Springless Diaphragm Valves
for High Performance

DP Series

- Suitable for ultrahigh-purity applications
- 316L VIM-VAR stainless steel body
- Low-pressure and high-pressure models
- VCR®, tube butt weld, and modular surface-mount end connections
- Manual or pneumatic actuation

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Features

Seat
- Fully contained PCTFE seat design provides:
  - excellent resistance to swelling and contamination
  - improved helium leak test performance
  - minimal particle generation
  - long cycle life.

Diaphragm
- Cobalt-based superalloy (UNS R30003) material for strength and corrosion resistance
- Optimal design for long cycle life

Body
- 316L VIM-VAR stainless steel body material for ultrahigh-purity applications
- Fully swept flow path
  - minimizes entrapment areas
  - facilitates purging
  - maximizes flow capacity.

Technical Data

<table>
<thead>
<tr>
<th>Model</th>
<th>Working Pressure psig (bar)</th>
<th>Temperature Rating °F (°C)</th>
<th>Flow Coefficient ($C_v$)</th>
<th>Orifice in. (mm)</th>
<th>Internal Volume in.³ (cm³)</th>
<th>Pneumatic Actuator</th>
<th>Actuation Pressure psig (bar)</th>
<th>Air Displacement in.³ (cm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-pressure</td>
<td>Vacuum to 250 (17.2)</td>
<td>–10 to 150 (–23 to 65)</td>
<td>0.27</td>
<td>0.16</td>
<td>0.086 (1.4) (body with BW4 ends)</td>
<td>60 to 120 (4.2 to 8.2)</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>High-pressure</td>
<td>Vacuum to 3045 (210)</td>
<td>–10 to 150 (–23 to 65)</td>
<td>0.20</td>
<td>0.16</td>
<td>0.086 (1.4) (body with BW4 ends)</td>
<td>70 to 120 (4.9 to 8.2)</td>
<td>0.47</td>
<td></td>
</tr>
</tbody>
</table>

See Options and Accessories, page 8, for high-temperature seat materials.
**Materials of Construction**

<table>
<thead>
<tr>
<th>Component</th>
<th>Material Grade/ASTM Specification</th>
<th>Low-Pressure</th>
<th>High-Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body and integral end</td>
<td>316L VIM-VAR SS/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>connections</td>
<td>SEMI F20 Ultrahigh-Purity³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welded VCR end connections</td>
<td>316L VAR SS/</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SEMI F20 High-Purity³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swagelok tube fittings</td>
<td>316 SS/A276</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seat</td>
<td>PCTFE/D1430</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diaphragm</td>
<td>Cobalt-based superalloy (UNS R30003)/AMS 5876</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support diaphragm</td>
<td>Silver-plated cobalt-based superalloy (UNS R30003)/AMS 5876</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washer</td>
<td>—</td>
<td>S17700</td>
<td></td>
</tr>
<tr>
<td>Bonnet</td>
<td>S17400 SS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bonnet nut</td>
<td>316 SS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pneumatic Actuator**

- Cylinder, cap, pistons: Aluminum
- O-rings: Buna N
- Springs: S17700 SS
- Button: 316 SS

**Manual Actuator**

- Actuator: 316 SS
- Button: 316 SS

**Process Specifications**

See Swagelok Ultrahigh-Purity Process Specification (SC-01) catalog, MS-06-61; Swagelok Photovoltaic Process Specification (SC-06) catalog, MS-06-64; and Swagelok Special Cleaning and Packaging (SC-11) catalog, 06-63, for details on processes, process controls, and process verification.

<table>
<thead>
<tr>
<th>Cleaning</th>
<th>Assembly and Packaging</th>
<th>Process Designator</th>
<th>Process Specification</th>
<th>Wetted Surface Roughness ($R_a$)</th>
<th>Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultrahigh-purity cleaning with a continuously monitored, deionized water, ultrasonic cleaning system</td>
<td>Performed in ISO Class 4 work areas; valves are double bagged and vacuum sealed in cleanroom bags.</td>
<td>P</td>
<td>Ultrahigh-Purity Process Specification (SC-01)</td>
<td>Electropolished and finished to an average of 5 µm. (0.13 µm)</td>
<td>Inboard helium leak tested to a rate of $1 \times 10^{-9}$ std cm$^3$/s at the seat, envelope, and all seals. The DP series design has been helium leak tested to maximum leak rate of $1 \times 10^{-10}$ std cm$^3$/s.</td>
</tr>
<tr>
<td>High-purity cleaning with a continuously monitored, deionized water, ultrasonic cleaning system</td>
<td>Performed in specially cleaned areas; valves are individually bagged.</td>
<td>P6</td>
<td>Photovoltaic Process Specification (SC-06)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special cleaning with non–ozone-depleting chemicals</td>
<td>Performed in specially cleaned areas; valves are individually bagged.</td>
<td>P1</td>
<td>Special Cleaning and Packaging (SC-11)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Performance Specifications**

Refer to DP Series Diaphragm Valve Technical Report, MS-06-15, for additional information on helium leak testing, particle counting, moisture analysis, hydrocarbon analysis, ionic cleanliness, and lab cycle testing data.

**Flow Data**

<table>
<thead>
<tr>
<th>Pressure Drop to Atmosphere psig (bar)</th>
<th>Low-Pressure Models ($C_v = 0.27$)</th>
<th>High-Pressure Models ($C_v = 0.20$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Water U.S. gal/min (L/min)</td>
<td>Air std ft$^3$/min (std L/min)</td>
</tr>
<tr>
<td>10 (0.68)</td>
<td>0.85 (3.2)</td>
<td>3.0 (86)</td>
</tr>
<tr>
<td>50 (3.4)</td>
<td>1.9 (7.2)</td>
<td>8.1 (230)</td>
</tr>
<tr>
<td>100 (6.8)</td>
<td>2.7 (10.2)</td>
<td>14.3 (410)</td>
</tr>
</tbody>
</table>
**Actuation Options**

**Manual Actuators**
- Low-pressure valves have blue handles as standard.
- High-pressure valves have white handles as standard.
- Seven handle colors are available; see Options and Accessories—Handle Colors, page 8.

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**Directional**
- Quick, quarter-turn actuation
- Handle shape provides visual indication of OPEN and CLOSED position
- Available on high- and low-pressure models

**Integral Lockout**
- Quick, quarter-turn actuation
- Lockable in the CLOSED position for safety
- Handle shape and window indicator provides visual indication of OPEN and CLOSED position.
- Available on high- and low-pressure models

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**Round**
- Quick, quarter-turn actuation
- Handle with window provides visual indication of OPEN and CLOSED positions
- Available on high- and low-pressure models

**Toggle**
- Spring-loaded toggle design for quick actuation
- Lockable in the CLOSED position for safety
- Handle position provides visual indication of OPEN and CLOSED positions
- Narrow handle profile allows close parallel mounting of valves
- Available on low-pressure models with PCTFE seats

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**Pneumatic Actuators**
- Normally open pneumatic actuators are marked with a green ring on top of the cylinder.

**IGC II Modular Surface-Mount Valves**
- 1.5 in. C-seal design
- Low-pressure valves: directional, integral lockout, round, toggle, and pneumatic actuators
- High-pressure valves: directional and integral lockout handles
- Available in two- or three-port configurations
- For more information on IGC II integrated gas components, see the *IGC II Integrated Gas Components—Substrates, Manifolds, Mounting Components, and Assembly Hardware* catalog, MS-02-134.
Ordering Information and Dimensions

Dimensions, in inches (millimeters), are for reference only and are subject to change.

Low-Pressure Valves

To order, add a process designator, P, P1, or P6 (see page 3), to the basic ordering number, then specify the actuator style as shown:

- For a **directional handle**, no additional designators are required.
- Example: 6LVV-DPBW4-P
- For an **integral lockout handle**, insert L.
  Example: 6LVV-DPBLW4-P
- For a **round handle**, insert R.
  Example: 6LVV-DPRBW4-P
- For a **toggle handle**, insert T.
  Example: 6LVV-DPTVR4-P
- For a **pneumatic actuator**, add -C for normally closed actuation or -O for normally open actuation.
  Example: 6LVV-DPBW4-P-C

---

### End Connection

<table>
<thead>
<tr>
<th>Inlet and Outlet</th>
<th>Basic Ordering Number</th>
<th>H, in. (mm)</th>
</tr>
</thead>
</table>
| 1/4 in. tube butt weld 0.30 in. (7.6 mm) tube stub, 0.035 in. wall | 6LVV-DPBW4- | 1.74 (44.2)
| 1/4 in. tube butt weld 0.26 in. (6.6 mm) tube stub, 0.035 in. wall | 6LVV-DPBW4S- | 1.61 (40.9)
| 6 mm tube butt weld, 1 mm wall | 6LVV-DPBW6M- | 1.74 (44.2)
| 1/4 in. female VCR fitting | 6LVV-DPFR4- | 2.78 (70.6)
| 1/4 in. rotatable male VCR fitting | 6LVV-DPMR4- | 2.78 (70.6)
| 1/4 in. integral male VCR fitting | 6LVV-DPVR4- | 2.30 (58.4)
| 1/4 in. Swagelok tube fitting | 6LVV-DPS4- | 2.46 (62.5)
| 6 mm Swagelok tube fitting | 6LVV-DPS6M- | 2.45 (62.2)

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➀ Low-pressure valves have blue handles. For other colors, see **Options and Accessories—Handle Colors**, page 8.

➁ Not available with P, P1, or P6 processing; omit process designator from ordering number.
Ordering Information and Dimensions

Dimensions, in inches (millimeters), are for reference only and are subject to change.

High-Pressure Valves

To order, add a process designator, P, P1, or P6 (see page 3), to the basic ordering number, then specify the actuator style as shown:

- For a **directional handle**, no additional designators are required.
  - Example: 6LVV-DPHBW4-P
- For an **integral lockout handle**, insert **L**.
  - Example: 6LVV-DPHLBW4-P
- For a **round handle**, insert **R**.
  - Example: 6LVV-DPHRBW4-P
- For a **pneumatic actuator**, add `-C` for normally closed actuation or `-O` for normally open actuation.
  - Example: 6LVV-DPHBW4-P-C

<table>
<thead>
<tr>
<th>End Connection</th>
<th>Basic Ordering Number</th>
<th><strong>H</strong> (in.</th>
<th><strong>H</strong> (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet and Outlet</td>
<td></td>
<td><strong>H</strong> (in.)</td>
<td><strong>H</strong> (mm)</td>
</tr>
<tr>
<td>1/4 in. tube butt weld</td>
<td>6LVV-DPHBW4-</td>
<td>1.74 (44.2)</td>
<td></td>
</tr>
<tr>
<td>0.30 in. (7.6 mm) tube stub, 0.035 in. wall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/4 in. tube butt weld short 0.26 in. (6.6 mm) tube stub, 0.035 in. wall</td>
<td>6LVV-DPHBW4S-</td>
<td>1.61 (40.9)</td>
<td></td>
</tr>
<tr>
<td>6 mm tube butt weld, 1 mm wall</td>
<td>6LVV-DPHBW6M-</td>
<td>1.74 (44.2)</td>
<td></td>
</tr>
<tr>
<td>1/4 in. female VCR fitting</td>
<td>6LVV-DPHFR4-</td>
<td>2.78 (70.6)</td>
<td></td>
</tr>
<tr>
<td>1/4 in. rotatable male VCR fitting</td>
<td>6LVV-DPHMR4-</td>
<td>2.30 (58.4)</td>
<td></td>
</tr>
<tr>
<td>1/4 in. integral male VCR fitting</td>
<td>6LVV-DPHVR4-</td>
<td>2.46 (62.5)</td>
<td></td>
</tr>
<tr>
<td>1/4 in. Swagelok tube fitting</td>
<td>6LVV-DPHS4-</td>
<td>2.46 (62.5)</td>
<td></td>
</tr>
<tr>
<td>6 mm Swagelok tube fitting</td>
<td>6LVV-DPHS6M-</td>
<td>2.45 (62.2)</td>
<td></td>
</tr>
</tbody>
</table>

1. High-pressure valves have white handles. For other colors, see Options and Accessories—Handle Colors, page 8.
2. Not available with P, P1, or P6 processing; omit process designator from ordering number.

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Bellows- and Diaphragm-Sealed Valves

**DP SERIES**

**DIAPHRAGM**

NUPRO DF SERIES BOTTOM VIEW N-ELD-444
Ordering Information and Dimensions
Dimensions, in inches (millimeters), are for reference only and are subject to change.

IGC II Modular Surface-Mount Valves

Directional and Round Handles

Integral Lockout Handle

Toggle Handle

Pneumatic Actuator

Bottom

Dimensions
For other valve dimensions, see Ordering Information and Dimensions for low-pressure or high-pressure valves on pages 5 and 6.

<table>
<thead>
<tr>
<th>Handle Type</th>
<th>Low-Pressure</th>
<th>High-Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H Open</td>
<td>H Closed</td>
</tr>
<tr>
<td>Directional and round</td>
<td>2.36  (59.9)</td>
<td>2.34  (59.4)</td>
</tr>
<tr>
<td>Integral lockout</td>
<td>3.25  (82.6)</td>
<td>3.59  (91.2)</td>
</tr>
<tr>
<td>Toggle</td>
<td>2.83  (71.9)</td>
<td>4.04  (103)</td>
</tr>
</tbody>
</table>

① Closed and locked position.

Low-Pressure Models

<table>
<thead>
<tr>
<th>Actuation</th>
<th>2 Port</th>
<th>3 Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directional handle</td>
<td>6LVV-MSM-DP-2-P</td>
<td>6LVV-MSM-DP-3-P</td>
</tr>
<tr>
<td>Integral lockout handle</td>
<td>6LVV-MSM-DPL-2-P</td>
<td>6LVV-MSM-DPL-3-P</td>
</tr>
<tr>
<td>Round handle</td>
<td>6LVV-MSM-DPR-2-P</td>
<td>6LVV-MSM-DPR-3-P</td>
</tr>
<tr>
<td>Toggle handle</td>
<td>6LVV-MSM-DPT-2-P</td>
<td>6LVV-MSM-DPT-3-P</td>
</tr>
<tr>
<td>Pneumatic, normally closed</td>
<td>6LVV-MSM-DP-2-P-C</td>
<td>6LVV-MSM-DP-3-P-C</td>
</tr>
<tr>
<td>Pneumatic, normally open</td>
<td>6LVV-MSM-DS-2-P-O</td>
<td>6LVV-MSM-DS-3-P-O</td>
</tr>
</tbody>
</table>

High-Pressure Models

<table>
<thead>
<tr>
<th>Actuation</th>
<th>2 Port</th>
<th>3 Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directional handle</td>
<td>6LVV-MSM-DPH-2-P</td>
<td>6LVV-MSM-DPH-3-P</td>
</tr>
<tr>
<td>Integral lockout handle</td>
<td>6LVV-MSM-DPHL-2-P</td>
<td>6LVV-MSM-DPHL-3-P</td>
</tr>
<tr>
<td>Round handle</td>
<td>6LVV-MSM-DPHR-2-P</td>
<td>6LVV-MSM-DPHR-3-P</td>
</tr>
</tbody>
</table>
Options and Accessories

Handle Colors (excluding multivalue manifolds)
Seven handle colors are available for color coding of process lines.
Select a basic kit ordering number and add a color designator.

<table>
<thead>
<tr>
<th>Handle Kit</th>
<th>Basic Ordering Number</th>
<th>Color</th>
<th>Designator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directional</td>
<td>NY-5K-DP-</td>
<td>Black</td>
<td>BK</td>
</tr>
<tr>
<td>Integral lockout</td>
<td>NY-5K-DPL-</td>
<td>Blue</td>
<td>BL</td>
</tr>
<tr>
<td>Round handle replacement</td>
<td>PY-5QK-DPR-</td>
<td>Green</td>
<td>GR</td>
</tr>
<tr>
<td>Round handle retrofit</td>
<td>PY-5K-DPR-</td>
<td>Orange</td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Red</td>
<td>RD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>White</td>
<td>WH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yellow</td>
<td>YW</td>
</tr>
</tbody>
</table>

Example: NY-5K-DP-RD for a red directional handle kit.

Diaphragm Replacement Kits
Include two diaphragms and replacement instructions.
Are available for high- or low-pressure valves.
Ordering number: E-3DK-DP

Actuator Replacement Kits
Include actuator and service instructions.
Select a kit ordering number:

<table>
<thead>
<tr>
<th>Actuator Replacement Kit</th>
<th>Ordering Numbers</th>
<th>Low-Pressure</th>
<th>High-Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directional handle</td>
<td>NY-DP-K1-BL</td>
<td>NY-DPH-K1-WH</td>
<td></td>
</tr>
<tr>
<td>Integral lockout handle</td>
<td>NY-DPL-K1-BL</td>
<td>NY-DPHL-K1-WH</td>
<td></td>
</tr>
<tr>
<td>Round handle</td>
<td>PY-DPR-K1-BL</td>
<td>PY-DPHR-K1-WH</td>
<td></td>
</tr>
<tr>
<td>Toggle handle</td>
<td>SS-DPT-K1-BL</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Pneumatic normally closed</td>
<td>A-DP-K1-C</td>
<td>A-DPH-K1-C</td>
<td></td>
</tr>
<tr>
<td>Pneumatic normally open</td>
<td>A-DP-K1-O</td>
<td>A-DPH-K1-O</td>
<td></td>
</tr>
<tr>
<td>High-temperature pneumatic normally closed</td>
<td>A-DPV-K1-C</td>
<td>A-DPHV-K1-C</td>
<td></td>
</tr>
<tr>
<td>High-temperature pneumatic normally open</td>
<td>A-DPV-K1-O</td>
<td>A-DPHV-K1-O</td>
<td></td>
</tr>
</tbody>
</table>

For high-pressure 1V and 2V monoblock configurations, insert M into the ordering number as shown.
Example: MS-ISK-DPHV-M-CM

Indicator Switch
Transmits a signal to an electrical device, indicating the open or closed position of the pneumatically actuated valve.
Features a single-pole, single-throw switch rated at:
- 1/2 A for 115 V (ac) for a normally open switch;
- 1/4 A for 115 V (ac) for a normally closed switch;
- –40 to 185°F (–40 to 85°C) temperature.
Includes a 24 in. (61 cm) wire lead with an inline clip.
Is available assembled on any normally closed and high-pressure, normally open, pneumatically actuated DP series valve, or as a kit for field assembly.

Factory-Assembled Indicator Switches
To order a valve with an indicator switch, add M for a normally open switch or M-2 for a normally closed switch to the valve ordering number.
Examples: 6LVV-DPFR4-P-CM 6LVV-DPHBW4-P-CM-2

High-Temperature Seat Material—Polyimide
- Temperature rating is from 50 to 300°F (10 to 150°C).
- Fluorocarbon FKM O-rings in pneumatic actuator are included.
- All other materials and ratings remain the same.
To order, insert V in the valve ordering number.
Examples: 6LVV-DPV111P-C 6LVV-DPVBW4P-C

Multiport and Elbow Valves and Monoblock Manifolds
DP series valves are available in multiport and elbow configurations and monoblock manifolds; refer to Bellows- and Diaphragm-Sealed Multiport and Elbow Valves and Monoblock Manifolds catalog, MS-02-442.

Oxygen Service Hazards
For more information about hazards and risks of oxygen-enriched systems, refer to Oxygen System Safety technical report, MS-06-13.

⚠️ Do not mix/interchange Swagelok products or components not governed by industrial design standards, including Swagelok tube fitting end connections, with those of other manufacturers.
Introduction
Since 1947, Swagelok has designed, developed, and manufactured high-quality, general-purpose and specialty fluid system products to meet the evolving needs of global industries. Our focus is on understanding our customers’ needs, finding timely solutions, and adding value with our products and services.

We are pleased to provide this global edition of the book-bound Swagelok Product Catalog, which compiles more than 100 separate product catalogs, technical bulletins, and reference documents into one convenient, easy-to-use volume. Each product catalog is up to date at the time of printing, with its revision number shown on the last page of the individual catalog. Subsequent revisions will supersede the printed version and will be posted on the Swagelok website and in the Swagelok electronic Desktop Technical Reference (eDTR) tool.

For more information, visit your Swagelok website or contact your authorized Swagelok sales and service representative.

Warranty Information
Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit swagelok.com or contact your authorized Swagelok representative.

Safe Product Selection
When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user.

⚠️ WARNING
Do not mix/interchange Swagelok products or components not governed by industrial design standards, including Swagelok tube fitting end connections, with those of other manufacturers.

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15-7 PH—TM AK Steel Corp.
AccuTrak, Beacon, Westlock—TM Tyco International Services
Atlas—TM Asahi Glass Co., Ltd.
ASCO, El-O-Matic—TM Emerson
AutoCAD—TM Autodesk, Inc.
CSA—TM Canadian Standards Association
Crestin, DuPont, Kalez, Krytov, Teflon, Viton—TM E.I. duPont Nemours and Company
DeviceNet—TM ODVA
Dyneon, Eglloy, TFM—TM Dyneon
Eglloy—TM Eglloy Specialty Metals
FM—TM FM Global
Grafoil—TM GrafTech International Holdings, Inc.
Honeywell, MICRO SWITCH—TM Honeywell
MAC—TM MAC Valves
Microsoft, Windows—TM Microsoft Corp.
NACE—TM NACE International
PH 15-7 Mo, 17-7 PH—TM AK Steel Corp
picofast—Hans Turck KG
Piller—TM Nippon Piller Packing Company, Ltd.
Raychem—TM Tyco Electronics Corp.
Sandvik, SAF 2507—TM Sandvik AB
Simriz—TM Freudenberg-NOK
SolidWorks—TM SolidWorks Corporation
UL—Underwriters Laboratories Inc.
Xylan—TM Whirlford Corporation
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