

Diaphragm Valves



DL and DS Series

- Packless, all-metal containment
- Working pressures from vacuum to 3500 psig (241 bar)
- Temperatures from -100 to 250°F (-73 to 121°C)

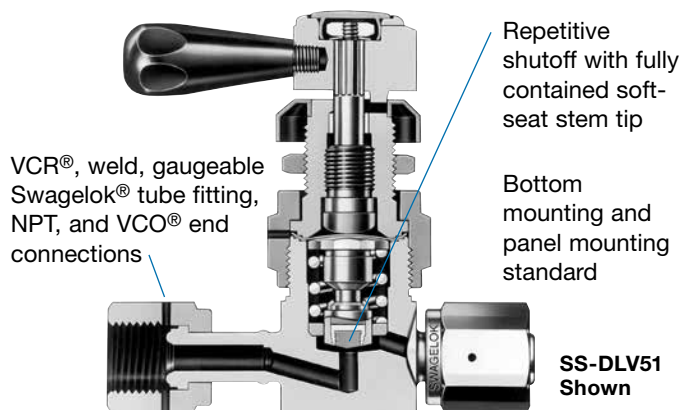
Features

DL Series

- DL series diaphragm valves require just one-quarter turn of the handle to actuate the valve from fully open to closed.
- Position indicator ring provides visual confirmation that the valve is fully open or closed.
- Splined handle and actuator prevent handle slippage and assure positive valve actuation.

DS Series

- DS series diaphragm valves require approximately one and one-half turns to operate from fully open to closed.
- Flow coefficient of 0.30 for high-flow requirements.



Technical Data

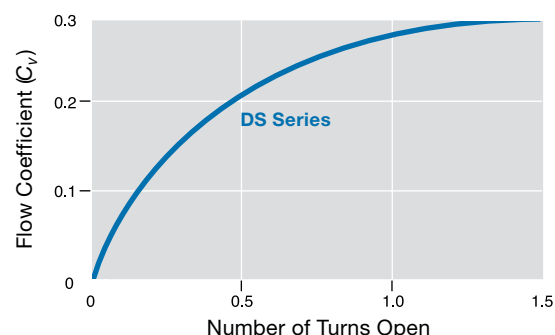
Series	Orifice in. (mm)	Flow Coefficient (C _v)	Pressure Rating at 70°F (20°C)	Differential Back Pressure ^① Max at 70°F (20°C)	Temperature Rating	Internal Volume ^②
DL	0.156 (4.0)	0.14	3500 psig (241 bar)	1500 psig (103 bar)	-100 to 250°F (-73 to 121°C)	0.18 in. ³ max (2.9 cm ³)
DS		0.30 ^③				

① A 17-7 PH® spring is available to increase the rating to 2500 psig (172 bar). To order, add -PS to the ordering number. Example: SS-DLS4-PS

② Determined using valves with Swagelok tube fitting end connections.

③ C_v for 6LV-DSBW4 valve is 0.25.

Flow Coefficient at Turns Open



Materials of Construction



Component	Material Grade/ASTM Specification
1 Set screw (DS series)	Alloy steel/ANSI 18.3
2 Rotary handle (DS series)	Aluminum 6061-T6 ^① /B211
Lever handle (DL series)	Aluminum 2024-T4 ^① /B211
Handle center (DL series)	Sintered 316 SS
Handle insert (DL series)	66 nylon/D4066
Nut (DL series)	18-8 SS
Indicator ring (DL Series)	316 SS/A240
3 Bonnet nut ^②	316 SS/A479
4 Panel mount nut	Sintered 316 SS
5 Bonnet	316 SS/A479
6 Wiper ring	Glass-filled PTFE
7 Actuator ^{③④}	416 SS/A582
8 Actuator button ^③	Brass 360/B16
9 Diaphragms (3)	316 SS/A240
10 Stem	316L SS/A479
11 Stem plug	
12 Stem container	
13 Stem insert	PCTFE
14 Spring	316 SS/A313
15 Gasket	PTFE-coated 316L SS/A240
16 Guide	Electropolished 316 SS/A240
17 Body	316L SS/A479
Swagelok tube fitting, integral tube butt weld, tube socket/tube butt weld, and VCO end connections	
VCR and NPT end connections	316 SS or 316L SS/A479

Pressure-Temperature Ratings

Temperature °F (°C)	Working Pressure psig (bar)
-100 (-73) to 100 (37)	3500 (241)
200 (93)	2950 (203)
250 (121)	2800 (192)

Wetted components listed in *italics*.

① Epoxy coated.

② Silver-plated threads.

③ Molybdenum disulfide-based lubricant.

④ Chrome-plated (DL series only).

Process Specifications

See Swagelok process specifications *Special Cleaning and Packaging (SC-11)* catalog, [MS-06-63](#), and *Ultra-high-Purity Process Specification (SC-01)* catalog, [MS-06-61](#), for details on processes, process controls, and process verification.

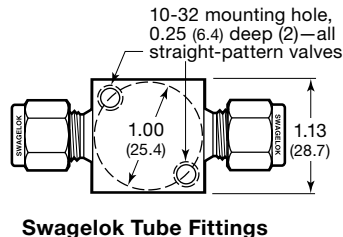
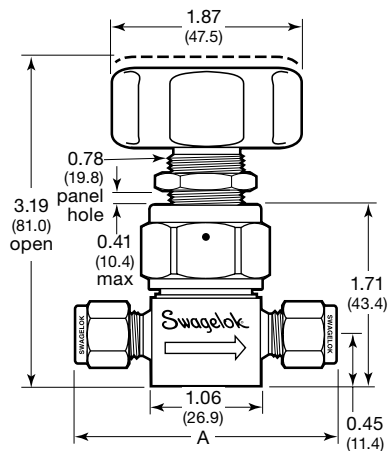
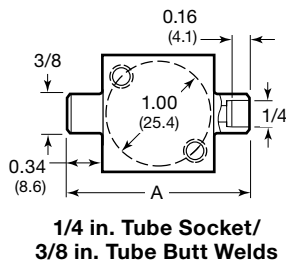
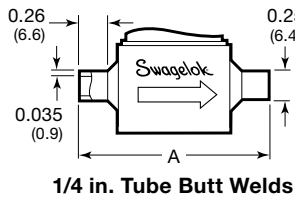
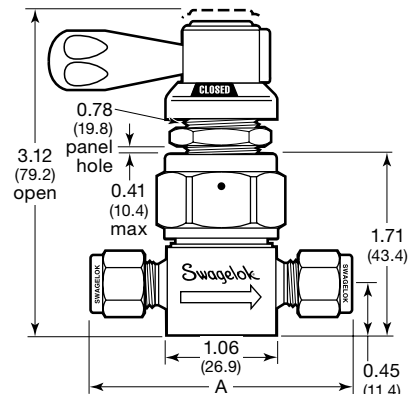
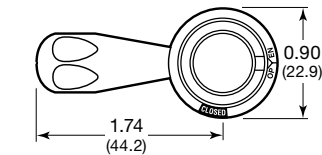
Cleaning	Assembly and Packaging	Process Designator	Process Specification	Wetted Surface Roughness (R_a)	Testing
Special cleaning with non-ozone-depleting chemicals	Performed in specially cleaned areas; valves are individually bagged	None	<i>Special Cleaning and Packaging (SC-11)</i>	20 μ in. (0.51 μ m) average, machine finished	Inboard helium leak tested to a rate of 4×10^{-9} std cm^3/s at the seat, envelope, and all seals
Ultra-high-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>Ultra-high-Purity Process Specification (SC-01)</i>	8 μ in. (0.20 μ m) average, machine finished and electropolished	

Ordering Information and Dimensions

Select an ordering number.

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

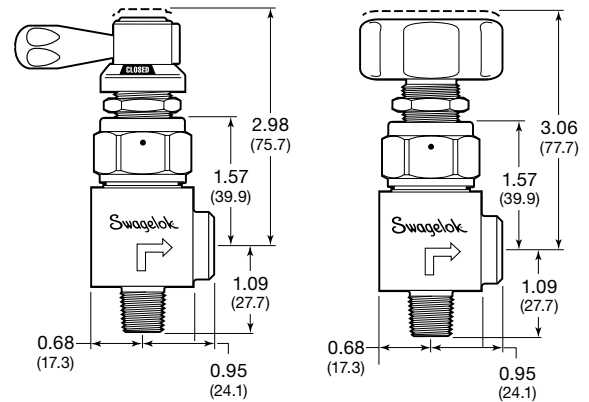
Straight Patterns



End Connections		DL Series Ordering Number	DS Series Ordering Number	A in. (mm)
Inlet/Outlet	Size			
Tube butt welds	1/4 in.	6LV-DLBW4	6LV-DSBW4	1.74 (44.2)
	3/8 in.	6LV-DLBW6	6LV-DSBW6	1.74 (44.2)
Tube socket and tube butt welds	1/4 and 3/8 in.	SS-DLTW4	SS-DSTW4	1.75 (44.4)
	3/8 and 1/2 in.	SS-DLTW6	SS-DSTW6	1.81 (46.0)
Swagelok tube fittings	1/4 in.	SS-DLS4	SS-DSS4	2.46 (62.5)
	3/8 in.	SS-DLS6	SS-DSS6	2.58 (65.5)
	6 mm	SS-DLS6MM	SS-DSS6MM	2.46 (62.5)
	8 mm	SS-DLS8MM	SS-DSS8MM	2.53 (64.3)
Female VCR fittings	1/4 in.	SS-DLV51	SS-DSV51	2.76 (70.1)
Female to male VCR fitting	1/4 in.	SS-DLV51-VCR4	SS-DSV51-VCR4	2.54 (64.5)
Male to female VCR fitting	1/4 in.	SS-DLVCR4V51	SS-DSVCR4V51	2.54 (64.5)
VCO O-ring fittings	1/4 in.	SS-DLVCO4	SS-DSVCO4	2.00 (50.8)
Male VCR fittings	1/4 in.	SS-DLVCR4	SS-DSVCR4	2.30 (58.4)

Dimensions shown with Swagelok tube fitting nuts finger-tight.

Angle Patterns



End Connections		DL Series Ordering Number	DS Series Ordering Number
Inlet/Outlet	Size		
Male/female NPT	1/4 in.	SS-DLM4F4A	SS-DSM4F4A

Options and Accessories

Optional Stem Tip Materials

To order a valve with an optional stem tip material, insert a stem tip material designator after the series designator in the ordering number.

Stem Tip Material	Designator
PTFE	T
Polyimide	V

Example: 6LV-DLTBW4

Stem Replacement Kit

A stem replacement kit includes a stem-tip assembly, spring, guide ring, and installation instructions.

Stem Tip Material	Stem Replacement Kit Ordering Number
PCTFE	6L-3AK-DS-KF
PTFE	6L-3AK-DS-T
Polyimide	6L-3AK-DS-VL


Diaphragm Seal Kits

A diaphragm seal kit includes three diaphragms (one set), one gasket, and installation instructions.

Ordering number: **SS-3DK-DS**

Oxygen Service Hazards

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

 **To increase service life, ensure proper valve performance, and prevent leakage, apply only as much torque as is required to achieve positive shutoff in DS series valves.**

Colored Handles

To order colored handles, add a color designator to the valve ordering number. Green is standard and requires no designator.

Handle Color	Designator
Black	-BK
Blue	-BL
Orange	-OR
Red	-RD
White	-WH
Yellow	-YW

Example: 6LV-DLBW4-**RD**

Ultrahigh-Purity Process Specification (SC-01)

Swagelok DL and DS series valves are processed in accordance with *Swagelok Special Cleaning and Packaging (SC-11)* catalog, [MS-06-63](#), to ensure compliance with product cleanliness requirements stated in ASTM G93 Level C.

To order a DL or DS series valve with special processing in accordance with *Swagelok Ultrahigh-Purity Process Specification (SC-01)* catalog, [MS-06-61](#), and with a surface finish of 8 $\mu\text{in.}$ (0.20 μm) R_a , add **-P** to the valve ordering number.

Example: 6LV-DLBW4-**P**

Multiport and Elbow Valves and Monoblock Manifolds

DL and DS series valves are available in multiport and elbow configurations and monoblock manifolds; see the *Swagelok 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. 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 Life-time 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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