Replaceable-Seat, Springless Diaphragm Valves

DPX and DFX Replaceable-Seat Diaphragm Valves

- Designed for semiconductor chemical cannister applications
- 316L VIM-VAR stainless steel body material
- Isolation and 3-port configurations
- 1/4 and 3/8 in. tube butt weld and 1/4 in. VCR® and “H” Type VCR end connections
- Standard and high-flow models

Swagelok

Contents

Features

Swagelok® replaceable-seat, springless diaphragm valves enable easy and repeatable seat replacement while providing a seat seal that protects against chemical and thermal swelling and process chemistry degradation. Specifically designed with the increasingly demanding purity needs of the chemical canister market in mind, these innovative designs extend the proven performance of Swagelok DP series and DF series valves.

Replaceable Seat

- Tight-fitting seat has minimal entrapment areas and a low profile to limit chemical and thermal expansion.
- Innovative seat carrier protects the seat, ensures correct installation, and compresses the seat diameter to enable precision fit into the valve body.

Seat Removal and Installation Tools

- Specially designed tooling (ordered separately, page 6) enables quick, controlled removal and installation of the replacement valve seat without damaging the sealing surface.

Diaphragm

- Cobalt-based superalloy (UNS R30003) material provides strength and corrosion resistance.

Body

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

Actuation Options

Round Handle

- Handle with window provides visual indication of OPEN and CLOSED positions.
- Detent option
  - resists inadvertent handle rotation in the OPEN or CLOSED positions
  - provides the abilitly to secure the handle in the CLOSED position.

Pneumatic Actuator

- Lightweight aluminum actuator is marked with a black ring on top of the cylinder.
- Normally closed actuation is available.

Technical Data

Valve Series	Pressure psig (bar)		Temperature Rating °F (°C)		Flow Coefficient (C_v)	Orifice in. (mm)	Internal Volume in.^{3} (cm^3)	Pneumatic Actuator	
	Operating	Burst	Operating	Short-Term Bakeout				Actuation Pressure psig (bar)	Air Displacement in.^{3} (cm^3)
DP series	Vacuum to 145 (10.0)	>3200 (220)	PFA seat: 50 to 150 (10 to 65) Polyimide seat: 50 to 302 (10 to 150)	302 (150) (valve open)	0.3	0.16 (4.1)	0.086 (1.4) (body with BW4 ends)	60 to 120 (4.2 to 8.2)	0.09 (1.5)
DF series					0.6	0.23 (5.8)	0.27 (4.4) (body with HVCR fittings)		

For information about a transportation pressure rating, contact your authorized Swagelok sales and service representative

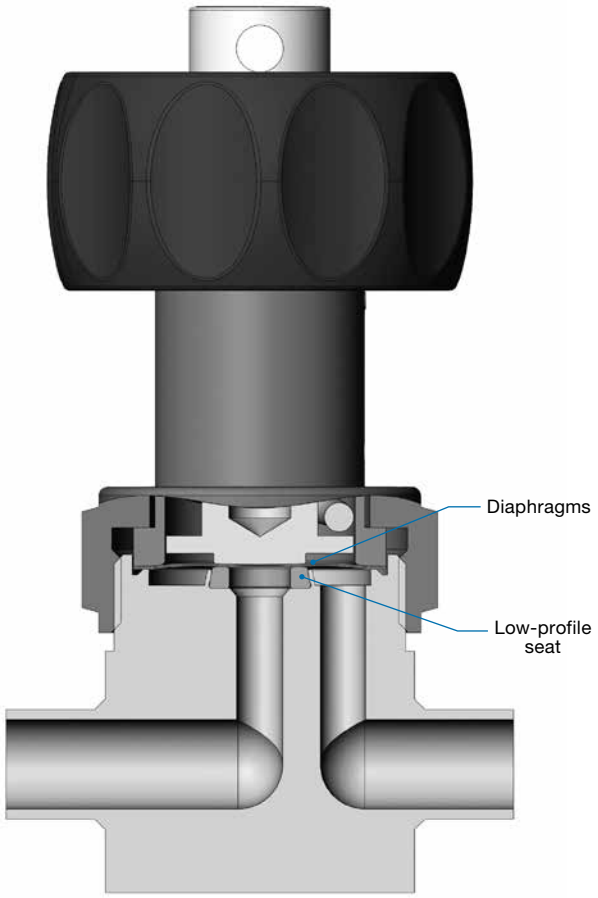
Materials of Construction

Component	Material Grade/ASTM Specification
Body and integral end connections	*316L VIM-VAR SS/ SEMI F20 Ultrahigh-Purity*①
Welded VCR end connections	316L VAR SS/ SEMI F20 High-Purity①
Seat	*PFA (standard) or polyimide*
Diaphragm	*Cobalt-based superalloy (UNS R30003)/AMS 5876*
Support diaphragm	Silver-plated cobalt-based superalloy (UNS R30003)/AMS 5876
Bonnet	S17400 SS
Bonnet nut	316 SS
Pneumatic Actuator	
Cylinder, cap, pistons	Aluminum
O-rings	Fluorocarbon FKM
Springs	S17700 SS
Button	316 SS
Manual Actuator	
Actuator	Silver-plated 316 SS
Springs	S17700 SS
Round handle	Polyester with stainless steel insert
Detent handle lock	316 SS
Screw and roll pin	18-8 SS
Label	Vinyl

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),* MS-06-61, for details on processes, process controls, and process verification.

Cleaning	Assembly and Packaging	Process Designator	Process Specification	Wetted Surface Roughness (R_a)	Production 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	*Ultrahigh-Purity Process Specification (SC-01)*	Electropolished and finished to an average of 5 µin. (0.13 µm)	Inboard helium leak tested at the seat, envelope, and seals is performed at the factory on all valves to a rate of 1×10^{-9} std cm^3/s

Performance Specifications

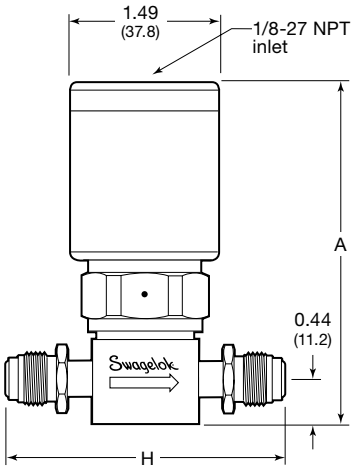
See the *DP Series Diaphragm Valve Technical Report,* MS-06-15, and the *DF Series Diaphragm Valve Technical Report,* MS-06-14, and product test reports for additional information on product performance.

Ordering Information and Dimensions

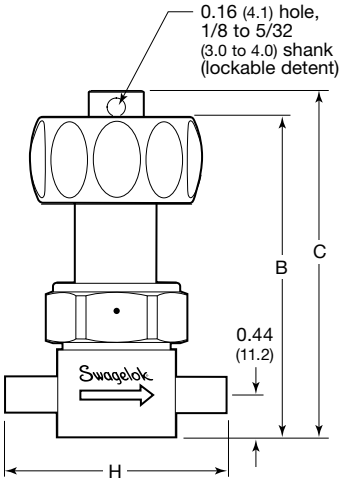
Dimensions, in inches (millimeters), are for reference only and are subject to change.

Two-Port Valves

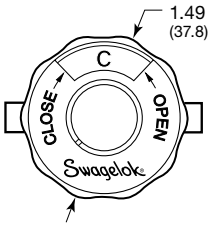
Pneumatic Actuator



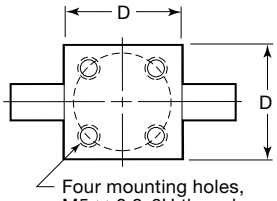
Round Handle



Round Handle Top



Bottom



Four mounting holes, M5 × 0.8-6H thread, 0.25 (6.4) deep, 45° from center line, on a 1.00 (25.4) bolt circle.

M5 × 0.8-6H holes are compatible with 10-32 mounting screws.

Rotatable Male VCR Fittings

Tube Butt Welds

End Connections Inlet / Outlet	Basic Ordering Number	Dimensions, in. (mm) A	B	C	D	H
DP Series						
1/4 in. female VCR fittings	6LVV-DPXFR4-P-	3.38 (85.9)	2.81 (71.4) closed	3.04 (77.2)	1.06 (26.9)	2.78 (70.6)
1/4 in. rotatable male VCR fittings	6LVV-DPXMR4-P-					
1/4 in. integral male VCR fittings	6LVV-DPXVR4-P-					2.30 (58.4)
1/4 × 0.035 in., 0.30 in. (7.6 mm) tube butt welds	6LVV-DPXBW4-P-					1.74 (44.2)
3/8 × 0.035 in., 0.30 in. (7.6 mm) tube butt welds	6LVV-DPXBW6-P-					1.74 (44.2)
DF Series						
1/4 in. female "H" type VCR fittings	6LVV-DFXHFR4-P-	3.65 (92.7)	3.04 (77.2)	3.27 (83.1)	1.25 (31.8)	2.78 (70.6)
1/4 in. rotatable male "H" type VCR fittings	6LVV-DFXHMR4-P-					2.96 (75.2)
3/8 × 0.035 in., 0.50 in. (12.7 mm) tube butt welds	6LVV-DFXBW6-P-					2.25 (57.1)

To create a complete ordering number:

- Select the basic ordering number then add the actuator designator as shown.
- For a **pneumatic actuator,** add **C** for normally closed actuation.

  Example: 6LVV-DPXFR4-P-**C**
- For a DPX valve with a **round handle,** insert **R** and add a color designator.

  Example: 6LVV-DPX**R**FR4-P-**BK**
- For a DFX valve with a **round handle**, add a color designator.

  Example: 6LVV-DFXFR4-P-**BK**
- For a **round detent handle,** insert **W** and add a color designator.

  Example: 6LVV-DPX**W**BW6-P-**BK**

Color	Designator
Black	BK
Blue	BL
Green	GR
Orange	OR
Red	RD
White	WH
Yellow	YW

Optional High-Temperature Seat

The temperature rating is from 50 to 300°F (10 to 150°C). All other materials and ratings remain the same.

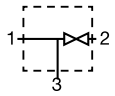
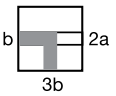
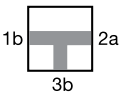
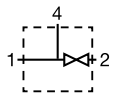
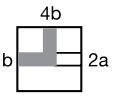
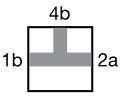
To order, insert **V** into the valve ordering number.

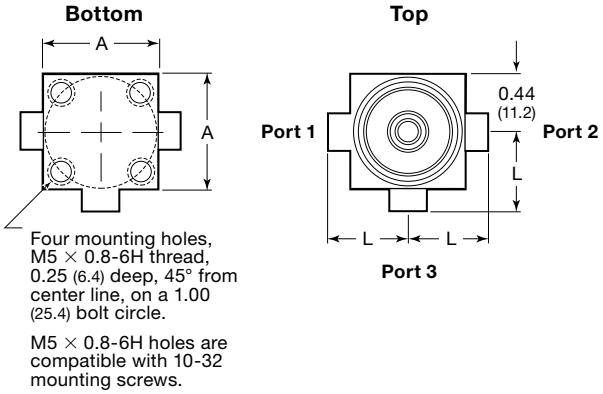
Examples: 6LVV-DPX**V**FR4-P-C
6LVV-DPXW**V**BW6-P-BK

Ordering Information and Dimensions

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

Three-Port Valves

Schematic	Flow Path		Basic Ordering Numbers
	Closed	Open	
			6LVV-DPXA _ _ _ P- 6LVV-DFXA _ _ _ P-
			6LVV-DPXB _ _ _ P- 6LVV-DFXB _ _ _ P-



To create a complete ordering number:

- Select the basic ordering number for the model and flow path.
- Select **end connections** from the table at right for each port on the body in numerical order. Insert the end connection designator into the valve ordering number in the same sequence it is selected.

  Example: 6LVV-DPXA**333**P-
- For **pneumatic actuators,** add **C** for normally closed actuation.

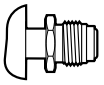
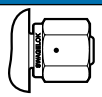
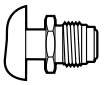
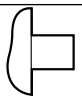
  Example: 6LVV-DPXA333P-**C**
- For a DPX with a **round handles,** insert **R** and add a color designator.

  Example: 6LVV-DPX**R**A333P-**BK**
- For a DFX with a **round handle**, add a color designator.

  Example: 6LVV-DFXA999P-**BL**
- For **round detent handles,** insert **W** and add a color designator.

  Example: 6LVV-DPX**W**A333P-**BK**

Color	Designator
Black	BK
Blue	BL
Green	GR
Orange	OR
Red	RD
White	WH
Yellow	YW

End Connections		Dimensions in. (mm) A	Dimensions in. (mm) L	Designator
DP Series				
1/4 in. female VCR fittings		1.06 (26.9)	1.39 (35.3)	3
1/4 in. rotatable male VCR fittings			1.39 (35.3)	2
1/4 × 0.035 in., 0.30 in. (7.6 mm) tube butt welds			0.87 (22.1)	1
3/8 × 0.035 in., 0.30 in. (7.6 mm) tube butt welds			0.87 (22.1)	9
DF Series				
1/4 in. female “H” type VCR fitting		1.25 (31.8)	1.39 (35.3)	D
1/4 in. rotatable male “H” type VCR fitting			1.48 (37.6)	E
3/8 × 0.035 in., 0.50 in. (12.7 mm) tube butt welds			1.12 (28.4)	9

Optional High-Temperature Seat

The temperature rating is from 50 to 300°F (10 to 150°C). All other materials and ratings remain the same.

To order, insert **V** into the valve ordering number.

Examples: 6LVV-DPX**V**A333P-C
6LVV-DPXW**V**A333P-BK

Tools and Maintenance Kits

Seat removal and installation tools are required to service Swagelok replaceable-seat diaphragm valves. For more information, see the *DP Series and DF Series Replaceable-Seat Diaphragm Valve* service instruction, MS-CRD-0223.

Seat Removal and Installation Tools

This tooling is designed specifically for Swagelok replaceable-seat diaphragm valves. Do not use on any other diaphragm-sealed valve.

- Diaphragms must be replaced with the seat; the kits below include the complete sealing system.
- Discard used seats; they cannot be reused.
- Tools are cleaned and packaged in accordance with Swagelok *Special Cleaning and Packaging (SC-11),* MS-06-63.

The seat removal tool easily removes the valve seat without risk of damage to the valve body.

The seat installation tool enables quick, positive installation of the replacement seat without direct contact to the seat material.

Valve Series	Tool Kit Ordering Numbers		
	Seat Installation and Removal	Seat Removal	Seat Installation
DP	MS-DPX-K2	MS-DPX-K4	MS-DPX-K3
DF	MS-DFX-K2	MS-DFX-K4	MS-DFX-K3

Seat Replacement Kits

Kits include a diaphragm and a support diaphragm, a seat carrier assembly, and instructions.

Seat Material	Basic Ordering Numbers	
	DP Series	DF Series
PFA	PFA-DPX-K1-	PFA-DFX-K1-
Polyimide	V-DPX-K1-	V-DFX-K1-

Kits are available in quantitites of 25, 50, 100, and 200. To order, add a quantity (25, 50, 100, or 200) to a basic kit ordering number.

Example: PFA-DPX-K1-**25**

To order replacement diaphragms only, see the Swagelok *Springless Diaphragm Valves for High Performance—DP Series* catalog, MS-01-165, or the Swagelok *High-Flow Springless Diaphgram Valves—DF Series* catalog, MS-02-24.

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.

Warranty Information

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

MS-02-470, RevD, March 2022