Solenoid Operated Directional Valve

DG4V-3-60 Design

**General Description**

Solenoid operated directional control valves are for directing and stopping flow at any point in a hydraulic system.

- Efficient control of greater hydraulic powers without increasing solenoid power consumption.

- Installed cost and space savings from higher power/weight-and-size ratios.

- Installation flexibility resulting from choice of numerous combinations of solenoid connectors and locations.

- Viton seals as standard for multi-fluid capability. Nitrile seals available as a model code option.

- Higher sustained machine productivity and higher uptime because of proven fatigue life and endurance, tested over 20 million cycles.

- Solenoid coils can be changed quickly and easily without leakage from hydraulic system.

- Compact, cost effective system design when used with Eaton® SystemStak™ valves and subplates.

- International standard interface. The valve mounting face conforms to ISO 4401, size 03 and is compatible with related international standards.

**DG4V3-S/R- High Performance and Standard Performance Valves**

- Minimum pressure drop 2.5 bar at 30 l/min.

- Range of coil connectors including DIN, Deutsch, AMP and terminal box.

- Range of coil voltages and power options.

- Up to 80 l/min (21 USgpm) and up to 40 l/min (10.5 USgpm) respectively at 350 bar (5000 psi).

- Offers designers the opportunity to select the optimum value package for each application.

---

---
DG4V-3 Model Series

1. Seal Type
   - Blank – Viton
   - F6 – Buna Nitrile/High CAN

2. Model series
   - 4 – Solenoid operated
   - V – Pressure rating 350 bar (5000 psi) on P, A & B ports
   - 3 – ISO4401 Size 03

3. Performance
   - Blank – High performance
   - S – Standard performance
   - R – Standard performance with 8 Watt coil

4. Spool Type
   - Please refer functional symbols on Page 5 for spool types.

5. 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

6. Manual Override Option
   - Blank – Plain override(s) in solenoid end(s) only
   - H – Water-resistant override(s) on solenoid end(s)
   - Z – No overrides at either end
   - W – Twist and lock override in solenoid ends
   - Box, type FW and solenoid with 1/2” NPT entry conduit
   - L – CSA approved models
   - EN21 – CSA approved models with 1/2” NPT entry conduit box, type FW and solenoid coil letter B, D, G, or H.
   - EN38 - Low leakage version. Typical leakage 5ml/min/land at 100 bar.
   - NOTE: EN38 valve spools have additional overlap and resulting 2X pressure drop compared to standard valve spools.

7. Spool Indicator Switch
   - S7 – Spool position monitoring switch. Single solenoid only.

8. Coil Type
   - U – ISO4400, DIN43650 connector
   - U1 – ISO4400 fitted with PG11 plug
   - U6 – ISO4400 fitted with DIN plug with lights
   - KU – Top exit flying lead (150mm)
   - KUP4 – Junior timer (Amp) connector
   - KUPS – Integral Deutsch connector
   - KUPM4L – Integral M12, 4-Pin connector
   - FW – Flying lead with 1/2” NPT thread wiring housing
   - FTW – Flying lead with terminal block & 1/2” NPT thread wiring housing
   - FPA3W – Fly. lead, 3 Pin connector & 1/2” NPT thread wiring housing
   - FPA5W – Fly. lead, 5 pin connector & 1/2” NPT thread wiring housing
   - X5 – Atex approved coil, ‘d’ type
   - X5 – Also CSA and UL approved

9. Tank Pressure Rating
   - Refer to “Operating Data” for port T pressure ratings.

10. Surge Suppressor/Damper
    - D1 – Diode positive bias
    - D2 – Negative bias
    - D7 – Transorb type

11. Solenoid Indicator Lights
    - Blank – None
    - L – Solenoid indicator lights
    - X5 – Flying lead coil type only

12. Coil Rating
    - B – 110V AC 50Hz/120V AC 60 Hz
    - BL – 110V 50Hz/120V 60 Hz
    - D – 220V AC 50Hz/240V AC 60 Hz
    - DS – 28V DC 30 watt
    - ER – 28V DC 30 watt
    - ES – 240V AC 60 Hz
    - G – 12V DC
    - GL – 12V DC
    - H – 24V DC
    - HL – 24V DC
    - HM – 24V DC 8 watt
    - X5 coil type only

13. Orifice Plug
    - 00 – No orifice required
    - 03 – 0.3 mm dia.
    - 06 – 0.6 mm dia.
    - 08 – 0.8 mm dia.
    - 09 – 0.9 mm dia.
    - 10 – 1.0 mm dia.
    - 13 – 1.3 mm dia.
    - 15 – 1.5 mm dia.
    - 20 – 2.0 mm dia.
    - 23 – 2.3 mm dia.

14. Special Features
    - “EN***” code number assigned as required.
### Functional Symbols

**Spool Options**

The valve function schematics apply to both U.S. and European valves

<table>
<thead>
<tr>
<th>Spool Options</th>
<th>U.S. Solenoid Standard</th>
<th>European Solenoid Standard (specify “V” in the model code at position 7 on page 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double solenoid valves, two position, detented</td>
<td><img src="Diagram1.png" alt="Diagram" /></td>
<td><img src="Diagram2.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Double solenoid valves, spring centered</td>
<td><img src="Diagram3.png" alt="Diagram" /></td>
<td><img src="Diagram4.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Single solenoid valves, solenoid at port A end</td>
<td><img src="Diagram5.png" alt="Diagram" /></td>
<td><img src="Diagram6.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Single solenoid valves, solenoid at port B end</td>
<td><img src="Diagram7.png" alt="Diagram" /></td>
<td><img src="Diagram8.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

▲ Transient condition only
### Operating Data

<table>
<thead>
<tr>
<th>Feature</th>
<th>DG4V-3</th>
<th>DG4V-3S</th>
<th>DG4V-3R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Limits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P, A and B ports</td>
<td>350 bar (5075 psi)</td>
<td>350 bar (5075 psi)</td>
<td>350 bar (5075 psi)</td>
</tr>
<tr>
<td>T port</td>
<td>210 bar (3045 psi)</td>
<td>100 bar (1450 psi)</td>
<td>210 bar (3045 psi)</td>
</tr>
<tr>
<td>Flow rating</td>
<td>See performance data</td>
<td>See performance data</td>
<td>See performance data</td>
</tr>
<tr>
<td>Relative duty factor</td>
<td>Continuous; ED = 100%</td>
<td>Continuous; ED = 100%</td>
<td>Continuous; ED = 100%</td>
</tr>
<tr>
<td>Type of protection: ISO 4400 coils with plug fitted correctly</td>
<td>IEC 144 class IP65</td>
<td>IEC 144 class IP65</td>
<td>IEC 144 class IP65</td>
</tr>
<tr>
<td>Coil winding</td>
<td>Class H</td>
<td>Class H</td>
<td>Class H</td>
</tr>
<tr>
<td>Lead wires (coils type F***)</td>
<td>Class H</td>
<td>Class H</td>
<td>Class H</td>
</tr>
<tr>
<td>Coil encapsulation</td>
<td>Class F</td>
<td>Class F</td>
<td>Class F</td>
</tr>
<tr>
<td><strong>Permissible voltage fluctuation:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>Refer to temperature limits.</td>
<td>Refer to temperature limits.</td>
<td>Refer to temperature limits.</td>
</tr>
<tr>
<td>Minimum</td>
<td>90% rated</td>
<td>90% rated</td>
<td>90% rated</td>
</tr>
<tr>
<td><strong>Typical response times at 100% rated volts measured from application/removal of voltage to full spool displacement of “2C” spool at:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow rate P-A, B-T</td>
<td>40 l/min (10.6 USgpm)</td>
<td>20 l/min (5.3 USgpm)</td>
<td>20 l/min (5.3 USgpm)</td>
</tr>
<tr>
<td>Pressure</td>
<td>175 bar (2537 psi)</td>
<td>175 bar (2537 psi)</td>
<td>175 bar (2527 PSI)</td>
</tr>
<tr>
<td>AC (–) energizing</td>
<td>15 ms</td>
<td>18 ms</td>
<td>18 ms</td>
</tr>
<tr>
<td>AC (–) de-energizing</td>
<td>23 ms</td>
<td>32 ms</td>
<td>32 ms</td>
</tr>
<tr>
<td>DC (+) energizing</td>
<td>45 ms</td>
<td>60 ms</td>
<td>60 ms</td>
</tr>
<tr>
<td>DC (+) de-energizing</td>
<td>28 ms</td>
<td>40 ms</td>
<td>40 ms</td>
</tr>
<tr>
<td><strong>Power consumption, AC solenoids (for coils listed in model code).</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial VA (RMS)</td>
<td>280</td>
<td>170</td>
<td>N/A</td>
</tr>
<tr>
<td>Initial Holding VA (RMS)</td>
<td>61</td>
<td>37</td>
<td>N/A</td>
</tr>
<tr>
<td>Holding VA (RMS)</td>
<td>61</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Power consumption, DC solenoids at rated voltage and 20 C (68 F).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full power coils</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dual frequency coils at 50 Hz</td>
<td>280</td>
<td>190</td>
<td>N/A</td>
</tr>
<tr>
<td>Dual frequency coils at 60 Hz</td>
<td>300</td>
<td>300</td>
<td>N/A</td>
</tr>
<tr>
<td>Low power coils, “BL” and “DL” (Not available with “N” – No-spring detented models):</td>
<td>Low power coils not usable with DG4V-3S valves.</td>
<td>Low power coils not usable with DG4V-3S valves.</td>
<td>Low power coils not usable with DG4V-3S valves.</td>
</tr>
<tr>
<td>Dual frequency coils at 50 Hz</td>
<td>–</td>
<td>18W</td>
<td>N/A</td>
</tr>
<tr>
<td>Dual frequency coils at 60 Hz</td>
<td>–</td>
<td>–</td>
<td>N/A</td>
</tr>
<tr>
<td>Low power coils</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12V, model type “G”</td>
<td>30W</td>
<td>–</td>
<td>N/A</td>
</tr>
<tr>
<td>24V, model type “H”</td>
<td>30W</td>
<td>–</td>
<td>N/A</td>
</tr>
<tr>
<td>Low power coils</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12V, model type “GL”</td>
<td>Low power coils not usable with DG4V-3S valves.</td>
<td>–</td>
<td>18W</td>
</tr>
<tr>
<td>24V, model type “HL”</td>
<td>18W</td>
<td>–</td>
<td>N/A</td>
</tr>
<tr>
<td>24V, HM Coil</td>
<td>8W</td>
<td>–</td>
<td>N/A</td>
</tr>
</tbody>
</table>

For applications where valves are to remain pressurized (either energized or de-energized) at pressures over 210 bar (3045 psi) without frequent switching, it is recommended to use the high performance model, DG4V-3.

\[\text{For applications where valves are to remain pressurized (either energized or de-energized) at pressures over 210 bar (3045 psi) without frequent switching, it is recommended to use the high performance model, DG4V-3.}\]

\[\text{For applications where valves are to remain pressurized (either energized or de-energized) at pressures over 210 bar (3045 psi) without frequent switching, it is recommended to use the high performance model, DG4V-3.}\]
Operating Data

Spool Position Indicator Models
Spool/spring arrangement types 0A, 0B, 2A, 2B, 22A, 23A, 35A, 52B, 3B, 6B

DC model type “S7”

This product has been designed and tested to meet specific standards outlined in the European Electromagnetic Compatibility Directive (EMC) 2004/108/EC. For instructions on installation requirements to achieve effective protection levels see this leaflet and the Installation Wiring Practices for Vickers Electronic Products leaflet 2468. Wiring practices relevant to this Directive are indicated by ▲ Electromagnetic Compatibility (EMC).

Input:
<table>
<thead>
<tr>
<th>Supply Voltage</th>
<th>20-32 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse Pol. Protection</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>outputs with alternating function - PNP</td>
</tr>
</tbody>
</table>

Output:
<table>
<thead>
<tr>
<th>Max output load</th>
<th>&lt;=400mA ; Duty Ratio 100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Circuit Protection</td>
<td>Yes</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>&lt;=0.05mm</td>
</tr>
<tr>
<td>Electrical connector</td>
<td>M12x1 4-Pole</td>
</tr>
<tr>
<td>Thermal shift</td>
<td>&lt;=±0.1mm</td>
</tr>
</tbody>
</table>

Plug connections:
- Pin 1: + Supply
- Pin 2: Normal Closed
- Pin 3: 0V
- Pin 4: Normal Open

EMC: Protection DIN EN 61000-6-1/2/3/4, Aug 2002
Humidity: 0-95% rel. (nach DIN 40040)
Protection Class: IP65 DIN 40050
Vibration: 0-500Hz Max. 20g
Shock: Max. 60g

Factory setting ensures this condition under all combinations of manufacturing tolerance and of temperature drift (see “Temperature Limits”).

Wiring Connections

Warning: All power must be switched off before connecting or disconnecting any plugs.

Pin number 4, “Normally open”
Pin number 3, 0V
Pin number 2, “normally closed”
Pin number 1, Supply +ve

MI2 4 PIN CONNECTOR DETAILS

Customer’s protective ground connection

WARNING: Electromagnetic Compatibility (EMC)
It is necessary to ensure that the unit is wired up in accordance with the connection arrangements shown above. For effective protection the user’s electrical cabinet, the valve subplate or manifold and the cable screens should be connected to efficient ground points.
In all cases both valve and cable should be kept as far away as possible from any sources of electromagnetic radiation such as cables carrying heavy current, relays and certain kinds of portable radio transmitters, etc. Difficult environments could mean that extra screening may be necessary to avoid the interference.
Performance Data

DG4V-3 models (high performance)

Graph 1
AC solenoid valves operating at 50 Hz

Graph 2
AC solenoid valves operating at 60 Hz

Graph 3
DC solenoid valves

Consult Eaton regarding each application that will jointly have flow rates approaching this curve and a pressurized volume exceeding 2000 cm³ (122 cu.in.)
Performance Data

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

Maximum flow rates
Performance based on full power solenoid coils warm and operating at 90% rated voltage.

See note at bottom of next page when using low power coils (DG4V-3 models only).

DG4V-3S models (standard performance)

Graph 4
AC solenoid valves operating at 50 Hz

Graph 5
AC solenoid valves operating at 60 Hz

Graph 6
DC solenoid valves

Spool / spring code | Graph 1 curve | Graph 2 curve | Graph 3 curve
--- | --- | --- | ---
0A(L) | 1 | 1 | 3
0B(L) & 0C | 1 | 1 | 1
2A(L) | 5 | 5 | 3
2B(L) & 2C | 2 | 2 | 3
2N | 1 | 1 | 1
6B(L) & 6C | 6 | 6 | 5
8B(L) & 8C | 8 | 7 | 8
22A(L) | 9 | 8 | 7
22B(L) & 22C | 7 | 7 | 6
33B(L) & 33C | 4 | 4 | 4
52BL, 52C | 6 | 6 | 5
521B | 6 | 6 | 5

▲ Consult Eaton regarding each application that will jointly have flow rates approaching this curve and a pressurized volume exceeding 2000 cm³ (122 cu.in.)
### Performance Data

#### Pressure drops

![Graph showing pressure drop vs flow rate for DG4V-3S and DG4V-3 solenoid operated directional valves.](image)

Curve for spool type 6: not recommended for flows in excess of 60 l/min (15.8 USgpm).

#### Pressure drops in offset positions except where otherwise indicated

<table>
<thead>
<tr>
<th>Spool / spring code</th>
<th>Spool positions covered</th>
<th>P to A</th>
<th>P to B</th>
<th>A to T</th>
<th>B to T</th>
<th>P to T</th>
<th>B to A or A to B</th>
</tr>
</thead>
<tbody>
<tr>
<td>0A(L)</td>
<td>Both</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>0B(L) &amp; 0C</td>
<td>De-energized</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2A(L)</td>
<td>Both</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2B(L) &amp; 2C</td>
<td>Energized</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2N</td>
<td>Both</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6B(L) &amp; 6C</td>
<td>De-energized</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6N</td>
<td>Both</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8B(L) &amp; 8C</td>
<td>All</td>
<td>9</td>
<td>9</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>22A(L), 22B(L) &amp; 22C</td>
<td>All</td>
<td>6</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>33B(L) &amp; 33C</td>
<td>De-energized</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>15</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>52BL &amp; 52C</td>
<td>Energized</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>52B</td>
<td>All</td>
<td>6</td>
<td>6</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>De-energized</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Energized</td>
<td>6</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

▲ B” plugged △ “A” plugged ○ “P” plugged

#### Viscosity cSt (SUS)

<table>
<thead>
<tr>
<th>Viscosity cSt (SUS)</th>
<th>14 (7.175)</th>
<th>20 (97.8)</th>
<th>43 (200)</th>
<th>54 (251)</th>
<th>65 (302)</th>
<th>76 (352)</th>
<th>85 (399)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of ∆P (Approx.)</td>
<td>81</td>
<td>88</td>
<td>104</td>
<td>111</td>
<td>116</td>
<td>120</td>
<td>124</td>
</tr>
</tbody>
</table>

For other viscosities, pressure drops approximate to:

A change to another specific gravity will yield an approximately proportional change in pressure drop. The specific gravity of a fluid may be obtained from its producer. Fire resistant fluids usually have higher specific gravities than oil.
Installation Dimension

Models for use with ISO 4400 (DIN 43650) connectors

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

Single solenoid models
DG4V-3(S)-*A(-*)-M-**-60
DG4V-3(S)-*B(-*)-M-**-60
DG4V-3(S)-*F-**-60
DG4V-3(S)-*AL(-*)-M-U-**-60
DG4V-3(S)-*BL(-*)-M-U-**-60

As shown

Solenoid and end cap interchanged

Dimensions in mm (in).

- Not applicable to type “8” spool.
- Can vary dependent on source of plug.

Model type AC or DC A Dim. B Dim. C Dim. D Dim.
All DC = 220 (8.66) 156 (6.14) 61 (2.5) 73 (2.87)
DG4V-3 AC ~ 200 (7.87) 146 (5.75) 51 (2.1) 63 (2.48)
DG4V-3S AC ~ 200 (7.87) 146 (5.75) 45 (1.7) 63 (2.48)

DG4V-3-*A(L)-(V)M-S7-U**-60

Single solenoid models with inductive type switch indicating when the spool is in the spring off-set position. Refer Pg6 connection to switch.

Location of solenoid for RH build models

Location of switch for RH build models

For coil removal:
64 (2.51) DC coil
54 (2.12) AC coil

126.8 (4.99)
237.7 (9.35) with DC solenoid
227.7 (8.90) with AC solenoid

Wiring: See electromagnetic warning
Installation Dimension

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

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

Single solenoid models
DG4V-3(S)-*A(-**) ●
DG4V-3(S)-*B(-**) ●
DG4V-3(S)-8BL(-**)

DG3V-3(S)-*F

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

Dimensions in mm (in).

<table>
<thead>
<tr>
<th>Model type</th>
<th>AC or DC</th>
<th>A Dim.</th>
<th>B Dim.</th>
<th>C Dim.</th>
<th>D Dim.</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>DC =</td>
<td>220 (8.66)</td>
<td>156.5 (6.14)</td>
<td>61 (2.5)</td>
<td>73 (2.87)</td>
</tr>
<tr>
<td>DG4V-3</td>
<td>AC ~</td>
<td>200 (7.87)</td>
<td>146.5 (5.75)</td>
<td>51 (2.1)</td>
<td>63 (2.48)</td>
</tr>
<tr>
<td>DG4V-3S</td>
<td>AC ~</td>
<td>200 (7.87)</td>
<td>146.5 (5.75)</td>
<td>45 (1.7)</td>
<td>63 (2.48)</td>
</tr>
</tbody>
</table>

Codes “FW”: 2 lead wires for each solenoid, approximately 150,00 (6.00) long. M3 (#6) terminals provided for customer connection.

Codes “FTW”: Valve supplied with lead wires connected into terminal strip suitable for M3 (#6) terminals for customer connection.
Installation Dimension

M12 Connector type

+24 VOLT (positive) PIN #4

-0 VOLT (negative) PIN #3

PINS #1 & #2 are unused

Key (Ref.)

Interface protected by shipping cover

219.43 [8.639]

Dual solenoid models

156.72 [6.130]

Single solenoid models

72.72 [2.863]

74.00 [2.913]

Interface complies to NFPA D-03
ISO 4401-03
Seals provided

Electrical Schematic
When switch (S1) is opened, the energy stored in the coil is trapped and dissipated by the diode (D1). The Zener makes exact limitation of inductive spikes.

**DIN 43650 Connector**

- **Cable diameter range**: Ø6–10 mm (0.24–0.40 in)
- **Wire section range**: Ø,5–1,5 mm² (0.0008–0.0023 in²)
- **Terminals**: Screw type
- **Type of protection**: IEC144 class IP65, when plugs are fitted correctly to the valves with interface seals (supplied with plugs) in place.

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

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

**KUP 7**

Packard connector pins - Male

**KUP 8**

Special packard connector pins with seals - Female

- "+" Positive
- "-" Negative

- "+" POSITIVE
- "-" NEGATIVE
Terminal strip and lights
For valves with type “F” coils.

Insta-Plug
DG4V-3(S)—FPA—60
DG4V-3(S)—FPBW—60
Eaton 2-part “Insta-Plug” eliminates breaking electrical inputs for valve disconnect. A male half is pre-wired to the valve body. The mating plug is inside a wire housing with external terminals for machine wire connections. Captive thumb screws, when loosened, permit the wire housing to be pulled clear of the valve for disconnect. A longer ground post provides first make/last break ground connection.

PA configuration

Dimensions in mm(in).
Electrical Plugs and Connectors

NFPA Connector T3.5.29-1980

DG4V-3(S)–FPA3W(L)-**-60
DG4V-3(S)–FPA5W(L)-**-60

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

Connection details and model type/model code references

Warning tag: “Electrical power must be disconnected before removing or replacing electrical plug.”

Surge Suppression Devices (For DC Valves)
Standard diode (D1), (D2)
Diode in parallel with coil, positive bias. When switch (S1) is opened, the energy stored in the coil is trapped and dissipated by the diode (D1), (D2).

- Works only with DC voltage
- Polarity dependent
- Increase drop out time

Surge Suppression Devices (For DC Valves)
Standard diode (D2)
Diode in parallel with coil, negative bias. When switch (S1) is opened, the energy stored in the coil is trapped and dissipated by the diode (D2).

- Works only with DC voltage
- Polarity dependent
- Increase drop out time

Transzorb (D7)
Diode and Zener diode in parallel with coil. When switch (S1) is opened, the energy stored in the coil is trapped and dissipated by the diode (D1) and Zener diode (Z1) and the coil resistance.
- The Zener makes exact limitation of inductive spikes.
- Works only with DC voltage
- Polarity dependent

NOTE: These surge suppression devices are “Polarity Dependent.” Proper biasing conditions must be met when installing/connecting a coil in a system. Times represent cessation/application of voltage to coil versus velocity (start/stop) of a cylinder using a single solenoid, spring offset valve (time in milliseconds).

Valve Shift and Dropout Times with and without Surge Suppression

<table>
<thead>
<tr>
<th>Shift</th>
<th>Dropout</th>
</tr>
</thead>
<tbody>
<tr>
<td>CETOP 3</td>
<td></td>
</tr>
<tr>
<td>Do Diode</td>
<td>23  60</td>
</tr>
<tr>
<td>Diode Alone</td>
<td>23  131</td>
</tr>
<tr>
<td>Diode/Zener</td>
<td>23  78</td>
</tr>
</tbody>
</table>