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# 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)



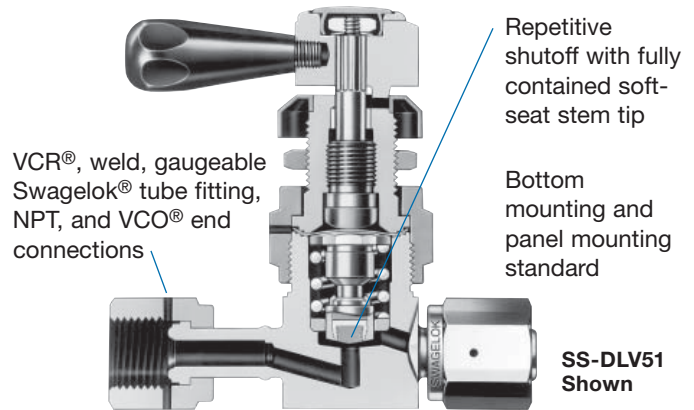
## Features

### 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

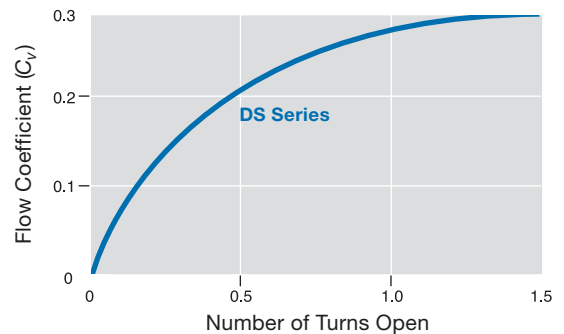
Series	Orifice in. (mm)	Flow Coefficient (C <sub>v</sub> )	Pressure Rating at 70°F (20°C)	Differential Back Pressure <sup>①</sup> Max at 70°F (20°C)	Temperature Rating	Internal Volume <sup>②</sup>
DL	0.156 (4.0)	0.14	3500 psig (241 bar)	1500 psig (103 bar)	-100 to 250°F (-73 to 121°C)	0.18 in. <sup>3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

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<sub>v</sub> 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 <sup>①</sup> /B211
Lever handle (DL series)	Aluminum 2024-T4 <sup>①</sup> /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 <sup>②</sup>	316 SS/A479
4 Panel mount nut	Sintered 316 SS
5 Bonnet	316 SS/A479
6 Wiper ring	Glass-filled PTFE
7 Actuator <sup>③④</sup>	416 SS/A582
8 Actuator button <sup>③</sup>	Brass 360/B16
9 Diaphragms (3)	316 SS/A240
10 Stem	316L SS/A479
11 Stem plug	
12 Stem container	
13 Stem insert	PCTFE/D1430
14 Spring	316 SS/A313
15 Gasket	PTFE-coated 316L SS/A240
16 Guide	Electropolished 316 SS/A479
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)*, *MS-06-63*, and *Ultrahigh-Purity Process Specification (SC-01)*, *MS-06-61*, for details on processes, process controls, and process verification.

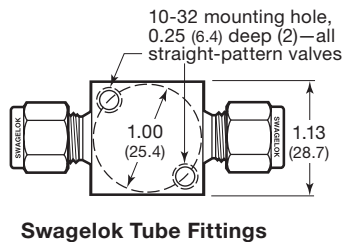
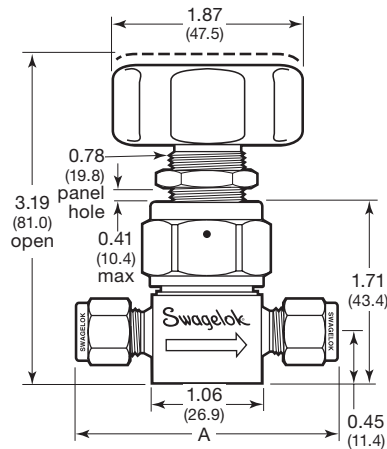
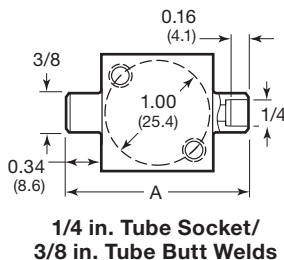
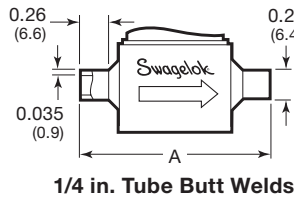
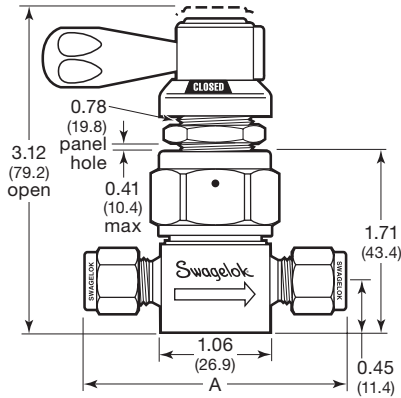
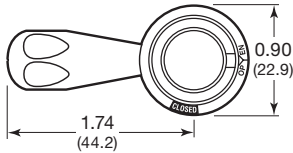
Cleaning	Assembly and Packaging	Process Designator	Process Specification	Wetted Surface Roughness ( $R_a$ )	Testing
Special cleaning with non-ozone-depleting chemicals	Performed in specially cleaned areas; valves are individually bagged	None	<i>Special Cleaning and Packaging (SC-11)</i>	20 $\mu\text{in.}$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

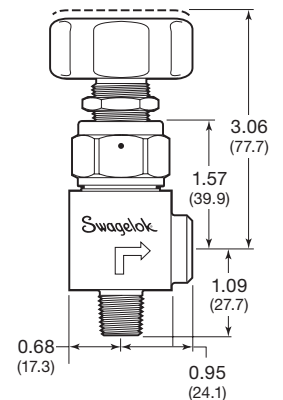
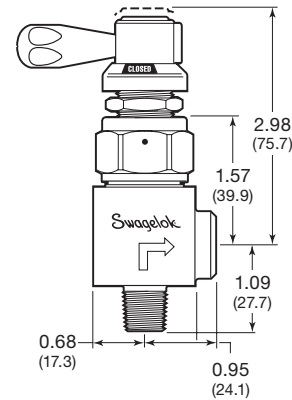
### Straight Patterns



Dimensions shown with Swagelok tube fitting nuts finger-tight.

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)

### 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, see the Swagelok *Oxygen System Safety* technical report, MS-06-13.

### 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)* 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)* and with a surface finish of 8  $\mu\text{in}$ . (0.20  $\mu\text{m}$ )  $R_a$ , add **-P** to the valve ordering number.

Example: 6LV-DLBW4-P

### Multiport and Elbow Valves and Multivalve Manifolds

DL and DS series valves are available in multiport and elbow configurations; see the Swagelok *Bellows- and Diaphragm-Sealed Multiport and Elbow Valves* catalog, MS-02-85. Multivalve manifolds are also available; contact your authorized Swagelok representative for more information.

#### 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.

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