/model code references

PLUGS WITH INDICATOR LIGHTS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>12-24V</td>
<td>977467</td>
<td>977466</td>
</tr>
<tr>
<td>100-125V</td>
<td>977469</td>
<td>977468</td>
</tr>
<tr>
<td>200-240V</td>
<td>977471</td>
<td>977470</td>
</tr>
</tbody>
</table>

5-pin connector
When fitted in double-solenoid valves, e.g.:
DG5V-7-***(S)(***)-(V)M-FPA3W(L)
DG5V-7-***(S)(***)-(V)M-FPA5W(L)
DG5V-7-***(S)(***)-(V)M-FPA3W(L)
DG5V-7-***(S)(***)-(V)M-FPA5W(L)

1-lead (to solenoid “B”)
5-lead (to solenoid “B”)

4-lead (to solenoid “A”)

3-green lead (ground)

12-24V 977467 977466
100-125V 977469 977468
200-240V 977471 977470

3-pin connector
When fitted in single-solenoid valves, e.g.:
DG5V-7-***(S)(***)-(V)M-FPA3W(L)
DG5V-7-***(S)(***)-(V)M-FPA5W(L)

1-green lead (ground)
3-lead (to solenoid)

2-lead (to solenoid)

5-pin connector
When fitted in single-solenoid valves, e.g.:
DG5V-7-***(S)(***)-(V)M-FPA3W(L)
DG5V-7-***(S)(***)-(V)M-FPA5W(L)

1-lead (to solenoid)
5-lead (to solenoid)

4-lead (capped)

3-green lead (ground)

3-lead (to solenoid)

2-lead (capped)
**Terminal Strip and Light Options**

When fitted in solenoid controlled valves DG5V-7-**(L)---F****(L).

**DG5V-7-**(L)---F****-**

1. For DC coils the +ve lead(s) must be connected to the terminal(s) marked +.

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.

**DG5V-7-**(L)---F****L-**
Released Assembly Numbers of Valve with Main Spool Monitoring Switch

### Size D07/NG16

<table>
<thead>
<tr>
<th>Assembly Number</th>
<th>Model Code</th>
<th>Assembly Number</th>
<th>Model Code</th>
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</thead>
<tbody>
<tr>
<td>02-396643</td>
<td>DG5V-7-0A-PPA-T-K-M-U-H7-30</td>
<td>5996923-001</td>
<td>DG5V-7-2C-PPD-T-M-U-H7-30</td>
</tr>
<tr>
<td>02-396644</td>
<td>DG5V-7-0C-PPD-T-K-M-U-A6-30</td>
<td>02-397195</td>
<td>DG5V-7-35A-PPA-E-Z-VM-U-H7-30</td>
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<tr>
<td>5996907-001</td>
<td>DG5V-7-0C-PPD-T-K-M-U-A7-30</td>
<td>5996924-001</td>
<td>DG5V-7-6C-PCA-T-M-U-H7-30</td>
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<td>5996914-001</td>
<td>DG5V-7-2A-PCA-T-M-U-H7-30</td>
<td>5996925-001</td>
<td>DG5V-7-6C-PCD-T-M-U-H7-30</td>
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<td>5996915-001</td>
<td>DG5V-7-2A-PCD-T-M-U-H7-30</td>
<td>02-397714</td>
<td>DG5V-7-6C-PDA-E-M-U-H7-30</td>
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<tr>
<td>5996916-001</td>
<td>DG5V-7-2A-PDA-T-M-U-H7-30</td>
<td>5996926-001</td>
<td>DG5V-7-6C-PDA-T-M-U-H7-30</td>
</tr>
<tr>
<td>5996917-001</td>
<td>DG5V-7-2A-PPA-T-M-U-H7-30</td>
<td>5996927-001</td>
<td>DG5V-7-6C-PPA-T-M-U-H7-30</td>
</tr>
<tr>
<td>5996918-001</td>
<td>DG5V-7-2A-PPD-T-M-U-H7-30</td>
<td>02-397713</td>
<td>DG5V-7-6C-PPD-E-M-U-H7-30</td>
</tr>
<tr>
<td>5996919-001</td>
<td>DG5V-7-2C-PCA-T-M-U-H7-30</td>
<td>5996928-001</td>
<td>DG5V-7-6C-PPD-T-M-U-H7-30</td>
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<tr>
<td>02-362980</td>
<td>DG5V-7-2C-PCD-T-M-U-H7-30</td>
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<td>02-362980</td>
<td>DG5V-7-2C-PDA-T-M-U-H7-30</td>
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<tr>
<td>5996921-001</td>
<td>DG5V-7-2C-PPA-T-M-U-H7-30</td>
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<tr>
<td>5996922-001</td>
<td>DG5V-7-2C-PPA-T-M-U-H7-30</td>
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