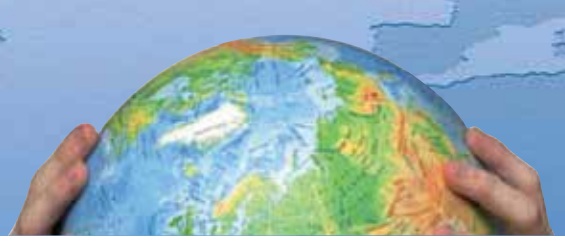
CARTEN-Fujikin Inc.
High Performance Valves & Process Flow Solutions

# SPDS SERIES

Ultra-High Purity Diaphragm Valves (SPDS)
Pneumatic Diaphragm Valves (SPDSA)
Dual Containment Diapgragm Valves (DCS)

# SPDS SERIES



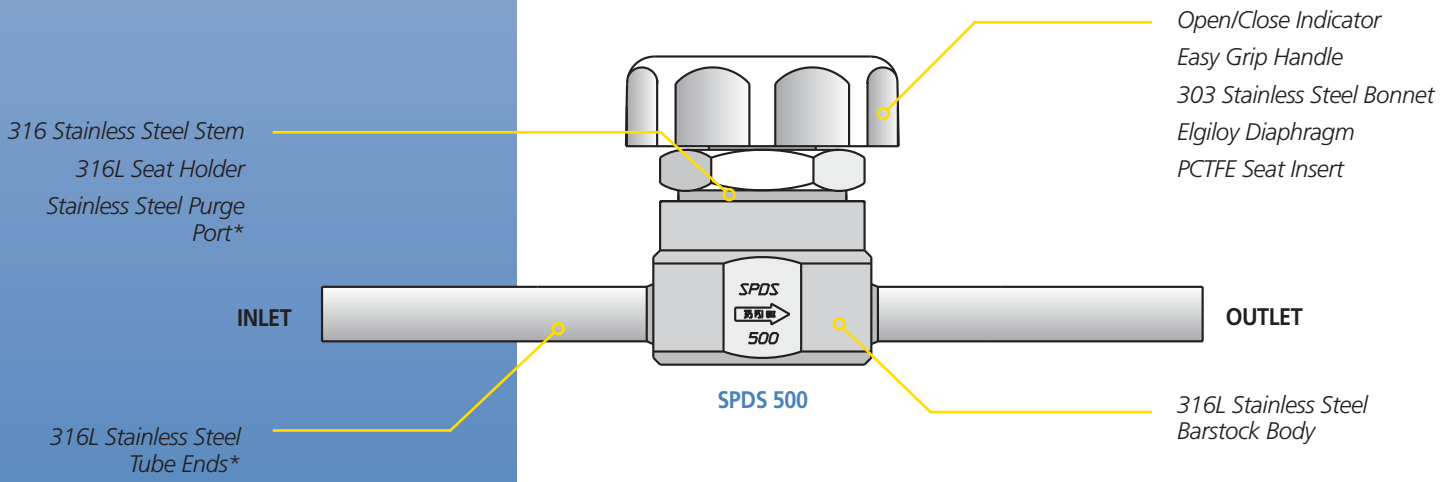
This SPDS (diaphragm design) valve series is intended for bulk gas distribution where containment, cleanliness and purity are of the utmost importance. Applications for this valve include:

- ***High purity gas system control valves***
- ***High purity gas control for point-of-use service***
- ***Superior containment and cleanliness for your most critical valve applications***
- ***Suitable for inert and most spec. gases***

## SPDS Series Product Features

- High Cv and Most Compact Design
- Ultra-High Purity Stainless Steel/PCTFE Gas Construction
- Elgiloy Tied-Diaphragm for Maximum Flow & High Life Cycle
- Springless, Packless Design
- No Internal Particle Shedding Components
- Electropolished Wetted Surfaces to 10 Ra Max (Optional surface finishes available)
- Industry Leading Design in Ultra-High Purity Gas Containment
- Purge Connections and Purge Valves are Integrated in Valve Body
- Assembled and Tested in Class 10 Cleanroom
- Valve Bodies and Tube Stubs are Serialized for Material Certification
- Inboard and Across the Seat Leak Tested with 100% Helium
- Cleaned For Ultra-High Purity Gas Service
- Purged and Final Packaged in Class 1 Cleanroom. Double-Bag Packaging with Ultra-High Purity $N_2$ Gas Environment
- Field Retrofit Manual or Air Actuated

## SPDS Construction Materials




SPDS 500

*See corresponding Code Charts for available end connections.

# SPDS SERIES

## SPDS Series Technical Data

| | | |
|---|---|---|
| MATERIAL OF CONSTRUCTION | Wetted Areas | Elgiloy, 316L Stainless Steel, PCTFE |
| | Non-Wetted Areas | 316L Stainless Steel, 303 Stainless Steel |
| MAXIMUM OPERATING PRESSURE | SPDS 250 & 375<br>SPDS 500, 750 & 1000 | Vacuum to 375 psig (25.8 bar) |
| MAXIMUM OPERATING TEMPERATURE | | -22F (-30ºC) to 180ºF (82ºC) |
| ORIFICE | SPDS 250 & 375<br>SPDS 500 & 750 | 0.250 in. (6.35 mm)<br>0.500 in. (12.7 mm) |
| FLOW COEFFICIENT ($C_V$) | SPDS 250 & 375<br>SPDS 500 & 755<br>SPDS 751 & 1000 | 0.41 & 0.64 respectively<br>2.81 & 3.15 respectively<br>7.0 & 9.0 respectively |
| HELIUM LEAK TEST | Inboard<br>Across the Seat<br>Outboard Pressure Test | $1 \times 10^{-11}$ Pa·m³/s ($1 \times 10^{-10}$ atm·cc (He) /s)<br>$1 \times 10^{-10}$ Pa·m³/s ($1 \times 10^{-9}$ atm·cc (He) /s)<br>$1 \times 10^{-7}$ Pa·m³/s ($1 \times 10^{-6}$ atm·cc (He) /s) |
| INTERNAL VOLUME | SPDS 250<br>SPDS 375<br>SPDS 500 & 755<br>SPDS 751 & 1000 | 0.124 in³ (2.032 cm³)<br>0.177 in³ (2.901 cm³)<br>0.816 in³ (13.374 cm³)<br>1.881 in³ (30.824 cm³) |
| CLEANLINESS | Assembled and tested in Class 10 cleanroom. Purged and final packaged in Class 1 cleanroom. Double-bag packaging (2 mil nylon inner bag, 6 mil polyethylene outer bag) with Ultra-High Purity $N_2$ gas environment. | |
| STANDARD FINISH | Electropolished to 10 Ra Max (0.25 Ra µm) on all wetted surfaces | |
| OPTIONS | Surface finish - 5 Ra, 20 Ra<br>Panel Mounting<br>Panel Mounting Angle valve (PMA)<br>Air-Actuated (SPDS 250, 375, 500 & 755)<br>Particle, moisture, THC and $O_2$ testing<br>SEM and ESCA testing, AES analysis | Material: Vespel® seat<br>Handle color (Std. white)<br>1/4 Turn handles (SPDS 250 & 375 only)<br>Fitting connections available for up to 1.00" size – inlet/outlet<br>JIS tube ends and tube length |

Specifications are subject to change without notice. Vespel® is a registered trademark of DuPont Company.

## SPDS Series Technical Dimensions

| Size | A | B | C | D | E | F | G | H | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SPDS 250 | Ø .250 (6.35mm) | 0.035 (.88mm) | 0.500 (12.7mm) | 2.22 (56.4mm) | 7.35 (186.6mm) | 2.00 (50.8mm) | 2.43 (61.7mm) | 4.86 (123.4mm) | 1.27 (32.3mm) | 3.04 (77.2mm) | 1.96 (49.7mm) |
| SPDS 375 | Ø .375 (9.5mm) | 0.035 (.88mm) | 0.500 (12.7mm) | 2.21 (56.4mm) | 7.31 (185.6mm) | 2.00 (50.8mm) | 2.37 (60.2mm) | 4.75 (120.3mm) | 1.27 (32.3mm) | 3.04 (77.2mm) | 1.96 (49.7mm) |
| SPDS 525 | Ø .500 (12.7mm) | 0.049 (1.2mm) | 0.500 (12.7mm) | 2.22 (56.4mm) | 7.35 (186.6mm) | 2.00 (50.8mm) | 2.42 (61.7mm) | 4.84 (122.9mm) | 1.27 (32.3mm) | 3.04 (77.2mm) | 1.96 (49.7mm) |
| SPDS 500 | Ø .500 (12.7mm) | 0.049 (1.2mm) | 0.463 (11.7mm) | 2.83 (71.8mm) | 8.08 (205.2mm) | 2.50 (63.5mm) | 2.50 (63.5mm) | 3.75 (95.2mm) | 2.00 (50.8mm) | 3.04 (77.2mm) | 2.01 (51.1mm) |
| SPDS 755 | Ø .750 (19.0mm) | 0.065 (1.6mm) | 0.500 (12.7mm) | 2.83 (71.8mm) | 8.00 (203.2mm) | 2.50 (63.5mm) | 2.50 (63.5mm) | 3.75 (95.2mm) | 1.91 (48.5mm) | 4.04 (102.6mm) | 2.01 (51.1mm) |

## SPDS 1000 Series Technical Dimensions

| Size | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| SPDS 751 | Ø .75 (19.0mm) | 0.065 (1.6mm) | 0.75 (19.0mm) | 4.03 (102.7mm) | 10.73 (272.5mm) | 3.81 (96.7mm) |
| SPDS 1000 | Ø 1.00 (25.4mm) | 0.065 (1.6mm) | 0.75 (19.0mm) | 3.06 (77.7mm) | 8.79 (223.2mm) | 3.81 (96.7mm) |

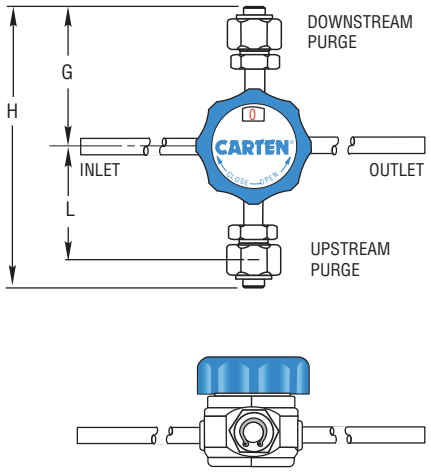
## SPDS T Series Technical Dimensions

| Size | A | B | C | D | E | F | G | H | J | K | L | M | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SPDST 250x250 | Ø .250 (6.35mm) | 0.035 (.88mm) | Ø .250 (6.35mm) | 0.035 (.88mm) | 4.50 (114.3mm) | 2.00 (50.8mm) | 3.69 (93.7mm) | 7.34 (186.4mm) | 1.27 (32.2mm) | 3.04 (77.2mm) | 0.500 (12.7mm) | 2.22 (56.4mm) | 1.95 (49.3mm) |
| SPDST 375x375 | Ø .375 (9.5mm) | 0.035 (.88mm) | Ø .375 (9.5mm) | 0.035 (.88mm) | 4.50 (114.3mm) | 2.00 (50.8mm) | 3.69 (93.7mm) | 7.34 (186.4mm) | 1.27 (32.2mm) | 3.04 (77.2mm) | 0.500 (12.7mm) | 2.22 (56.4mm) | 1.95 (49.5mm) |
| SPDST 525x250 | Ø .500 (12.7mm) | 0.049 (1.2mm) | Ø .250 (6.35mm) | 0.035 (.88mm) | 4.50 (114.3mm) | 2.00 (50.8mm) | 4.10 (104.1mm) | 7.34 (186.4mm) | 1.27 (32.2mm) | 3.04 (77.2mm) | 0.500 (12.7mm) | 2.22 (56.4mm) | 1.95 (49.5mm) |
| SPDST 500x375 | Ø .500 (12.7mm) | 0.049 (1.2mm) | Ø .375 (9.5mm) | 0.035 (.88mm) | 6.81 (172.9mm) | 2.50 (63.5mm) | 4.03 (102.3mm) | 8.07 (204.9mm) | 2.00 (50.8mm) | 3.04 (77.2mm) | 0.463 (11.8mm) | 2.83 (71.8mm) | 2.31 (58.6mm) |
| SPDST 500x500 | Ø .500 (12.7mm) | 0.049 (1.2mm) | Ø .500 (12.7mm) | 0.049 (1.2mm) | 6.81 (172.9mm) | 2.50 (63.5mm) | 4.03 (102.3mm) | 8.07 (204.9mm) | 2.00 (50.8mm) | 3.04 (77.2mm) | 0.463 (11.8mm) | 2.83 (71.8mm) | 2.31 (58.6mm) |
| SPDST 755x500 | Ø .750 (19.0mm) | 0.065 (1.6mm) | Ø .500 (12.7mm) | 0.049 (1.2mm) | 6.81 (172.9mm) | 2.50 (63.5mm) | 4.03 (102.3mm) | 8.07 (204.9mm) | 2.00 (50.8mm) | 3.04 (77.2mm) | 0.463 (11.8mm) | 2.83 (71.8mm) | 2.31 (58.6mm) |

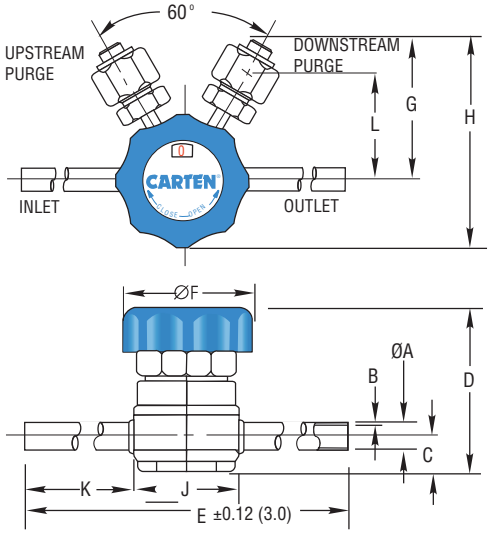
# SPDS SERIES

## SPDS and SPDST Series Typical Valve Dimensions (1/4" to 1")

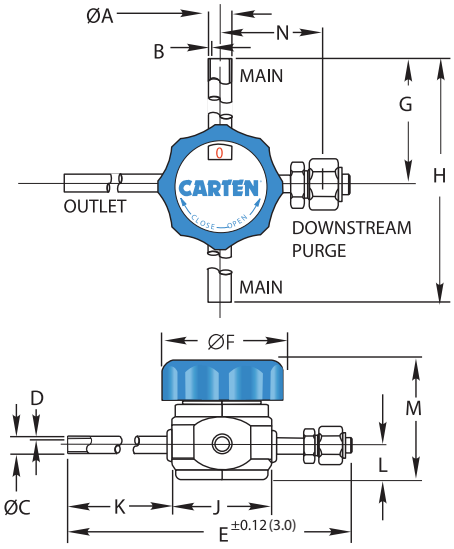
### SPDS 250 & 375



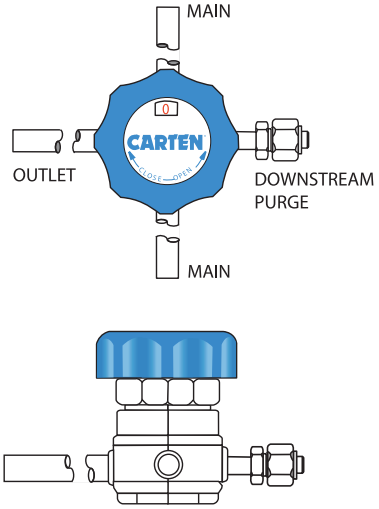

### SPDS 500 & 755



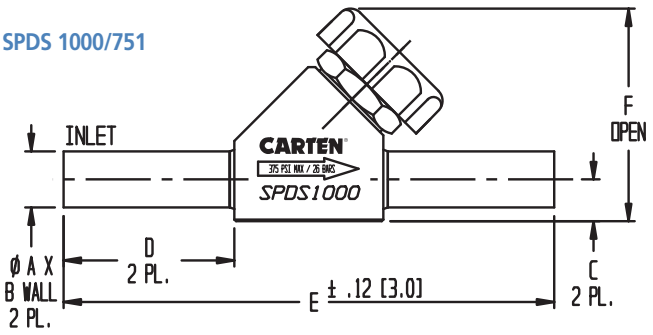

### SPDST 250 & 375




### SPDST 500 & 755

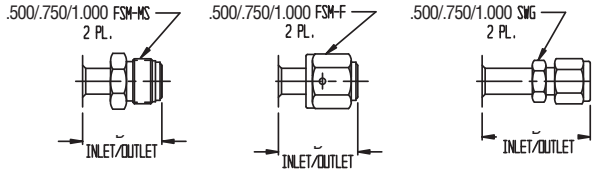



### SPDS 1000/751




### OPTIONAL VALVE END CONNECTIONS

AVAILABLE ON SPDS 1/2" -1" BODY SIZES




| Size | Length | | |
|---|---|---|---|
| | FSM-M | FSM-F | SWG |
| 500 | 1.54 (39.1mm) | 1.54 (39.1mm) | 2.10 (53.3mm) |
| 750 | 2.04 (51.8mm) | 2.04 (51.8mm) | 2.03 (51.6mm) |
| 1000 | 2.36 (59.9mm) | 2.36 (59.9mm) | 2.49 (63.2mm) |

NOTE 1: All tolerances are ±0.06 in. (±1.52mm) unless otherwise stated;
NOTE 2: Dimensional drawings shown are for reference only. Please contact CARTEN® for customer drawings.

# SPDSA SERIES

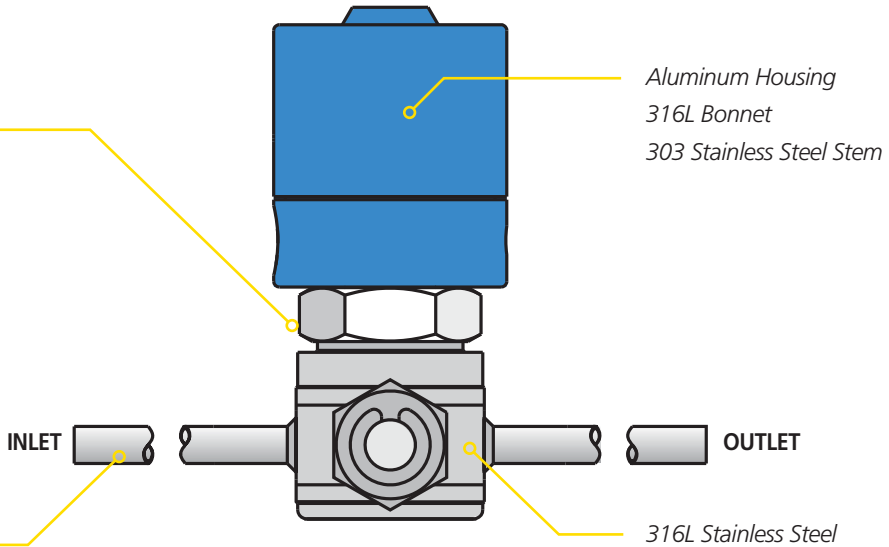
This SPDSA Valve Series is designed for high performance gas and chemical distribution systems combined with the lowest overall operating costs, make this valve an excellent consideration for:

- ***High purity gas distribution system control***
- ***High purity gas valves for point-of-use service***
- ***Superior containment and cleanliness for your most critical valve applications***
- ***Suitable for inert and most spec. gases***

## SPDSA Series Product Features

- Diaphragm Design for Ultra-High Purity Service and High Cycle Life
- High Purity Stainless/PCTFE Gas Construction
- Elgiloy Tied-Diaphragm for Maximum Flow & High Life Cycle
- Springless, Packless Design
- No Internal Particle Shedding Components
- Electropolished Wetted Surfaces to 10 Ra Max (Optional surface finishes available)
- Industry Leading Design for Ultra-High Purity Gas Containment
- Purge Connections and Purge Valves are Integrated in Valve Body
- Assembled and Tested in Class 10 Cleanroom
- Valve Bodies and Tube Stubs are Serialized for Material Certification
- Inboard and Across the Seat Leak Tested with 100% Helium
- Cleaned For Ultra-High Purity Gas Service
- Purged and Final Packaged in Class 1 Cleanroom. Double-Bag Packaging with Ultra-High Purity $N_2$ Gas Environment
- Field Retrofit Manual or Air Actuated

## SPDSA Construction Materials




SPDSA 250

*See corresponding Code Charts for available end connections.

# SPDSA Series Technical Data

| | | | | |
|---|---|---|---|---|
| MATERIAL OF CONSTRUCTION | Wetted Areas | | 316L Stainless Steel, Elgiloy Nickel Alloy, PCTFE | |
| | Non-Wetted Areas | | 316L Stainless Steel, 303 Stainless Steel | |
| MAXIMUM OPERATING PRESSURE | SPDSA250/375/525<br>SPDSA500/755 | | Vacuum to 250 psig (0-17.2 bar) | |
| MAXIMUM OPERATING TEMPERATURE | PCTFE Seat<br>Vespel® Seat | | -22F (-30°C) to 180°F (82°C)<br>302°F (150°C) | |
| FLOW COEFFICIENT ($C_V$)<br>AND ACTUATOR PRESSURE | Model | Size | Cv | Act. Pressure |
| | SPDSA250<br>SPDSA375<br>SPDSA525<br>SPDSA500<br>SPDSA755 | 1/4"<br>3/8"<br>1/2"<br>1/2"<br>3/4" | 0.41<br>0.64<br>0.68<br>2.81<br>3.15 | 60-80psig<br>(4.1-5.5 bar)<br>60-80psig<br>90-100psig<br>(6.2-6.9 bar) |
| HELIUM LEAK TEST | Inboard<br>Across the Seat<br>Outboard Pressure Test | | $1 \times 10^{-11}$ Pa·m³/s ($1 \times 10^{-10}$ atm·cc (He) /s)<br>$1 \times 10^{-10}$ Pa·m³/s ($1 \times 10^{-9}$ atm·cc (He) /s)<br>$1 \times 10^{-7}$ Pa·m³/s ($1 \times 10^{-6}$ atm·cc (He) /s) | |
| CLEANLINESS AND PACKAGING | Assembled and Tested in Class 10 Cleanroom. Purged and Final Packaged in Class 1 Cleanroom. Double-bag packaging (2 mil nylon inner bag, 6 mil polyethylene outer bag) with Ultra-High Purity $N_2$ gas environment. | | | |
| STANDARD FINISH | Electropolished to 10 Ra Max (0.25 µm) on all wetted surfaces | | | |
| OPTIONS | Normally open, normally closed, dual acting<br>Limit/Proximity Switch<br>Surface finish – 5 Ra optional<br>Testing: Particle, moisture, THC, O2, SEM, ESCA, and AES | | Purge fitting type and location<br>Fitting connections available for inlet/outlet<br>JIS tube stubs and tube length | |

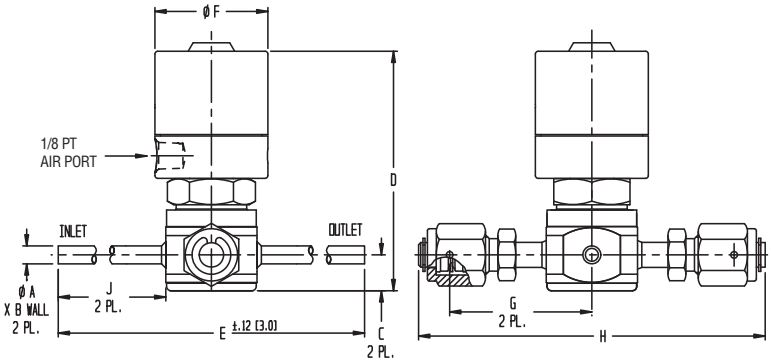
Specifications are subject to change without notice. *Vespel® is a registered trademark of Dupont Company.

# SPDSA Series Technical Dimensions

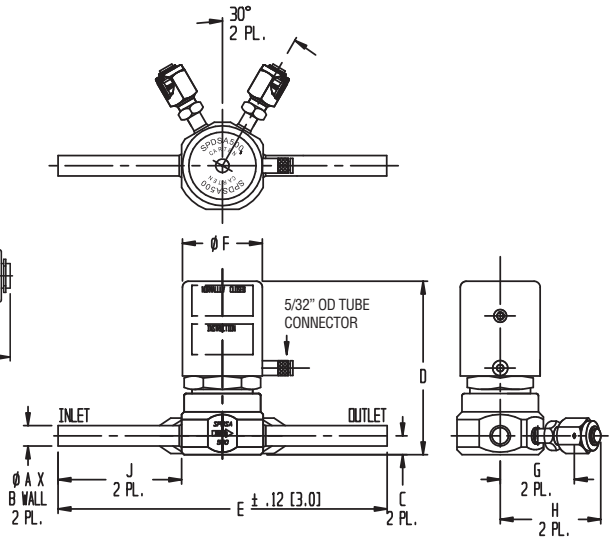
| Size | A | B | C | D | E | F | G | H | J |
|---|---|---|---|---|---|---|---|---|---|
| SPDSA 250-NC | Ø .25 (6.35mm) | 0.035 (.88mm) | 0.50 (12.7mm) | 3.34 (84.8mm) | 7.37 (187.1mm) | 1.57 (39.8mm) | 1.94 (49.2mm) | 4.83 (122.6mm) | 3.05 (77.4mm) |
| SPDSA 250-NO | Ø .25 (6.35mm) | 0.035 (.88mm) | 0.50 (12.7mm) | 3.49 (88.6mm) | 7.37 (187.1mm) | 1.57 (39.8mm) | 1.94 (49.2mm) | 4.83 (122.6mm) | 3.05 (77.4mm) |
| SPDSA 375-NC | Ø 3.75 (.5mm) | 0.035 (.88mm) | 0.50 (12.7mm) | 3.34 (84.8mm) | 7.35 (186.6mm) | 1.57 (39.8mm) | 1.96 (49.7mm) | 4.83 (122.6mm) | 3.04 (77.2mm) |
| SPDSA 375-NO | Ø 3.75 (.5mm) | 0.035 (.88mm) | 0.50 (12.7mm) | 3.49 (88.6mm) | 7.35 (186.6mm) | 1.57 (39.8mm) | 1.96 (49.7mm) | 4.83 (122.6mm) | 3.04 (77.2mm) |
| SPDSA 525-NC | Ø .50 (12.7mm) | 0.049 (1.2mm) | 0.50 (12.7mm) | 3.34 (84.8mm) | 7.37 (187.1mm) | 1.57 (39.8mm) | 1.94 (49.2mm) | 4.83 (122.6mm) | 3.05 (77.4mm) |
| SPDSA 525-NO | Ø .50 (12.7mm) | 0.049 (1.2mm) | 0.50 (12.7mm) | 3.49 (88.6mm) | 7.37 (187.1mm) | 1.57 (39.8mm) | 1.94 (49.2mm) | 4.83 (122.6mm) | 3.05 (77.4mm) |
| SPDSA 500-NC | Ø .50 (12.7mm) | 0.049 (1.2mm) | 0.46 (11.6mm) | 4.26 (108.2mm) | 8.08 (205.2mm) | 1.96 (49.7mm) | 2.01 (51.0mm) | 2.50 (63.5mm) | 3.04 (77.2mm) |
| SPDSA 500-NO | Ø .50 (12.7mm) | 0.049 (1.2mm) | 0.46 (11.6mm) | 4.26 (108.2mm) | 8.08 (205.2mm) | 1.96 (49.7mm) | 2.01 (51.0mm) | 2.50 (63.5mm) | 3.04 (77.2mm) |
| SPDSA 755-NC | Ø .75 (19.0mm) | 0.065 (1.6mm) | 0.46 (11.6mm) | 4.26 (108.2mm) | 8.00 (203.2mm) | 1.96 (49.7mm) | 2.01 (51.0mm) | 2.50 (63.5mm) | 3.04 (77.2mm) |
| SPDSA 755-NO | Ø .75 (19.0mm) | 0.065 (1.6mm) | 0.46 (11.6mm) | 4.26 (108.2mm) | 8.00 (203.2mm) | 1.96 (49.7mm) | 2.01 (51.0mm) | 2.50 (63.5mm) | 3.04 (77.2mm) |

# SPDSA Series Typical Valve Dimensions

### SPDSA 250, 375 & 525




### SPDSA 500 & 755




NOTE 1: All tolerances are ±0.06 in. (±1.52mm) unless otherwise stated;
NOTE 2: Dimensional drawings shown are for reference only. Please contact CARTEN® for customer drawings.

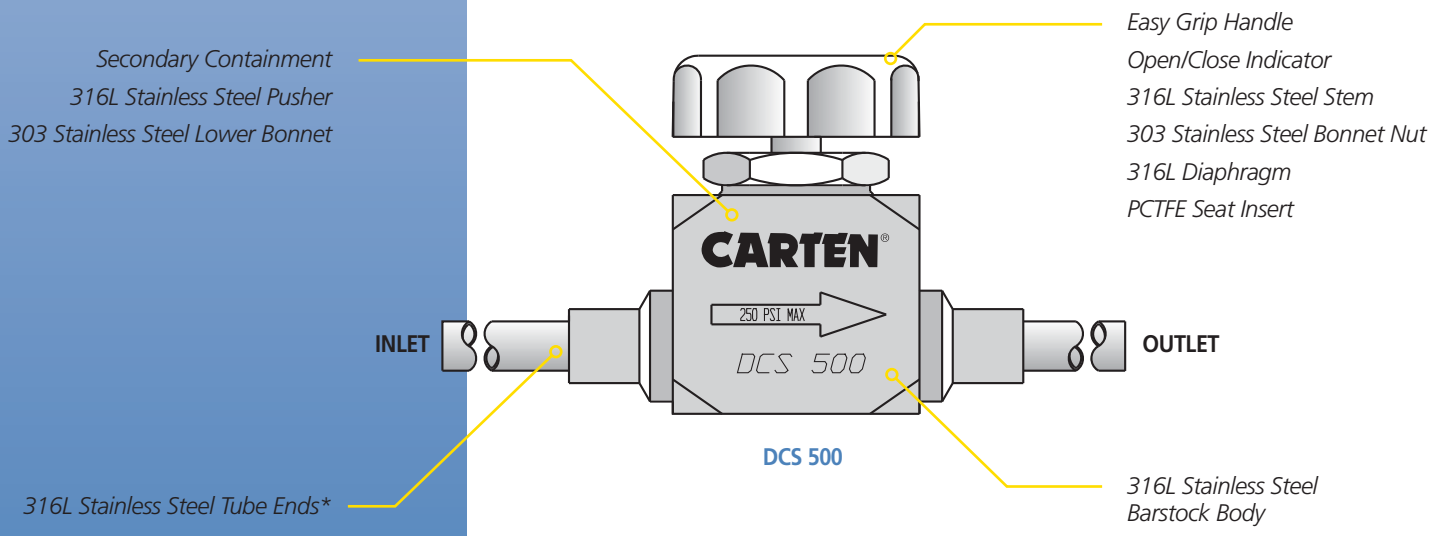
# DCS SERIES

This DCS (diaphragm design) valve series is intended for bulk gas or solvent double containment distribution service where cleanliness and purity are of the utmost importance. These springless, packless, diaphragm valves control the passage of gas or solvent through the primary tube while providing a complete secondary containment flow path. The secondary flow path remains open regardless of the primary passage being opened or closed.

## DCS Series Product Features

- Dual Containment Directly Through the Valve
- Diaphragm Design for Ultra-High Purity and Long Cycle Life
- High Purity Stainless/PCTFE Gas Construction
- Elgiloy Tied-Diaphragm for Maximum Flow & High Life Cycle
- Springless, Packless Design
- No Internal Particle Shedding Components
- Electropolished Wetted Surfaces to 10 Ra Max (Optional surface finishes available)
- Industry Leading Design for Ultra-High Purity Gas Containment
- Purge Connections and Purge Valves are Integrated in Valve Body
- Assembled and Tested in Class 10 Cleanroom
- Valve Bodies and Tube Stubs are Serialized for Material Certification
- Inboard and Across the Seat Leak Tested with 100% Helium
- Cleaned For Ultra-High Purity Gas Service
- Purged and Final Packaged in Class 1 Cleanroom. Double-Bag Packaging with Ultra-High Purity $N_2$ Gas Environment
- Field Retrofit Manual or Air Actuated

## DCS Construction Materials




DCS 500

*See corresponding Code Charts for available end connections.
U.S. Patent # 4,867,201

# DCS Series Technical Data

| | | |
|---|---|---|
| MATERIAL OF CONSTRUCTION | Primary Wetted Areas | 316L Stainless Steel, PCTFE |
| | Secondary Non-Wetted Areas | 316L Stainless Steel, 303 Stainless Steel |
| MAXIMUM OPERATING PRESSURE | Primary and Secondary | Vacuum to 250 psig (0-17.2 bar) (See Application Note) |
| MAXIMUM OPERATING TEMPERATURE | PCTFE Seat<br>Vespel® Seat | -22° F (-30° C) to 180°F (82°C)<br>302°F (150°C) |
| ORIFICE | DCS 250 & 375<br>DCS 500 & 750 | 0.250 in. (6.35 mm)<br>0.437 in. (10.96 mm) |
| FLOW COEFFICIENT ($C_V$) | DCS 250<br>DCS 375<br>DCS 500<br>DCS 750 | 0.41<br>0.41<br>1.2<br>1.2 |
| HELIUM LEAK TEST | Inboard<br>Across the Seat<br>Outboard Pressure Test | 1 x $10^{-11}$ Pa·m³/s (1 x $10^{-10}$ atm·cc (He) /s)<br>1 x $10^{-10}$ Pa·m³/s (1 x $10^{-9}$ atm·cc (He) /s)<br>1 x $10^{-7}$ Pa·m³/s (1 x $10^{-6}$ atm·cc (He) /s) |
| CLEANLINESS AND PACKAGING | Assembled and tested in Class 10 Cleanroom. Purged and Final Packaged in Class 1 Cleanroom. Double-bag packaging (2 mil nylon inner bag, 6 mil polyethylene outer bag) with Ultra-High Purity $N_2$ gas environment. | |
| STANDARD FINISH | Electropolished to 10 Ra Max (0.25 µm) on all wetted surfaces | |
| OPTIONS | Surface finish – 5 Ra<br>Testing: Particle, moisture, THC and $O_2$<br>SEM and ESCA testing, AES analysis<br>Handwheel color | |

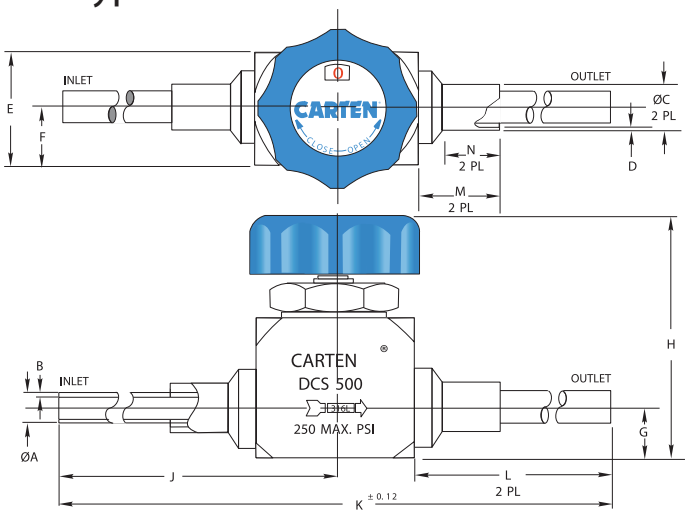
Specifications are subject to change without notice. *Vespel® is a registered trademark of Dupont Company.

# DCS Series Technical Dimensions

| Size | A | B | C | D | E | F | G | H | J | K | L | M | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DCS 250/500 | 0.250 | 0.035 | 0.500 | 0.049 | 1.75 (44.5mm) | 0.85 (22.2mm) | 0.625 (15.8mm) | 3.08 (78.2mm) | 4.00 (101.6mm) | 8.00 (203.2mm) | 3.00 (76.2mm) | 1.11 (28.1mm) | 0.75 (19.05mm) |
| DCS 375/625 | 0.375 | 0.035 | 0.625 | 0.049 | 1.75 (44.5mm) | 0.85 (22.2mm) | 0.625 (15.8mm) | 3.08 (78.2mm) | 4.00 (101.6mm) | 8.00 (203.2mm) | 3.00 (76.2mm) | 1.11 (28.1mm) | 0.75 (19.05mm) |
| DCS 500/750 | 0.500 | 0.049 | 0.750 | 0.065 | 2.00 (50.8mm) | 1.000 (25.4mm) | 0.687 (17.4mm) | 3.52 (89.4mm) | 4.25 (107.9mm) | 8.50 (215.9mm) | 3.00 (76.2mm) | 1.11 (28.1mm) | 0.75 (19.05mm) |
| DCS 750/1000 | 0.750 | 0.065 | 1.000 | 0.065 | 2.00 (50.8mm) | 1.000 (25.4mm) | 0.687 (17.4mm) | 3.52 (89.4mm) | 4.25 (107.9mm) | 8.50 (215.9mm) | 3.00 (76.2mm) | 1.11 (28.1mm) | 0.75 (19.05mm) |

# DCS Series Typical Valve Dimensions

DCS 250/500
DCS 375/625
DCS 500/750
DCS 750/1000




Application Note (DCS Series):
A typical application utilizes a vacuum on the secondary line. However, the secondary line pressure can exceed the primary if desired. As the secondary pressure increases to more than 60 psi over the primary (for DCS 250) or 20 psi (for DCS 500), reduced primary flow rate could result. Increasing secondary pressure to more than 110 psi over the primary (for DCS 250) or 50 psi (for DCS 500), the flow in the primary will be essentially shut off.

NOTE 1: All tolerances are ±0.06 in. (±1.52mm) unless otherwise stated;
NOTE 2: Dimensional drawings shown are for reference only. Please contact CARTEN® for customer drawings.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