DG3V-5, 10 Series, Pilot Operated
DG5V-5, 10/20 Series, Solenoid Controlled, Pilot Operated
ISO 4401-05-05-0-94

Typical Section
DG5V-5-2C

Basic Characteristics
Max. operating pressure ............. 315 bar (4567 psi)
Max. flow at max. pressure ........... 160 L/min (42 USgpm)

General Description
These valves are used for controlling the starting, stopping and direction of fluid flow.

Two types of control are available:
– Hydraulic pilot pressure (DG3V-5 models)
– Integrally-mounted solenoid operated pilot valves (DG5V-5 models) comprising spring-offset, spring-centered and detented versions.

Pilot pressure and drain can be independently configured for internal or external connection.

All spool types have been designed to provide good low-shock, fast-response characteristics which can be enhanced by an optional pilot choke module to control the speed of travel of the main spool.
**Functional Symbols**

**DG3V-5, Pilot Operated Models**
Comprehensive and simplified symbols

- **Spring Centered, DG3V-5-**
  - Spool types: All

- **DG3V-5-**
  - Spool types: 0, 2, 6, 52

**DG3V-5-**
- Models with Pilot Choke Module
  - Obtained by specifying “2” at Model Code position

- “a” and “b” interchanged for spool type 8

**DG5V-5, Solenoid Controlled, Pilot Operated Models**
Comprehensive and simplified symbols, shown configured for external pilot supply and internal drain

- **Spring Offset, End-to-End, DG5V-5-**
  - Spool types: 0, 2, 6, 52

- **DG5V-5-**
  - Spool types: 0, 2, 6, 52

A.2
Spring Offset, End-to-Center
Models    Spool types
DG5V-5-**B  0, 2, 52
DG5V-5-**BL  8

Spring Centered, DG5V-5-**C
Spool types: All

Detented, DG5V-5-**N
Spool types: 0, 2, 6, 52

DG5V-5 Options
The following are shown in a DG5V-5-**C example:
1. Pilot choke module
2. External pilot connection
3. Internal drain

Symbols on Nameplates
Control elements (i.e. solenoid pilot valve, choke module, cover plate) used with size 5 main stage valves are standard Vickers units complete with their individual nameplates including model code and symbols. The main stage carries the model code of the 2-stage valve and the functional symbol of the main stage spool. Referring to the examples, nameplates are located as follows:
1. On main stage (DG3V-5/DG5V-5)
2. On cover plate (DG3V-5)
3. On pilot choke module (DG5V-5)
4. On pilot stage valve (DG5V-5)

Note that for clarity lines (dotted lines in illustrations) are omitted from the main-stage nameplate.
For Direct Pilot-Operated Models

(F3-) DG3V-5-** C (-2) -1*

For Solenoid-Controlled, Pilot-Operated Models

(F3-) DG5V-5-** ** (-2) (-E) (-T) (*) - (V) M-***** (L) -*- -*

Model Codes

Features in brackets are optional; all other features must be specified when ordering.

For DG5V solenoid-controlled models, other features/options on the DG4V-3/3S 60-design pilot valve may be made available as applicable and subject to quantity required. See appropriate catalog for details:

- 2015 for AC voltages: DG4V-3 (high performance) models
- 2168 for DC voltages: DG4V-3S (standard performance) models

For Direct Pilot-Operated Models

(F3-) DG3V-5.- ** C (-2) -1*

For Solenoid-Controlled, Pilot-Operated Models

(F3-) DG5V-5.** ** (-2) (-E) (-T) (*) - (V) M-***** (L) -*- -*

Spool Types

Shown in 3-position form, plus 2 transients

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>o</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
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<td></td>
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<td>11</td>
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<td></td>
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<tr>
<td>31</td>
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<td></td>
</tr>
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<td>33</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. In the detailed and simplified symbols on 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-5.-**A(L) and DG5V-5.-**N valves.

Notes:
1. In the detailed and simplified symbols on 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-5.-**A(L) and DG5V-5.-**N valves.

1. Special seals for phosphate esters
Omit for standard seals (see “Hydraulic Fluids” section)

2. Spool type
See “Functional Symbols”

3. Spool spring arrangement

For DG3V-5
C = Hydraulic pilot-operated, 3-position, spring-centered

For DG5V-5 ▲
A = Single solenoid, spring-offset to position “a”; energize solenoid for position “b”
AL = Single solenoid, spring-offset to position “b”; energize solenoid for position “a”
B = Single solenoid, spring-offset to center position “o”; energize solenoid for position “b”
BL = Single solenoid, spring-offset to center position “o”; energize solenoid for position “a”
C = Double solenoid, spring-centered; energize solenoid for position “a” or “b”
N = Double solenoid; energize solenoid for position “a” or “b”; detent-held in last selected position ▲

▲ All main-stage assemblies are spring-centered. The conditions described depend on the availability of pilot pressure in excess of 4.5 bar (65 psi) to move the spool against these springs. This is particularly important when using external pilot pressure supply.

Subject to availability of pilot pressure.

4. Spool shift control
2 = Pilot choke adjustment for both directions of spool travel
Omit if not required

5. Pilot pressure supply
E = Valve configured for external pilot supply to port “X”
Omit for internal pilot supply (port “X” must be blanked off, e.g. at the valve mounting face, when using internal pilot supply)

6. Pilot drain arrangement ▲
T = Valve configured for internal pilot valve drain (port “Y” must be blanked off, e.g. at the valve mounting face, when using internal drain)
Omit for external drain from port “Y”
▲ See ▲ for pressure limits.
Pilot valve manual override option
No symbol = Plain override(s) on solenoid end(s) only
H = Water-resistant override(s) on solenoid end(s)
Z = No override at either end
▼ See catalog 2015 for details.

Solenoid identity method
V = Solenoid “A” at port “A” end of pilot valve body and/or solenoid “B” at port “B” end of pilot valve body, independent of main-stage port locations and spool type.
Omit (except as noted below) for US ANSI B93.7 standard requiring solenoid “A” energization to connect main ports P and A and/or solenoid “B” energization to connect P and B, independent of solenoid location.
Note: The “V” code is always used for valves with type “8” spool as the solenoid identity is the same for both methods of identification.

Start of electrical features
M = Start of electrical features codings

Solenoid type/connection(s)
U = ISO 4400 (DIN 43650) mounting
FJ = M20 thread conduit box
FTJ = M20 thread conduit box with terminal connector strip
FW = ½" NPT thread conduit box
FTW = ½" NPT thread conduit box with terminal connector strip
FPA3W = Junction box with 3-pin male connector to NFPA T3.5.29-1980 for single-solenoid valves
FPA5W = Junction box with 5-pin male connector to NFPA T3.5.29-1980 for single or double-solenoid valves
Some female plug connector options available separately from Vickers Systems (see “Plugs for ISO 4400” on page A.10).
Female connector to be supplied by customer.

Indicator lights
For FTJ, FTW, FPA3W and FPA5W type coils only
L = Lights fitted
No symbol = Lights not fitted
For U-type coils use separate plug with integral light; (see “Plugs for ISO 4400” on page A.10).

Coil rating
A = 110V AC 50 Hz
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
◇ For 60 Hz or dual frequency.

Port T or Y maximum pressure †
5 = 100 bar (1450 psi), for DC solenoids only
6 = 160 bar (2300 psi), for AC solenoids only
† This pressure rating (determined by the pilot valve drain port) is applicable to:
1. Port T when using internal drain (“T” at position ▲)
2. Port Y when using external drain (no symbol at position ▲)

Design number, 10 and 20 series
Subject to change. Installation dimensions unaltered for design numbers 10 to 19 and 20 to 29 inclusive.
10 = DG5V-5 with AC solenoids
DG3V-5
20 = DG5V-5 with DC solenoids

Operating Data
Based on petroleum oil at 36 cSt (168 SUS) and at 50°C (122°F).

<table>
<thead>
<tr>
<th>Maximum pressures</th>
<th>315 bar (4567 psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>For DG3V-5:</td>
<td></td>
</tr>
<tr>
<td>All ports</td>
<td>315 bar (4567 psi)</td>
</tr>
<tr>
<td>For DG5V-5 externally drained:</td>
<td></td>
</tr>
<tr>
<td>Ports P, A, B, T, X</td>
<td>315 bar (4567 psi)</td>
</tr>
<tr>
<td>Port Y:</td>
<td></td>
</tr>
<tr>
<td>With AC solenoids</td>
<td>160 bar (2300 psi)</td>
</tr>
<tr>
<td>With DC solenoids</td>
<td>210 bar (3045 psi)</td>
</tr>
<tr>
<td>For DG5V-5 internally drained:</td>
<td></td>
</tr>
<tr>
<td>Ports P, A, B, X, Y</td>
<td>315 bar (4567 psi)</td>
</tr>
<tr>
<td>Port T:</td>
<td></td>
</tr>
<tr>
<td>With AC solenoids</td>
<td>160 bar (2300 psi)</td>
</tr>
<tr>
<td>With DC solenoids</td>
<td>210 bar (3000 psi)</td>
</tr>
</tbody>
</table>

| Maximum flow       | 160 L/min (42 USgpm) |

| Minimum pilot pressure | See “Control Data” |

For all data related to the DG4V-3/3S 60-design pilot valve, refer to appropriate catalog:
2015 for AC voltages: DG4V-3 models
2168 for DC voltages: DG4V-3S models
Control Data

Pilot Pressures
Differential pressure, i.e. pilot pressure at port P (or port X) minus pilot drain pressure at port T (or port Y).
Maximum .......... 315 bar (4567 psi)
Minimum (for max. flow):
For spool types 0, 1, 8 dot dot dot 4,5 bar (65 psi).
For spool type 6 8 bar (116 psi).
For spool types 2, 3, 31, 33, 52 10 bar (145 psi).
All main stages are spring-centered.

Selection of spool offset positions "a" or "b" requires pilot pressure equal to or in excess of the above minimums to move the spool against the spring force. This is particularly important when using external pilot pressure supply.

When using a type 8 spool with the valve configured for internal pilot supply, flow through the valve should be at least 80 L/min (21 USgpm) to generate 4.5 bar (65 psi) pressure drop when the spool is in the center position (flow P to T).

DG5V-5-**N
The spool of the pilot valve of this model is detent-held in its last selected position, and the spool will remain in this position after the solenoid has been de-energized.

The main stage is spring-centered and requires at least minimum pilot pressure to hold the spool in its offset ("detent-held") position. When pilot pressure falls below the recommended minimum, the main-stage spool will move to position "o" under the action of the centering springs. The system designer should ensure that under these conditions the flow condition at center position "o" is appropriate for the application.

Hydraulic Fluids
These valves are suitable for use with hydraulic oils, water-in-oil emulsions and water glycols.

The extreme operating range is from 500 to 13 cSt (2270 to 70 SUS) but the recommended running range is 54 to 13 cSt (245 to 70 SUS).

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 μm, 5 μm and 15 μm. 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

Pilot Choke Module
This allows the velocity of the main-stage spool to be controlled, thereby reducing transient shock conditions. For best results a constant, low pilot pressure is recommended.

Performance Data
Pressure Drops
Based on petroleum oil at 36 cSt (168 SUS) and at 50°C (122°F).

<table>
<thead>
<tr>
<th>Spool type</th>
<th>For positions “a” or “b”:</th>
<th>For position “o”:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P to A</td>
<td>B to T</td>
</tr>
<tr>
<td>0</td>
<td>4</td>
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<tr>
<td>1</td>
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<td>33</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>52</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Flow rate

Hydraulic Fluids

Contamination Control Requirements

A.6
### Temperature Limits

Minimum ambient: \(-20\, ^\circ C \text{ (}-4\, ^\circ F\)\)

<table>
<thead>
<tr>
<th>Maximum ambient</th>
<th>Fluid temperature limits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DG3V-5 models</strong></td>
<td><strong>Petroleum oil</strong></td>
</tr>
<tr>
<td>As for fluids</td>
<td>Min.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DG5V-5 models</th>
<th>Min.</th>
<th>Max.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>With AC dual frequency coils:</td>
<td>(-20, ^\circ C) ((-4, ^\circ F)</td>
<td>(+80, ^\circ C) ((+176, ^\circ F)</td>
</tr>
<tr>
<td>At 50 Hz and 107% voltage</td>
<td>(40, ^\circ C) ((104, ^\circ F)</td>
<td>(+54, ^\circ C) ((+130, ^\circ F)</td>
</tr>
<tr>
<td>At 60 Hz and 107% voltage</td>
<td>(50, ^\circ C) ((122, ^\circ F)</td>
<td></td>
</tr>
<tr>
<td>At 60 Hz and 110% voltage</td>
<td>(40, ^\circ C) ((104, ^\circ F)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>With AC single frequency (50 Hz) coils:</th>
<th>Min.</th>
<th>Max.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>At 50 Hz and 110% voltage</td>
<td>(40, ^\circ C) ((104, ^\circ F)</td>
<td>(+80, ^\circ C) ((+176, ^\circ F)</td>
</tr>
<tr>
<td>With DC coils at 110% voltage</td>
<td>(70, ^\circ C) ((158, ^\circ F)</td>
<td>(+54, ^\circ C) ((+130, ^\circ F)</td>
</tr>
</tbody>
</table>

*To obtain optimum service life from both fluid and hydraulic system, \(65\, ^\circ C\) \((150\, ^\circ F\) is the recommended maximum fluid temperature, except for water-containing fluids.

For synthetic fluids consult fluid manufacturer or Vickers where limits are outside those for petroleum oil.

### Solenoid Identification

(Refers to installation drawing, next page)

For model code variants:

**Position 5**, spool spring arrangement

**Position 8**, solenoid identification method

<table>
<thead>
<tr>
<th>Model</th>
<th>Spool types</th>
<th>Solenoid identity:</th>
<th>Spool types</th>
<th>Solenoid identity:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Main port</td>
<td>Main port</td>
<td>Main port</td>
<td>Main port</td>
</tr>
<tr>
<td></td>
<td>A end</td>
<td>B end</td>
<td>A end</td>
<td>B end</td>
</tr>
<tr>
<td>DG5V-5-*A/B(-2)(-E)(-T)(-**)-M</td>
<td>All except “8”</td>
<td>–</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>DG5V-5-*A/B(-2)(-E)(-T)(-**)-VM</td>
<td>All except “8”</td>
<td>–</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>DG5V-5-*AL/BL(-2)(-E)(-T)(-**)-M</td>
<td>All except “8”</td>
<td>“8” only</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>DG5V-5-*AL/BL(-2)(-E)(-T)(-**)-VM</td>
<td>All except “8”</td>
<td>“8” only</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>DG5V-5-*C/N(-2)(-E)(-T)(-**)-M</td>
<td>All except “8”</td>
<td>A</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>DG5V-5-*C/N(-2)(-E)(-T)(-**)-VM</td>
<td>All spools</td>
<td>B</td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>
Installation Dimensions in mm (inches)

Solenoid Controlled Models with ISO 4400 (DIN 43650) Electrical Connections and Optional Pilot Choke
DG5V-5-**(L)(-2)(-E)(-T)(-*)(-V)M-U example

For solenoid identification see previous page.

For plug removal

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

For pilot choke fitted:
214,0 (8.5) ▼

Without pilot choke:
174,0 (6.9) ▼

Pilot choke adjusters fitted when Model Code 4 = 2.
To adjust, turn locknut counter-clockwise, then turn screw clockwise to slow down rate of spool travel, or counter-clockwise to increase the rate.
Re-tighten 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.
Solenoïd Controlled Models with Junction Box
having Optional Terminal Strip and Indicator Lights
DG5V-5-***(L)(-2)(-E)(-T)(-*)(-V)M-F****(L) example

For solenoïd identification see page A.7.
Available also with other options shown on
previous and following pages.

M20-6H x 1.5 thread for F(T)J options, or
\( \frac{1}{2}'' \) NPT for F(T)W options, at both ends. Closure plug
fitted at one end.
A.5 and under "NFPA Connector--" and "Terminal Strip
and Lights", on pages A.10 and A.11.

For solenoïd identification see page A.7.
Available also with other options shown on
previous and following pages.

Pilot Operated Models with Optional Pilot Choke
DG3V-5-** C(-2) example

Ground connection
\( \varnothing4,0 \) (0.16 dia)
sel-tapping screw

50 (2.0) max. over
conduit box cover

With pilot choke fitted: 218,0 (8.6)
Without pilot choke: 178,0 (7.0)

Water-Resistant Manual Override
DG5V-5-**M-*****(L)H valves

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

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

220,0 (8.66) for double-solenoid models
or
156,0 (6.2) for single-solenoid models
(see previous page)

Note: "H" feature is not field convertible
from other models; specify with order.
Electrical Plugs and Connectors for DG5 Valves

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.

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>

Plugs with indicator lights

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Part no.</th>
<th>Color (sol. A)</th>
<th>Color (sol. B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-24V</td>
<td>977467</td>
<td>Gray</td>
<td>Black</td>
</tr>
<tr>
<td>100-125V</td>
<td>977469</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200-240V</td>
<td>977471</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NFPA Connector T3.5.29-1980
DG5V-5-**(**)---FP3W(L) and DG5V-5-**(**)---FP5W(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.

Connection details and model type/model code references

5-pin connector
When fitted in double-solenoid valves, e.g:
DG5V-5-**(**)---(V)M-FP3SW(L)
DG5V-5-**(**)---(V)M-FP5SW(L)

3-pin connector
When fitted in single-solenoid valves, e.g:
DG5V-5-**-**-(V)M-FP3W(L)
DG5V-5-**-**-(V)M-FP5W(L)

5-pin connector
When fitted in single-solenoid valves, e.g:
DG5V-5-**-**-(V)M-FP3SW(L)
DG5V-5-**-**-(V)M-FP5SW(L)
**Terminal Strip and Light Options**
When fitted in solenoid controlled valves DG5V-5-**(L)---F****(L).

**DG5V-5-***(L)---F****:*  
Terminal strip (part number 890345) clips to cover and can be field-fitted

**DG5V-5-***(L)---F****:*  
Conduit box cover and nameplate complete with sealing gasket and 4 screws

- **Connections to solenoid A**  
  (or B, according to model type)

- **Connections to solenoid B**  
  (or A, according to model type)

- **Rubber gasket**

- **4 terminal screws M3 x 0,5-6H**  
  (part number 02-113355)

- **M3 x 0,5-6H screws (part number 186006)** 2 each end

- **28,50** (1.12)

- **30,00** (1.18)

- **28,50** (1.12)

- **2 lenses in cover**

- **Anti-rotation tab ensures correct orientation of cover to junction box**

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 linked.

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.

**Mounting Attitude**
Unrestricted except for no-spring detented model DG5V-5-**N, which may be affected by severe vibration or shock, especially if a solenoid is not energized.