

# 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:

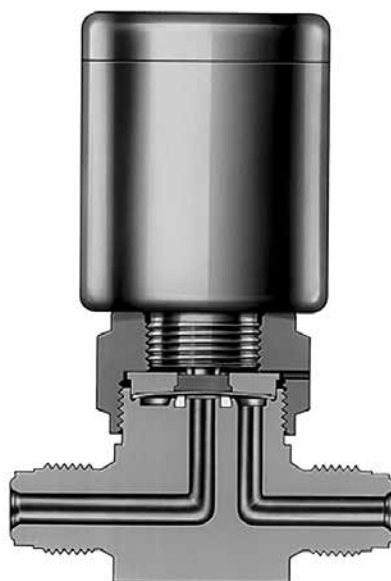
- excellent resistance to swelling and contamination
- improved helium leak test performance
- minimal particle generation
- long cycle life.

### 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.



## Models

### Low-Pressure

- Pressure rating: 250 psig (17.2 bar)
- Temperature rating: -10 to 150°F (-23 to 65°C)
- Flow coefficient: 0.27

### High-Pressure

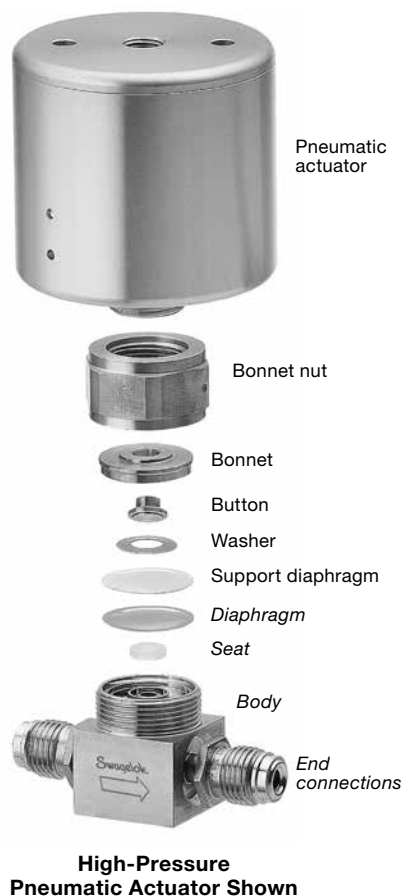
- Pressure rating: 3045 psig (210 bar)
- Temperature rating: -10 to 150°F (-23 to 65°C)
- Flow coefficient: 0.20

## Technical Data

Model	Working Pressure psig (bar)		Temperature Rating °F (°C)		Flow Coefficient (C <sub>v</sub> )	Orifice in. (mm)	Internal Volume in. <sup>3</sup> (cm <sup>3</sup> )	Pneumatic Actuator	
	Operating	Burst	Operating	Short-Term Bakeout				Actuation Pressure psig (bar)	Air Displacement in. <sup>3</sup> (cm <sup>3</sup> )
Low- pressure	Vacuum to 250 (17.2)	3200 (220)	-10 to 150 (-23 to 65)	302 (150) (valve open)	0.27	0.16 (4.1)	0.086 (1.4) (body with BW4 ends)	60 to 120 (4.2 to 8.2)	0.09 (1.5)
High- pressure	Vacuum to 3045 (210)	12 200 (840)			0.20			70 to 120 (4.9 to 8.2)	0.47 (7.7)

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

## Materials of Construction



Component	Material Grade/ASTM Specification	
	Low-Pressure	High-Pressure
<i>Body and integral end connections</i>	316L VIM-VAR SS/ SEMI F20 Ultrahigh-Purity <sup>①</sup>	
<i>Welded VCR end connections</i>	316L VAR SS/ SEMI F20 High-Purity <sup>①</sup>	
Swagelok tube fittings	316 SS/A276	
Seat	PCTFE/D1430	
Diaphragm	Cobalt-based superalloy (UNS R30003)/AMS 5876	
Support diaphragm	Silver-plated cobalt-based superalloy (UNS R30003)/AMS 5876	
Washer	—	S17700
Bonnet	S17400 SS	
Bonnet nut	316 SS	
Pneumatic Actuator		
Cylinder, cap, pistons	Aluminum	
O-rings	Buna N	
Springs	S17700 SS	
Button	316 SS	
Manual Actuator		
Actuator	316 SS	
Button	—	316 SS
Directional handle	Nylon with stainless steel insert	
Integral lockout handle	Glass-filled nylon with stainless steel base	
Round handle	Polyester with stainless steel insert	
Toggle handle	316 SS with epoxy coating	—

Wetted components listed in *italics*.

O-rings are lubricated with PTFE-based lube; no lubricants on wetted components.

① 20 % minimum elongation allowed.

## 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, MS-06-63, for details on processes, process controls, and process verification.

Cleaning	Assembly and Packaging	Process Designator	Process Specification	Wetted Surface Roughness ( $R_a$ )	Testing
Ultrahigh-purity cleaning with a continuously monitored, deionized water, ultrasonic cleaning system	Performed in ISO Class 4 work areas; valves are double bagged and vacuum sealed in cleanroom bags.	P	<i>Ultrahigh-Purity Process Specification (SC-01)</i>	Electropolished and finished to an average of 5 $\mu$ in. (0.13 $\mu$ m)	Inboard helium leak tested to a rate of $1 \times 10^{-9}$ std $\text{cm}^3/\text{s}$ 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 $\text{cm}^3/\text{s}$ .
High-purity cleaning with a continuously monitored, deionized water, ultrasonic cleaning system	Performed in specially cleaned areas; valves are individually bagged.	P6	<i>Photovoltaic Process Specification (SC-06)</i>		
Special cleaning with non-ozone-depleting chemicals	Performed in specially cleaned areas; valves are individually bagged.	P1	<i>Special Cleaning and Packaging (SC-11)</i>		

## 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

Pressure Drop to Atmosphere psig (bar)	Low-Pressure Models $C_v = 0.27$		High-Pressure Models $C_v = 0.20$	
	Water U.S. gal/min (L/min)	Air std $\text{ft}^3/\text{min}$ (std L/min)	Water U.S. gal/min (L/min)	Air std $\text{ft}^3/\text{min}$ (std L/min)
10 (0.68)	0.85 (3.2)	3.0 (86)	0.63 (2.4)	2.3 (64)
50 (3.4)	1.9 (7.2)	8.1 (230)	1.4 (5.4)	6.0 (170)
100 (6.8)	2.7 (10.2)	14.3 (410)	2.0 (7.6)	10.6 (300)

## 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.



#### 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

#### 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



### Pneumatic Actuators

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

**High-Pressure Pneumatic Actuator**



**Low-Pressure Pneumatic Actuator**



### IGC II Modular Surface-Mount Valves



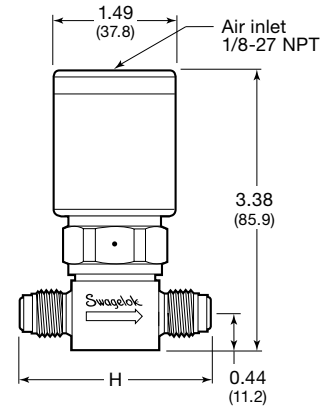
- 1.5 in. C-seal design
- Low-pressure valves: directional, integral lockout, round, toggle, and pneumatic actuators
- High-pressure valves: directional and integral lockout handles
- Available in two- or three-port configurations
- For more information on IGC II integrated gas components, see the *IGC 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.

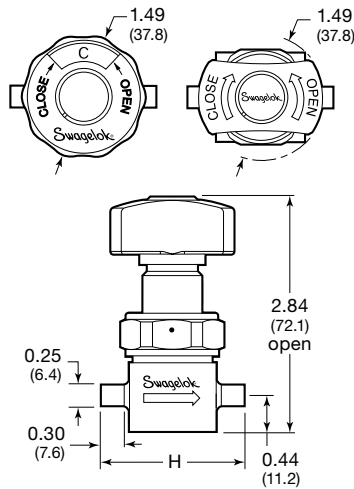
### Low-Pressure Valves

#### Pneumatic Actuator



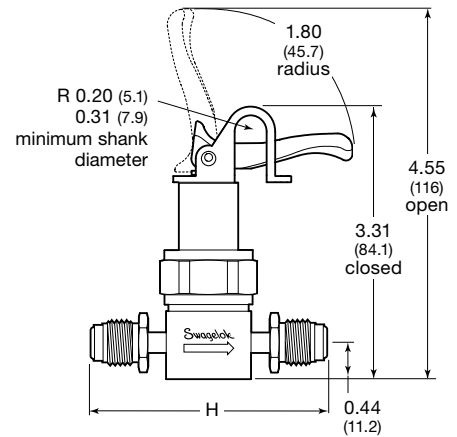
Integral Male VCR Fittings

#### Round Handle Directional Handle

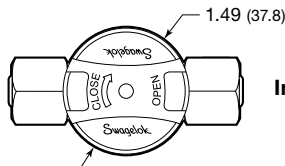


Tube Butt Weld Ends

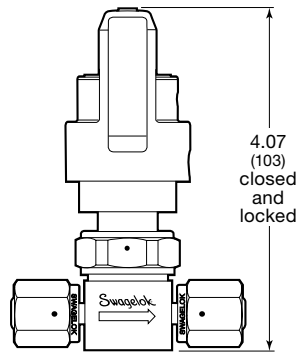
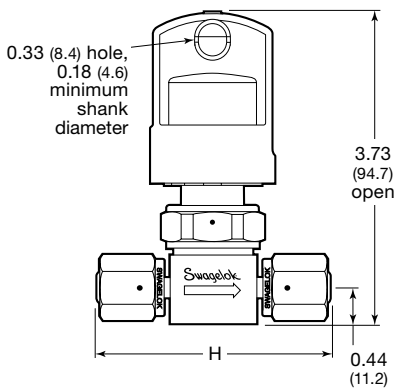
#### Toggle Handle



Rotatable Male VCR Fittings

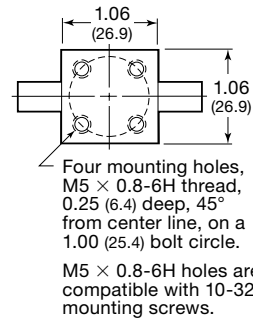


Integral Lockout Handle



Female VCR Fittings

#### Bottom



End Connection Inlet and Outlet	Basic Ordering Number <sup>①</sup>	H in. (mm)
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-	
1/4 in. integral male VCR fitting	6LVV-DPVR4-	2.30 (58.4)
1/4 in. Swagelok tube fitting	6LVV-DPS4- <sup>②</sup>	2.46 (62.5)
6 mm Swagelok tube fitting	6LVV-DPS6M- <sup>②</sup>	2.45 (62.2)

<sup>①</sup> Low-pressure valves have blue handles. For other colors, see **Options and Accessories—Handle Colors**, page 8.

<sup>②</sup> Not available with **P**, **P1**, or **P6** processing; omit process designator from ordering number.

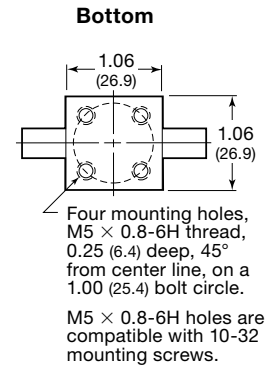
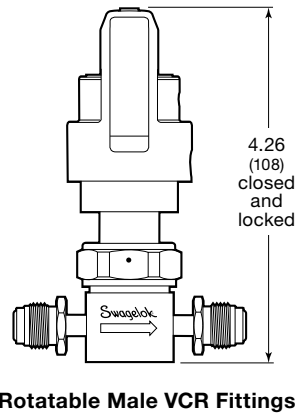
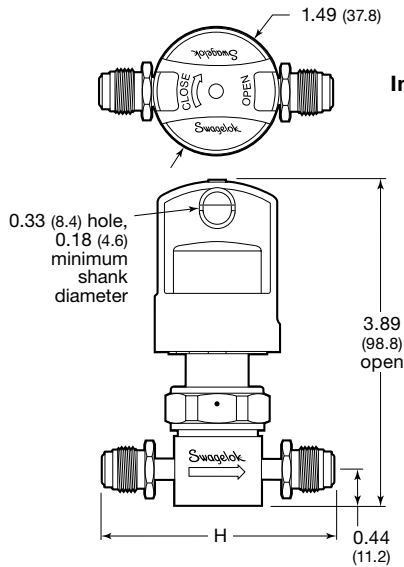
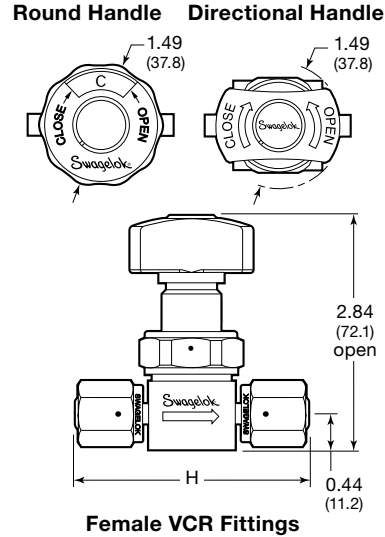
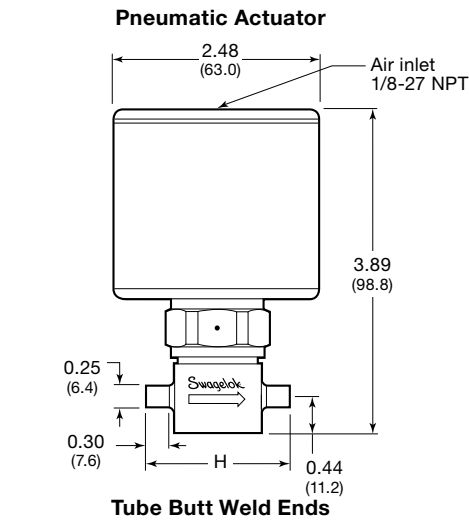
To order, add a process designator, **P**, **P1**, or **P6** (see page 3), to the basic ordering number, then specify the actuator style as shown:

- For a **directional handle**, no additional designators are required.
- Example: 6LVV-DPBW4-P
- For an **integral lockout handle**, insert **L**.  
Example: 6LVV-DPLBW4-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

## Ordering Information and Dimensions

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

### High-Pressure Valves



End Connection Inlet and Outlet	Basic Ordering Number <sup>①</sup>	H in. (mm)
1/4 in. tube butt weld 0.30 in. (7.6 mm) tube stub, 0.035 in. wall	6LVV-DPHBW4-	1.74 (44.2)
1/4 in. tube butt weld short 0.26 in. (6.6 mm) tube stub, 0.035 in. wall	6LVV-DPHBW4S-	1.61 (40.9)
6 mm tube butt weld, 1 mm wall	6LVV-DPHBW6M-	1.74 (44.2)
1/4 in. female VCR fitting	6LVV-DPHFR4-	2.78 (70.6)
1/4 in. rotatable male VCR fitting	6LVV-DPHMR4-	
1/4 in. integral male VCR fitting	6LVV-DPHVR4-	2.30 (58.4)
1/4 in. Swagelok tube fitting	6LVV-DPHS4- <sup>②</sup>	2.46 (62.5)
6 mm Swagelok tube fitting	6LVV-DPHS6M- <sup>②</sup>	2.45 (62.2)

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.

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:

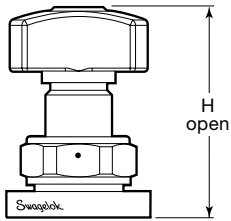
- For a **directional handle**, no additional designators are required.  
Example: 6LVV-DPHBW4-P
- For an **integral lockout handle**, insert **L**.  
Example: 6LVV-DPHLBW4-P
- For a **round handle**, insert **R**.  
Example: 6LVV-DPHRBW4-P
- For a **pneumatic actuator**, add **-C** for normally closed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

## Ordering Information and Dimensions

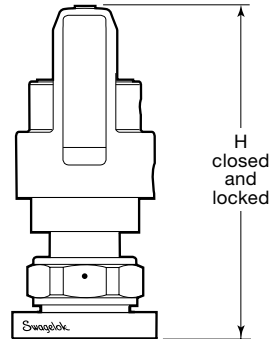
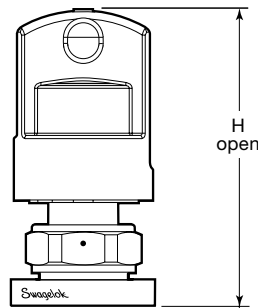
Dimensions, in inches (millimeters), are for reference only and are subject to change.

### IGC II Modular Surface-Mount Valves

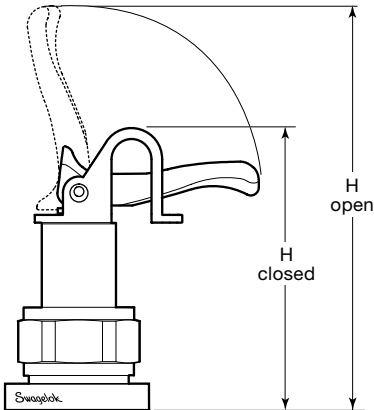
#### Directional and Round Handles



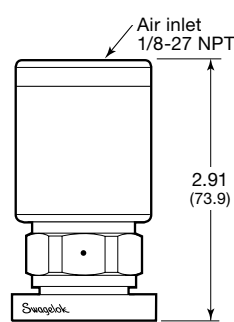
#### Integral Lockout Handle



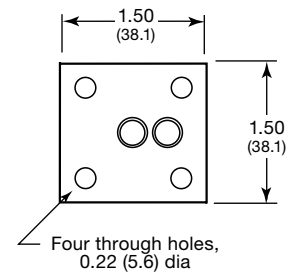
#### Toggle Handle



#### 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.

Handle Type	Dimensions, in. (mm)			
	Low-Pressure		High-Pressure	
	H Open	H Closed	H Open	H Closed
Directional and round	2.36 (59.9)	2.34 (59.4)	2.36 (59.9)	2.34 (59.4)
Integral lockout	3.25 (82.6)	3.59 <sup>①</sup> (91.2)	3.41 (86.6)	3.78 <sup>①</sup> (96.0)
Toggle	2.83 (71.9)	4.04 (103)	—	

<sup>①</sup> Closed and locked position.

### Low-Pressure Models

Actuation	Ordering Numbers	
	2 Port	3 Port
Directional handle	6LVV-MSM-DP-2-P	6LVV-MSM-DP-3-P
Integral lockout handle	6LVV-MSM-DPL-2-P	6LVV-MSM-DPL-3-P
Round handle	6LVV-MSM-DPR-2-P	6LVV-MSM-DPR-3-P
Toggle handle	6LVV-MSM-DPT-2-P	6LVV-MSM-DPT-3-P
Pneumatic, normally closed	6LVV-MSM-DP-2-P-C	6LVV-MSM-DP-3-P-C
Pneumatic, normally open	6LVV-MSM-DP-2-P-O	6LVV-MSM-DP-3-P-O

### High-Pressure Models

Actuation	Ordering Numbers	
	2 Port	3 Port
Directional handle	6LVV-MSM-DPH-2-P	6LVV-MSM-DPH-3-P
Integral lockout handle	6LVV-MSM-DPHL-2-P	6LVV-MSM-DPHL-3-P
Round handle	6LVV-MSM-DPHR-2-P	6LVV-MSM-DPHR-3-P

## Options and Accessories

### Handle Colors (excluding multivalve manifolds)

Seven handle colors are available for color coding of process lines.

Select a basic kit ordering number and add a color designator.

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

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

## Maintenance Kits

### 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:

Actuator Replacement Kit	Ordering Numbers	
	Low-Pressure	High-Pressure
Directional handle	NY-DP-K1-BL	NY-DPH-K1-WH
Integral lockout handle	NY-DPL-K1-BL	NY-DPHL-K1-WH
Round handle	PY-DPR-K1-BL	PY-DPHR-K1-WH
Toggle handle	SS-DPT-K1-BL	—
Pneumatic normally closed	A-DP-K1-C	A-DPH-K1-C <sup>①</sup>
Pneumatic normally open	A-DP-K1-O	A-DPH-K1-O <sup>①</sup>
High-temperature pneumatic normally closed	A-DPV-K1-C	A-DPHV-K1-C <sup>①</sup>
High-temperature pneumatic normally open	A-DPV-K1-O	A-DPHV-K1-O <sup>①</sup>

<sup>①</sup> For high-pressure 1V and 2V monoblock configurations, insert **M** into the ordering number as shown.

Examples: A-DPHM-K1-C  
A-DPHMV-K1-C

**⚠ Do not interchange high- and low-pressure actuators.**

## Oxygen Service Hazards

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

**Caution: Do not mix or interchange parts with those of other manufacturers.**

## 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-DPVC111P-C  
6LVV-DPHVBW4P-C

## 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

### Indicator Switch Kits

Include actuator and switch. Select an ordering number.

Indicator Switch Kit	Ordering Numbers	
	Low-Pressure	High-Pressure
Normally open	MS-ISK-DP-CM	MS-ISK-DPH-CM <sup>①</sup>
Normally closed	MS-ISK-DP-CM-2	MS-ISK-DPH-CM-2 <sup>①</sup>

<sup>①</sup> For high-pressure 1V and 2V monoblock configurations, insert **M** into the ordering number as shown.

Example: MS-ISK-DPHM-CM

## 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.



## 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; for example, the Swagelok *Gaugeable Tube Fittings and Tube Adapters* catalog is MS-01-140, RevW. 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.

### 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.**

**Caution: Do not mix or interchange parts with those of other manufacturers.**

## Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit [swagelok.com](http://swagelok.com) or contact your authorized Swagelok representative.

Swagelok, Ferrule-Pak, Goop, Hinging-Collecting, IGC, Kenmac, Micro-Fit, Nupro, Snoop, Sno-Trik, SWAK, VCO, VCR, Ultra-Torr, Whitey—TM Swagelok Company  
15-7 PH—TM AK Steel Corp.  
AccuTrak, Beacon, Westlock—TM Tyco International Services  
Aflas—TM Asahi Glass Co., Ltd.  
ASCO, El-O-Matic—TM Emerson  
AutoCAD—TM Autodesk, Inc.  
CSA—TM Canadian Standards Association  
Crastin, DuPont, Kalrez, Krytox, Teflon, Viton—TM E.I. duPont Nemours and Company  
DeviceNet—TM ODVA  
Dyneon, Elgiloy, TFM—TM Dyneon  
Elgiloy—TM Elgiloy 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  
Pillar—TM Nippon Pillar 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 Whitford Corporation  
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