Solenoid Operated Directional Valves

Catalog

DG4V3-70 Series
On-board electronics option
M12 cable connection
This product has been designed and tested to meet specific standards outlined in the European Electromagnetic Compatibility Directive (EMC) 89/336/EEC, amended by 91/263/EEC, 92/31/EEC and 93/68/EEC, article 5. 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).
Introduction

1. Product introduction and target applications

DG solenoid valves are used in hydraulic circuits to start, stop and direct flow. With electronics on board, the DG4V3-Z-70 enables new machine control solutions, eliminating solenoid power shifting in the controls cabinet. The DG4V3 – 70 series valve takes advantage of contemporary electronics and wiring practices applied in automation solutions world wide. Using industry standard M12 connectors and with the optional on board switching amplifier the –70 offers OEMs and users opportunity to simplify the electronics, and increase throughput by specifying preassembled and pre-wired electro-hydraulic manifold assemblies as shown on the previous page. This valve with on-board electronics has passed water immersion tests, qualified to IP67, and EMC testing to CE requirements. The rugged construction, designed and qualified by Eaton with key features such as plug in coils, M12 connector and multiple coil wattages, meeting major automotive plant specifications, makes this valve a natural for global projects.

This solenoid valve is the latest in a long line of recognized Vickers brand DG valves. The – 70 builds on the proven – 60 valve design, adding connectivity and functionality tailored for state of the art 24 VDC machine control system. This product is available from and supported by Eaton and an extensive network of qualified distribution partners world wide.

2. Functional description

Electronics are housed in a robust metal housing sealed to IP67 environmental ratings and meeting CE standards for Electromagnetic Compliance.

- Standard features include surge suppression and LED’s indicating voltage to the active coil.
- The “Z” option adds the switching amplifier on board, eliminating the cost and heat associated with having this function in the machine controls cabinet. 24 VDC power is supplied separately to pin1 of the M12 connector, while pin 2 or 4 control the solid-state switch connection to either solenoid A or B. Pin 3 is common.

3. Summary Features and Benefits

Hydraulic

Mounting interface: ISO 4401 size 03, ANSI/B93.7M size 3, CETOP RP65H, size 3, DIN 24340, NG 6

Maximum pressure: 350 bar (5075 psi) P, A and B ports. 210 bar (3000 psi) T port

Maximum flow: up to 80 l/m (21 USgpm) depending on spool type and coil wattage.

Environmental

IP 65 rated protection from low pressure water jets from all directions.

IP 67 rated, water immersion tested.

EMC qualified to EN 61326

CE certified, CE mark on the valve.

Electrical

- 24 VDC operation only
- M12 connection.
- Coil control options, described on page 9:
  - A-option, direct connection from the M-12 connector to each coil.
  (Model code pos 15)
  - Z-option, On Board Switching amplifier.

Information on available coil power levels and commands required to operate the on board switching amplifier is in section 5, Technical Specifications.
# Model Codes

**DG4V3-70**

## DG4V - Subplate-mounted, solenoid-operated directional control valve.
350 bar on P, A & B Ports

### ISO Number
3 - ISO 4401-AB-03-4-B with location pin

### Spool Type
See “Functional Symbols” Section on page 5

### Spool/Spring Arrangement

#### Single solenoid models
- **A** - Spring offset, Right hand build (standard)
- **AL** - Spring offset, Left hand build (optional)
- **F** - Spring offset shift to center, Right hand build (standard). Not available with HM coil.
- **FL** - Spring offset shift to center, Left hand build (optional). Not available with HM coil.
- **B** - Spring centered, Right hand build (standard)
- **BL** - Spring centered, Left hand build (optional)

#### Dual solenoid models
- **C** - Spring centered. No R or L option
- **N** - No spring detented. No R or L option.

### Manual Override Option
- **P** - Plain overrides in solenoid ends only (standard)
- **H** - Waterproof override in solenoid ends only
- **H2** - Waterproof override in both ends of single solenoid
- **P2** - Plain override in both ends of single solenoid models
- **W** - Twist and lock manual override (not available in “F6” models)
- **Z** - No overrides in either end

### Seal Type
- **F3** - Viton Seals (standard)
- **F6** - Nitrile Seals for Water Based Fluids

### Solenoid Energization Identity
- **A** - Solenoid identification based on ANSI B93 9 (i.e. energize solenoid A TO GIVE flow P to A) (standard)
- **V** - Solenoid identification determined by position of solenoid (i.e. solenoid ‘A’ at port ‘A’ end, solenoid ‘B’ at port ‘B’ end). Required for 8C-type spool.

### Electrical Flag
- **SN** - No Switch (standard)
- **S6** - LVDT style switch. Single solenoid valve only. (Not yet available. To be released on request.)

### Electrical Connector
- **PM4** - 4 Pin M12 Connector

### Wiring Convention
- **A** - Pins 2, 3 & 4 direct connection used
- **Z** - On board switching amplifier

### Configuration
- **S** - Standard configuration (diodes and lights included)

### Coil Identification
- **H** - 24 VDC, 30W
- **HL** - 24 VDC, 18W
- **HM** - 24 VDC, 10W

### Tank Pressure Rating
- **7** - 210 Bar

### Port Orifice Plugs
- **NP** - No Port Orifices (standard)
- **P** - Orifice in “P” port
- **A** - Orifice in “A” port
- **B** - Orifice in “B” port
- **T** - Orifice in “T” port

### Sizes (the “**” above):
- **03** - 0.30 orifice dia
- **06** - 0.60 orifice dia
- **08** - 0.80 orifice dia
- **10** - 1.00 orifice dia
- **13** - 1.30 orifice dia
- **15** - 1.50 orifice dia
- **20** - 2.00 orifice dia
- **23** - 2.30 orifice dia
- **25** - 2.50 orifice dia
- **30** - 3.00 orifice dia
- **35** - 3.50 orifice dia.

### Design Number
- **70** - Design Number

### Special Modifications
- **Omit** - If not required
Functional Symbols, Spools

Available spool options
(illustrated to the right)
Configurations include 3-position and 2-position, spring centered, spring off-set and no-spring detented.

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

<table>
<thead>
<tr>
<th>Solenoid</th>
<th>Spool Type</th>
<th>Solenoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG4V-3-*N(V)</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>DG4V-3-*C(V)</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>DG4V-3-*B(F(V)</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>DG4V-3-*AL(V)</td>
<td>B</td>
<td>A</td>
</tr>
</tbody>
</table>

Solenoids identified to U.S. standards
(specify “A” in model code)
Functional symbols related to solenoid identity “A” and/or “B” according to NFPA/ANSI standards, i.e. energizing solenoid “A” gives flow P to A, solenoid “B” gives flow P to B (as applicable).

Location of solenoid “A” or “B” shown relative to the hydraulic work port.

Double solenoid valves, two position, detented
- Solenoid A
- Solenoid B

Single solenoid valves, solenoid at port A end
- Solenoid A

Double solenoid valves, spring centered
- Solenoid A
- Solenoid B

Single solenoid valves, solenoid at port B end
- Solenoid B

Transient condition only

Solens identified to European standards
(specify “V” in model code)
Functional symbols related to solenoid identity “A” and/or “B” according to European convention i.e. solenoid “A” adjacent to “A” port, solenoid “B” adjacent to “B” port of valve.

Location of solenoid “A” or “B” shown relative to the hydraulic work port.

Double solenoid valves, two position, detented
- Solenoid A
- Solenoid B

Single solenoid valves, solenoid at port A end
- Solenoid A

Double solenoid valves, spring centered
- Solenoid A
- Solenoid B

Single solenoid valves, solenoid at port B end
- Solenoid B

Transient condition only

"A" and “B” designations are printed on the name label adjacent to the solenoid indicator lights, illustrated above.
Flow limit curves are subject to the following conditions:
The maximum flow curves assume simultaneous and equal flow rates. Single flow paths or applications with substantial differential flows or with large compressed volumes of oil, 2000 ccm (122 cm³) should be subjected to analysis beyond the maximum flow curves in this catalog.

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).

Coil ratings
Voltage: “H” 24 VDC only. Optional H (30W), HL (18W) and HM (10W).

Maximum flow performance is based on coils stabilized at high temperature (continuously subjected to 90% of rated voltage) and operated at 90% of rated 24 VDC voltage. Test fluid is mineral based oil at 36 cSt (168.8 SUS) and 0.87 specific gravity.

Solenoid Power Level by Coil Option

<table>
<thead>
<tr>
<th>COIL TYPE</th>
<th>RATED POWER¹</th>
<th>RATED CURRENT¹</th>
<th>HOT CURRENT²</th>
</tr>
</thead>
<tbody>
<tr>
<td>“H”</td>
<td>30W</td>
<td>1.20 A</td>
<td>950 mA</td>
</tr>
<tr>
<td>“HL”</td>
<td>18W</td>
<td>800 mA</td>
<td>670 mA</td>
</tr>
<tr>
<td>“HM”</td>
<td>10W</td>
<td>430 mA</td>
<td>370 mA</td>
</tr>
</tbody>
</table>

¹ Solenoid at 20°C (68°F) and nominal 24 VDC
² Solenoid at “high” temperature, stabilized at 24 VDC
### OPERATING DATA:

<table>
<thead>
<tr>
<th>Pressure Limits</th>
<th>350 bar (5075 psi)</th>
<th>210 bar (3045 psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rating</td>
<td>Up to 80 l/min, see Flow limit curves on page 6.</td>
<td></td>
</tr>
<tr>
<td>Relative Duty Factor</td>
<td>Continuous; ED = 100%</td>
<td></td>
</tr>
<tr>
<td>Type of Protection</td>
<td>IEC 144 class IP67</td>
<td></td>
</tr>
<tr>
<td>Coil Winding</td>
<td>NEC class H</td>
<td></td>
</tr>
<tr>
<td>Coil Encapsulation</td>
<td>NEC class F</td>
<td></td>
</tr>
<tr>
<td>Permissable Voltage Fluctuation</td>
<td>Range 24 VDC +/- 10%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Typical response time at 100% rated volts measured from application/removal of voltage to full displacement of 2C spool at:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coil Designation</td>
<td>H</td>
</tr>
<tr>
<td>Flow Rate P-A, B-T</td>
<td>40 l/m (10.6 Usgpm)</td>
<td>25 l/m (6.6 Usgpm)</td>
</tr>
<tr>
<td>Pressure</td>
<td>175 bar (2600 psi)</td>
<td>175 bar (2600 psi)</td>
</tr>
<tr>
<td>DC (=) energizing</td>
<td>60 ms</td>
<td>65 ms</td>
</tr>
<tr>
<td>DC (=) de-energizing</td>
<td>33</td>
<td>40</td>
</tr>
<tr>
<td>Power consumption, DC solenoids at rated voltage and 20°C (68°F).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full power coils:</td>
<td>24V, model type “H”</td>
<td>30W</td>
</tr>
<tr>
<td></td>
<td>24V, model type “HL”</td>
<td>18W</td>
</tr>
<tr>
<td></td>
<td>24V, model type “HM”</td>
<td>10W</td>
</tr>
<tr>
<td>Weight</td>
<td>2.5 kg (5.5 lb) approx.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.9 kg (4.2 lb) approx.</td>
<td></td>
</tr>
<tr>
<td>Fluid cleanliness</td>
<td>19/17/14</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>Fluid</td>
<td>-20 to +70°C (-4 to +158°F)</td>
</tr>
<tr>
<td></td>
<td>Ambient air</td>
<td>-20 to +70°C (-4 to +158°F)</td>
</tr>
<tr>
<td></td>
<td>Storage</td>
<td>-25 to +85°C (-13 to +185°F)</td>
</tr>
</tbody>
</table>
Pressure Drop Performance

Pressure Drop Curves by Spool Type

![Pressure Drop Curves](image)

- ▼ Curve for spool type 6: not recommended for flows in excess of 60 l/min (15.8 US gpm).
- Pressure drops in offset positions except where otherwise indicated.

### Spool/Spring Code

<table>
<thead>
<tr>
<th>Spool/Spring Code</th>
<th>Covered Spool Positions</th>
<th>P-A</th>
<th>P-B</th>
<th>A-T</th>
<th>B-T</th>
<th>P-T</th>
<th>B-A or A-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, 0F</td>
<td>De-energized</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>Energized</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>2</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), 2C, 2F</td>
<td>Energized</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Energized</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2N (H and HL coil)</td>
<td>Both</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2N (HM coil)</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), 6C, 6F</td>
<td>De-energized</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Energized</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7B(L), 7C, 7F</td>
<td>De-energized</td>
<td>6</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Energized</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8B(L), 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>33B(L), 33C</td>
<td>De-energized</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>15</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Energized</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

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

For other viscosities, pressure drops approximate to:

### Viscosity cSt (SUS)

<table>
<thead>
<tr>
<th>Viscosity cSt (SUS)</th>
<th>14</th>
<th>20</th>
<th>43</th>
<th>54</th>
<th>65</th>
<th>76</th>
<th>85</th>
</tr>
</thead>
<tbody>
<tr>
<td>(17.5)</td>
<td>(97.8)</td>
<td>(200)</td>
<td>(251)</td>
<td>(302)</td>
<td>(352)</td>
<td>(399)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>% of △p</th>
<th>81</th>
<th>88</th>
<th>104</th>
<th>111</th>
<th>116</th>
<th>120</th>
<th>124</th>
</tr>
</thead>
</table>

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.
Electrical Specifications

Solenoid Indication Standard
LED is lit when there is power to the coil.

EMC Qualifications
to EN 61326

A-Option
Direct connected coil shown to the right.
Protection network for inductive loads protects the (machine control) switch from high voltages and speeds the de-energizing of the solenoid.

Z-Option
Switching Amplifier on Board shown to the right.
The circuit on the Z-option is reverse polarity protected. The output is short circuit protected. In case of a shorted solenoid, the amplifier will remove the voltage from it. When the short is removed the amplifier will restart automatically.

Electrical Data:
For the “Z” option, switching amplifier version.

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>24 VDC ± 10 % range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control input</td>
<td>Per IEC 61131-2 for digital input type 2</td>
</tr>
<tr>
<td>Switching Frequency</td>
<td>2 Hz maximum</td>
</tr>
<tr>
<td>Range</td>
<td>-2 to +30V</td>
</tr>
<tr>
<td>ON condition</td>
<td>11 V and above. 6 mA at 11 V. Maximum 20 mA at 24 V</td>
</tr>
<tr>
<td>OFF condition</td>
<td>5 V and below. 2 mA at 5 V</td>
</tr>
</tbody>
</table>

M12 Connection
Pin 2 always controls ("Z" option) or power ("A" option) the solenoid on the "B" port side of the valve.
Pin 3 is always common or 0 volt, both A and Z control option.
Pin 4 always controls ("Z" option) or power ("A" option) the solenoid on the "A" port side of the valve.

CONTROL OPTION | PIN NUMBER | CONNECTION REF DESTINATION
--- | --- | ---
PM 4AS “A” Option | 1 | No Connection
| 2 | Power, Solenoid on B-Port Side
| 3 | Common, Sol A & B
| 4 | Power, Solenoid on A-Port Side
PM 4ZS "Z" Option | 1 | Power Supply
| 2 | Control Input, Solenoid on B-Port Side
| 3 | Common, 0V
| 4 | Control Input, Solenoid on A-Port Side

Note: For left hand builds ("L" in model code pos 8) pin connection to port A and B will be reversed.

WARNING:
Electromagnetic Compatibility (EMC)
It is necessary to ensure that the valve is wired up in accordance with the connection arrangements shown in this leaflet.

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 source 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 interference.
Installation Dimensions

DG4V-3-*C/N-**M-PM4*S-***7-70

DG4V-3-*C/N-H*-M-PM4*S-***7-70

DG4V-3-*A/B/F(L)-P2*-M-PM4*S-***7-70

DG4V-3-*A/B/F(L)-H2*-M-PM4*S-***7-70

DG4V-3-*A/B/F(L)-M-PM4*S-***7-70
Single station subplates, rear and side tapped ports.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>PORTS P, A, T, B AT REAR OR SIDE</th>
<th>THREAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>DGVM-3-1-R</td>
<td>Rear</td>
<td>G 3/8 (3/8&quot; BSP) x</td>
</tr>
<tr>
<td>DGMS-3-1E-1-R</td>
<td>Side</td>
<td>12.0 (0.47) deep</td>
</tr>
<tr>
<td>DGVM-3-1-S</td>
<td>Rear</td>
<td>3/4&quot;-16 UNF-2B x</td>
</tr>
<tr>
<td>DGMS-3-1E-1-S</td>
<td>Side</td>
<td>14.3 (0.56) deep (SAE)</td>
</tr>
<tr>
<td>DGMS-3-1EY-1-S</td>
<td>Side</td>
<td>5/8&quot;-18 UNF-2B x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.7 (0.5) deep (SAE)</td>
</tr>
</tbody>
</table>

When a subplate is not used, a machined pad must be provided for mounting. The pad must be flat within 0.01 mm per 100 mm (0.0001" per 1") and smooth within 0.8 £gm (32 £gin).

The interface conforms to ISO 4401-AB-03-4A (size 03) plus location pin hole ANSI/B93.7M (and NFPA) size 03 CETOP R35H4.2-03, plus location pin hole DIN 24340 Form A6, plus location pin hole

Dimensional tolerance = 0.2 (0.008) except where otherwise stated.

Prior to installing a valve, ensure that both valve and mounting surface are clean and free from burrs.

▲ ISO 4401 gives dimensions in mm. Inch conversions are accurate to 0.01" unless stated.

■ #10-24 UNC-2B optional
Manifolds for 2, 3, 4, 5 and 6 valve stations.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>A DIM.</th>
<th>B DIM.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DGMS – 3-2E(X)–1*–*</td>
<td>121 (4.8)</td>
<td>108 (4.25)</td>
</tr>
<tr>
<td>DGMS – 3–3E(X)–1*–*</td>
<td>171 (6.8)</td>
<td>158 (6.22)</td>
</tr>
<tr>
<td>DGMS – 3–4E–1*–*</td>
<td>221 (8.7)</td>
<td>208 (8.19)</td>
</tr>
<tr>
<td>DGMS – 3–5E–1*–*</td>
<td>271 (10.7)</td>
<td>258 (10.15)</td>
</tr>
<tr>
<td>DGMS – 3–6E–1*–*</td>
<td>321 (12.7)</td>
<td>308 (12.12)</td>
</tr>
</tbody>
</table>

These two ports are present in 4, 5, and 6 station models. Optional in 2 and 3 station models, specify DGMS – 3–2EX–1*–* or DGMS – 3–3EX–1*–*.

Valve Station 1

Valve Station 2

4 holes per model type
BSPF ports: M5-6H x 12.0 (0.47) deep
SAE ports: #10-24 UNC-2B x 12.5 (0.5) deep

A and B ports tapped according to model type:
DGMS-E(X)-1*-R:
G3/8 (3/8" BSPF)
DGMA-E(X)-1*-S:
3/4:-16 UNF-2B (SAE)

Thru connection P and T ports on types
DGMS-3-2EX-1*–* and DGMS-3-3EX-1*–*
Companion products

(Companion products can be ordered on the same order and shipped with the valves)

CONNECTOR BLOCKS FOR 24 VDC OPERATION.

<table>
<thead>
<tr>
<th>Vickers P/N</th>
<th>Model description</th>
<th>Outlets</th>
</tr>
</thead>
<tbody>
<tr>
<td>02-396529</td>
<td>CBDR4PSC-D</td>
<td>4</td>
</tr>
<tr>
<td>02-396530</td>
<td>CBDR6PSC-D</td>
<td>6</td>
</tr>
<tr>
<td>02-396531</td>
<td>CBDR8PSC-D</td>
<td>8</td>
</tr>
</tbody>
</table>

Current ratings: Each pin 2 amp, each port 4 amp max. Block maximum 12 amp.

M12 4-PIN MALE TO FEMALE CABLE SETS WITH STRAIGHT ENDS. 4 WIRE 22 AWG

<table>
<thead>
<tr>
<th>Vickers P/N</th>
<th>Model description</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>02-396533</td>
<td>CSDS4A4RY220.4-D</td>
<td>0.4 M (16 inch)</td>
</tr>
<tr>
<td>02-396534</td>
<td>CSDS4A4RY220.6-D</td>
<td>0.6 M (24 inch)</td>
</tr>
<tr>
<td>02-396535</td>
<td>CSDS4A4RY2201-D</td>
<td>1.0 M (36 inch)</td>
</tr>
<tr>
<td>02-396536</td>
<td>CSDS4A4RY2202-D</td>
<td>2.0 M (79 inch)</td>
</tr>
</tbody>
</table>

Hydraulic Accessories

DGVM-3-1*-*

DGMS-3-1E(Y)-1*-*

Single station sub-plate, rear and side tapped ports

Bolt kits

BK590716:
M5X30 mm

BK590716:
#10-24 x 31.5 mm (1.25 in)
### Available Parts and Recommended Models

#### Parts available for sale:

**SEAL KITS:**
- F-3 Viton seals, standard: 02-397447
- F-6 Seal option for water glycol fluids: 02-397448

**COILS, ALL 24 VDC:**
- H, 30-watt full power: 865923
- HL, 18-watt low power: 865963
- HM, 10-watt reduced power: 02-365173

Note: Solenoid power affects spool shifting force and hydraulic performance. Only the 30-watt full power solenoid provides full flow ratings and extra shifting force to overcome potential spool sticking associated with oil contamination and silting.

**Recommended Models and Released Assembly Numbers:**

#### 30 W Direct connected coils:
- 02-397816 DG4V-3-0B-P-F3-AM-SN-PM 4AS-H7-NP-70
- 02-397800 DG4V-3-2A-P-F3-AM-SN-PM 4AS-H7-NP-70
- 02-397811 DG4V-3-2C-P-F3-AM-SN-PM 4AS-H7-NP-70
- 02-397817 DG4V-3-2N-P-F3-AM-SN-PM 4AS-H7-NP-70
- 02-397818 DG4V-3-33C-P-F3-AM-SN-PM 4AS-H7-NP-70
- 02-397812 DG4V-3-6C-P-F3-AM-SN-PM 4AS-H7-NP-70

#### 30 W On board switching amplifier:
- 02-397819 DG4V-3-0B-P-F3-AM-SN-PM 4AS-HL7-NP-70
- 02-397810 DG4V-3-2A-P-F3-AM-SN-PM 4AS-HL7-NP-70
- 02-397812 DG4V-3-2C-P-F3-AM-SN-PM 4AS-HL7-NP-70
- 02-397817 DG4V-3-2N-P-F3-AM-SN-PM 4AS-HL7-NP-70
- 02-397820 DG4V-3-33C-P-F3-AM-SN-PM 4AS-HL7-NP-70
- 02-397813 DG4V-3-6C-P-F3-AM-SN-PM 4AS-HL7-NP-70

#### 18 W Direct connected coils:
- 02-397821 DG4V-3-0B-P-F3-AM-SN-PM 4AS-HL7-NP-70
- 02-397822 DG4V-3-2A-P-F3-AM-SN-PM 4AS-HL7-NP-70
- 02-397823 DG4V-3-2C-P-F3-AM-SN-PM 4AS-HL7-NP-70
- 02-397824 DG4V-3-2N-P-F3-AM-SN-PM 4AS-HL7-NP-70
- 02-397851 DG4V-3-33C-P-F3-AM-SN-PM 4AS-HL7-NP-70
- 02-397852 DG4V-3-6C-P-F3-AM-SN-PM 4AS-HL7-NP-70

#### 18 W On board switching amplifier:
- 02-397853 DG4V-3-0B-P-F3-AM-SN-PM 4AS-HL7-NP-70
- 02-397854 DG4V-3-2A-P-F3-AM-SN-PM 4AS-HL7-NP-70
- 02-397855 DG4V-3-2C-P-F3-AM-SN-PM 4AS-HL7-NP-70
- 02-397856 DG4V-3-2N-P-F3-AM-SN-PM 4AS-HL7-NP-70
- 02-397857 DG4V-3-33C-P-F3-AM-SN-PM 4AS-HL7-NP-70
- 02-397858 DG4V-3-6C-P-F3-AM-SN-PM 4AS-HL7-NP-70

#### 10 W Direct connected coils:
- 02-397859 DG4V-3-2A-P-F3-AM-SN-PM 4AS-HM 7-NP-70
- 02-397860 DG4V-3-6C-P-F3-AM-SN-PM 4AS-HM 7-NP-70

Two-stage solenoid valves with DG4V3-70 series pilot are available on request. The following models are listed for reference:
- 02-411881 DG5V-5-6C-M-PM 4AS-H7-10
- 02-411924 DG5V-5-2A-M-PM 4AS-HL7-10
- 02-411925 DG5V-5-2C-M-PM 4AS-HL7-10
- 02-411927 DG5V-5-2N-M-PM 4AS-HL7-10
- 02-411928 DG5V-5-6C-M-PM 4AS-HL7-10
- 02-411929 DG5V-5-33C-M-PM 4AS-HL7-10