Swagelok® Ball Valve Actuation Options

- Rack and pinion pneumatic actuators, solenoid valves, and limit switches
- ISO 5211-compliant pneumatic actuators, solenoid valves, limit switches, and position sensors
- Complete actuated assemblies and kits for field assembly available

Swagelok

Contents

Swagelok Ball Valve Actuation Options

Swagelok offers a range of accessories to enhance instrumentation and process ball valve performance and control, including pneumatic actuators, solenoid valves, limit switches, and position sensors.

- **Pneumatic actuators** are available in both our standard 130 and 150 series rack and pinion models and in our ISO 5211-compliant models.
- **Solenoid valves** attach to the actuator to create an electropneumatically actuated assembly.
- **Limit switches** indicate actuator position by means of an electrical signal.
- **Position sensors** provide visual status of a valve.

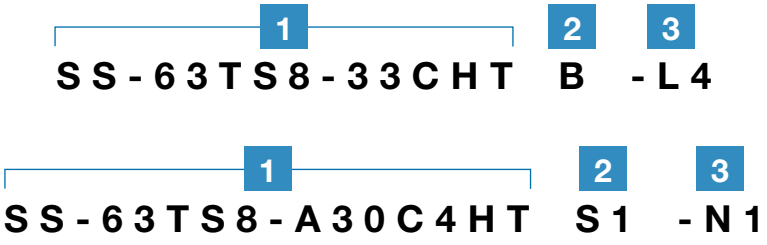
Factory assemblies and kits for field assembly are available.

Regional Ordering Information

Pneumatic actuators and position sensors in this product catalog are available to customers worldwide. Limit switches and solenoid valves meet voltage and approval requirements associated with the North American region. A wide variety of limit switches and solenoid valves to meet the voltage and approval requirements of your region are available. For the products you need please contact your authorized Swagelok sales and service representative.

Ordering Multiple Ball Valve Actuation Options

Swagelok ball valves are available with multiple actuation options to meet specific system requirements. Add designators in the order shown. Contact your authorized Swagelok representative with any questions.



1 **Valve-Actuator-Solenoid Operation** (pages 6 and 13)

2 **Solenoid Voltage** (pages 6 and 13)

3 **Limit Switch or Position Sensor** (limit switches—pages 7, 8, and 14; position sensor—page 16)

⚠ **Caution: Actuated assemblies must be properly aligned and supported. Improper alignment or inadequate support of the actuated assembly may result in leakage or premature valve failure.**

Swagelok 130 and 150 Series Pneumatic Actuators

Features

- 90° actuation
  - 2-way (straight and angle) flow paths
  - 3-way (L and H special flow paths)
  - 4-way flow paths
- 180° actuation for other 3-way flow paths
- Spring-return and double-acting models available
- Special service actuators
  - High temperature
  - Low temperature
  - Nonfluorocarbon
- Low-pressure spring-return actuators for lower-pressure air are available. Contact your authorized Swagelok representative.

Swagelok 133 Series Pneumatic Actuator
(spring-return model shown)

Swagelok Ball Valve
(60 series valve shown)

Technical Data

Service Ratings

Actuator Service	Temperature Range °F (°C)	Maximum Actuator Pressure psig (bar)	
		At 100°F (37°C)	At Maximum Temperature
Standard	–20 to 200 (–28 to 93)	200 (13.7)	165 (11.3)
High temperature	0 to 400 (–17 to 204)		100 (6.8)
Low temperature	–40 to 200 (–40 to 93)		165 (11.3)
Nonfluorocarbon	–20 to 200 (–28 to 93)		165 (11.3)

For minimum required actuator operating pressures, see individual Swagelok ball valve product catalogs.

Air Displacement

Actuator Model	Volume in.^{3} (cm^3)
90° Actuation	
131	1.5 (24.6)
133	4.9 (80.3)
135	15.5 (254)
180° Actuation	
151	3.0 (49.2)
153	9.6 (157)
155	30.5 (500)

Approximate Weight

Actuator and mounting kit

Actuator Model	Weight lb (kg)
Spring Return	
131, 151	1.5 (0.7)
133, 153	3.8 (1.7)
135, 155	12.5 (5.7)
Double Acting	
131, 151	1.3 (0.6)
133, 153	2.5 (1.1)
135, 155	9.7 (4.4)

Swagelok Pneumatic Actuators

Materials of Construction

Component	Actuator Service			
	Standard	High Temperature	Low Temperature	Non-fluorocarbon
	Material			
Body, cap	Anodized cast aluminum alloy with black urethane exterior finish			
Piston	Cast aluminum alloy			
Output shaft	Hardened 416 SS			
Shaft bushing(s) (131, 133, 151, and 153 series—2; 135 and 155 series—1)	Bronze	PEEK	Bronze	PEEK
O-rings	Buna N	Fluorocarbon FKM	Buna C	Ethylene propylene
Spring	Zinc phosphate-plated alloy steel			
Internal screw	131, 133, 151, and 153 series—cadmium-plated steel; 135 and 155 series—steel			
Cap screws	Cadmium-plated steel			
Retaining rings	Cadmium- or zinc-plated steel			
Roll pin (131, 133, 151, and 153 series)	420 SS			
Wall mount bracket	Stainless steel			
Lubricant	Multipurpose hydrocarbon	PTFE-based	Hydrocarbon-based	Silicone-based

Ordering Information

Swagelok pneumatic actuators are available factory assembled to valves or in kits for field assembly. See the Swagelok ball valve catalogs for complete ordering instructions, including suggested actuators and necessary mounting components.

- *One-Piece Instrumentation Ball Valves—40G Series and 40 Series,* MS-02-331
- *Ball Valves, General Purpose and Special Application—60 Series,* MS-01-146
- *Trunnion Ball Valves—83 and H83 Series,* MS-01-166
- *Swagelok Alternative Fuel Service (AFS) Ball Valves For High-Pressure, High-Flow Applications,* MS-02-303
- *Multipurpose Ball Valves—SK Series,* MS-02-345

Solenoid Valves for Swagelok 130 and 150 Series Pneumatic Actuators

Solenoid valves for Swagelok 130 and 150 series actuators are manufactured by MAC Valves.

Features

Available for use with:

- Spring-return pneumatic actuators (3-way, 2-position)
- Double-acting pneumatic actuators (4-way, 2-position).

Technical Data

For additional technical information, see MAC® 900 series (standard solenoid) and MAC 200 series (explosion-proof solenoid) product literature.

Actuation Pressure

25① to 150 psig (1.7 to 10.3 bar)

① 25 psig (1.7 bar) is the minimum requirement for the solenoid valve. See valve product catalogs for minimum actuator pressure requirements.

Temperature Range

0 to 120°F (–17 to 48°C)

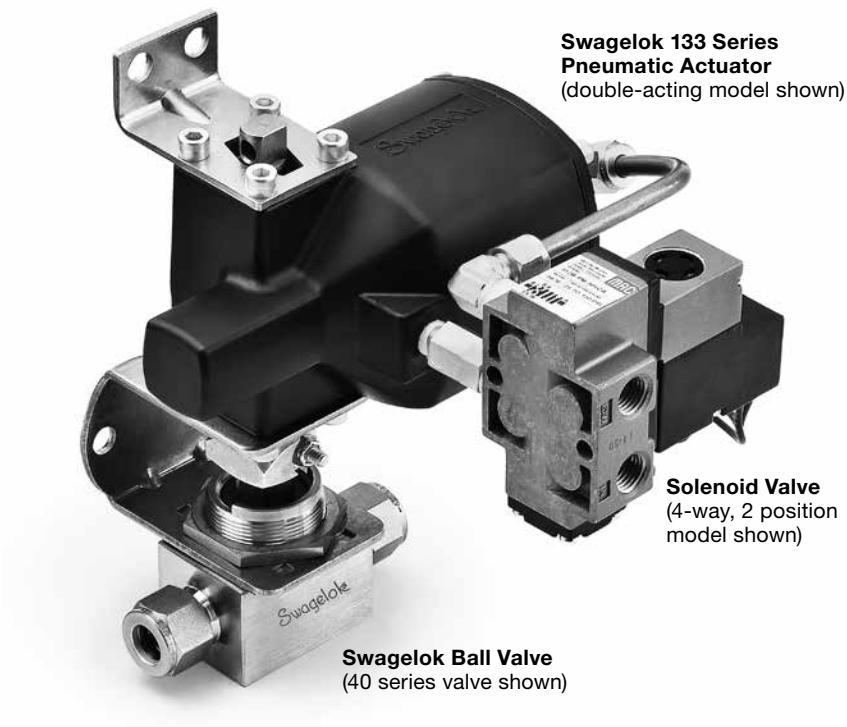
Electrical Data

- General-purpose, class A coil, continuous duty, encapsulated
- 18 AWG lead wires, 18 in. (46 cm) long
- 1/2 in. female NPS electrical conduit connection (enclosure)
- MAC 200 explosion-proof models—CSA (Canada and U.S.A.) compliance:
  - Division 1, Class I, Groups B, C and D
  - Class II, Groups E, F, and G.

Materials of Construction

Component	Material
Solenoid body, spool, poppet	Aluminum
Spool O-ring	Buna N
Fasteners	Zinc-plated alloy steel
Lubricants	Silicone- and PTFE-based

Solenoid valves are assembled with brass Swagelok fittings. Copper tubing is used with double-acting actuators.



Swagelok 133 Series Pneumatic Actuator
(double-acting model shown)

Solenoid Valve
(4-way, 2 position model shown)

Swagelok Ball Valve
(40 series valve shown)

Operating Modes

Air pressure is required to cycle the ball valve. See valve product catalogs for minimum actuator pressure requirements.

Actuator / Solenoid Operation	Valve Position		Designator
	Solenoid Energized	Solenoid De-energized	
2-Way (90°) Actuation			
Spring-return, normally closed / energized to open	Open	Closed	C
Spring-return, normally open / energized to close	Closed	Open	O
Double-acting / energized to open	Open	Closed	DC
Double-acting / energized to close	Closed	Open	DO
3-Way (90° and 180°) Actuation			
Spring-return / energized to switch	Opposite port	Initial position	S
Double-acting / energized to switch	Opposite port	Initial position	D

⚠ Warning:

Following a significant loss of air pressure to *spring-return actuators,* the ball valve will return to the solenoid de-energized position, whether the solenoid is energized or not.

Following a significant loss of air pressure to *double-acting actuators,* the ball valve may cycle.

Solenoid Valves for Swagelok 130 and 150 Series Pneumatic Actuators

Ordering Information

Factory-Assembled Valves with Solenoids

Typical Ordering Number

A		B	C	D
SS-63TS8-33		C	HT	B

A Valve-Actuator Ordering Number

Build a Swagelok ball valve-pneumatic actuator assembly ordering number from the product catalog.

B Actuator / Solenoid Operation

(see page 5)

2-Way (90°) Actuation

- **C** = Spring return, normally closed / energized to open 90°
- **DC** = Double-acting / energized to open
- **DO** = Double-acting / energized to close
- **O** = Spring return, normally open / energized to close

3-Way (90° and 180°) Actuation

- **D** = Double acting / energized to switch
- **S** = Spring return, switching / energized to switch 180°

C Actuator Service

- **FP** = Fusible plug①
- **HT** = High temperature②
- **LT** = Low temperature
- **NF** = Nonfluorocarbon③
- **None** = Standard

① Available for 60 series fire series (A60T) valves: a fail-safe pneumatic actuator that contains a Swagelok fusible plug and a Swagelok mud-dauber fitting. The fusible plug melts if the external temperature reaches 280°F (137°C), relieving pressure in the actuator and allowing the valve to cycle closed.

② Suggested for 60 series steam service (S60P) and thermal service (T60M) valves.

③ Suggested for factory-assembled valves with UHMWPE seats and packing.

D Solenoid Voltage

- **B** = 12 V (dc)
- **C** = 24 V (dc)
- **D** = 110 / 120 V (ac)
- **E** = 220 / 240 V (ac)
- **J** = Explosion proof 24 V (dc) / 120 V (ac) for spring-return actuator
- **K** = Explosion proof 24 V (dc) / 120 V (ac) for double-acting actuator

Solenoids for Field Assembly

Solenoid pneumatic ports are 1/4 in. female NPT connections.

Kits for mounting solenoids to Swagelok 130 and 150 series pneumatic actuators are available separately.

Solenoid Voltage	Solenoid Ordering Number
12 V (dc)	A-SVMF4-C12D
24 V (dc)	A-SVMF4-C24D
110 / 120 V (ac)	MS-SVMF4-C120A
220 / 240 V (ac)	MS-SVMF4-C240A
Explosion proof 24 V (dc) / 120 V (ac), spring-return actuator	MS-SV-64
Explosion proof 24 V (dc) / 120 V (ac), double-acting actuator	MS-SV-55

Solenoid Mounting Kits

Solenoid kits for mounting to Swagelok 130 or 150 series pneumatic actuators contain all connections needed for direct mounting and manufacturer instructions.

Actuator Series	Spring-Return Actuator	Double-Acting Actuator
131, 151	MS-1K-SOL-31S	MS-1K-SOL-31D
133, 153	MS-1K-SOL-33S	MS-1K-SOL-33D
135, 155	MS-1K-SOL-35S	MS-1K-SOL-35D

Solenoid mounting kits for spring-return actuators include a brass hex reducing nipple and steel flush plug.

- MS-SV-64 solenoid requires only a Swagelok hex reducing nipple:
  - **B-4-HRN-2** for 131 / 151 and 133 / 153 series actuators
  - **B-8-HRN-4** for 135 / 155 series actuators.

Double-acting actuator solenoid kits include brass hex reducing nipple, brass Swagelok male elbows, and pre-bent copper tubing.

Limit Switches for Swagelok 130 and 150 Series Pneumatic Actuators—Honeywell® MICRO SWITCH™ Models

Features

- Available for any Swagelok ball valve 130 or 150 series pneumatic actuator assembly.

Technical Data

For additional technical information, see Honeywell MICRO SWITCH product literature.

Temperature Rating

–13 to 185°F (–25 to 85°C)

Electrical Data

- Meets specifications for NEC Class I (NEMA 7), Division I, Groups C and D; and NEC Class II (NEMA 9), Division I, Groups E, F, and G.
- L1 model—two switches: SPDT (single-pole, double-throw) circuit
- L2 model—two switches: DPDT (double-pole, double-throw) circuit
- UL listed and CSA certified.

Electrical Ratings

UL / CSA rating: L23

20 A; 120, 240, or 480 V (ac), inductive and resistive

1 hp, 120 V (ac); 2 hp, 240 V (ac)

0.5 A, 125 V (dc); 0.25 A, 250 V (dc) resistive

Limit Switch
(L1 model shown)

Swagelok 133 Series Pneumatic Actuator
(double-acting model shown)

Swagelok Ball Valve
(AFS ball valve shown)

Materials of Construction

Component	Material
Housing	Epoxy-coated aluminum
Coupling	Anodized aluminum
Actuator bracket	Stainless steel
O-rings	Buna N

Dimensions

See page 9.

Ordering Information

Factory-Assembled Valves with Limit Switches

To order a Swagelok 130 or 150 series actuator and valve factory-assembled with a limit switch, add a limit switch designator from the table at right to the ordering number.

Examples: SS-45F8-33C-**L1** for a 45 series valve with normally closed pneumatic actuator and limit switch with two SPDT switches

SS-63TS8-33D-**L2** for a 63 series valve with double-acting pneumatic actuator and limit switch with two DPDT switches

Limit Switch Kits for Field Assembly

Select a kit ordering number from the table at right. Limit switch kits contain limit switch, actuator bracket, coupling, mounting plate, and instructions.

Limit Switch Model	Actuator Model	Limit Switch Designator	Kit Ordering Number
L1 (Honeywell SPDT)	131, 151	L1	MS-LSK-A1-131
	133, 153		MS-LSK-A1-133
	135, 155		MS-LSK-A1-135
L2 (Honeywell DPDT)	131, 151	L2	MS-LSK-A2-131
	133, 153		MS-LSK-A2-133
	135, 155		MS-LSK-A2-135

Limit Switches for Swagelok 130 and 150 Series Pneumatic Actuators—Westlock Models

Features

- Available for any Swagelok ball valve 130 or 150 series pneumatic actuator assembly.

Technical Data

For additional technical information, see Westlock® AccuTrak™ product literature.

Temperature Rating

–40 to 185°F (–40 to 85°C)

Electrical Data

L4 and L3B / L3BX Models

- NEMA 4, 4X: General purpose and watertight
- One 1/2 in. female NPT conduit
- Two SPDT switches

L5 and L5B / L5BX Models

- NEMA 4, 4X, 7, 9—UL, CSA: Combination explosion-proof and watertight, Class I, Groups C, D; Class II, Groups E, F, G; Div 1, 2
- Two 3/4 in. female NPT conduits
- Two SPDT switches

Limit Switch
(L3B model shown)

Swagelok 133 Series Pneumatic Actuator
(double-acting model with solenoid valve shown)

Swagelok Ball Valve
(63 series valve shown)

Matrials of Construction

Component	Material
Housing	Polyester-coated die-cast aluminum (L5, L5B / L5BX models); glass-filled nylon resin (L4, L3B / L3BX models)
Shaft, fasteners	Stainless steel
Beacon monitor (optional)	Copolyester

Dimensions

See next page.

Ordering Information

Factory-Assembled Valves with Limit Switches

To order a Swagelok 130 or 150 series actuator and valve factory-assembled with a limit switch, add a limit switch designator from the table at right to the ordering number.

Examples: SS-63TS8-33D-**L4** for a 63 series valve with 133 series double-acting actuator and AccuTrak 1040 limit switch

SS-43GXS4-51S-**L3BX** for a 3-way 43G series valves with 151 series spring-return actuator, AccuTrak 1040 limit switch, and Beacon monitor

Limit Switch Kits for Field Assembly

Select a kit ordering number from the table at right. Kits contain limit switch, mounting bracket, fasteners, and manufacturer instructions.

Limit Switch Model	Limit Switch Designators		Kit Ordering Numbers	
	130 Series	150 Series	130 Series	150 Series
L4 (Westlock AccuTrak 1040)	-L4		MS-LSK-L4	
L3B / L3BX L4 with Beacon monitor①	-L3B	-L3BX	MS-LSK-L3B	MS-LSK-L3BX
L5 (Westlock AccuTrak 2007)	-L5		MS-LSK-L5	
L5B / L5BX L5 with Beacon monitor①	-L5B	-L5BX	MS-LSK-L5B	MS-LSK-L5BX

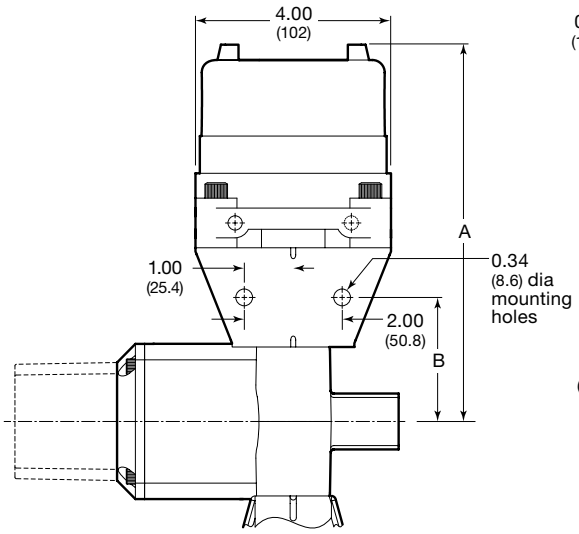
① Contact your authorized Swagelok representative to order a limit switch kit with a Beacon monitor for a 3-way valve with special flow path or for any 4-way or 5-way multiport valve.

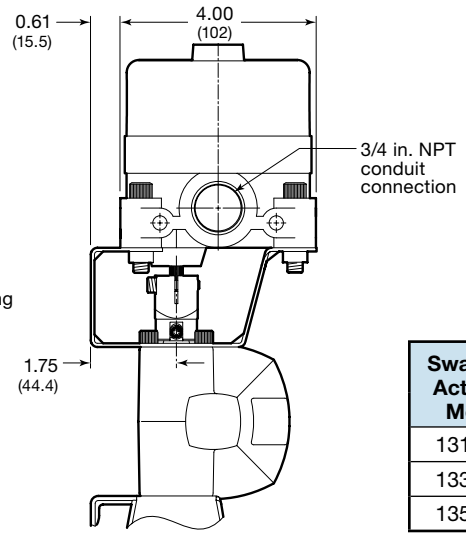
Limit Switches for Swagelok 130 and 150 Series Pneumatic Actuators

Dimensions

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

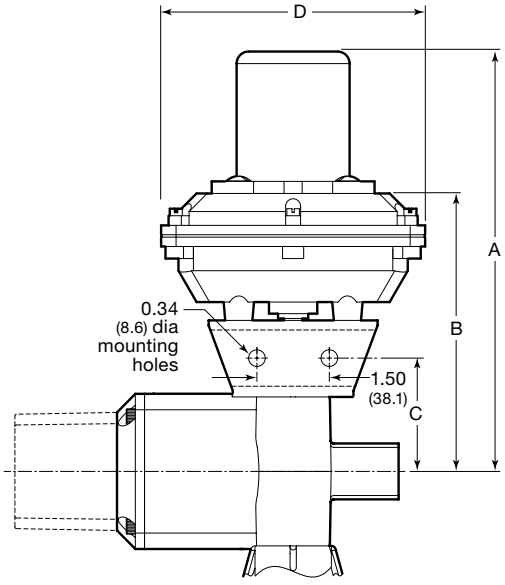
Honeywell Limit Switches

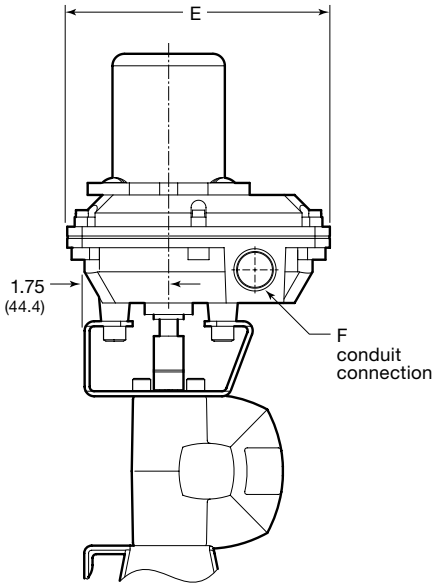




Swagelok Actuator Model	Dimensions, in. (mm)	
	A	B
131, 151	7.22 (183)	2.13 (54.1)
133, 153	7.65 (195)	2.56 (65.0)
135, 155	8.40 (214)	3.31 (84.1)

Westlock Limit Switches





Limit Switch Model	Dimensions, in. (mm)											
	131, 151 Actuators			133, 153 Actuators			135, 155 Actuators			D	E	F
	A	B	C	A	B	C	A	B	C			
L4	—	5.32 (135)	1.91 (48.5)	—	5.76 (126)	2.34 (59.4)	—	6.51 (165)	3.09 (78.5)	5.47 (139)	5.47 (139)	1/2 in. NPT
L3B, L3BX	8.26 (210)	—	1.91 (48.5)	8.70 (221)	—	2.34 (59.4)	9.45 (240)	—	3.09 (78.5)	5.47 (139)	5.47 (139)	1/2 in. NPT
L5	—	6.00 (152)	1.91 (48.5)	—	6.44 (164)	2.34 (59.4)	—	7.19 (183)	3.09 (78.5)	6.13 (156)	6.42 (163)	3/4 in. NPT
L5B, L5BX	8.94 (227)	—	1.91 (48.5)	9.38 (238)	—	2.34 (59.4)	10.1 (257)	—	3.09 (78.5)	6.13 (156)	6.42 (163)	3/4 in. NPT

Swagelok ISO 5211-Compliant Pneumatic Actuators

Features

- 90° actuation
  - 2-way (straight and angle) flow paths
  - 3-way (L and H special flow paths)
  - 4-way flow paths
- 180° actuation for other 3-way flow paths
- Spring-return and double-acting models available
- High-temperature service actuators available

Swagelok A15 Pneumatic Actuator

Swagelok Ball Valve
(40 series valve shown)

Service Ratings

Maximum actuator pressure is 116 psig (8.0 bar).

Actuator Service	Temperature Range °F (°C)
Standard	–40 to 176 (–40 to 80)
High temperature	5 to 302 (–15 to 150)

Certifications

Factory-assembled Swagelok valve-actuator assemblies can be ATEX certified on request at the time of quotation.

ATEX certification is not available for field assemblies.

Materials of Construction

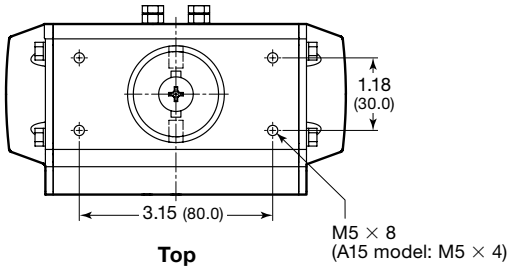
Component	Actuator Service	
	Standard	High Temperature
	Material	
Housing	Aluminum	
End cap	Cast aluminum	
Plug	Buna N	
O-rings	Buna N	Fluorocarbon FKM (FPM)
Drive shaft	Alloy C-22	
Spring cartridge	SiCr spring alloy steel	
Cap screws	304 SS	
Position indicator	Glass-reinforced polypropylene	

Additional materials may be available. Contact your authorized Swagelok representative.

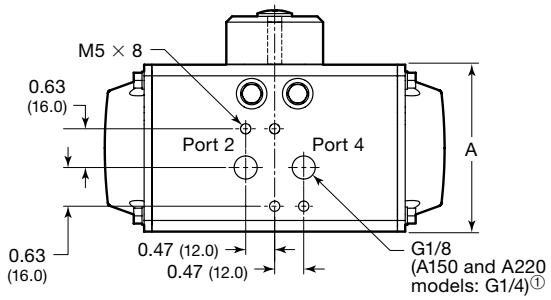
Swagelok ISO 5211-Compliant Pneumatic Actuators

Dimensions

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

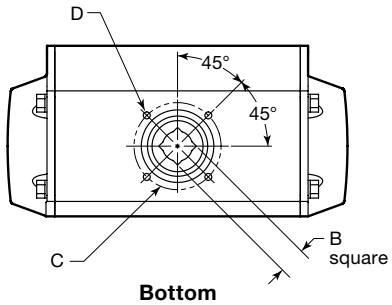


Top
VDI / VDE 3845 (NAMUR)
Interface
(Not applicable to A10 model actuators)



① To connect remote-mounted solenoids to 1/4 in. Swagelok tube fittings, order Swagelok male ISO / BSP parallel thread (RS) connectors and gaskets:
For G1/8 port: **SS-400-1-2RS** connector and **SS-2-RS-2V** gasket
For G1/4 port: **SS-400-1-4RS** connector and **SS-4-RS-2V** gasket

Side
VDI / VDE 3845 (NAMUR)
Interface



Bottom
ISO 5211 Interface

Actuator Model	ISO 5211 Flange Size	Dimensions, in. (mm)			
		A	B	C	D
A10	F04	2.60 (66.0)	0.43 (11)	1.65 (42)	M5 × 8
A15	F04	2.72 (69.0)	0.43 (11)	1.65 (42)	M5 × 8
A30	F05	3.35 (85.0)	0.55 (14)	1.97 (50)	M6 × 9
A60	F05	4.02 (102)	0.55 (14)	1.97 (50)	M6 × 9
A100	F07	4.53 (115)	0.67 (17)	2.76 (70)	M8 × 12
A150	F07	5.00 (127)	0.67 (17)	2.76 (70)	M8 × 12
A220	F07	5.71 (145)	0.86 (22)	2.76 (70)	M8 × 12

90° Actuation

Actuator Kit	Weight lb (kg)
MS-A10-DA-DIN	1.7 (0.75)
MS-A10-4-DIN	1.9 (0.88)
MS-A10-5-DIN	1.9 (0.89)
MS-A15-DA-DIN	2.4 (1.1)
MS-A15-3-DIN	2.6 (1.2)
MS-A15-4-DIN	2.6 (1.2)
MS-A30-DA-DIN	3.5 (1.6)
MS-A30-3-DIN	3.8 (1.7)
MS-A30-4-DIN	4.0 (1.8)
MS-A60-DA-DIN	6.0 (2.7)
MS-A60-3-DIN	6.4 (2.9)
MS-A60-4-DIN	6.4 (2.9)
MS-A60-5-DIN	6.6 (3.0)
MS-A100-DA-DIN	8.4 (3.8)
MS-A100-4-DIN	9.3 (4.2)
MS-A100-5-DIN	9.5 (4.3)
MS-A150-5-DIN	13.0 (5.9)
MS-A220-4-DIN①	19.8 (9.0)

① Requires adapter insert **MS-ADH22/17,** available separately, to reduce actuator coupling receptacle to 0.67 in. (17 mm) square.

180° Actuation

Actuator Kit	Weight lb (kg)
MS-A15-XDA-DIN	4.6 (2.1)
MS-A30-XDA-DIN	7.5 (3.4)
MS-A60-XDA-DIN	13.0 (5.9)
MS-A100-XDA-DIN	18.5 (8.4)

Ordering Information

Swagelok ISO 5211-compliant pneumatic actuators are available factory assembled to valves or in kits for field assembly. See the Swagelok ball valve catalogs for complete ordering instructions, including suggested actuators and necessary mounting components.

- *One-Piece Instrumentation Ball Valves—40G Series and 40 Series,* MS-02-331
- *Ball Valves, General Purpose and Special Application—60 Series,* MS-01-146
- *Trunnion Ball Valves—83 and H83 Series,* MS-01-166
- *Swagelok Alternative Fuel Service (AFS) Ball Valves For High-Pressure, High-Flow Applications,* MS-02-303
- *Multipurpose Ball Valves—SK Series,* MS-02-345
- *Medium-Pressure Ball Valves—FKB Series,* MS-02-354.

Solenoid Valves for Swagelok ISO 5211-Compliant Pneumatic Actuators

Solenoid valves for Swagelok ISO 5211-compliant actuators are manufactured by ASCO.

Features

- Available for A10 through A220 size Swagelok ISO 5211-compliant pneumatic actuators

Technical Data

For additional technical information, see ASCO series 8551 product literature.

Actuation Pressure

30① to 150 psig (2.1 to 10.3 bar)

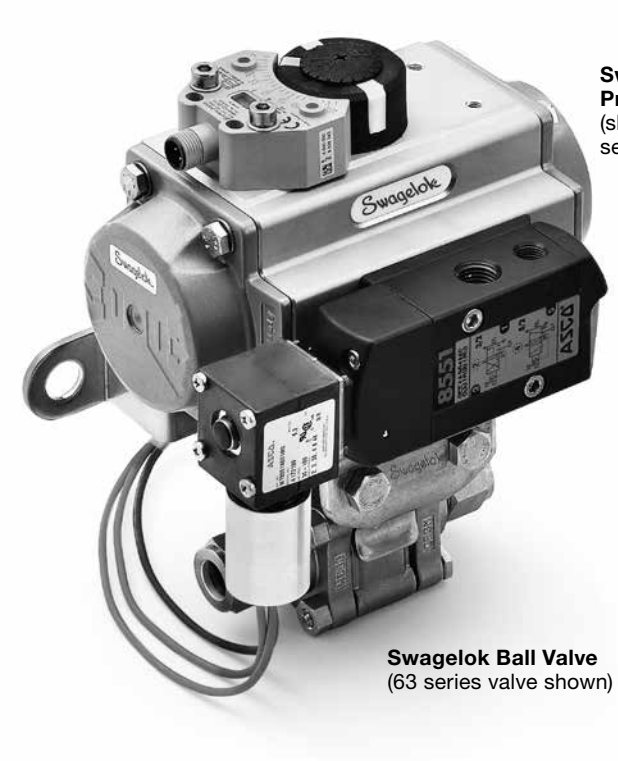
① 30 psig (2.1 bar) is the minimum requirement for the solenoid valve. See valve product catalogs for minimum actuator pressure requirements.

Temperature Range

- 120 and 240 V (ac) models: 5 to 140°F (–15 to 60°C)
- 12 and 24 V (dc) models: 5 to 77°F (–15 to 25°C)

Electrical Data

- NEMA 4–CSA: General purpose and watertight, meeting the requirements of Type 1, 2, 3, 3S, 4, and 4X.
- NEMA 7–UL, CSA, CE: Combination explosion proof and watertight, meeting the requirements 3, 3S, 4, 4X, 6, 6P, 7, and 9, Class I, Div 1 (Groups A–D) and Class I, Div 2 Type 9 (Groups E–G).



Swagelok A30 Pneumatic Actuator (shown with position sensor)

Solenoid Valve

Swagelok Ball Valve (63 series valve shown)

Materials of Construction

Component	Material
Solenoid body	Anodized aluminum
O-rings	Buna N

Solenoid Valves for Swagelok ISO 5211-Compliant Pneumatic Actuators

Ordering Information

Factory-Assembled Valves with Solenoids

Spring-Return Actuator Typical Ordering Number

A	B	C
SS-63TS8-A30C4	HT	S1

A Valve Ordering Number
Build a Swagelok ball valve–ISO 5211-compliant pneumatic actuator assembly ordering number from the product catalog.

B Actuator Service
None = Standard
HT = High temperature

C Solenoid Voltage
S1 = 120 V (ac) / NEMA 4
S2 = 24 V (dc) / NEMA 4
S3 = 240 V (ac) / NEMA 4
S4 = 12 V (dc) / NEMA 4
S5 = 120 V (ac) / NEMA 4, NEMA 7
S6 = 24 V (dc) / NEMA 4, NEMA 7

Double-Acting Actuator Typical Ordering Number

A	B	C	D
SS-63TS8-A30D	C	HT	S1

A Valve Ordering Number
Build a Swagelok ball valve–ISO 5211-compliant pneumatic actuator assembly ordering number from the product catalog.

B Solenoid Operation
C = Energized to open
O = Energized to close

C Actuator Service
None = Standard
HT = High temperature

D Solenoid Voltage
S1 = 120 V (ac) / NEMA 4
S2 = 24 V (dc) / NEMA 4
S3 = 240 V (ac) / NEMA 4
S4 = 12 V (dc) / NEMA 4
S5 = 120 V (ac) / NEMA 4, NEMA 7
S6 = 24 V (dc) / NEMA 4, NEMA 7

Solenoid Kits for Field Assembly

Kits contain fasteners, adapter plates to assemble for either spring-return or double-acting actuation, and manufacturer instructions.

Solenoid Voltage	Kit Ordering Number
12 V (dc) / NEMA 4	MS-SV-S4
24 V (dc) / NEMA 4	MS-SV-S2
120 V (ac) / NEMA 4	MS-SV-S1
240 V (ac) / NEMA 4	MS-SV-S3
24 V (dc) / NEMA 4, NEMA 7	MS-SV-S6
120 V (ac) / NEMA 4, NEMA 7	MS-SV-S5

Limit Switches for Swagelok ISO 5211-Compliant Pneumatic Actuators

Limit switches for Swagelok ISO 5211-compliant pneumatic actuators are manufactured by Westlock.

Features

- Available for A15 through A220 size Swagelok ISO 5211-compliant pneumatic actuators

Technical Data

For additional technical information, see Westlock AccuTrak product literature.

Temperature Rating

–40 to 185°F (–40 to 85°C)

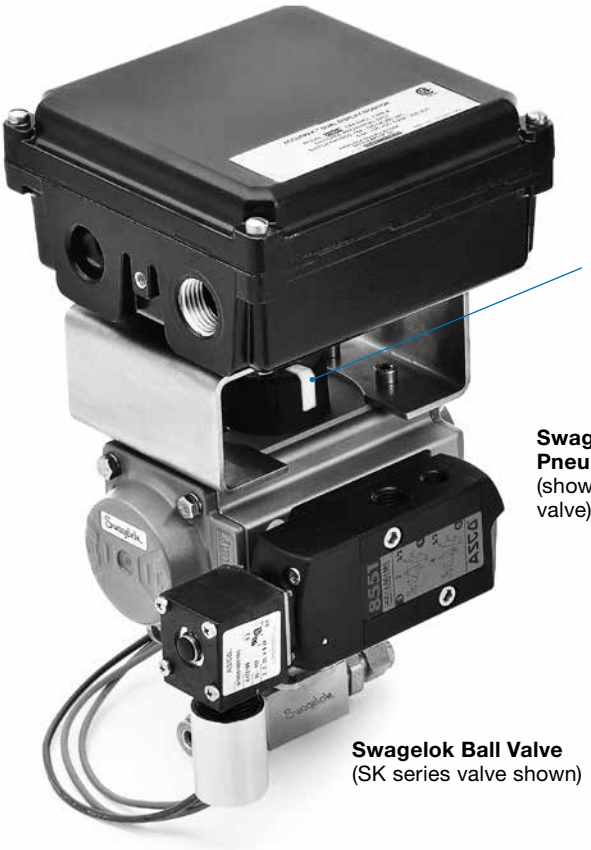
Electrical Data

N1 and N1B Models

- NEMA 4, 4X: General purpose and watertight
- One 1/2 in. female NPT conduit
- Two SPDT switches

N2 and N2B Models

- NEMA 4, 4X, 7, 9—UL, CSA: Combination explosion-proof and watertight, Class I, Groups C, D; Class II, Groups E, F, G; Div 1, 2
- Two 3/4 in. female NPT conduits
- Two SPDT switches



Materials of Construction

Component	Material
Housing	Polyester-coated die-cast aluminum (N1, N2, N2B models); glass-filled nylon resin (N1B model)
Shaft, fasteners	Stainless steel
Beacon monitor (optional)	Copolyester

Ordering Information

Factory-Assembled Valves with Limit Switches

To order a Swagelok ISO 5211-compliant actuator and valve factory-assembled with a limit switch, add **-N1** or **-N2** to the ordering number.

Example: SS-63TS8-A30C4-**N1**

To order a limit switch with Beacon monitor, add **B** for a 2-way valve.

Example: SS-63TS8-A30C4-**N1B**

Contact your authorized Swagelok representative to order a limit switch with a Beacon monitor for a 3-way valve.

Limit Switch Kits for Field Assembly

Kits contain limit switch, mounting bracket, fasteners, and manufacturer instructions.

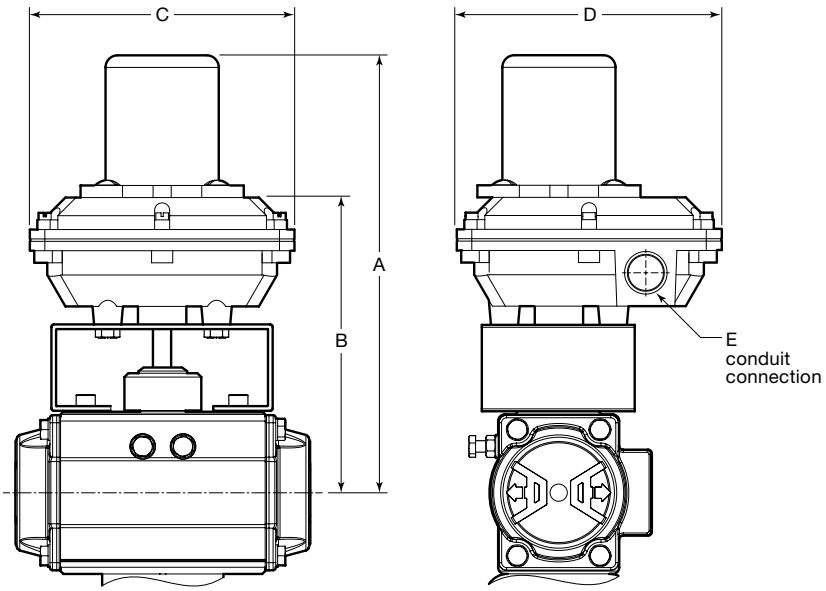
Limit Switch Model	Kit Ordering Numbers		
	A15 Actuator	A30 to A150 Actuators	A220 Actuator
N1 (Westlock AccuTrak 2004)	MS-LSK-N1-A15	MS-LSK-N1	MS-LSK-N1-A220
N1B Westlock AccuTrak 1040 with Beacon monitor①	MS-LSK-N1B-A15	MS-LSK-N1B	MS-LSK-N1B-A220
N2 (Westlock AccuTrak 2007)	MS-LSK-N2-A15	MS-LSK-N2	MS-LSK-N2-A220
N2B N2 limit switch with Beacon monitor①	MS-LSK-N2B-A15	MS-LSK-N2B	MS-LSK-N2B-A220

① Contact your authorized Swagelok representative to order a limit switch kit with a Beacon monitor for a 3-way valve.

Limit Switches for Swagelok ISO 5211-Compliant Pneumatic Actuators

Dimensions

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



Limit Switch Model	Dimensions, in. (mm)														
	A15 Actuator		A30 Actuator		A60 Actuator		A100 Actuator		A150 Actuator		A220 Actuator		C	D	E
	A	B	A	B	A	B	A	B	A	B	A	B			
N1	—	5.77 (147)	—	6.09 (155)	—	6.42 (163)	—	6.68 (170)	—	6.91 (176)	—	7.65 (194)	5.47 (139)	5.47 (139)	1/2 in. NPT
N1B	8.71 (221)	—	9.03 (229)	—	9.36 (238)	—	9.62 (244)	—	9.85 (250)	—	10.6 (269)	—	5.47 (139)	5.47 (139)	1/2 in. NPT
N2	—	6.15 (164)	—	6.77 (172)	—	7.10 (254)	—	7.36 (187)	—	7.59 (193)	—	8.33 (212)	6.13 (156)	6.42 (163)	3/4 in. NPT
N2B	9.39 (239)	—	9.71 (247)	—	10.0 (254)	—	10.3 (262)	—	10.5 (267)	—	11.3 (287)	—	6.13 (156)	6.42 (163)	3/4 in. NPT

Position Sensors for Swagelok ISO 5211-Compliant Pneumatic Actuators

Position sensors for Swagelok ISO 5211-compliant pneumatic actuators are manufactured by Pepperl & Fuchs.

Features

- Available for A15 through A220 size Swagelok ISO 5211-compliant pneumatic actuators

Technical Data

For additional technical information, see Pepperl & Fuchs product literature.

Temperature Rating

- N9 model: –14 to 158°F (–25 to 70°C)
- N10 model: –14 to 212°F (–25 to 100°C)

Electrical Data

- N9 model: general purpose—UL, CSA, CE; nonincendive—FM
- N10 model: intrinsically safe—UL, CSA, CE, FM, Ex

Electrical Connection

- Quick disconnect type V1
- Cord sets offered separately through Pepperl & Fuchs.

Material

- Housing: Crastin® PBS thermoplastic polyester resin

Ordering Information

Factory-Assembled Valves with Position Sensors

To order an ISO-5211 compliant actuator and valve factory-assembled with a position sensor, add **-N9** or **-N10** to the ordering number.

Example: SS-63TS8-A30C4-**N9**

Position Sensor Kits for Field Assembly

Kits contain position sensor, fasteners, metal target, and manufacturer instructions.

Position Sensor Model	Kit Ordering Numbers①	
	A15 to A150 Actuators	A220 Actuator
N9 (Pepperl & Fuchs NBN3-F25-E8-V1)	MS-LSK-N9	MS-LSK-N9-A220
N10 (Pepperl & Fuchs NCN3-F25-N4-V1)	MS-LSK-N10	MS-LSK-N10-A220

① For 3-way, 180° actuators, an additional metal target, available separately, is required.
Ordering number: **MS-PI-EISAMET**

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 valve components 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-02-343, RevC, December 2019

Swagelok® Alternative Fuel Service (AFS) Ball Valves

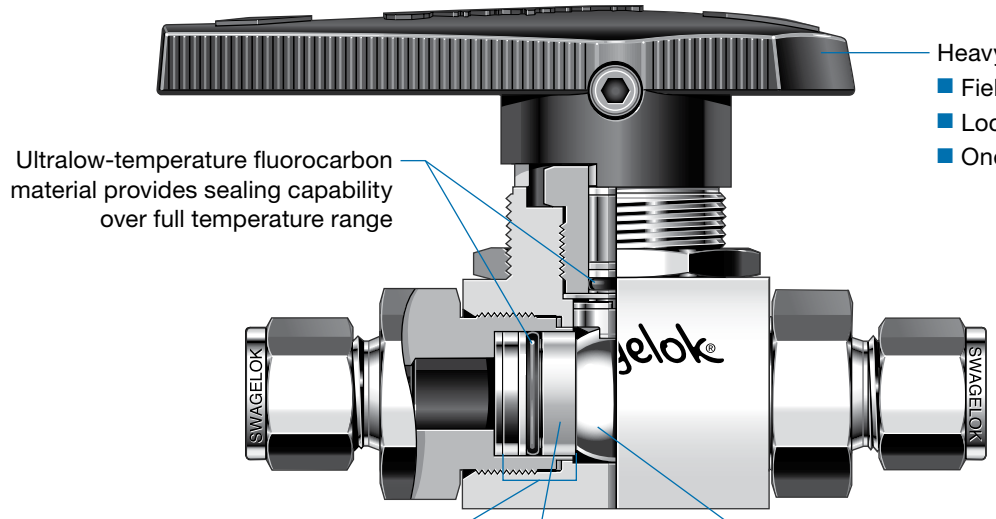
For High-Pressure, High-Flow Applications

Swagelok AFS Ball Valves

- Working pressures up to 6000 psig (413 bar)
- Flow coefficients (C_v) from 4.0 to 13.8
- Fractional and metric Swagelok tube fittings; ISO and NPT pipe end connections available
- 316 stainless steel body and end connections
- Manual and pneumatic actuation

Swagelok

Swagelok Alternative Fuel Service (AFS) Ball Valves



Features

- High flow—C_v from 4.0 to 13.8
- All wetted components are compatible with hydrogen and compressed natural gas (CNG)
- Maximum pressure rating: 6000 psig (413 bar)
- Temperature rating: –40 to 250°F (–40 to 121°C)
- Low operating torque
- No packing adjustment required
- Field repairable with seal kit

Pressure-Temperature Ratings

End Connections	Swagelok Tube Fittings			Female Pipe	
	3/8, 1/2 in., 12 mm	3/4 in., 16 mm	1 in.	3/8, 1/2 in.	3/4 in.
Temperature, °F (°C)	**Working Pressure,** psig (bar)				
–40 (–40) to 200 (93)	6000 (413)	5800 (400)	4700 (323)	6000 (413)	5532 (381)
250 (121)	6000 (413)	5742 (395)	4653 (320)	6000 (413)	5532 (381)

Ratings are based on ASME Code for Pressure Piping B31.3, Process Piping. To determine working pressure ratings in accordance with ASME B31.1, Power Piping, for 316 stainless steel, multiply pressure by:

- 0.86 for temperatures from 100 to 200°F (37 to 93°C).
- 0.82 for temperatures up to 250°F (121°C).

Important Information About Swagelok AFS Ball Valves

⚠ **Swagelok AFS ball valves are designed to be used in the fully open or fully closed position.**

⚠ **Valves that have not been cycled for a period of time may have a higher initial actuation torque.**

Low Fugitive Emissions

The American Petroleum Institute's API 641 tests for fugitive emissions to atmosphere for quarter-turn ball valves. The tests are conducted at a third party lab and certify that at no point in the test did the valve leak in excess of 100 ppm of methane. Certificates stating that the valve is certified for Low Emissions are available for valves with standard Fluorocarbon Stem O-rings. For more information, contact your authorized Swagelok sales and service representative.

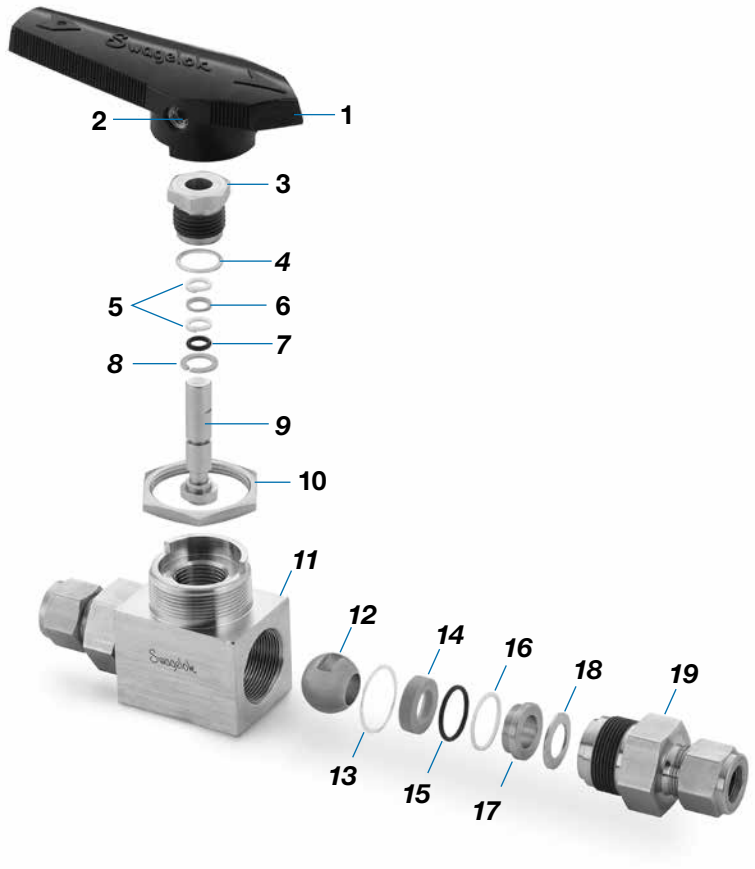
Certifications

- ANSI / NGV 3.1-2014 / CSA 12.3-2014,
  Classification: Manual valve
  Pressure: 3600 psig (248 bar)
  Temperature: –40 to 250°F (–40 to 121°C)
- ANSI / IAS NGV 4.6-1999 / CSA 12.56-M99,
  Classification: Class A
  Pressure: 4500 psig (310 bar)
  Temperature: –40 to 185°F (–40 to 85°C)
- ECE R110 Manual Service Valve Type Approval
  Classification: Class 0
  Pressure: 3770 psig (260 bar)
  Temperature: –40 to 248°F (–40 to 120°C)
- Certifications do not include attachments to the valve, such as actuators or a different handle mechanism.

Materials of Construction

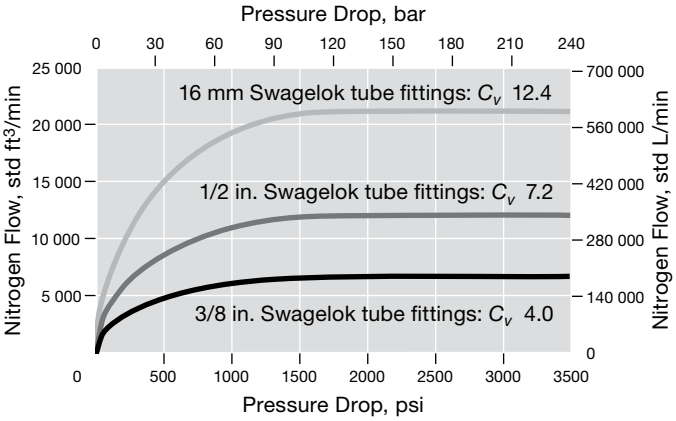
Component	Material Grade/ ASTM Specification
1 Handle	Nylon with brass insert
2 Set screw	S17400 SS
3 Packing bolt	316 SS / A479
4 *Packing bolt gasket*	*Silver-plated 316 SS / A240*
5 Guide ring (2)	PTFE / D1710
6 Stem backup ring	PEEK
7 *Stem O-ring*	*Ultralow-temperature fluorocarbon / D2000*
8 *Thrust washer*	*PEEK*
9 *Stem*	*316 SS / A276*
10 Panel nut	316 SS / B783
11 *Body*	*316 SS / A479*
12 *Ball*	*PTFE-coated 316 SS / A276*
13 *End screw gasket (2)*	*Silver-plated 316 SS / A240*
14 *Seat (2)*	*PEEK*
15 *Seat O-ring (2)*	*Ultralow-temperature fluorocarbon / D2000*
16 *Seat backup ring (2)*	*PTFE / D1710*
17 *Seat gland (2)*	*316 SS / A479*
18 *Seat spring (2)*	*316 SS / A240 or A666*
19 *End screw (2)*	*316 SS / A479*
Lubricant	*PTFE-based*

Wetted components listed in *italics*.

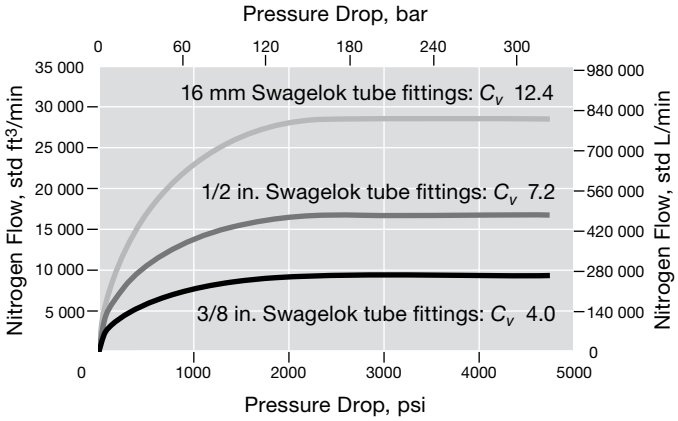


Flow Data at 70°F (20°C)

Inlet Pressure 3600 psig (248 bar)



Inlet Pressure 5000 psig (344 bar)



Testing

Every Swagelok AFS ball valve is factory tested in both directions with nitrogen at 1000 psig (69 bar). Seats have a maximum allowable leak rate of 0.1 std cm³/min. Shell testing is performed to a requirement of no detectable leakage with a liquid leak detector.

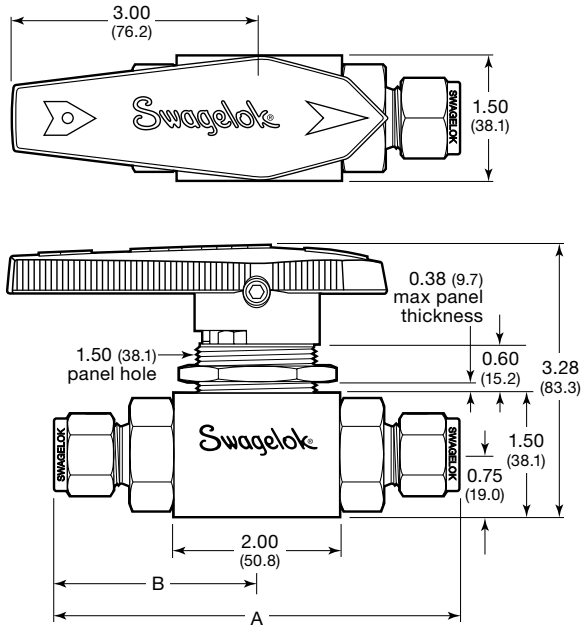
Cleaning and Packaging

All Swagelok AFS ball valves are cleaned and packaged in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62.

Ordering Information and Dimensions

Select an ordering number.

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



End Connections①		Ordering Number	C_v	Orifice in. (mm)	Dimensions in. (mm)	
Type	Size				A	B
Fractional Swagelok tube fitting	3/8 in.	SS-AFSS6	4.0	0.281 (7.1)	4.57 (116)	2.29 (58.2)
	1/2 in.	SS-AFSS8	7.2	0.406 (10.3)	4.80 (122)	2.40 (61.0)
	3/4 in.	SS-AFSS12	7.1	0.472 (12.0)	4.80 (122)	2.40 (61.0)
	1 in.	SS-AFSS16②	6.5	0.472 (12.0)	5.10 (130)	2.55 (64.8)
Metric Swagelok tube fitting	12 mm	SS-AFSS12MM	5.2	0.406 (10.3)	4.80 (122)	2.20 (55.9)
	16 mm	SS-AFSS16MM	12.4	0.472 (12.0)	4.80 (122)	2.40 (61.0)
Female NPT	3/8 in.	SS-AFSF6	11.0	0.472 (12.0)	4.00 (102)	2.00 (50.8)
	1/2 in.	SS-AFSF8	13.8		4.00 (102)	2.00 (50.8)
	3/4 in.	SS-AFSF12②	7.8		4.12 (105)	2.06 (52.3)
Female ISO tapered③	1/2 in.	SS-AFSF8RT	13.8	0.472 (12.0)	4.00 (102)	2.00 (50.8)

Dimensions shown with Swagelok tube fitting nuts finger-tight.

① Valves can be ordered with two different end connections. Contact your authorized Swagelok sales and service representative.

② Not available with AGA, IAS, and ECE R110 certifications; not recommended for panel mounting; not available with pneumatic actuator.

③ Thread type ISO/BSP (tapered), based on DIN 3852, Swagelok RT fittings. See specifications ISO 7/1, BS EN ISO 10226-1, and JIS B0203.

Options and Accessories

Handle Options

Black nylon directional handles are standard.

- To order a directional handle of another color, add a handle color designator to the valve ordering number.

Handle Color	Designator
Blue	-BL
Green	-GR
Orange	-OG
Red	-RD
Yellow	-YW

  Example: SS-AFSS6-**RD**

- To order a nylon oval handle, add **-K** to the valve ordering number.

  Example: SS-AFSS6-**K**

- To order a black aluminum directional handle, add **-AHD** to the valve ordering number.

  Example: SS-AFSS6-**AHD**

Handle Kits

The replacement handle kit includes a handle with set screw and instructions.

- Black nylon directional handle kit ordering number: **NY-5K-AFS-BK**

  To order a nylon directional handle kit in a color other than black, replace **-BK** in the kit ordering number with a handle color designator.

  Example: NY-5K-AFS-**RD**

- Nylon oval handle kit ordering number: **NY-5K-AFSK-BK**
- Black aluminum directional handle kit ordering number: **A-5K-AFS-BK**

Stem Seal Material Option

Ultralow-temperature fluorocarbon FKM is standard. Ultralow-temperature nitrile (Buna C) is available as an option to enhance valve cycle life. Valves with ultralow-temperature nitrile have a temperature rating of –40 to 200°F (–40 to 93°C) **and are not certified to AGA, IAS, or ECE R110.**

To order, add **-BCS** to the valve ordering number.

Example. SS-AFSS6-**BCS**

Locking Brackets

- Designed to lock valve in the open and closed position
- Accommodates shackle diameters up to 0.344 in. (8.7 mm)
- To order the locking bracket factory-assembled on a valve, add **-LH** to the valve ordering number.

  Example: SS-AFSS6-**LH**

  To order the locking bracket for field assembly, use kit ordering number: **SS-51K-AFS-LH**

Swagelok Pneumatic Actuators

The Swagelok rack and pinion pneumatic actuator is compact, lightweight, easily mountable, and can be operated with standard shop air. The actuators are available in spring-return and double-acting modes.

For technical data, including materials of construction, air displacement, and weight, refer to *Ball Valve Actuation Options* catalog, MS-02-343.

⚠ **Actuated assemblies must be properly aligned and supported. Improper alignment or inadequate support of the actuated assembly may result in shorter valve life.**

Actuator Service Ratings

Actuator Service	Temperature °F (°C)	Maximum Actuator Pressure, psig (bar)	
		At 100°F (37°C)	At Maximum Temperature
Standard	–20 to 200 (–28 to 93)	200 (13.7)	165 (11.3)
High temperature	0 to 400 (–17 to 204)		100 (6.8)
Low temperature①	–40 to 200 (–40 to 93)		165 (11.3)

① Maximum working pressure for valves mounted to low-temperature service actuators is 4500 psig (310 bar).

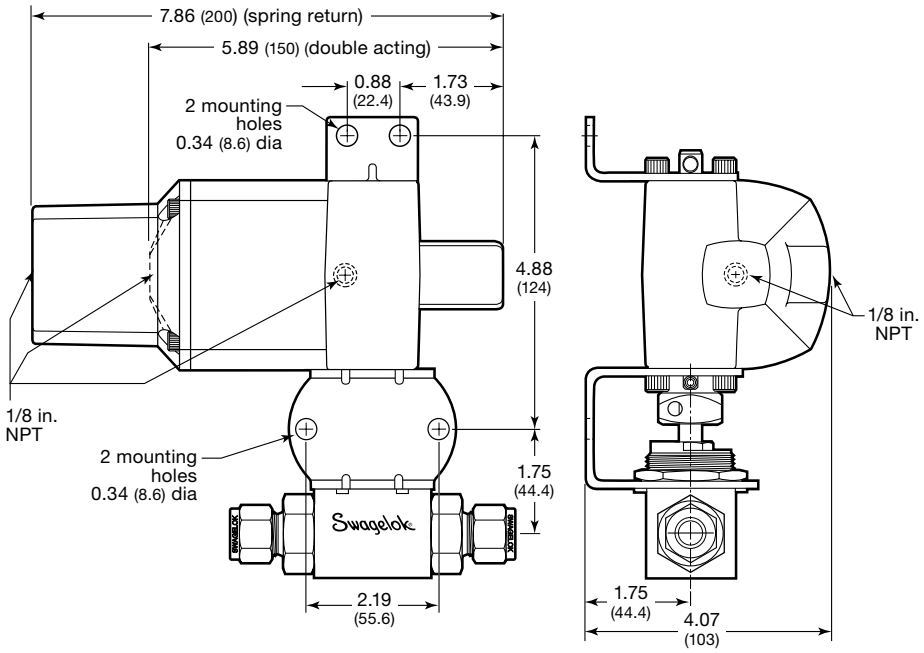
Actuator Pressure at Maximum System Pressure

Required pressures based on valve performance using pressurized air or nitrogen.

Actuator Model	Actuation Modes			
	Spring Return		Double Acting	
	Single	Dual	Single	Dual
	Minimum Actuator Pressure, psig (bar) at 100°F (37°C)			
133	80 (5.6)	–	40 (2.8)	80 (5.6)

Dimensions

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



Ordering Information

Factory Assembly

Typical Ordering Number

SS-AFSS6 - 33 **D** **HT**

Valve Ordering Number

Actuator Model

Actuation Mode

- **D** = Double acting
- **C** = Normally closed spring return
- **O** = Normally open spring return

Actuator Service

- **None** = Standard
- **HT** = High temperature
- **LT** = Low temperature①

① Maximum working pressure for valves mounted to low-temperature service actuators is 4500 psig (310 bar).

For dual-mounted assemblies (two valves mounted to one actuator), add **DM** to the ordering number. Example: SS-AFSS6-33DHT**DM**

Field Assembly

Order one actuator kit and one mounting bracket kit for each valve.

Mounting bracket kit ordering number:
MS-MB-AFS-133

Actuator Mode	Actuator Service	Kit Ordering Number
Spring return	Standard	MS-133-SR
	High temperature	MS-133-SR-HT
	Low temperature①	MS-133-SR-LT
Double acting	Standard	MS-133-DA
	High temperature	MS-133-DA-HT
	Low temperature①	MS-133-DA-LT

① Maximum working pressure for valves mounted to low-temperature service actuators is 4500 psig (310 bar).

ISO 5211-Compliant Pneumatic Actuators

Swagelok ISO 5211-compliant rack and pinion pneumatic actuators are available in spring-return and double-acting modes.

For technical data, including actuator materials of construction and weight, refer to *Ball Valve Actuation Options* catalog, MS-02-343.

For additional information on selecting and sizing ISO 5211-compliant actuators, refer to *Actuated Ball Valve Selection Guide—ISO 5211-Compliant Actuator Mounting Bracket Kits* catalog, MS-02-136.

⚠ **Actuated assemblies must be properly aligned and supported. Improper alignment or inadequate support of the actuated assembly may result in shorter valve life.**

Actuator Service Ratings

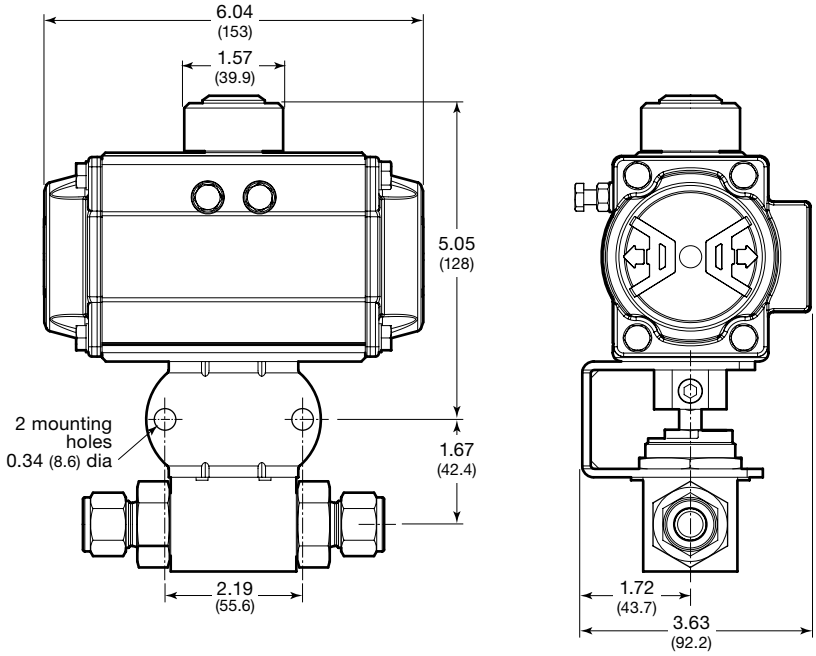
Actuator Service	Temperature Range °F (°C)	Maximum Actuator Pressure, psig (bar)
Standard	–40 to 176 (–40 to 80)	116 (7.9)
High temperature	5 to 302 (–15 to 150)	

Minimum Actuator Pressure

Actuator Model	Actuation Modes	
	Spring Return	Double Acting
	Minimum Actuator Pressure, psig (bar)	
A30	55 (3.8)	40 (2.8)

Dimensions

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



Ordering Information

Factory Assembly

Typical Ordering Number

SS-AFSS6 - A30 **D** **HT**

Valve Ordering Number | **Actuator Model** | **Actuation Mode** | **Actuator Service**

Actuation Mode
- **D** = Double acting
- **C4** = Normally closed spring return
- **O4** = Normally open spring return

Actuator Service
- **None** = Standard
- **HT** = High temperature

Field Assembly

Order one actuator kit and one mounting bracket kit for each valve.

Mounting bracket kit ordering number:
SS-MB-AFS-F05-14DIN-M

Actuator Mode	Actuator Service	Kit Ordering Number
Spring return	Standard	MS-A30-4-DIN
	High temperature	MS-A30-4-DIN-HT
Double acting	Standard	MS-A30-DA-DIN
	High temperature	MS-A30-DA-DIN-HT

Options for ISO 5211-Compliant and Swagelok Pneumatic Actuators

Swagelok offers a range of accessories to enhance instrumentation and process ball valve performance and control, including solenoid valves, limit switches, and position sensors. Factory assemblies and kits for field assembly are available.

Refer to *Ball Valve Actuation Options* catalog, MS-02-343, for additional information.

Maintenance Kits

Kit components are of the same materials and grades listed in **Materials of Construction,** page 3.

Seat Seal Kits

The seat seal kit contains two seats, seat O-rings, seat backup rings, seat springs, end screw gaskets, lubricant with Material Safety Data Sheet (MSDS), and instructions.

Kit ordering number: **SS-9K-AFS**

Stem and Seat Seal Kits

The stem and seat seal kit contains a stem O-ring, two guide rings, stem backup ring, thrust washer, packing bolt gasket, two seats, seat O-rings, seat backup rings, seat springs, end screw gaskets, lubricant with Material Safety Data Sheet (MSDS), and instructions.

Kit ordering number: **SS-91K-AFS**

To order a kit with a stem O-ring of optional ultralow-temperature nitrile (Buna C) material, use kit ordering number: **SS-91K-AFS-BCS**

Caution: Do not mix or interchange valve components with those of other manufacturers.

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 Lifetime 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.

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

Trunnion Ball Valves

83 Series and H83 Series

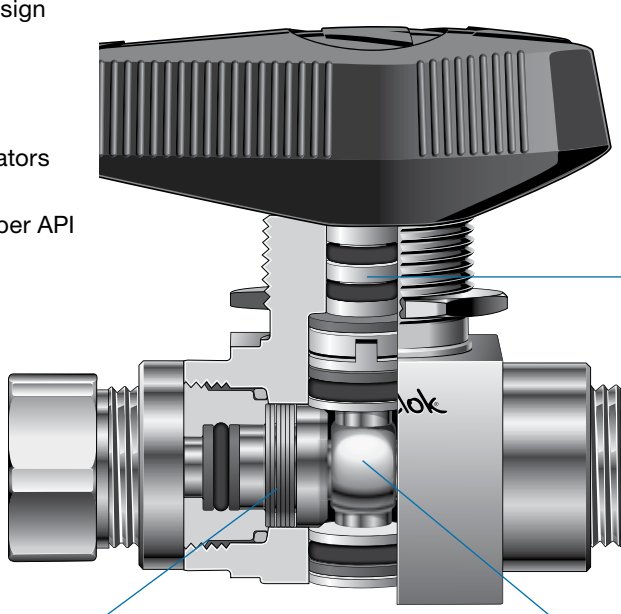
- Working pressures up to 10 000 psig (689 bar)
- 1/8 to 1/2 in. and 6 to 12 mm Swagelok® tube fitting or NPT end connections
- 316 stainless steel materials

Swagelok

Contents

Features

- Compact, maximum-flow design
- Low operating torque
- 2- or 3-way flow patterns
- Panel mounting
- Pneumatic and electric actuators available
- Low Emissions certification per API 641 available



Heavy-duty handle indicates flow direction.

Bottom-loaded stem:
- prevents stem blowout
- enhances system safety.

Spring-loaded seats:
- provide leak-tight integrity in both low- and high-pressure systems
- contribute to low operating torque
- reduce seat wear from pressure surges.

Trunnion-style ball:
- prevents ball blowout
- contributes to low operating torque.

Important Information About Ball Valves

⚠ **Swagelok ball valves are designed to be used in a fully open or fully closed position.**

⚠ **Valves that have not been cycled for a period of time may have a higher initial actuation torque.**

Technical Data

Seat Material	Temperature Rating °F (°C)	Pressure Rating at 100°F (37°C) psig (bar)		Flow Coefficient (C_v)
		Stainless Steel	Alloy 400	
83 Series				
PCTFE, reinforced nylon	0 to 250 (–17 to 121)	6000 (413)	5000 (344)	2-way valves—1.0 to 1.6 depending on end connection; 3-way valves—0.75
PEEK	0 to 450 (–17 to 232)	6000 (413)	5000 (344)	
PTFE		1500 (103)		
H83 Series				
PEEK	0 to 450 (–17 to 232)	6000 to 10 000 (413 to 689) depending on end connection	—	2-way valves—1.0 to 1.6 depending on end connection; 3-way valves—0.75

Pressure-Temperature Ratings

83 Series

Pressure-temperature ratings for 83 series valves are based on listed seat materials, fluorocarbon FKM O-rings, and reinforced PTFE backup rings.

Low-temperature L83 series ball valves are available, see page 9.

Material	316 SS			Alloy 400		
Seat Material	PCTFE, Nylon	PTFE	PEEK	PCTFE, Nylon	PTFE	PEEK
Temperature, °F (°C)	Working Pressure, psig (bar)					
0 (–17) to 100 (37)	6000 (413)	1500 (103)	6000 (413)	5000 (344)	1500 (103)	5000 (344)
150 (65)	3000 (206)	1125 (77.5)	5800 (399)	3000 (206)	1125 (77.5)	4690 (323)
200 (93)	2000 (137)	750 (51.6)	5000 (344)	2000 (137)	750 (51.6)	4390 (302)
250 (121)	1000 (68.9)	625 (43.0)	4100 (282)	1000 (68.9)	625 (43.0)	4100 (282)
300 (148)	—	500 (34.4)	3200 (220)	—	500 (34.4)	3200 (220)
350 (176)	—	375 (25.8)	2300 (158)	—	375 (25.8)	2300 (158)
400 (204)	—	250 (17.2)	1400 (96.4)	—	250 (17.2)	1400 (96.4)
450 (232)	—	125 (8.6)	500 (34.4)	—	125 (8.6)	500 (34.4)

H83 Series

Pressure-temperature ratings for H83 series valves are based on PEEK seats, fluorocarbon FKM O-rings, and reinforced PTFE backup rings.

Low-temperature LH83 series ball valves are available, see page 9.

Material	316 SS				
End Connections	F2, F4, S4, S6MM	S10MM	S6, S8MM	S8	S12MM
Temperature, °F (°C)	Working Pressure, psig (bar)				
0 (–17) to 100 (37)	10 000 (689)	8400 (578)	7500 (516)	6700 (461)	6600 (454)
150 (65)	7 500 (516)	7500 (516)	7500 (516)	6700 (461)	6600 (454)
200 (93)	5 000 (344)	5000 (344)	5000 (344)	5000 (344)	5000 (344)
250 (121)	4 100 (282)	4100 (282)	4100 (282)	4100 (282)	4100 (282)
300 (148)	3 200 (220)	3200 (220)	3200 (220)	3200 (220)	3200 (220)
350 (176)	2 300 (158)	2300 (158)	2300 (158)	2300 (158)	2300 (158)
400 (204)	1 400 (96.4)	1400 (96.4)	1400 (96.4)	1400 (96.4)	1400 (96.4)
450 (232)	500 (34.4)	500 (34.4)	500 (34.4)	500 (34.4)	500 (34.4)

Flow Data at 70°F (20°C)

83 Series 2-Way

0.187 in. (4.75 mm) orifice, 1.2 C_v

Pressure Drop to Atmosphere (Δp) psi (bar)	Air Flow std ft³/min (std L/min)	Water Flow U.S. gal/min (L/min)
10 (0.68)	14 (390)	3.8 (14)
50 (3.4)	36 (1000)	8.5 (32)
100 (6.8)	64 (1800)	12 (45)

H83 Series 2-Way

0.187 in. (4.75 mm) orifice, 1.2 C_v

Pressure Drop to Atmosphere (Δp) psi (bar)	Air Flow std ft³/min (std L/min)	Water Flow U.S. gal/min (L/min)
150 (10.3)	92 (2600)	15 (56)
600 (41.3)	340 (9600)	29 (100)
1000 (68.9)	570 (16 100)	38 (140)

83 Series 3-Way

0.187 in. (4.75 mm) orifice, 0.75 C_v

Pressure Drop to Atmosphere (Δp) psi (bar)	Air Flow std ft³/min (std L/min)	Water Flow U.S. gal/min (L/min)
10 (0.68)	8.0 (220)	2.4 (9.0)
50 (3.4)	23 (650)	5.3 (20)
100 (6.8)	40 (1100)	7.5 (28)

H83 Series 3-Way

0.187 in. (4.75 mm) orifice, 0.75 C_v

Pressure Drop to Atmosphere (Δp) psi (bar)	Air Flow std ft³/min (std L/min)	Water Flow U.S. gal/min (L/min)
150 (10.3)	57 (1600)	9.2 (34)
600 (41.3)	210 (5900)	18 (68)
1000 (68.9)	350 (9900)	24 (90)

Testing

Every Swagelok trunnion ball valve is factory tested with nitrogen at 1000 psig (69 bar). Seats have a maximum allowable leak rate of 0.1 std cm³/min. Shell testing is performed to a requirement of no detectable leakage with a liquid leak detector.

Low Fugitive Emissions

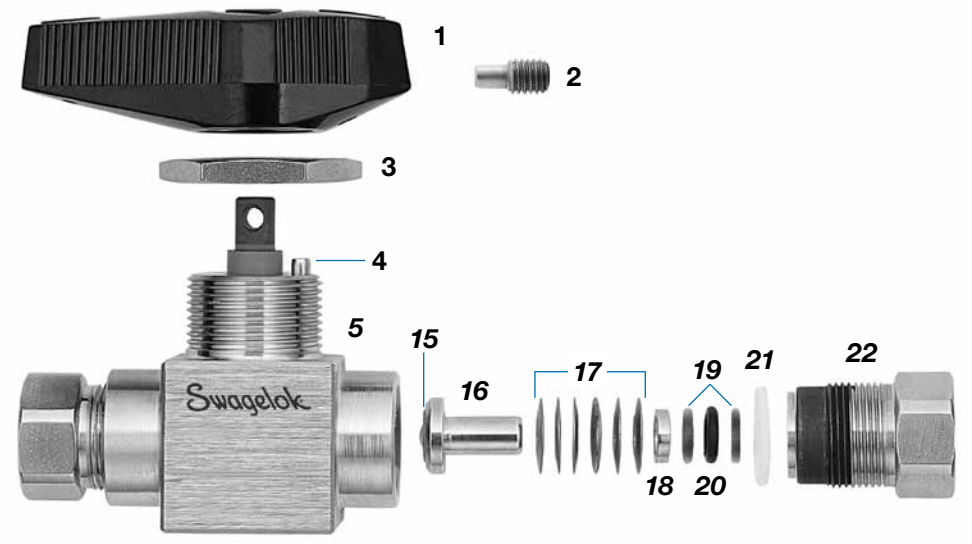
The American Petroleum Institute's API 641 tests for fugitive emissions to atmosphere for quarter turn ball valves. The tests are conducted at a third party lab and certify that at no point in the test did the valve leak in excess of 100 ppm of methane. Certificates stating that the valve is certified for Low Emissions service are available for the 83 series with Fluorocarbon FKM stem O-rings. For more information, contact your authorized Swagelok sales and service representative.

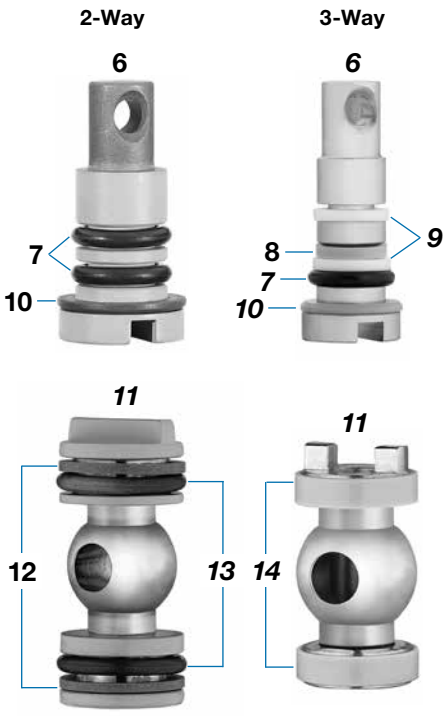
Cleaning and Packaging

All Swagelok trunnion ball valves are cleaned and packaged in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62. Cleaning and packaging 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 are available as an option for 83 series valves, see page 10.

Materials of Construction

83 Series





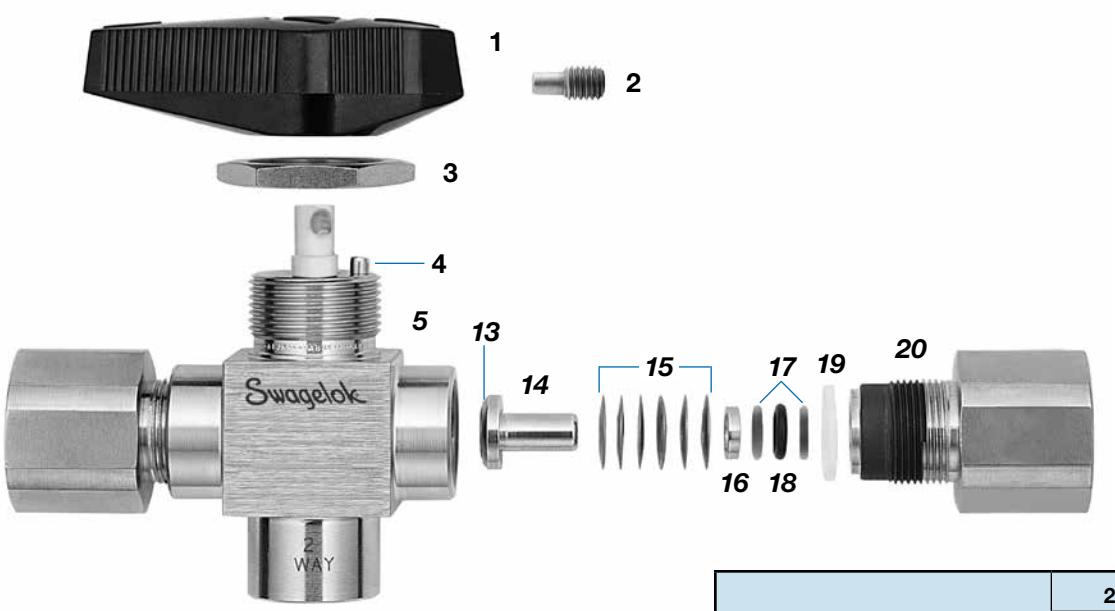
Component	Valve Body Material			
	Stainless Steel		Alloy 400	
	2-Way	3-Way	2-Way	3-Way
	Material Grade/ASTM Specification			
1 Handle	Phenolic with brass insert			
2 Set screw	S17400 SS			
3 Panel nut	316 SS/B783			
4 Stop pins (2-way—2; 3-way—1)	Stainless steel			
5 *Body*	*316 SS/A479*		*Alloy 400/B164*	
6 *Stem*	*316 SS/A276*		*Alloy 400/B164*	
7 *Stem O-rings (2-way—2; 3-way—1)*	*Fluorocarbon FKM*			
8 Primary stem backup ring	—	PEEK	—	PEEK
9 Secondary stem backup ring	—	PTFE/D1710	—	PTFE/D1710
10 *Stem bearing*	Reinforced PTFE	*PEEK*	Reinforced PTFE	*PEEK*
11 *Ball*①	*316 SS/A276*	*S21800/A276*	*Alloy 400/B164*	
12 Trunnion backup rings (2)	Reinforced PTFE	—	Reinforced PTFE	—
13 *Trunnion O-rings (2)*	*Fluorocarbon FKM*	—	*Fluorocarbon FKM*	—
14 *Trunnion bearings*	—	*PEEK*	—	*PEEK*
15 *Seats (2)*	*PCTFE/AMS 3650, PTFE/D1710, reinforced nylon, or PEEK*			
16 *Seat carriers (2)*	*316 SS/A276*		*Alloy 400/B164*	
17 *Seat springs (6 with PTFE; 12 with all others)*	*Alloy X-750/AMS 5542*			
18 *Seat carrier guides (2)*	*316 SS/A276*		*Alloy 400/B164*	
19 *Seat carrier backup rings (4)*	*Reinforced PTFE*			
20 *Seat carrier O-rings (2)*	*Fluorocarbon FKM*			
21 *End screw seals (2)*	*PTFE/D1710*			
22 *End screws (2)*	*316 SS/A479*		*Alloy 400/B164*	
Wetted lubricants	*Fluorinated-based (all valves); tungsten disulfide additive (valves with PEEK seats)*			
Nonwetted lubricant	Molybdenum disulfide with hydrocarbon binder coating			

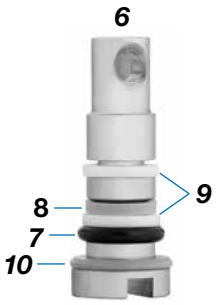
Wetted components listed in *italics*.

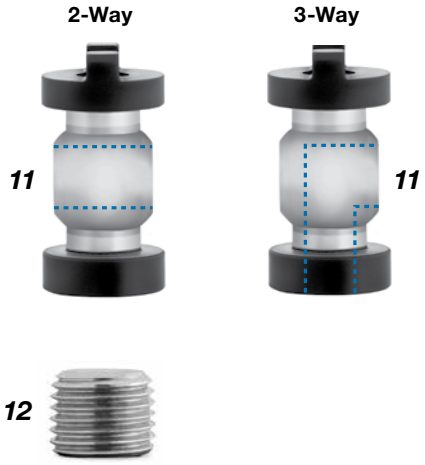
① Ball trunnions are PTFE coated in 83 series 2-way valve.

Materials of Construction

H83 Series







Component	2-Way	3-Way
	Material Grade/ ASTM Specification	
1 Handle	Phenolic with brass insert	
2 Set screw	S17400 SS	
3 Panel nut	316 SS/B783	
4 Stop pin (2-way—2; 3-way—1)	Stainless steel	
5 *Body*	*316 SS/A479*	
6 *Stem*	*316 SS/A276*	
7 *Stem O-ring*	*Fluorocarbon FKM*	
8 Primary stem backup ring	PEEK	
9 Secondary stem backup ring	PTFE/D1710	
10 *Stem bearing*	*PEEK*	
11 *Ball*①	*S21800/A276*	
12 *Plug (2-way only)*	*316 SS/A276*	—
13 *Seats (2)*	*PEEK*	
14 *Seat carriers (2)*	*316 SS/A276*	
15 *Seat springs (12)*	*Alloy X-750/AMS 5542*	
16 *Seat carrier guides (2)*	*316 SS/A276*	
17 *Seat carrier backup rings (4)*	*Reinforced PTFE*	
18 *Seat carrier O-rings (2)*	*Fluorocarbon FKM*	
19 *End screw seals (2)*	*PTFE/D1710*	
20 *End screws (2)*	*316 SS/A479*	
Wetted lubricants	*Tungsten disulfide and fluorinated-based*	
Nonwetted lubricant	Molybdenum disulfide with hydrocarbon binder coating	

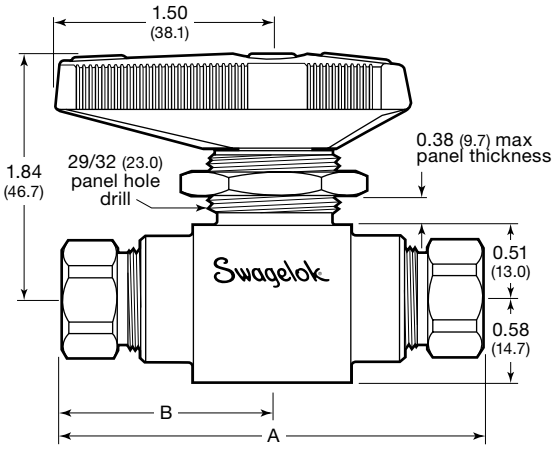
Wetted components listed in *italics*.

① Ball trunnions are Xylan® coated.

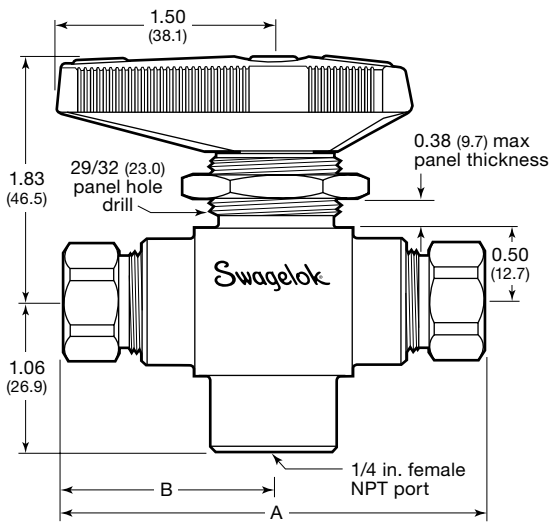
Ordering Information and Dimensions

Dimensions, in inches (millimeters), are for reference only and are subject to change. Dimensions shown with Swagelok tube fitting nuts finger-tight.

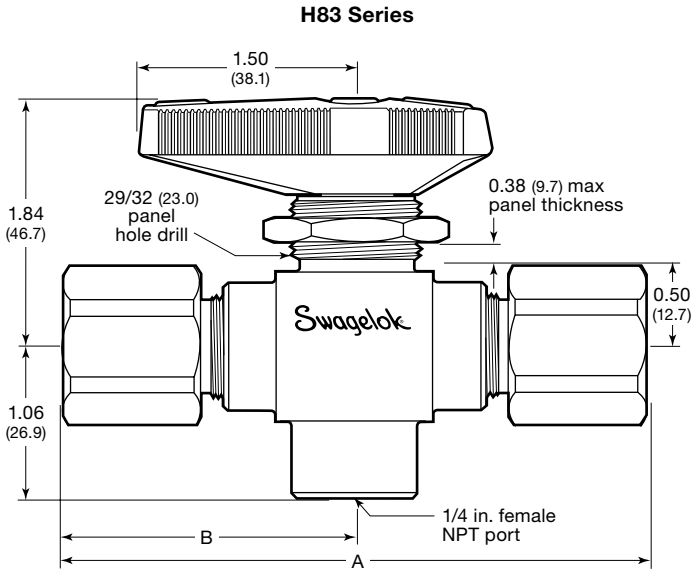
83 Series 2-Way



83 Series 3-Way



H83 Series



Ordering Information and Dimensions

83 Series

Select a valve ordering number from the table below.

Valve ordering numbers specify stainless steel material. To order valves of alloy 400 material, replace **SS** in the ordering number with **M.**

Example: **M**-83KF2

Valve ordering numbers specify a PCTFE seat. To order valves with other seat materials, replace **K** in the ordering number with a seat material designator.

Seat Material	Designator
PTFE	T
Reinforced nylon	N
PEEK	P

Example: SS-83**T**F2

H83 Series

Select a valve ordering number from the table below.

End Connections		Flow Coefficient (C_v)	83 Series Valve Ordering Number	H83 Series Valve Ordering Number	Dimensions, in. (mm)	
Type	Size				A	B
2-Way Valve, 0.187 in. (4.75 mm) Orifice						
Female NPT	1/8 in.	1.2	SS-83KF2	SS-H83PF2	2.94 (74.7)	1.47 (37.3)
	1/4 in.	1.0	SS-83KF4	—	2.94 (74.7)	1.47 (37.3)
			—	SS-H83PF4	3.93 (99.8)	1.97 (50.0)
	1/2 in.①	1.2	SS-83KF8	—	4.25 (108)	2.13 (54.1)
Fractional Swagelok tube fitting	1/4 in.	1.6	SS-83KS4	SS-H83PS4	4.14 (105)	2.07 (52.6)
	3/8 in.	1.4	SS-83KS6	SS-H83PS6	4.39 (112)	2.19 (55.6)
	1/2 in.①	1.0	SS-83KS8	SS-H83PS8	4.60 (117)	2.30 (58.4)
Metric Swagelok tube fitting	6 mm	1.6	SS-83KS6MM	SS-H83PS6MM	4.14 (105)	2.07 (52.6)
	8 mm	1.5	SS-83KS8MM	SS-H83PS8MM	4.15 (105)	2.07 (52.6)
	10 mm	1.3	SS-83KS10MM	SS-H83PS10MM	4.41 (112)	2.20 (55.9)
	12 mm①	1.0	SS-83KS12MM	SS-H83PS12MM	4.60 (117)	2.30 (58.4)
3-Way Valve, 0.187 in. (4.75 mm) Orifice						
Female NPT②	1/8 in.	0.75	SS-83XKF2	SS-H83XPF2	2.94 (74.7)	1.47 (37.3)
	1/4 in.		SS-83XKF4	—	2.94 (74.7)	1.47 (37.3)
			—	SS-H83XPF4	3.93 (99.8)	1.97 (50.0)
Fractional Swagelok tube fitting②	1/4 in.		SS-83XKS4	SS-H83XPS4	4.14 (105)	2.07 (52.6)
	3/8 in.		SS-83XKS6	SS-H83XPS6	4.39 (112)	2.19 (55.6)
	1/2 in.①		SS-83XKS8	SS-H83XPS8	4.60 (117)	2.30 (58.4)
Metric Swagelok tube fitting②	6 mm		SS-83XKS6MM	SS-H83XPS6MM	4.14 (105)	2.07 (52.6)
	8 mm		SS-83XKS8MM	SS-H83XPS8MM	4.15 (105)	2.07 (52.6)
	10 mm		SS-83XKS10MM	SS-H83XPS10MM	4.41 (112)	2.20 (55.9)
	12 mm①		SS-83XKS12MM	SS-H83XPS12MM	4.60 (117)	2.30 (58.4)

For more information about pressure ratings of valves with tube fitting end connections, refer to *Tubing Data* catalog, MS-01-107.

① Not recommended for panel mounting.

② Bottom port of all 3-way valves is 1/4 in. female NPT.

Options and Accessories

83 and H83 Series Handles

Black phenolic handles are standard. Colored phenolic, oval, and 316 stainless steel bar handles are available. To order, add a handle designator to the valve ordering number.

Example: SS-83KF2-**RD**

Handle	Designator
Black phenolic	-BK
Blue phenolic	-BL
Green phenolic	-GR
Orange phenolic	-OG
Red phenolic	-RD
Yellow phenolic	-YW
Stainless steel bar	-SH
Oval	-K

Handle Kits

Handle kits contain a handle and set screw.

Standard black phenolic handle kit ordering number: **PH-5K-83-BK**

To order handles in other colors, replace **-BK** in the kit ordering number with a handle designator.

Example: PH-5K-83-**RD**

Oval handles are available factory assembled only.

Stainless steel bar handle kit ordering number: **SS-5K-83**

Locking Handle

The stainless steel locking handle accommodates shackle diameters from 1/4 to 5/16 in. (6.4 to 7.9 mm) and a 3/4 in. (19.0 mm) minimum shackle length. It can lock 83 series and H83 series 2-way and 3-way valves in the open or closed position.

To order a valve with a factory-assembled locking handle, add **-LH** to a valve ordering number.

Examples: SS-83KS8-**LH**
SS-83XKS8-**LH**

Locking Handle Kits

The stainless steel locking handle kit is available for replacing an existing phenolic or stainless steel bar handle; it cannot be used to replace an existing oval handle. The kit includes a locking handle, lock plate, set screw, and instructions.

Kit ordering number: **SS-5K-83LH**

83 Series Seal Kits

Seal kits contain components of the same materials as new components. See **Materials of Construction,** page 4, or **Low-Temperature Service,** page 9.

For a complete ordering number, add a seat material designator to a basic seal kit ordering number.

Example: SS-9K-83**K**

Seat Material	Designator
PEEK	P
PCTFE	K
PTFE	T
Reinforced nylon	N

Valve Series	Basic Seal Kit Ordering Number	Kit Contents
83 2-way	SS-9K-83	O-rings, stem bearing, ball, seat subassemblies (seats and seat carriers), seat springs, end screw seals, lubricant, lubricant Material Safety Data Sheet (MSDS), instructions
Low-temperature 83 2-way	SS-9K-L83	
83 3-way	SS-9K-83X	Stem, handle set screw, O-rings, backup rings, bearings, ball, seat subassemblies (seats and seat carriers), seat springs, end screw seals, lubricant, lubricant MSDS, instructions
Low-temperature 83 3-way	SS-9K-L83X	

Seal kit ordering numbers specify stainless steel material. For alloy 400 material, replace **SS** with **M** for in the basic ordering number.

Example: **M**-9K-83K

H83 Series Seal Kits

Seal kits contain components of the same materials as new components. See **Materials of Construction,** page 5, or **Low-Temperature Service,** page 9.

Valve Series	Seal Kit Ordering Number	Kit Contents
H83 2-way	SS-9K-H83P	Stem, handle set screw, O-rings, backup rings, stem bearing, ball, seat subassemblies (seats and seat carriers), seat springs, end screw seals, lubricant, lubricant MSDS, instructions
Low-temperature H83 2-way	SS-9K-LH83P	
H83 3-way	SS-9K-H83XP	
Low-temperature H83 3-way	SS-9K-LH83XP	

83 Series Vent Options

A downstream or upstream ball vent is available in 83 series 2-way valves. The vent port in the ball does not intersect the main flow passage, ensuring no leakage of system media from the vent port. When the valve is open, flow is straight through. The pressure rating with a ball vent is reduced to 500 psig (34.4 bar).

Downstream (DV) Vent

When a downstream-vented valve is closed, full shutoff occurs at the upstream seat. Downstream system media passes through the vent hole in the ball trunnion and vents to atmosphere through the bottom of the trunnion.

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

Example: SS-83K**DV**F2

Upstream (UV) Vent

When an upstream-vented valve is closed, full shutoff occurs at the downstream seat. Upstream system media passes through the vent hole in the ball trunnion and vents to atmosphere through the bottom of the trunnion.

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

Example: SS-83K**UV**F2

Service Options

83 and H83 Series Low-Temperature Service

Trunnion ball valves for low-temperature service, with a temperature rating of –40 to 200°F (–40 to 93°C), are available. Low-temperature valves have low-temperature Buna C O-rings. All other materials and ratings are the same as those of standard valves.

To order a valve for low-temperature service, insert **L** into the valve ordering number.

Example: SS-**L**83KF2

L83 Series Pressure-Temperature Ratings

Material	316 SS			Alloy 400		
Seat Material	**PCTFE, Nylon**	**PTFE**	**PEEK**	**PCTFE, Nylon**	**PTFE**	**PEEK**
Temperature, °F (°C)	**Working Pressure,** psig (bar)					
–40 (–40) to 100 (37)	6000 (413)	1500 (103)	6000 (413)	5000 (344)	1500 (103)	5000 (344)
150 (65)	3000 (206)	1125 (77.5)	5800 (399)	3000 (206)	1125 (77.5)	4690 (323)
200 (93)	2000 (137)	750 (51.6)	5000 (344)	2000 (137)	750 (51.6)	4390 (302)

LH83 Series Pressure-Temperature Ratings

Material	316 SS				
End Connections	**F2, F4, S4, S6MM**	**S10MM**	**S6, S8MM**	**S8**	**S12MM**
Temperature, °F (°C)	**Working Pressure,** psig (bar)				
–40 (–40) to 100 (37)	10 000 (689)	8400 (578)	7500 (516)	6700 (461)	6600 (454)
150 (65)	7 500 (516)	7500 (516)	7500 (516)	6700 (461)	6600 (454)
200 (93)	5 000 (344)	5000 (344)	5000 (344)	5000 (344)	5000 (344)

83 Series Valves With ECE R110-Type Approval

–40 to 185°F (–40 to 85°C) Temperature Range

Stainless steel 83 series 2-way and 3-way valves with PEEK seats and Buna C O-rings are available with ECE R110-type approval for use in alternative fuel service.

- Temperature rating: –40 to 185°F (–40 to 85°C)
- Pressure rating within the range: 3770 psig (260 bar)

To order, add **-11354** to a PEEK-seated, low-temperature valve ordering number.

Examples: SS-L83PS8**-11354**
SS-L83XPS8**-11354**

–40 to 248°F (–40 to 120°C) Temperature Range

Stainless steel 83 series 2-way and 3-way valves with PEEK seats and low-temperature fluorocarbon FKM O-rings are available with ECE R110-type approval for use in alternative fuel service.

- Temperature rating: –40 to 248°F (–40 to 120°C)
- Pressure rating within the range: 3770 psig (260 bar)

To order, add **-21265** to a PEEK-seated, low-temperature valve ordering number.

Examples: SS-L83PS8**-21265**
SS-L83XPS8**-21265**

G83 Series Valves with NGV 3.1 Approval

Stainless steel G83 series 2-way and 3-way manual valves with PEEK seats and Buna C O-rings are available with ANSI NGV 3.1/CSA 12.3 approval.

- Temperature rating: –40 to 180°F (–40 to 82°C)
- Pressure rating: 5000 psig (344 bar)
- Marking: CSA (Canada and U.S.A.) mark and manufacturing date code

Testing

Every Swagelok G83 series valve is factory tested with nitrogen at 5000 psig (344 bar), with a maximum allowable leak rate of 0.5 std cm^3/min, and at 100 psig (6.8 bar), with a maximum allowable leak rate of 0.1 std cm^3/min Shell testing is performed to a requirement of no detectable leakage with a liquid leak detector.

To order, replace **L** with **G** in a PEEK-seated, low-temperature valve ordering number.

Examples: SS-**G**83PS8
SS-**G**83XPS8

Additional Valve Materials

Alloy 625, alloy 825, and Alloy 2507 super duplex stainless steel materials are available for 83 series valves. Refer to *Trunnion Ball Valves—Special Alloy Materials* catalog, MS-02-357.

Service Options

83 Series for "Fast Fill" CNG Filling Station Applications

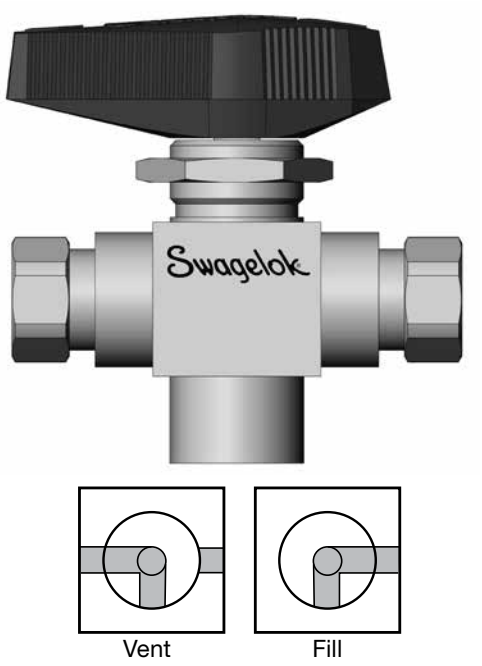
Stainless steel 83 series 3-way manual valves are available for use in a variety of filling station applications. These valves improve performance in demanding high-cycle, high-pressure applications, and prevent the need for frequent rebuilds.

Features include:

- A directional installation with 90 degree actuation for ease of operation during filling
- 3-way design with vent port for ease of venting after fill
- PEEK seats to reduce maintenance required in high-cycle applications
- Cycle life test report available upon request

Example: SS-83DXLPF4
SS-L83DXLPF4

Note: The handle set screw used in this valve is longer than the standard 83 series handle set screw and thus is not interchangeable. Seal kits are not available for the 83DXL valve.



83 Series Special Cleaning and Packaging (SC-11)

To order optional cleaning and packaging 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 for 83 series valves, add **-SC11** to the valve ordering number.

Example: SS-83KF2-**SC11**

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.

FFKM O-Ring Material

An optional FFKM O-ring material is available for 83 and H83 Series ball valves.

- Temperature rating for 83 Series with FFKM O-ring material: 25 to 250°F (–3 to 121°C)
- Temperature rating for H83 Series with FFKM O-ring material: 36 to 250°F (3 to 121°C)

To order, add **-KZ** to the valve ordering number.

Example: SS-83PS4-**KZ**

Pneumatic Actuators

Swagelok rack and pinion pneumatic actuators are compact, lightweight, easily mountable, and can be operated with standard shop air. They are available in spring-return and double-acting modes. On-off (2-way) valves require 90° actuation; switching (3-way) valves require 180° actuation.

For technical data, including pressure-temperature ratings and materials of construction, refer to *Ball Valve Actuation Options* catalog, MS-02-343.

⚠ **Actuated assemblies must be properly aligned and supported. Improper alignment or inadequate support of the actuated assembly may result in leakage or premature valve failure.**

Pressure-Temperature Ratings

Actuator Service	Actuator Service Designator	Temperature Range °F (°C)	Maximum Actuator Pressure, psig (bar)	
			At 100°F (37°C)	At Maximum Temperature
Standard	—	–20 to 200 (–28 to 93)	200 (13.7)	165 (11.3)
High temperature	HT	0 to 400 (–17 to 204)		100 (6.8)
Low temperature	LT	–40 to 200 (–40 to 93)		165 (11.3)
Nonfluorocarbon	NF	–20 to 200 (–28 to 93)		165 (11.3)

83 Series Actuator Pressure at Maximum System Pressure

Based on valve performance using pressurized air or nitrogen.

Valve Series	Actuator Model	Actuator Model Designator	System Pressure psig (bar)	Actuation Modes			
				Double Acting		Spring Return	
				Single	Dual	Single	Dual
				Minimum Actuator Pressure, psig (bar)			
83 2-way	31 (90°)	-31	1500 (103)	30 (2.1)	50 (3.5)	70 (4.9)	80 (5.6)
			6000 (413)	35 (2.5)	60 (4.2)	75 (5.2)	—
	33 (90°)	-33	1500 (103)	15 (1.1)	20 (1.4)	65 (4.5)	70 (4.9)
			6000 (413)	20 (1.4)	25 (1.8)	75 (5.2)	75 (5.2)
83 3-way	51 (180°)	-51	1500 (103)	35 (2.5)	60 (4.2)	75 (5.2)	—
			6000 (413)	45 (3.2)	85 (5.8)	—	
	53 (180°)	-53	1500 (103)	15 (1.1)	25 (1.8)	70 (4.9)	75 (5.2)
			6000 (413)	20 (1.4)	35 (2.5)	75 (5.2)	—

H83 Series Actuator Pressure at Maximum System Pressure

Based on valve performance using pressurized air or nitrogen.

Valve Series	Actuator Model	Actuator Model Designator	System Pressure psig (bar)	Actuation Modes			
				Double Acting		Spring Return	
				Single	Dual	Single	Dual
				Minimum Actuator Pressure, psig (bar)			
H83 2-way	31 (90°)	-31	1 500 (103)	35 (2.5)	60 (4.2)	—	—
			6 000 (413)	45 (3.2)	85 (5.9)		
			10 000 (689)	55 (3.8)	100 (6.9)		
	33 (90°)	-33	1 500 (103)	15 (1.1)	25 (1.8)	70 (4.9)	75 (5.2)
			6 000 (413)	20 (1.4)	35 (2.5)	75 (5.2)	85 (5.9)
			10 000 (689)	25 (1.8)	45 (3.2)	80 (5.6)	90 (6.3)
H83 3-way	51 (180°)	-51	1 500 (103)	35 (2.5)	60 (4.2)	—	—
			6 000 (413)	45 (3.2)	85 (5.9)		
			10 000 (689)	55 (3.8)	100 (6.9)		
	53 (180°)	-53	1 500 (103)	15 (1.1)	25 (1.8)	70 (4.9)	—
			6 000 (413)	20 (1.4)	35 (2.5)	75 (5.2)	
			10 000 (689)	25 (1.8)	45 (3.2)	80 (5.6)	

Pneumatic Actuators

Ordering Information

Factory-Assembled Valves with Actuators

Typical Ordering Number

A		B	C	D
SS - 83KF2		-31	D	HT

A Valve Ordering Number

B Actuator Model
Based on valve series, flow pattern, and actuation mode, select an actuator designator. See **Actuator Pressure at Maximum System Pressure** tables, page 11.
- **-31** = 90° actuation
- **-33** = 90° actuation
- **-51** = 180° actuation
- **-53** = 180° actuation

C Actuation Mode
- **C** = Spring return, normally closed
- **D** = Double acting
- **O** = Spring return, normally open
- **S** = Spring return, 3-way valves

D Actuator Service
- **HT** = High temperature
- **LT** = Low temperature
- **NF** = Nonfluorocarbon
- **None** = Standard

*For dual-mounted assemblies (two valves mounted to one actuator), add **DM** to the ordering number.*

*Example: SS-83KF2-31D**DM***

Kits for Field Assembly

Order one actuator kit and one mounting bracket kit for each valve.

Actuator Kit Typical Ordering Number

	A		B	C
MS-1	31	-	DA	-HT

A Actuator Model
Based on valve series, flow pattern, and actuation mode, select an actuator designator. See **Actuator Pressure at Maximum System Pressure** tables, page 11.
- **31** = 90° actuation
- **33** = 90° actuation
- **51** = 180° actuation
- **53** = 180° actuation

B Actuation Mode
- **DA** = Double acting
- **SR** = Spring return

C Actuator Service
- **-HT** = High temperature
- **-LT** = Low temperature
- **-NF** = Nonfluorocarbon
- **None** = Standard

Mounting Bracket Kits

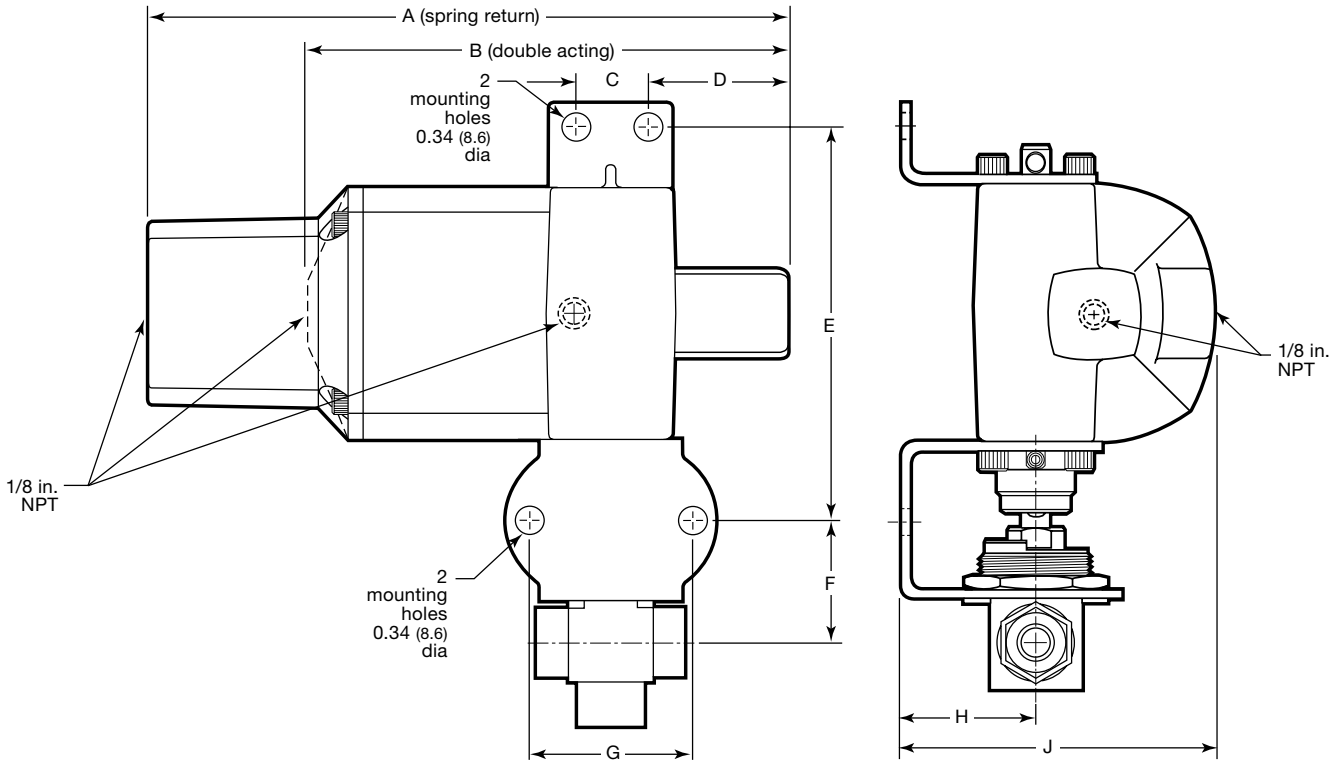
Mounting bracket kits contain:
- 316 stainless steel mounting bracket
- carbon steel coupling
- stainless steel stop pin (90° actuation, 2 roll pins; 180° actuation, 1 roll pin)
- S17400 set screw
- instructions.

Valve Series	Actuator Model	Mounting Bracket Kit Ordering Number
83, H83 2-way	31 (90°)	MS-MB-83-131
	33 (90°)	MS-MB-83-133
83, H83 3-way	51 (180°)	MS-MB-83-131
	53 (180°)	MS-MB-83-133

Pneumatic Actuators

Dimensions

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



Actuator Model	Dimensions, in. (mm)								
	A	B	C	D	E	F	G	H	J
31 (90°) 51 (180°)	4.91 (125)	4.09 (104)	0.63 (16.0)	1.15 (29.2)	3.64 (92.5)	1.28 (32.5)	2.00 (50.8)	1.31 (33.3)	3.04 (77.2)
33 (90°) 53 (180°)	7.86 (200)	5.89 (150)	0.88 (22.4)	1.73 (44.0)	4.88 (124)	1.51 (38.4)	2.00 (50.8)	1.75 (44.4)	4.07 (103)

ISO 5211-Compliant Pneumatic Actuators

Swagelok ISO 5211-compliant rack and pinion pneumatic actuators are suitable for general applications. They are available in spring-return and double-acting modes. On-off (2-way) valves require 90° actuation; switching (3-way) valves require 180° actuation.

Valve-actuator assemblies on this page are based on:

- maximum valve pressure
- ambient temperature (50 to 100°F [10 to 37°C])

For technical data, including actuator materials of construction and weight, refer to *Ball Valve Actuation Options* catalog, MS-02-343.

For additional information on selecting and sizing ISO 5211-compliant actuators, refer to *Actuated Ball Valve Selection Guide—ISO 5211-Compliant Actuator Mounting Bracket Kits* catalog, MS-02-136.

⚠ **Actuated assemblies must be properly aligned and supported. Improper alignment or inadequate support of the actuated assembly may result in leakage or premature valve failure.**

Pressure-Temperature Ratings

Maximum actuator pressure is 116 psig (8.0 bar). See **Minimum Actuator Pressure** table below for minimum actuator pressures.

Actuator Service	Actuator Service Designator	Temperature Range °F (°C)
Standard	—	–40 to 176 (–40 to 80)
High temperature	HT	5 to 302 (–15 to 150)

83 Series Minimum Actuator Pressure

Valve Series	Actuator Model	Spring Return Model Designators		Double Acting Model Designator	Actuation Mode	
		Normally Closed	Normally Open		Spring Return	Double Acting
					Minimum Actuator Pressure, psig (bar)	
83 2-way	A10 (90°)	—	—	-A10D	—	36 (2.5)
	A15 (90°)	-A15C3	-A15O3	-A15D	43 (3.0)	36 (2.5)
83 3-way	A15 (180°)	—	—	-A15XD	—	36 (2.5)

H83 Series Minimum Actuator Pressure

Valve Series	Actuator Model	Spring Return Model Designators		Double Acting Model Designator	Actuation Mode	
		Normally Closed	Normally Open		Spring Return	Double Acting
					Minimum Actuator Pressure, psig (bar)	
H83 2-way	A10 (90°)	—	—	-A10D	—	43 (3.0)
	A15 (90°)	-A15C3	-A15O3	-A15D	43 (3.0)	36 (2.5)
H83 3-way	A15 (180°)	—	—	-A15XD	—	36 (2.5)

ISO 5211-Compliant Pneumatic Actuators

Ordering Information

Factory-Assembled Valves with Actuators

Typical Ordering Number

A B C
SS-83KF2 -A15D HT

A Valve Ordering Number

B Actuator Model
Based on valve series, flow pattern, and actuation mode, select an actuator designator. See **Minimum Actuator Pressure** tables, page 14.

C Actuator Service
HT = High temperature
None = Standard

Kits for Field Assembly

Order one actuator kit and one mounting bracket kit for each valve.

Actuator Kit Typical Ordering Number

A B C D
MS - **A15** - **3** - DIN **-HT**

A Actuator Model
Based on valve series, flow pattern, and actuation mode, select an actuator. See **Minimum Actuator Pressure** tables, page 14.
A10 = A10
A15 = A15

B Actuation Mode
DA = Double acting (2-way valves)
XDA = Double acting (3-way valves)
3 = Spring return

C Coupling Drive Type
DIN

D Actuator Service
-HT = High temperature
None = Standard

Mounting Bracket Kits

Swagelok ISO 5211 mounting bracket kits contain:

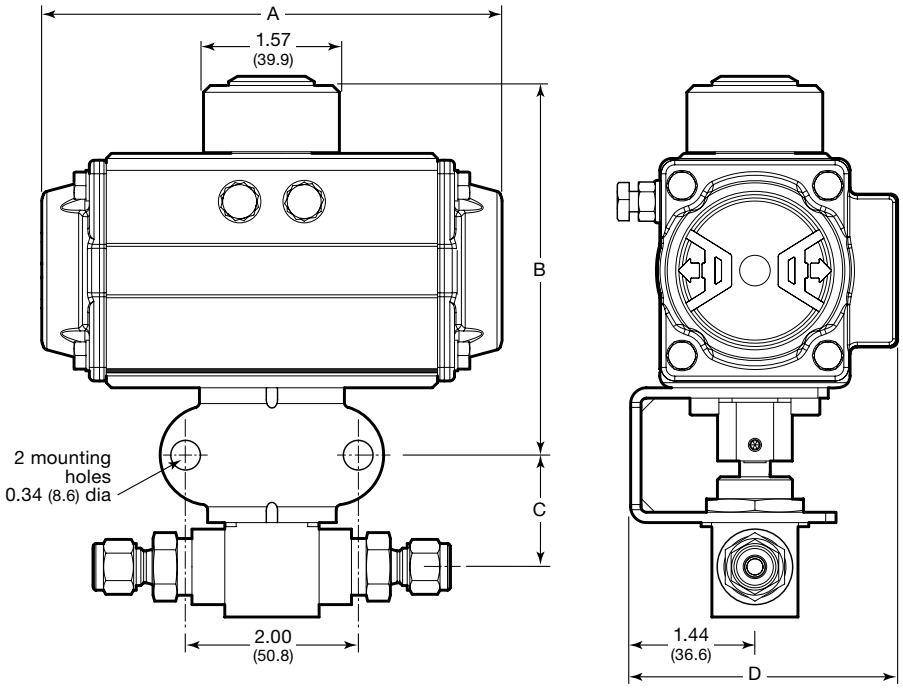
- 316 stainless steel mounting bracket
- four A4 stainless steel socket head cap screws (A4 is approximately equivalent to AISI 316.)
- 316 stainless steel coupling
- A4 stainless steel set screw
- instructions.

Kit ordering number: **SS-MB-83-F04-11DIN-M**

ISO 5211-Compliant Pneumatic Actuators

Dimensions

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



Valve Series	Actuator Model	Dimensions, in. (mm)			
		A	B	C	D
83, H83 2-way	A10 (90°)	4.65 (118)	4.17 (106)	1.29 (32.8)	2.84 (72.1)
	A15 (90°)	5.33 (135)	4.17 (106)	1.29 (32.8)	3.09 (78.5)
83, H83 3-way	A15 (180°)	7.55 (192)	4.28 (109)	1.29 (32.8)	3.09 (78.5)

Options for ISO 5211-Compliant and Swagelok Pneumatic Actuators

Swagelok offers a range of accessories to enhance instrumentation and process ball valve performance and control, including solenoid valves, limit switches, and position sensors. Factory assemblies and kits for field assembly are available.

Refer to *Ball Valve Actuation Options* catalog, MS-02-343, for additional information.

Electric Actuators

Swagelok electric actuators are rugged and lightweight, and connect alternating- or direct-current power sources.

Refer to *Electric Actuators—141 and 142 Series* catalog, MS-01-35, for additional information.

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

Swagelok

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 Lifetime 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.

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

Actuated Ball Valve Selection Guide

ISO 5211-Compliant Actuator Mounting Bracket Kits

40G, 40, 60, 83, H83, SK, and FKB Series Valves
AFS Ball Valves

- Calculate valve operating torque
- Choose actuators and related components
- Select mounting bracket kits

Swagelok

Contents

Introduction

This guide enables the user to:

- determine the operating torque for Swagelok® 40G, 40, 60, 83, H83, SK, and FKB series valves and AFS ball valves in a variety of operating conditions
- select and size actuators, based on valve operating torque
- choose Swagelok ISO 5211 dimensionally compliant mounting bracket kits, based on calculated operating torque values and actuator manufacturers' literature.

40G Series Valves

Swagelok 43G series valve with ISO 5211-compliant actuator.

Operating Torque

Operating torque for a Swagelok 40G series ball valve is influenced by:

- packing material
- system pressure
- system temperature
- system media.

The tables and calculations on page 3 can be used for 2- and 3-way stainless steel 40G series valves.

Valve Operating Torque

Start (break) torque is the torque required to begin actuation of a valve. The actuator start torque must be greater than the valve start torque.

End (run) torque is the torque required to complete the actuation. The actuator end torque must be greater than the valve end torque.

Factors that Affect Operating Torque

Frequency of Use

Operating torque typically increases as the time interval between cycles increases.

For applications in which valves are cycled less frequently than noted in the **Calculating Operating Torque** instructions, contact your authorized Swagelok sales and service representative.

Cycle Wear

Contacting surfaces—valve ball, seat, and body, for example—gradually wear as valves are actuated repeatedly, resulting in increased friction and operating torque. Actuation speed may influence the rate of valve wear as well.

For applications in which valves are actuated rapidly or repeatedly—more often than once per hour—contact your authorized Swagelok representative.

Seat or Packing Material

In some ball valve designs, friction between ball and seat or packing affects operating torque, which varies with material and lubricant.

System Pressure

Higher pressures cause greater contact forces and friction, resulting in higher operating torque.

System Temperature

The values given in the tables that follow were generated at room temperature. Lower or higher temperatures, depending on the valve design, can cause increased operating torque.

System Media

The values given in the tables that follow were generated with clean, dry nitrogen gas. Different system fluids have varying viscosities, bringing about different levels of friction and affecting operating torque. Some lightweight oils may reduce operating torque. Dirty, abrasive, or highly viscous fluids may increase operating torque.

40G Series Valves

Calculating Operating Torque

1. Select the base start and base end torque at system pressure from Table 1.
2. Select the temperature factor from Table 2.
3. Select the media factor from Table 3.
4. Calculate the start and end operating torque:
   Base torque (Table 1)
   × temperature factor (Table 2)
   × media factor (Table 3).

Example: A 43G valve with modified PTFE packing is operated with nitrogen at 2500 psig and 70°F (20°C).

1. According to Table 1, the base start torque is 37 in.·lb and the base end torque is 11 in.·lb.
2. According to Table 2, the temperature factor is 1.0.
3. According to Table 3, the media factor is 1.0.
4. Start torque = 37 in.·lb × 1.0 × 1.0 = 37 in.·lb

   End torque = 11 in.·lb × 1.0 × 1.0 = 11 in.·lb

Ordering Information

1. Select the desired 40G series valve and packing material. Using the **Calculating Operating Torque** instructions at left, calculate the valve start and end torque.
2. Choose an actuator based on the valve start and end torque. See the actuator manufacturer's literature to specify ISO 5211 mounting dimensions, including flange and coupling sizes.
3. Select a mounting bracket kit ordering number based on valve series, flange size, and coupling size.

Table 1—Base Start and End Torque

Use linear interpolation to obtain torque values for system pressures not listed.

Valve Series	System Pressure, psig (bar, MPa)							
	0 to 1000 (68.9, 6.89)		1500 (103, 10.3)		2500 (172, 17.2)		3000 (206, 20.6)	
	Base Torque, in.·lb (N·m, cm·kg)							
	Start	End	Start	End	Start	End	Start	End
41G/42G 41GE/42GE 41G-1466/42G-1466	13 (1.5, 15) 10 (1.2, 12) 13 (1.5, 15)	7 (0.8, 8.1) 7 (0.8, 8.1) 7 (0.8, 8.1)	15 (1.7, 18) 11 (1.3, 13) —	7 (0.8, 8.1) 7 (0.8, 8.1) —	15 (1.7, 18) 12 (1.4, 14) —	8 (0.9, 9.3) 8 (0.9, 9.3) —	—	—
43G 43GE 43G-1466	32 (3.7, 37) 23 (2.6, 27) 28 (3.2, 33)	9 (1.1, 11) 10 (1.2, 12) 16 (1.9, 19)	33 (3.8, 39) 25 (2.9, 29) —	10 (1.2, 12) 11 (1.3, 13) —	37 (4.2, 43) 27 (3.1, 32) —	11 (1.3, 13) 12 (1.4, 14) —	40 (4.6, 47) 30 (3.4, 35) —	11 (1.3, 13) 13 (1.5, 15) —

Table 2—Temperature Factors

Use linear interpolation to obtain factors for system temperatures not listed.

Valve Series	Temperature, °F (°C)	
	–65 (–53)	50 to 300 (10 to 148)
41G/42G 41GE/42GE 41G-1466/42G-1466	1.0 1.5 1.0	1.0 1.0 1.0
43G 43GE 43G-1466	1.0 1.5 1.0	1.0 1.0 1.0

Table 3—Media Factors

Medium-Weight Oil	Clean Water	Nitrogen Gas
0.85	1.0	1.0

40G Series Valve Designators

None—standard, modified PTFE packing

E—UHMWPE packing

-1466—modified PTFE packing, assembled without lubricant and cleaned and packaged in accordance with Swagelok *Special Cleaning and Packaging (SC-11)* (MS-06-63).

See *Mounting Instructions, ISO 5211 Dimensionally Compliant Bracket, Coupling, and Actuator,* MS-INS-4080-NAMUR.

Mounting Bracket Kit Ordering Numbers

Valve Series	ISO 5211 Flange Size	Coupling Size	Cap Screw Type	Bracket Kit Ordering Number
41G/42G	F03	9 mm ISO	Metric	SS-MB-41G-F03-9ISO-M
		9 mm ISO	Fractional	SS-MB-41G-F03-9ISO-F
		9 mm DIN	Metric	SS-MB-41G-F03-9DIN-M
		9 mm DIN	Fractional	SS-MB-41G-F03-9DIN-F
	F04	9 mm ISO	Metric	SS-MB-41G-F04-9ISO-M
		9 mm ISO	Fractional	SS-MB-41G-F04-9ISO-F
		9 mm DIN	Metric	SS-MB-41G-F04-9DIN-M
		9 mm DIN	Fractional	SS-MB-41G-F04-9DIN-F
		11 mm ISO	Metric	SS-MB-41G-F04-11ISO-M
		11 mm ISO	Fractional	SS-MB-41G-F04-11ISO-F
		11 mm DIN	Metric	SS-MB-41G-F04-11DIN-M
		11 mm DIN	Fractional	SS-MB-41G-F04-11DIN-F
43G	F03	9 mm ISO	Metric	SS-MB-43G-F03-9ISO-M
		9 mm ISO	Fractional	SS-MB-43G-F03-9ISO-F
		9 mm DIN	Metric	SS-MB-43G-F03-9DIN-M
		9 mm DIN	Fractional	SS-MB-43G-F03-9DIN-F
	F04	9 mm ISO	Metric	SS-MB-43G-F04-9ISO-M
		9 mm ISO	Fractional	SS-MB-43G-F04-9ISO-F
		9 mm DIN	Metric	SS-MB-43G-F04-9DIN-M
		9 mm DIN	Fractional	SS-MB-43G-F04-9DIN-F
		11 mm ISO	Metric	SS-MB-43G-F04-11ISO-M
		11 mm ISO	Fractional	SS-MB-43G-F04-11ISO-F
		11 mm DIN	Metric	SS-MB-43G-F04-11DIN-M
		11 mm DIN	Fractional	SS-MB-43G-F04-11DIN-F
	F05	11 mm ISO	Metric	SS-MB-43G-F05-11ISO-M
		11 mm ISO	Fractional	SS-MB-43G-F05-11ISO-F
		11 mm DIN	Metric	SS-MB-43G-F05-11DIN-M
		11 mm DIN	Fractional	SS-MB-43G-F05-11DIN-F
		14 mm ISO	Metric	SS-MB-43G-F05-14ISO-M
		14 mm ISO	Fractional	SS-MB-43G-F05-14ISO-F
		14 mm DIN	Metric	SS-MB-43G-F05-14DIN-M
		14 mm DIN	Fractional	SS-MB-43G-F05-14DIN-F

40 Series Valves

Operating Torque

Operating torque for a Swagelok 40 series ball valve is influenced by:

- cycle frequency
- packing material
- system pressure
- system temperature
- system media.

The tables and calculations on this page can be used for 2- and 3-way 40 series valves in stainless steel, brass, and alloy 400 materials.

Calculating Operating Torque

If the valve will be cycled at least once per 3 days, but not more than once per hour:

1. Select the base start and base end torque at system pressure from Table 4.
2. Select the temperature factor from Table 5.
3. Select the media factor from Table 6.
4. Calculate the start and end operating torque:
   Base torque (Table 4)
   × temperature factor (Table 5)
   × media factor (Table 6).

Example: A 43 series valve with PTFE packing is operated with nitrogen at 1500 psig and 70°F (20°C) and cycled every 3 days.

1. According to Table 4, the base start torque is 33 in.·lb and the base end torque is 10 in.·lb.
2. According to Table 5, the temperature factor is 1.0.
3. According to Table 6, the media factor is 1.0.
4. Start torque = 33 in.·lb × 1.0 × 1.0 = 33 in.·lb

   End torque = 10 in.·lb × 1.0 × 1.0 = 10 in.·lb.

If the valve will be cycled less frequently than once per 3 days or more frequently than once per hour, contact your authorized Swagelok representative.

Table 4—Base Start and End Torque

Use linear interpolation to obtain torque values for system pressures not listed.

Valve Series	System Pressure, psig (bar, MPa)			
	0 to 1000 (68.9, 6.89)		1500 (103, 10.3)	
	Base Torque, in.·lb (N·m, cm·kg)			
	Start	End	Start	End
41/42 41T/42T 41E/42E 41-1466/42-1466	13 (1.5, 15) 13 (1.5, 15) 10 (1.2, 12) 13 (1.5, 15)	7 (0.8, 8.1) 7 (0.8, 8.1) 7 (0.8, 8.1) 7 (0.8, 8.1)	15 (1.7, 18) 15 (1.7, 18) 11 (1.3, 13) —	7 (0.8, 8.1) 7 (0.8, 8.1) 7 (0.8, 8.1) —
43 43T 43E 43-1466	32 (3.7, 37) 36 (4.1, 42) 23 (2.6, 27) 28 (3.2, 33)	9 (1.1, 11) 15 (1.7, 18) 10 (1.2, 12) 16 (1.9, 19)	33 (3.8, 39) 38 (4.3, 44) 25 (2.9, 29) —	10 (1.2, 12) 16 (1.9, 19) 11 (1.3, 13) —
44 44T 44E 44-1466	37 (4.2, 43) 48 (5.5, 56) 70 (8.0, 81) 60 (6.8, 70)	20 (2.3, 24) 22 (2.5, 26) 33 (3.8, 39) 40 (4.6, 47)	40 (4.6, 47) 52 (5.9, 60) 75 (8.5, 87) —	22 (2.5, 26) 23 (2.6, 27) 35 (4.0, 41) —
45 45T 45E 45-1466	80 (9.1, 93) 80 (9.1, 93) 130 (14.7, 150) 135 (15.3, 156)	30 (3.4, 35) 35 (4.0, 41) 46 (5.2, 53) 95 (10.8, 110)	85 (9.7, 98) 85 (9.7, 98) 135 (15.3, 156) —	32 (3.7, 37) 37 (4.2, 43) 50 (5.7, 58) —

Valve Series	System Pressure, psig (bar, MPa)			
	2500 (172, 17.2)		3000 (206, 20.6)	
	Base Torque, in.·lb (N·m, cm·kg)			
	Start	End	Start	End
41/42 41T/42T 41E/42E 41-1466/42-1466	15 (1.7, 18) 15 (1.7, 18) 12 (1.4, 14) —	8 (0.9, 9.3) 8 (0.9, 9.3) 8 (0.9, 9.3) —	—	—
43 43T 43E 43-1466	37 (4.2, 43) 42 (4.8, 49) 27 (3.1, 32) —	11 (1.3, 13) 18 (2.1, 21) 12 (1.4, 14) —	40 (4.6, 47) 45 (5.1, 52) 30 (3.4, 35) —	11 (1.3, 13) 20 (2.3, 24) 13 (1.5, 15) —
44 44T 44E 44-1466	44 (5.0, 51) 57 (6.5, 66) 83 (9.4, 96) —	25 (2.9, 29) 26 (3.0, 30) 40 (4.6, 47) —	—	—
45 45T 45E 45-1466	95 (10.8, 110) 95 (10.8, 110) 150 (17.0, 173) —	35 (4.0, 41) 42 (4.8,49) 55 (6.3, 64) —	—	—

Table 5—Temperature Factors

Use linear interpolation to obtain factors for temperatures from –65 to 50°F (–53 to 10°C).

Valve Series	Temperature, °F (°C)	
	(–65) (–53)	50 to 150 (10 to 65)
41/42 41T/42T 41E/42E 41-1466/42-1466	1.0 1.0 1.5 1.0	1.0 1.0 1.0 1.0
43 43T 43E 43-1466	1.0 1.0 1.5 1.0	1.0 1.0 1.0 1.0
44 44T 44E 44-1466	1.0 1.35 1.5 1.0	1.0 1.0 1.0 1.0
45 45T 45E 45-1466	1.0 1.35 1.5 1.0	1.0 1.0 1.0 1.0

Table 6—Media Factors

Medium-Weight Oil	Clean Water	Nitrogen Gas
0.85	1.0	1.0

40 Series Valve Designators

None—standard, PTFE packing

T—low-temperature, PFA packing

E—low-temperature, UHMWPE packing

-1466—modified PTFE packing, assembled without lubricant and cleaned and packaged in accordance with Swagelok *Special Cleaning and Packaging (SC-11)* (MS-06-63).

40 Series Valves

Ordering Information

1. Select the desired 40 series valve and packing material. Using the **Calculating Operating Torque** instructions at left, calculate the valve start and end torque.
2. Choose an actuator based on the valve start and end torque. See the actuator manufacturer's literature to specify ISO 5211 mounting dimensions, including flange and coupling sizes.
3. Select a Swagelok 40 series bracket kit ordering number. Bracket kits can be used with stainless steel, brass, and alloy 400 valves with K-style, double-flat stems.

   K-style stems are standard for all many 44 and 45 series valves, but are optional for 41, 42, and 43 series valves. For more information, contact your authorized Swagelok representative.

To order a valve with a K-style, double-flat stem and without a handle, if they are not standard, add **-K-NH** to the valve ordering number.

Example: SS-41S1-**K-NH**

See *Mounting Instructions, ISO 5211 Dimensionally Compliant Bracket, Coupling, and Actuator,* MS-INS-4080-NAMUR.

Swagelok 45 series valve with El-O-Matic® actuator and Westlock® limit switch.

Mounting Bracket Kit Ordering Numbers

Valve Series	ISO 5211 Flange Size	Coupling Size	Cap Screw Type	Bracket Kit Ordering Number
41/42	F03	9 mm ISO	Metric	SS-MB-41-F03-9ISO-M
		9 mm ISO	Fractional	SS-MB-41-F03-9ISO-F
		9 mm DIN	Metric	SS-MB-41-F03-9DIN-M
		9 mm DIN	Fractional	SS-MB-41-F03-9DIN-F
	F04	9 mm ISO	Metric	SS-MB-41-F04-9ISO-M
		9 mm ISO	Fractional	SS-MB-41-F04-9ISO-F
		9 mm DIN	Metric	SS-MB-41-F04-9DIN-M
		9 mm DIN	Fractional	SS-MB-41-F04-9DIN-F
		11 mm ISO	Metric	SS-MB-41-F04-11ISO-M
		11 mm ISO	Fractional	SS-MB-41-F04-11ISO-F
		11 mm DIN	Metric	SS-MB-41-F04-11DIN-M
		11 mm DIN	Fractional	SS-MB-41-F04-11DIN-F
43	F03	9 mm ISO	Metric	SS-MB-43-F03-9ISO-M
		9 mm ISO	Fractional	SS-MB-43-F03-9ISO-F
		9 mm DIN	Metric	SS-MB-43-F03-9DIN-M
		9 mm DIN	Fractional	SS-MB-43-F03-9DIN-F
	F04	9 mm ISO	Metric	SS-MB-43-F04-9ISO-M
		9 mm ISO	Fractional	SS-MB-43-F04-9ISO-F
		9 mm DIN	Metric	SS-MB-43-F04-9DIN-M
		9 mm DIN	Fractional	SS-MB-43-F04-9DIN-F
		11 mm ISO	Metric	SS-MB-43-F04-11ISO-M
		11 mm ISO	Fractional	SS-MB-43-F04-11ISO-F
		11 mm DIN	Metric	SS-MB-43-F04-11DIN-M
		11 mm DIN	Fractional	SS-MB-43-F04-11DIN-F
	F05	11 mm ISO	Metric	SS-MB-43-F05-11ISO-M
		11 mm ISO	Fractional	SS-MB-43-F05-11ISO-F
		11 mm DIN	Metric	SS-MB-43-F05-11DIN-M
		11 mm DIN	Fractional	SS-MB-43-F05-11DIN-F
		14 mm ISO	Metric	SS-MB-43-F05-14ISO-M
		14 mm ISO	Fractional	SS-MB-43-F05-14ISO-F
		14 mm DIN	Metric	SS-MB-43-F05-14DIN-M
		14 mm DIN	Fractional	SS-MB-43-F05-14DIN-F

Valve Series	ISO 5211 Flange Size	Coupling Size	Cap Screw Type	Bracket Kit Ordering Number
44	F03	9 mm ISO	Metric	SS-MB-44-F03-9ISO-M
		9 mm ISO	Fractional	SS-MB-44-F03-9ISO-F
		9 mm DIN	Metric	SS-MB-44-F03-9DIN-M
		9 mm DIN	Fractional	SS-MB-44-F03-9DIN-F
	F04	11 mm ISO	Metric	SS-MB-44-F04-11ISO-M
		11 mm ISO	Fractional	SS-MB-44-F04-11ISO-F
		11 mm DIN	Metric	SS-MB-44-F04-11DIN-M
		11 mm DIN	Fractional	SS-MB-44-F04-11DIN-F
	F05	11 mm ISO	Metric	SS-MB-44-F05-11ISO-M
		11 mm ISO	Fractional	SS-MB-44-F05-11ISO-F
		11 mm DIN	Metric	SS-MB-44-F05-11DIN-M
		11 mm DIN	Fractional	SS-MB-44-F05-11DIN-F
		14 mm ISO	Metric	SS-MB-44-F05-14ISO-M
		14 mm ISO	Fractional	SS-MB-44-F05-14ISO-F
		14 mm DIN	Metric	SS-MB-44-F05-14DIN-M
		14 mm DIN	Fractional	SS-MB-44-F05-14DIN-F
45	F05	11 mm ISO	Metric	SS-MB-45-F05-11ISO-M
		11 mm ISO	Fractional	SS-MB-45-F05-11ISO-F
		11 mm DIN	Metric	SS-MB-45-F05-11DIN-M
		11 mm DIN	Fractional	SS-MB-45-F05-11DIN-F
		14 mm ISO	Metric	SS-MB-45-F05-14ISO-M
		14 mm ISO	Fractional	SS-MB-45-F05-14ISO-F
		14 mm DIN	Metric	SS-MB-45-F05-14DIN-M
		14 mm DIN	Fractional	SS-MB-45-F05-14DIN-F
		17 mm ISO	Metric	SS-MB-45-F05-17ISO-M
		17 mm ISO	Fractional	SS-MB-45-F05-17ISO-F
		17 mm DIN	Metric	SS-MB-45-F05-17DIN-M
		17 mm DIN	Fractional	SS-MB-45-F05-17DIN-F
	F07	17 mm ISO	Metric	SS-MB-45-F07-17ISO-M
		17 mm ISO	Fractional	SS-MB-45-F07-17ISO-F
		17 mm DIN	Metric	SS-MB-45-F07-17DIN-M
		17 mm DIN	Fractional	SS-MB-45-F07-17DIN-F

60 Series Valves

Operating Torque

Operating torque for a Swagelok 60 series valve is influenced by:

- cycle frequency
- seat material
- system pressure
- system temperature
- system media.

The tables and calculations on this page can be used for 2- and 3-way 60 series valves in stainless steel, carbon steel, and brass materials.

Calculating Operating Torque

If the valve will be cycled at least once per day, but not more than once per hour:

1. Select the base start and base end torque at system pressure from Table 7.
2. Select the temperature factor from Table 8.
3. Select the media factor from Table 9.
4. Calculate the start and end operating torque:
   Base torque (Table 7)
   × temperature factor (Table 8)
   × media factor (Table 9).

Example: A 63 series valve with reinforced PTFE seat is operated with nitrogen at 1500 psig and 70°F (20°C) and cycled once per day.

1. According to Table 7, the base start torque is 62 in.·lb and the base end torque is 37 in.·lb.
2. According to Table 8, the temperature factor is 1.0.
3. According to Table 9, the media factor is 1.0.
4. Start torque = 62 in.·lb × 1.0 × 1.0 = 62 in.·lb

   End torque = 37 in.·lb × 1.0 × 1.0 = 37 in.·lb.

If the valve will be cycled less frequently than once per day or more frequently than once per hour, contact your authorized Swagelok representative.

Table 7—Base Start and End Torque

Use linear interpolation to obtain torque values for system pressures not listed.

Valve Series	System Pressure, psig (bar, MPa)					
	0		1000 (68.9, 6.89)		1500 (103, 10.3)	
	Base Torque, in.·lb (N·m, cm·kg)					
	Start	End	Start	End	Start	End
62T 62P	18 (2.1, 21) 25 (2.9, 29)	16 (1.9, 19) 16 (1.9, 19)	22 (2.5, 26) 25 (2.9, 29)	20 (2.3, 24) 16 (1.9, 19)	25 (2.9, 29) 30 (3.4, 35)	22 (2.5, 26) 20 (2.3, 24)
63T 63P	52 (5.9, 60) 50 (5.7, 58)	28 (3.2, 33) 40 (4.6, 47)	58 (6.6, 67) 50 (5.7, 58)	35 (4.0, 41) 40 (4.6, 47)	62 (7.1, 72) 65 (7.4, 75)	37 (4.2, 43) 50 (5.7, 58)
65T 65P	125 (14.2, 144) 90 (10.2, 104)	60 (6.8, 70) 75 (8.5, 87)	160 (18.1, 185) 90 (10.2, 104)	100 (11.3, 116) 75 (8.5, 87)	180 (20.4, 208) 150 (17.0, 173)	120 (13.6, 139) 125 (14.2, 144)
67T 67P	250 (28.3, 288) 190 (21.5, 219)	120 (13.6, 139) 160 (18.1, 185)	290 (32.8, 335) 190 (21.5, 219)	140 (15.9, 162) 160 (18.1, 185)	310 (35.1, 358) 275 (31.1, 317)	145 (16.4, 168) 230 (26.0, 265)
68T 68P	290 (32.8, 335) 280 (31.7, 323)	135 (15.3, 156) 230 (26.0, 265)	370 (41.9, 427) 280 (31.7, 323)	200 (22.6, 231) 230 (26.0, 265)	500 (56.5, 576) 360 (40.7, 415)	235 (26.6, 271) 295 (33.4, 340)

Valve Series	System Pressure, psig (bar, MPa)					
	2200 (151, 15.1)		2500 (172, 17.2)		3000 (206, 20.6)	
	Base Torque, in.·lb (N·m, cm·kg)					
	Start	End	Start	End	Start	End
62T 62P	26 (3.0, 30) 37 (4.2, 43)	23 (2.6, 27) 23 (2.6, 27)	— 40 (4.6, 47)	— 25 (2.9, 29)	— 45 (5.1, 52)	— 30 (3.4, 35)
63T 63P	67 (7.6, 78) 100 (11.3, 116)	42 (4.8, 49) 75 (8.5, 85)	— 110 (12.5, 127)	— 85 (9.7, 98)	—	—
65T 65P	205 (23.2, 237) 230 (26.0, 265)	150 (17.0, 173) 190 (21.5, 219)	— 260 (29.4, 300)	— 215 (24.3, 248)	—	—
67T 67P	335 (37.9, 386) 405 (45.8, 467)	160 (18.1, 185) 340 (38.5, 392)	—	—	—	—
68T 68P	500 (56.5, 576) 485 (54.9, 559)	280 (31.7, 323) 400 (45.2, 461)	—	—	—	—

Table 8—Temperature Factors

Use linear interpolation to obtain factors for temperatures from 100 to 450°F (37 to 232°C).

Valve Series	Temperature, °F (°C)	
	–20 to 100 (–28 to 37)	450 (232)
62T 62P	1.0 1.0	1.9 1.0
63T 63P	1.0 1.0	3.0 1.0
65T 65P	1.0 1.0	2.3 1.2
67T 67P	1.0 1.0	2.0 1.0
68T 68P	1.0 1.0	2.8 1.0

Table 9—Media Factors

Seat Material	Medium-Weight Oil	Clean Water	Nitrogen Gas
PTFE PEEK	0.9 1.0	1.0 1.0	1.0 1.0

60 Series Valve Designators

T—reinforced PTFE seat and packing

P—PEEK seat and packing

60 Series Valves

Ordering Information

1. Select the desired 4-bolt 60 series valve and seat material. Using the **Calculating Operating Torque** instructions at left, calculate the valve start and end operating torque.

   For 60 series valves with encased 8-bolt construction, contact your authorized Swagelok representative.

2. Choose an actuator based on the valve start and end torque. See the actuator manufacturer's literature to specify ISO 5211 mounting dimensions, including flange and coupling sizes.

3. Select a Swagelok 60 series bracket kit ordering number. Bracket kits can be used with stainless steel, carbon steel, and alloy 400 valves.

   To order bracket kits for brass valves, insert **-B** into the bracket kit ordering number.

   Example: SS-MB-62-**B**-F03-9ISO-M

See *Mounting Instructions, ISO 5211 Dimensionally Compliant Bracket, Coupling, and Actuator to 4-Bolt 60 Series Valves,* MS-INS-4B60NM.

Swagelok 63 series valve with ISO 5211-compliant actuator, ASCO® solenoid, and Pepperl+Fuchs proximity sensor.

Mounting Bracket Kit Ordering Numbers

Valve Series	ISO 5211 Flange Size	Coupling Size	Cap Screw Type	Bracket Kit Ordering Number
62	F03	9 mm ISO	Metric	SS-MB-62-F03-9ISO-M
		9 mm ISO	Fractional	SS-MB-62-F03-9ISO-F
		9 mm DIN	Metric	SS-MB-62-F03-9DIN-M
		9 mm DIN	Fractional	SS-MB-62-F03-9DIN-F
		11 mm ISO	Metric	SS-MB-62-F03-11ISO-M
		11 mm ISO	Fractional	SS-MB-62-F03-11ISO-F
		11 mm DIN	Metric	SS-MB-62-F03-11DIN-M
		11 mm DIN	Fractional	SS-MB-62-F03-11DIN-F
		14 mm ISO	Metric	SS-MB-62-F03-14ISO-M
		14 mm ISO	Fractional	SS-MB-62-F03-14ISO-F
		14 mm DIN	Metric	SS-MB-62-F03-14DIN-M
		14 mm DIN	Fractional	SS-MB-62-F03-14DIN-F
	F04	9 mm ISO	Metric	SS-MB-62-F04-9ISO-M
		9 mm ISO	Fractional	SS-MB-62-F04-9ISO-F
		9 mm DIN	Metric	SS-MB-62-F04-9DIN-M
		9 mm DIN	Fractional	SS-MB-62-F04-9DIN-F
		11 mm ISO	Metric	SS-MB-62-F04-11ISO-M
		11 mm ISO	Fractional	SS-MB-62-F04-11ISO-F
		11 mm DIN	Metric	SS-MB-62-F04-11DIN-M
		11 mm DIN	Fractional	SS-MB-62-F04-11DIN-F
		14 mm ISO	Metric	SS-MB-62-F04-14ISO-M
		14 mm ISO	Fractional	SS-MB-62-F04-14ISO-F
		14 mm DIN	Metric	SS-MB-62-F04-14DIN-M
		14 mm DIN	Fractional	SS-MB-62-F04-14DIN-F
63	F05	11 mm ISO	Metric	SS-MB-63-F05-11ISO-M
		11 mm ISO	Fractional	SS-MB-63-F05-11ISO-F
		11 mm DIN	Metric	SS-MB-63-F05-11DIN-M
		11 mm DIN	Fractional	SS-MB-63-F05-11DIN-F
		14 mm ISO	Metric	SS-MB-63-F05-14ISO-M
		14 mm ISO	Fractional	SS-MB-63-F05-14ISO-F
		14 mm DIN	Metric	SS-MB-63-F05-14DIN-M
		14 mm DIN	Fractional	SS-MB-63-F05-14DIN-F
		17 mm ISO	Metric	SS-MB-63-F05-17ISO-M
		17 mm ISO	Fractional	SS-MB-63-F05-17ISO-F
		17 mm DIN	Metric	SS-MB-63-F05-17DIN-M
		17 mm DIN	Fractional	SS-MB-63-F05-17DIN-F

Valve Series	ISO 5211 Flange Size	Coupling Size	Cap Screw Type	Bracket Kit Ordering Number
65	F05	14 mm ISO	Metric	SS-MB-65-F05-14ISO-M
		14 mm ISO	Fractional	SS-MB-65-F05-14ISO-F
		14 mm DIN	Metric	SS-MB-65-F05-14DIN-M
		14 mm DIN	Fractional	SS-MB-65-F05-14DIN-F
		17 mm ISO	Metric	SS-MB-65-F05-17ISO-M
		17 mm ISO	Fractional	SS-MB-65-F05-17ISO-F
		17 mm DIN	Metric	SS-MB-65-F05-17DIN-M
		17 mm DIN	Fractional	SS-MB-65-F05-17DIN-F
	F07	14 mm ISO	Metric	SS-MB-65-F07-14ISO-M
		14 mm ISO	Fractional	SS-MB-65-F07-14ISO-F
		14 mm DIN	Metric	SS-MB-65-F07-14DIN-M
		14 mm DIN	Fractional	SS-MB-65-F07-14DIN-F
		17 mm ISO	Metric	SS-MB-65-F07-17ISO-M
		17 mm ISO	Fractional	SS-MB-65-F07-17ISO-F
		17 mm DIN	Metric	SS-MB-65-F07-17DIN-M
		17 mm DIN	Fractional	SS-MB-65-F07-17DIN-F
67	F07	14 mm ISO	Metric	SS-MB-67-F07-14ISO-M
		14 mm ISO	Fractional	SS-MB-67-F07-14ISO-F
		14 mm DIN	Metric	SS-MB-67-F07-14DIN-M
		14 mm DIN	Fractional	SS-MB-67-F07-14DIN-F
		17 mm ISO	Metric	SS-MB-67-F07-17ISO-M
		17 mm ISO	Fractional	SS-MB-67-F07-17ISO-F
		17 mm DIN	Metric	SS-MB-67-F07-17DIN-M
		17 mm DIN	Fractional	SS-MB-67-F07-17DIN-F
68	F07	14 mm ISO	Metric	SS-MB-68-F07-14ISO-M
		14 mm ISO	Fractional	SS-MB-68-F07-14ISO-F
		14 mm DIN	Metric	SS-MB-68-F07-14DIN-M
		14 mm DIN	Fractional	SS-MB-68-F07-14DIN-F
		17 mm ISO	Metric	SS-MB-68-F07-17ISO-M
		17 mm ISO	Fractional	SS-MB-68-F07-17ISO-F
		17 mm DIN	Metric	SS-MB-68-F07-17DIN-M
		17 mm DIN	Fractional	SS-MB-68-F07-17DIN-F

83 and H83 Series Valves

Operating Torque

Operating torque for a Swagelok 83 or H83 series valve is influenced by:

- system pressure
- cycle frequency
- system media.

The tables and calculations on this page can be used for 83 and H83 series valves of stainless steel and alloy 400 with any seat material.

Calculating Operating Torque

If the valve will be cycled no more than once per hour:

1. Select the base start and base end torque at system pressure from Table 10.
2. Select the media factor from Table 11.
3. Calculate the start and end operating torque:
   Base torque (Table 10)
   × media factor (Table 11).

Example: An 83 series 3-way valve is operated with medium-weight oil at 1500 psig and cycled once per day.

1. According to Table 10, the base start torque is 25 in.·lb and the base end torque is 15 in.·lb.
2. According to Table 11, the media factor is 0.9.
3. Start torque = 25 in.·lb × 0.9
   = 22.5 in.·lb

   End torque = 15 in.·lb × 0.9
   = 13.5 in.·lb.

If the valve will be cycled more frequently than once per hour, contact your authorized Swagelok representative.

Table 10—Base Start and End Torque

Use linear interpolation to obtain torque values for system pressures not listed.

Valve Series	System Pressure, psig (bar, MPa)									
	0		1500 (103, 10.3)		3000 (206, 20.6)		6000 (413, 41.3)		10 000 (689, 68.9)	
	Base Torque, in.·lb (N·m, cm·kg)									
	Start	End	Start	End	Start	End	Start	End	Start	End
83 2-way	15 (1.7, 18)	15 (1.7, 18)	15 (1.7, 18)	15 (1.7, 18)	17 (2.0, 20)	17 (2.0, 20)	20 (2.3, 24)	20 (2.3, 24)	—	—
83 3-way	25 (2.9, 29)	15 (1.7, 18)	25 (2.9, 29)	15 (1.7, 18)	27 (3.1, 32)	17 (2.0, 20)	30 (3.4, 35)	20 (2.3, 24)	—	—
All H83	25 (2.9, 29)	15 (1.7, 18)	25 (2.9, 29)	15 (1.7, 18)	27 (3.1, 32)	17 (2.0, 20)	30 (3.4, 35)	20 (2.3, 24)	35 (4.0, 41)	20 (2.3, 24)

Ordering Information

Swagelok 83 series valve with ISO 5211-compliant actuator.

1. Select the desired 83 or H83 series valve. Using the **Calculating Operating Torque** instructions above, calculate the valve start and end operating torque.
2. Choose an actuator based on the valve start and end torque. See the actuator manufacturer's literature to specify ISO 5211 mounting dimensions, including flange and coupling sizes.
3. Select a Swagelok 83 series bracket kit ordering number. Bracket kits can be used with stainless steel and alloy 400 valves.

See *Mounting Instructions, ISO 5211 Dimensionally Compliant Bracket, Coupling, and Actuator,* MS-INS-4080-NAMUR.

Table 11—Media Factors

Medium-Weight Oil	Clean Water	Nitrogen Gas
0.9	1.0	1.0

Mounting Bracket Kit Ordering Numbers

ISO 5211 Flange Size	Coupling Size	Cap Screw Type	Bracket Kit Ordering Number
F03	9 mm ISO	Metric	SS-MB-83-F03-9ISO-M
	9 mm ISO	Fractional	SS-MB-83-F03-9ISO-F
	9 mm DIN	Metric	SS-MB-83-F03-9DIN-M
	9 mm DIN	Fractional	SS-MB-83-F03-9DIN-F
F04	9 mm ISO	Metric	SS-MB-83-F04-9ISO-M
	9 mm ISO	Fractional	SS-MB-83-F04-9ISO-F
	9 mm DIN	Metric	SS-MB-83-F04-9DIN-M
	9 mm DIN	Fractional	SS-MB-83-F04-9DIN-F
	11 mm ISO	Metric	SS-MB-83-F04-11ISO-M
	11 mm ISO	Fractional	SS-MB-83-F04-11ISO-F
	11 mm DIN	Metric	SS-MB-83-F04-11DIN-M
	11 mm DIN	Fractional	SS-MB-83-F04-11DIN-F
F05	11 mm ISO	Metric	SS-MB-83-F05-11ISO-M
	11 mm ISO	Fractional	SS-MB-83-F05-11ISO-F
	11 mm DIN	Metric	SS-MB-83-F05-11DIN-M
	11 mm DIN	Fractional	SS-MB-83-F05-11DIN-F
	14 mm ISO	Metric	SS-MB-83-F05-14ISO-M
	14 mm ISO	Fractional	SS-MB-83-F05-14ISO-F
	14 mm DIN	Metric	SS-MB-83-F05-14DIN-M
	14 mm DIN	Fractional	SS-MB-83-F05-14DIN-F

AFS Ball Valves

Operating Torque

Operating torque for a Swagelok AFS ball valve is influenced by:

- system pressure
- system temperature.

Calculating Operating Torque

If the valve will be cycled at least once per day, but not more than once per hour:

1. Select the base start and base end torque at system pressure from Table 12.
2. Select the temperature factor from Table 13.
3. Calculate the start and end operating torque:
   Base torque (Table 12)
   × temperature factor (Table 13).

Example: AFS valve is operated with nitrogen at 4500 psig and 70°F (20°C).

1. According to Table 12, the base start torque is 61 in.·lb and the base end torque is 36 in.·lb.
2. According to Table 13, the temperature factor is 1.0.
3. Start torque = 61 in.·lb × 1.0
   = 61 in.·lb

   End torque = 36 in.·lb × 1.0
   = 36 in.·lb.

If the valve will be cycled less frequently than once per day or more frequently than once per hour, contact your authorized Swagelok representative.

Table 12—Base Start and End Torque

Torque values based on the valve's remaining closed for one day at pressure. Use linear interpolation to obtain torque values for system pressures not listed.

Valve Torque	**System Pressure,** psig (bar, MPa)			
	0	**1000 (68.9, 6.89)**	**4500 (310, 31.0)**	**6000 (413, 41.3)**
	Base Torque, in.·lb (N·m, cm·kg)			
Start	13 (1.5, 15)	23 (2.6, 27)	61 (6.9, 71)	76 (8.6, 88)
End	12 (1.4, 14)	18 (2.1, 21)	36 (4.1, 42)	41 (4.7, 48)

Table 13—Temperature Factors

Temperature factors based 6000 psig (413 bar) system pressure and on the valve's remaining closed for one day at pressure. Use linear interpolation to obtain factors for system temperatures not listed.

Temperature, °F (°C)			
–40 (–40)	**70 (20)**	**185 (85)**	**250 (121)**
2.9	1.0	1.0	1.0

Ordering Information

Swagelok AFS ball valve with ISO 5211-compliant actuator.

1. Select the desired AFS valve. Using the **Calculating Operating Torque** instructions at right, calculate the valve start and end torque.
2. Choose an actuator based on the valve start and end torque. See the actuator manufacturer's literature to specify ISO 5211 mounting dimensions, including flange and coupling sizes.
3. Select a mounting bracket kit ordering number.

See *Mounting Instructions, ISO 5211 Dimensionally Compliant Bracket, Coupling, and Actuator,* MS-INS-4080-NAMUR.

Mounting Bracket Kit Ordering Numbers

ISO 5211 Flange Size	Coupling Size	Cap Screw Type	Bracket Kit Ordering Number
F05	11 mm ISO	Metric	SS-MB-AFS-F05-11ISO-M
	11 mm ISO	Fractional	SS-MB-AFS-F05-11ISO-F
	11 mm DIN	Metric	SS-MB-AFS-F05-11DIN-M
	11 mm DIN	Fractional	SS-MB-AFS-F05-11DIN-F
	14 mm ISO	Metric	SS-MB-AFS-F05-14ISO-M
	14 mm ISO	Fractional	SS-MB-AFS-F05-14ISO-F
	14 mm DIN	Metric	SS-MB-AFS-F05-14DIN-M
	14 mm DIN	Fractional	SS-MB-AFS-F05-14DIN-F
	17 mm ISO	Metric	SS-MB-AFS-F05-17ISO-M
	17 mm ISO	Fractional	SS-MB-AFS-F05-17ISO-F
	17 mm DIN	Metric	SS-MB-AFS-F05-17DIN-M
	17 mm DIN	Fractional	SS-MB-AFS-F05-17DIN-F
F07	17 mm ISO	Metric	SS-MB-AFS-F07-17ISO-M
	17 mm ISO	Fractional	SS-MB-AFS-F07-17ISO-F
	17 mm DIN	Metric	SS-MB-AFS-F07-17DIN-M
	17 mm DIN	Fractional	SS-MB-AFS-F07-17DIN-F

SK Series Valves

Operating Torque

Operating torque for a Swagelok SK series valve is influenced by:

- cycle frequency
- system pressure
- system temperature.

Calculating Operating Torque

1. Determine the base start and base end torque at system pressure from Table 14.
2. Determine the temperature factor from Table 15.
3. Calculate the start and end operating torque:
   Base torque (Table 14)
   × temperature factor (Table 15).

Example: SK series valve is operated with nitrogen at 3000 psig and 70°F (20°C).

1. According to Table 14, the base start torque is 21 in.·lb and the base end torque is 10 in.·lb.
2. According to Table 15, the temperature factor is 1.0.
3. Start torque = 21 in.·lb × 1.0 = 21 in.·lb

   End torque = 10 in.·lb × 1.0 = 10 in.·lb.

If the valve will be cycled less frequently than once per day or more frequently than once per hour, contact your authorized Swagelok representative.

Table 14—Base Start and End Torque

Use linear interpolation to obtain torque values for system pressures not listed.

Valve Torque	**System Pressure,** psig (bar, MPa)		
	0	**3000 (206, 20.6)**	**6000 (413, 41.3)**
	Base Torque, in.·lb (N·m, cm·kg)		
Start	14 (1.6, 17)	21 (2.4, 25)	26 (3.0, 30)
End	10 (1.2, 12)	10 (1.2. 12)	10 (1.2. 12)

Table 15—Temperature Factors

Use linear interpolation to obtain factors for system temperatures not listed.

Temperature, °F (°C)				
–40 (–40)	**0 (–17)**	**70 (20)**	**250 (121)**	**302 (150)**
2.0	2.0	1.0	1.0	1.0

Ordering Information

Swagelok SK series valve with ISO 5211-compliant actuator.

1. Choose an actuator based on the valve start and end torque. See the actuator manufacturer's literature to specify ISO 5211 mounting dimensions, including flange and coupling sizes.
2. Select a mounting bracket kit ordering number.

See *Mounting Instructions, ISO 5211 Dimensionally Compliant Bracket, Coupling, and Actuator,* MS-INS-4080-NAMUR.

Mounting Bracket Kit Ordering Numbers

ISO 5211 Flange Size	Coupling Size	Cap Screw Type	Bracket Kit Ordering Number
F04	11 mm ISO	Metric	SS-MB-4SK-F04-11ISO-M
	11 mm ISO	Fractional	SS-MB-4SK-F04-11ISO-F
	11 mm DIN	Metric	SS-MB-4SK-F04-11DIN-M
	11 mm DIN	Fractional	SS-MB-4SK-F04-11DIN-F

FKB Series Valves

Operating Torque

Operating torque for a Swagelok FKB series valve is influenced by:

- system pressure
- system temperature.

Calculating Operating Torque

If the valve will be cycled at least once per day, but not more than once per hour:

1. Select the base start and base end torque at system pressure from Table 16.
2. Select the temperature factor from Table 17.
3. Calculate the start and end operating torque:
   Base torque (Table 16)
   × temperature factor (Table 17).

Example: 8FKB valve is operated with nitrogen at 7500 psig and 70°F (20°C).

1. According to Table 16, the base start torque is 256 in.·lb and the base end torque is 63 in.·lb.
2. According to Table 17, the temperature factor is 1.0.
3. Start torque = 256 in.·lb × 1.0
   = 256 in.·lb

   End torque = 63 in.·lb × 1.0
   = 63 in.·lb.

If the valve will be cycled less frequently than once per day or more frequently than once per hour, contact your authorized Swagelok representative.

Table 16—Base Start and End Torque

Torque values based on the valve's remaining closed for one day at pressure. Use linear interpolation to obtain torque values for system pressures not listed.

Valve Series	System Pressure, psig (bar, MPa)									
	0		3750 (258, 25.83)		7500 (516, 51.6)		11 250 (775, 77.5)		15 000 (1034, 103)	
	Base Torque, in.·lb (N·m, cm·kg)									
	Start	End	Start	End	Start	End	Start	End	Start	End
6FKB	30 (3.4, 35)	30 (3.4, 35)	51 (5.8, 59)	33 (3.8, 39)	71 (8.1, 82)	35 (4.0, 41)	85 (9.7, 98)	47 (5.4, 55)	102 (12, 118)	49 (5.6, 57)
8FKB	84 (9.5, 97)	71 (8.1, 82)	166 (19, 192)	72 (8.2, 83)	256 (29, 295)	63 (7.2, 73)	322 (37, 371)	64 (7.3, 74)	375 (43, 432)	76 (8.6, 88)
12FKB	288 (33, 332)	184 (21, 212)	308 (35, 355)	140 (16, 162)	396 (45, 257)	145 (17, 168)	443 (51, 511)	121 (14, 140)	543 (62, 626)	116 (14, 134)

Ordering Information

Swagelok 6FKB series valve with ISO 5211-compliant actuator.

1. Select the desired FKB series valve. Using the **Calculating Operating Torque** instructions above, calculate the valve start and end torque.
2. Choose an actuator based on the valve start and end torque. See the actuator manufacturer's literature for ISO 5211 mounting dimensions, including flange and coupling sizes.
3. Select a mounting bracket kit ordering number.

See *Medium-Pressure Ball Valve, Mounting Instructions for FKB Series Medium-Pressure Ball Valves to ISO 5211-Compliant Actuators,* MS-CRD-0124.

Table 17—Temperature Factors

Temperature factors based 6000 psig (413 bar) system pressure and on the valve's remaining closed for one day at pressure. Use linear interpolation to obtain factors for system temperatures not listed.

Valve Series	Temperature, °F (°C)		
	0 (–17)	70 (20)	250 (121)
6FKB	1.5	1.0	1.0
8FKB	1.2	1.0	1.0
12FKB	1.0	1.0	0.6

Mounting Bracket Kit Ordering Numbers

Valve Series	ISO 5211 Flange Size	Coupling Size	Cap Screw Type	Bracket Kit Ordering Number
6FKB	F05	14 mm DIN	Metric	SS-MB-6FKB-F05-14DIN-M
8FKB	F07	17 mm DIN	Metric	SS-MB-8FKB-F07-17DIN-M
12FKB	F07	17 mm DIN	Metric	SS-MB-12FKB-F07-17DIN-M

Mounting Bracket Kits

Kits for Swagelok 40G, 40, 83, H83, SK, and FKB series and AFS ball valves contain:

- 316 stainless steel mounting bracket that meets ISO 5211 dimensional specifications
- four (eight for FKB series valves) 316 stainless steel socket head cap screws for fractional sizes, or A4 stainless steel for metric sizes (A4 is approximately equivalent to AISI 316.)
- Coupling
  - 40G, SK, and FKB series—powdered metal 300 series stainless steel
  - 40, 83, and H83 series and AFS ball valves—316 stainless steel
- A4 stainless steel set screw (316 stainless steel for FKB series valves)
- instructions.

Kits for Swagelok 60 series valves contain:

- 316 stainless steel mounting bracket that meets ISO 5211 dimensional specifications
- four 316 stainless steel socket head cap screws for fractional sizes, or A4 stainless steel for metric sizes (A4 is approximately equivalent to AISI 316.)
- 316 stainless steel coupling
- 316 stainless steel wall mounting bracket
- two 316 stainless steel lock washers
- 302 stainless steel upper and lower grounding springs
- 316 stainless steel lock tab
- two 316 stainless steel hex nuts and bolts
- lubricant and MSDS
- instructions.

Actuated Ball Valve Assemblies

In addition to bracket kits, Swagelok can provide complete actuated ball valve assemblies—including valves, actuators, sensors, and solenoids—with interfaces that meet ISO 5211, NAMUR, and VDI/VDE 3845 standards.

Assemblies are based on:

- maximum valve pressure
- ambient temperature (50 to 100°F [10 to 37°C])
- a design margin of 20 % for calculated operating torque

Contact your authorized Swagelok representative for assemblies built for other system conditions.

See the Swagelok *Actuation Options for Swagelok Ball Valves* catalog (MS-02-343) for more information.

Swagelok-Stocked Components

Actuators	*Sensors*	*Solenoids*
Swagelok	Pepperl+Fuchs (proximity sensors)	ASCO®
	Westlock (limit switches)	

Additional components and manufacturers available on request.

⚠ **Caution: Actuated assemblies must be properly aligned and supported. Improper alignment or inadequate support of the actuated assembly may result in leakage or premature valve failure.**

Caution: Do not mix or interchange valve components with those of other manufacturers.

About this document

Thank you for downloading this electronic catalog, which is part of General Product catalog Swagelok published in print. This type of electronic catalog is updated as new information arises or revisions, which may be more current than the printed version.

Swagelok Company is a major developer and provider of fluid system solutions, including products, integration solutions and services for industry research, instrumentation, pharmaceutical, oil and gas, power, petrochemical, alternative fuels, and semiconductor. Our manufacturing facilities, research, service and distribution facilities support a global network of more than 200 authorized sales and service centers in 57 countries.

Visit www.swagelok.com to locate your Swagelok representative and obtain any information on features, technical information and product references, or to learn about the variety of services available only through authorized sales centers and service Swagelok.

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.

Warranty Information

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

Fire Series Ball Valves

A60T Series

Features

- Operating temperatures up to 400°F (204°C)
- Working pressures up to 2200 psig (151 bar)
- Stainless steel or carbon steel construction
- Meet API Standard 607, 6th edition, and Swagelok fire test specification SEI-00334. See **Fire Test Standards,** next page.
- Available in 63, 65, 67, and 68 series valve sizes.

See the Swagelok *Ball Valves, General Purpose and Special Application—60 Series* catalog, MS-01-146, for materials of construction, pressure-temperature ratings, testing, cleaning and packaging, ordering information, dimensions, options, accessories, and actuators.

⚠ **Actuator accessories are not fire-test rated.**

Fire Test Standards

Industry standards do not address situations in which a valve seat is only *partially* destroyed. Yet this condition can occur when a valve is heated unevenly during a fire.

As a result, Swagelok developed test specification SEI-00334. This procedure qualifies the performance of valves subjected to uneven heating. Fire series ball valves are tested in the Swagelok fire-test laboratory and meet SEI-00334 test specifications.

Fire Test Data

Fire Test Specification	API 607 6th Edition	Swagelok SEI-00334
Fire test objective	Exposure to fire of specified time, temperature, and heat flux	Exposure to fire and water, producing specified partially destroyed seat
Valve position	Closed	Closed
Flow media	Water	Water
Fire test valve pressure	1650 psig (113 bar)—1/2 to 1 in. 1500 psig (103 bar)—1 1/2 to 2 in.	100 to 130 psig (6.8 to 8.9 bar)
Fuel for fire	Not specified	Fuel, temperature, time, and water are altered to achieve a partially destroyed soft seat
Flame temperature	1400 to 1800°F (760 to 982°C)	
Fire duration	30 min	
Heat flux	Calorimeter cubes reach 1200°F (648°C) within 15 min	
Allowable leak rate	See table below	Seat, during fire and cool down—95 mL/min or 40 mL/min/NPS,① whichever is greater
Cycle after burn	1 cycle—open or close under test pressure	None

① NPS = inch of nominal pipe size.

API 607 6th Edition Maximum Allowable Leak Rates

Valve Series	NPS	DIN	During Burn Period mL/min		After Cool Down and Operational Test mL/min	
			Shell	Seat	Shell	Seat
63	1/2	15	60	240	15	24
65	1	25	100	400	25	40
67	1 1/2	40	160	640	40	64
68	2	50	200	800	50	80

Typical Fire Test

Pneumatically actuated fire series ball valve set up for burn.

Test is in progress; fail-safe actuator feature cycles the ball valve to closed position.

Actuator lubricants begin to burn off, and actuator begins to melt.

Actuator melted away.

Valve quenched with water.

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

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Printed in U.S.A., AGS
MS-02-47, R6

One-Piece Instrumentation Ball Valves

40G Series and 40 Series

- On-off, switching, and crossover flow paths
- Working pressures up to 3000 psig (206 bar)
- Temperatures from –65 to 300°F (–53 to 148°C)
- Environmental and heated-process applications
- 1/16 to 3/4 in. and 3 to 12 mm end connections

Contents

Swagelok Instrumentation Ball Valves

Swagelok one-piece instrumentation ball valves have been well accepted and widely used in a variety of industries for many years.

Both the original Swagelok 40 series and the newer 40G series valves accommodate a wide range of actuator, flow path, and handle options, as well as offer ease of packing adjustment while inline.

40G Series and 40 Series Comparison

Feature	Valve Series		
	41G, 42G, 43G	**41, 42, 43**	**44, 45**
Valve Body Materials	Stainless steel	Brass, alloy 400	Stainless steel, brass, alloy 400
Packing Materials	Modified PTFE or UHMWPE	PTFE, PFA①, or UHMWPE①	PTFE or PFA①
Working Pressure psig (bar)	Up to 3000 (206), depending on valve size. See page 5.		
Temperature Rating °F (°C)	Modified PTFE packing –65 to 300 (–53 to 148) UHWMPE packing –65 to 150 (–53 to 65)	PTFE packing: 50 to 150 (10 to 65) Live-loaded PFA or UHWMPE packing: –65 to 150 (–53 to 65)	PTFE packing: 50 to 150 (10 to 65) Live-loaded PFA packing: –65 to 150 (–53 to 65)
Flow Coefficients (C_v)	0.08 to 2.4	0.05 to 2.4	1.5 to 12
End Connection Sizes	1/16 to 3/8 in.; 3 to 8 mm		3/8 to 3/4 in.; 8 to 12 mm
Flow Patterns	On-off (2-way); switching (3-way)	On-off (2-way); switching (3-way, 5-way and 7-way); crossover (4-way and 6-way)	On-off (2-way); switching (3-way and 5-way); crossover (4-way)

① Live-loaded PFA and UHMWPE packing materials. See **40T and 40E Series for Low-Temperature Service,** page 3.

Important Information About Swagelok Instrumentation Ball Valves

⚠ **Swagelok ball valves are designed to be used in a fully open or fully closed position.**

⚠ **Valves that have not been cycled for a period of time may have a higher initial actuation torque.**

⚠ **A packing adjustment may be required periodically to increase service life and to prevent leakage.**

- Service instructions are shipped with each 40G series and 40 series valve.
- 40G and 40 series valves are factory tested with nitrogen at 1000 psig (69 bar), or the rated pressure if lower than 1000 psig (69 bar).
- 40 series valve packing must be readjusted for service at higher than test pressure.
- See page 12 for standard production tests and page 23 for optional production tests.
- Instrumentation ball valves exposed to dynamic temperature conditions before installation may lose their initial packing load. Packing adjustment may be needed.
- 41G and 42G series valves require an 8 mm deep-well socket and 43G series valves require a 9 mm deep-well socket to adjust the packing bolt.
- 41 and 42 series valves require a 3/8 in. open-ended wrench; 44 series valves require a 1/2 in. open-ended wrench; and 45 series valves require a 5/8 in. open-ended wrench to adjust the packing bolt.
- 43 series valves require an adapter to adjust the packing bolt. Ordering number: **MS-WK-43**

Features

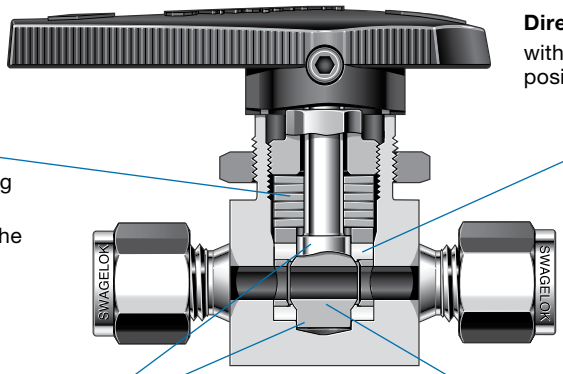
40G Series

Swagelok 41G, 42G, and 43G series valves easily replace original stainless steel 41, 42, and 43 series valves.

- Equivalent dimensions
- Comparable materials of construction

Couplings must be replaced on actuated valves. See pages 18 and 20.

Swagelok 44 and 45 series valves remain available in stainless steel; the full range of 40 series sizes is available in brass and alloy 400.



Directional handle
with double-flat stem indicates position of orifice.

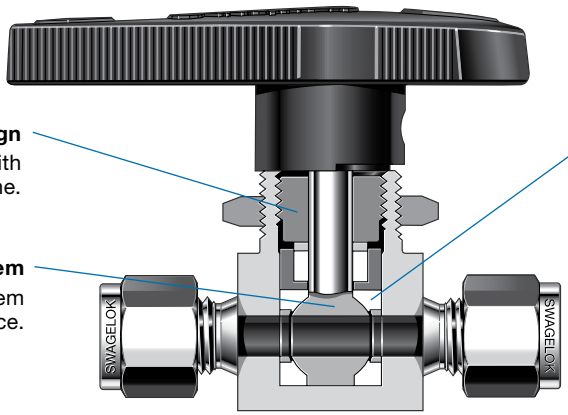
Top-loaded, live-loaded design
- reduces need for packing adjustment
- allows adjustment with the valve in-line
- compensates for wear
- improves thermal cycle performance.

Single-piece, patent-pending encapsulated packing
- is constructed of modified PTFE
- reduces potential leak points
- does not require system pressure to seal
- has virtually no dead space
- allows bidirectional flow
- is easily cleaned and purged
- Low Emissions certification per API 641 available.

Balanced-trunnion, patent-pending design
- supports packing, reducing the need for packing adjustment
- reduces packing volume, minimizing thermal effects
- minimizes packing extrusion
- improves thermal cycle performance.

One-piece ball stem
ensures alignment of stem and orifice.

40 Series



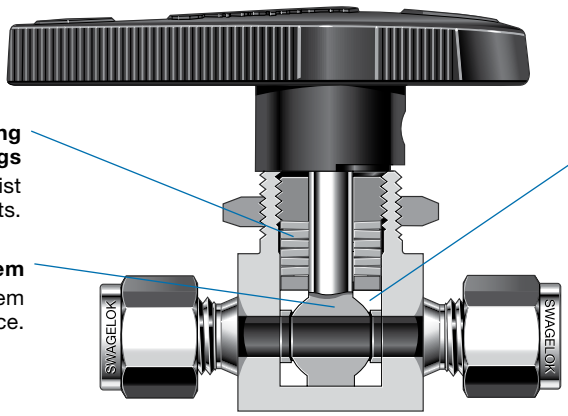
Directional handle
indicates position of orifice.

Top-loaded design
allows adjustment with the valve in-line.

Capsule seat packing
- is constructed of PTFE
- does not require system pressure to make a seal
- has virtually no dead space
- allows bidirectional flow
- is easily cleaned and purged
- Low Emissions certification per API 641 available.

One-piece ball stem
ensures alignment of stem and orifice.

40T and 40E Series for Low-Temperature Service



Directional handle
indicates position of orifice.

Live-loading packing springs
maintain load, resist thermal effects.

Capsule seat packing
- is constructed PFA (all sizes) or UHMWPE (41, 42, and 43 series sizes)
- does not require system pressure to make a seal
- has virtually no dead space
- allows bidirectional flow
- is easily cleaned and purged
- Low Emissions certification per API 641 available.

One-piece ball stem
ensures alignment of stem and orifice.

Materials of Construction

40G Series

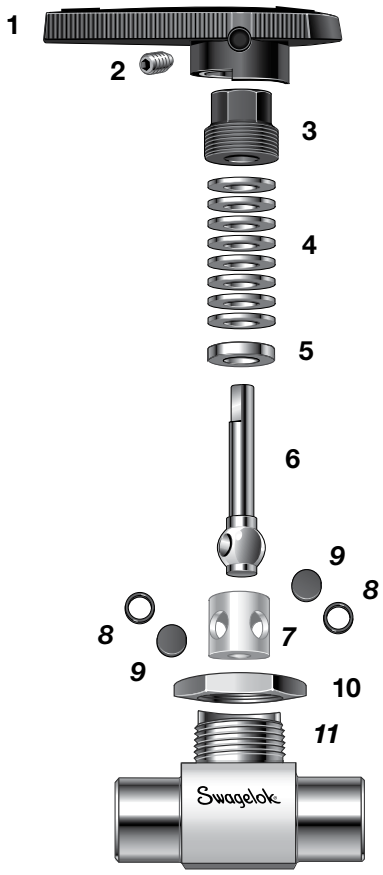
Component	Stainless Steel Valve Body Material Material Grade/ASTM Specification
1 Handle	Nylon with powdered metal 300 series SS insert
2 Set screw	S17400/A564
3 Packing bolt	Powdered metal 300 series SS
4 Springs①	S17700/A693
5 Gland	Powdered metal 300 series SS
6 *Ball stem*	*316 SS/A276*
7 *Packing*	*Modified PTFE/D1710 type 1, Grade 1, Class B or UHMWPE/D4020*
8 *Side rings*	*Powdered metal 300 series SS/B783②*
9 *Side discs*	
10 Panel nut	Powdered metal 300 series SS/B783
11 *Body③*	*316 SS/A276 and A479*
Wetted lubricant	*Silicone-based*
Nonwetted lubricant	Molybdenum disulfide with hydrocarbon binder coating

Wetted components listed in *italics*.

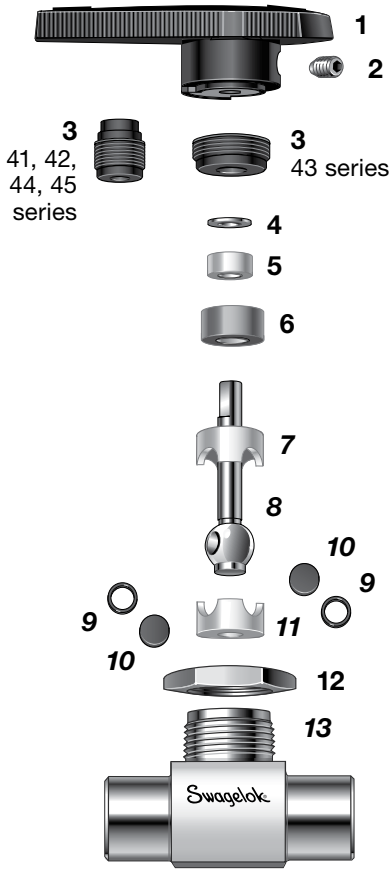
① 41G and 42G series: 8 springs; 43G series: 6 springs.

② B783 specification not available on 41G and 42G series; standard on 43G series.

③ Bodies with VCO® end connections and modified PTFE packing have fluorocarbon FKM O-rings; bodies with with VCO end connections and UHMWPE packing have ethylene propylene O-rings.



40 Series



Component	Valve Body Materials Stainless Steel	Brass	Alloy 400
	Material Grade/ASTM Specification		
1 Handle	Nylon with brass insert		
2 Set screw	S17400 SS/A564		
3 Packing bolt	Powdered metal 300 series SS or 316 SS/A276, A479	Brass CDA 360/B16	Alloy 400/B164
4 Upper gland	316 SS/A240	41, 42, 45 series: brass 260/B36; 43, 44 series: 316 SS/A240	Alloy 400/B127
5 Bushing	PTFE/D1710		
6 Lower gland	Powdered metal 300 series SS	Brass CDA 360/B16	Alloy 400/B164
7 *Upper packing*	*PTFE/D1710*		
8 *Ball stem*	*316 SS/A276*	*Brass CDA 360/B16①*	*Alloy 400/B164*
9 *Side rings*	*Fluorocarbon-coated powdered metal 300 series SS/B783*	*Fluorocarbon-coated brass powdered metal①*	*Fluorocarbon-coated alloy 400 powdered metal*
10 *Side discs*			
11 *Lower packing*	*PTFE/D1710*		
12 Panel nut	Powdered metal 300 series SS/B783	Brass CDA 360/B16	Powdered metal 300 series SS/B783
13 *Body②*	*316 SS/ A276, A479*	*Brass CDA 356 or 360/B16*	*Alloy 400/B164*
Wetted lubricant	*41, 42, 43 series: silicone-based; 44, 45 series: silicone- and fluorinated-based*		
Nonwetted lubricant	Molybdenum disulfide with hydrocarbon binder coating		

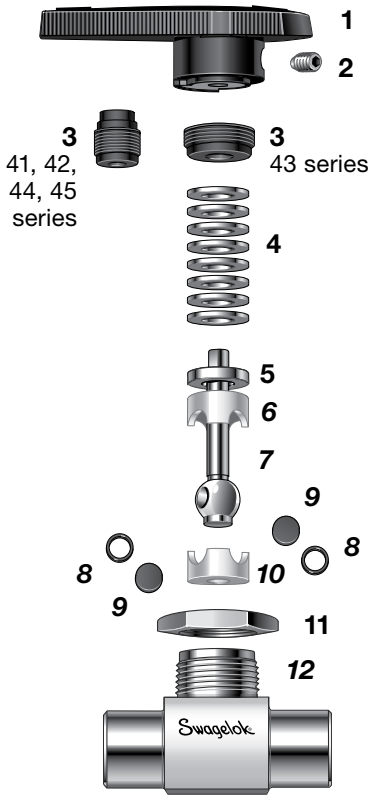
Wetted components listed in *italics.*

① 4-way, 5-way, 6-way, and 7-way valves contain stainless steel stem, rings, and discs.

② Bodies with VCO end connections have fluorocarbon FKM O-rings.

Materials of Construction

40T and 40E Series for Low-Temperature Service



Component	Valve Body Materials		
	Stainless Steel	Brass	Alloy 400
	Material Grade/ASTM Specification		
1 Handle	Nylon with brass insert		
2 Set screw	S17400 SS/A564		
3 Packing bolt	Powdered metal 300 series SS or 316 SS/A276, A479	Brass CDA 360/B16	Alloy 400/B164
4 Springs①	Molybdenum disulfide-coated S17700 SS/A693		
5 Gland	Powdered metal 300 series SS		
***6** Upper packing*	*40T: PFA/D3307; 40E: UHMWPE/D4020*		
***7** Ball stem*	*316 SS/A276 and A479*		*Alloy 400/B164*
***8** Side rings*	*40T: fluorocarbon-coated powdered metal 300 series SS/B783; 40E: 300 series powdered metal SS/B783*		*Fluorocarbon-coated alloy 400 powdered metal*
***9** Side discs*			
***10** Lower packing*	*40T: PFA/D3307; 40E: UHMWPE/D4020*		
11 Panel nut	Powdered metal 300 series SS/B783	Brass CDA 360/B16	Powdered metal 300 series SS/B783
***12** Body②*	*316 SS/A276, A479*	*Brass CDA 360/B16*	*Alloy 400/B164*
Wetted lubricant	*40T: hydrocarbon- and silicone-based③; 40E: hydrocarbon-based*		
Nonwetted lubricant	Molybdenum disulfide with hydrocarbon binder coating		

Wetted components listed in *italics.*

① 41 and 42 series—8 springs; 43 series—6 springs; 44 and 45 series—4 springs.

② 40T body with VCO fittings has fluorocarbon FKM O-rings; 40E body with VCO fittings has ethylene propylene O-rings.

③ 44T and 45T—hydrocarbon-based and silicone- and fluorinated-based.

Pressure-Temperature Ratings

The 40G series valve is designed for thermal cycling in both environmental and heated-process applications.

Ratings shown below apply to on-off (2-way) and switching (3-way) valves. Ratings for switching (5-way and 7-way) and crossover (4-way and 6-way) valves are shown on pages 10 and 11, respectively.

Temperature ratings are limited to 150°F (65°C) max with UHMWPE packing.

Valve Series	40G		40			40T and 40E		
Packing Material	Modified PTFE UHMWPE①		PTFE			Live-Loaded PFA (40T Series) Live-Loaded UHMWPE (40E Series)		
Valve Size (Configuration)	41G, 42G (Straight, Angle, 3-Way); 43G (Angle, 3-Way)	43G (Straight)	41, 42 (Straight, Angle, 3-Way); 43 (Angle, 3-Way); 44, 45 (Straight)	43 (Straight)	44, 45 (Angle, 3-Way)	41, 42 (Straight, Angle, 3-Way); 43 (Angle, 3-Way); 44, 45 (Straight)	43 (Straight)	44, 45 (Angle, 3-Way)
Temperature °F (°C)	**Working Pressure,** psig (bar)							
–65 (–53) to 50 (10)	2500 (172)	3000 (206)	—	—	—	2500 (172)	3000 (206)	1500 (103)
50 (10) to 150 (65)	2500 (172)	3000 (206)	2500 (172)	3000 (206)	1500 (103)	2500 (172)	3000 (206)	1500 (103)
200 (93)	2500 (172)	2800 (193)	—	—	—	—	—	—
250 (121)	2500 (172)	2650 (182)	—	—	—	—	—	—
300 (148)	2500 (172)	2500 (172)	—	—	—	—	—	—

Pressure ratings for valves with Swagelok tube fitting ends may be lower due to the tubing pressure rating. Refer to *Tubing Data* catalog, MS-01-107, for additional information.

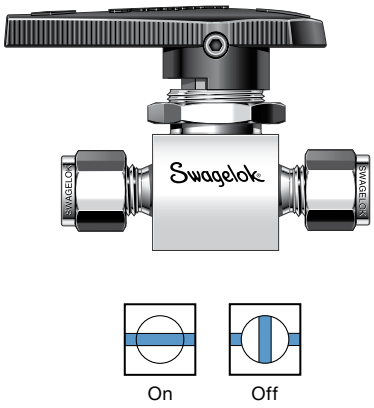
① Temperature ratings are limited to 150°F (65°C) max with UHMWPE packing.

On-Off (2-Way) Valves

Flow Patterns

Straight and Angle Patterns for On-Off Service

Straight Pattern



Angle Pattern

Ordering Information

40G Series Valves

Select a 40G series ordering number from the **40G Series Complete Ordering Number** column, shaded *blue.*

Example: **SS-41GS1**

To order a valve with UHMWPE packing, insert **E** into the valve ordering number.

Example: SS-41G**E**S1

40 Series Valves

Add a body material designator to a 40 series basic ordering number from the **40 Series Basic Ordering Number** column, shaded *gray.*

Material	Valve Series	Designator
316 SS	44, 45	SS
Alloy 400	41, 42, 43, 44, 45	M
Brass	41, 42, 43, 44, 45	B

Examples: **M**-42S4
SS-44S6

40T and 40E Series Valves

Insert a seat packing material designator.

Material	Valve Series	Designator
PFA	41, 42, 43, 44, 45	T
UHMWPE	41, 42, 43	E

Examples: M-42**E**S4
SS-44**T**S6

Angle-Pattern Valves

Angle-pattern valves have the same options and accessories as straight-pattern valves; the pressure-temperature ratings (page 5), flow coefficients, and dimensions are different.

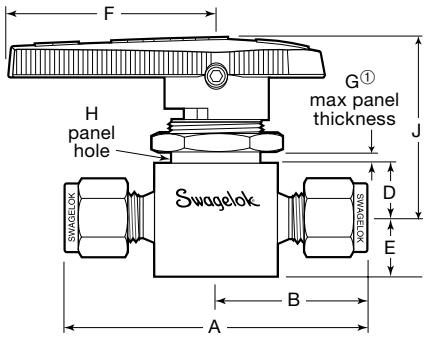
To order an angle-pattern valve, add **-A** to ordering number of a valve with the *C* dimension listed.

Examples: SS-43GS4-**A**
SS-44S6-**A**

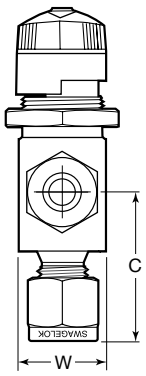
Dimensions

Dimensions are for reference only and are subject to change. Dimensions shown with Swagelok tube fitting nuts finger-tight.

Straight Pattern



Angle Pattern



① 1/8 in. (3.2 mm) minimum panel thickness.

On-Off (2-Way) Valves

End Connections		C_v		40G Series Complete Ordering Number	40 Series Basic Ordering Number	Orifice in. (mm)	Dimensions in. (mm)									
Inlet/Outlet	Size	Straight	Angle				A	B	C	D	E	F	G	H	J	W
Fractional Swagelok tube fittings	1/16 in.	0.10	—	SS-41GS1	-41S1	0.052 (1.32)	1.68 (42.7)	0.84 (21.3)	—	0.34 (8.6)	0.28 (7.1)	1.12 (28.4)	1/4 (6.4)	19/32 (15.1)	1.36 (34.5)	0.58 (14.7)
	1/8 in.	0.20	0.15	SS-41GS2	-41S2	0.093 (2.36)	2.01 (51.1)	1.01 (25.7)	0.97 (24.6)	0.34 (8.6)	0.28 (7.1)	1.12 (28.4)	1/4 (6.4)	19/32 (15.1)	1.36 (34.5)	0.58 (14.7)
	1/4 in.	0.60	0.35	SS-42GS4	-42S4	0.125 (3.18)	2.21 (56.1)	1.10 (27.9)	1.07 (27.2)	0.34 (8.6)	0.28 (7.1)	1.12 (28.4)	1/4 (6.4)	19/32 (15.1)	1.36 (34.5)	0.58 (14.7)
		1.4	0.90	SS-43GS4	-43S4	0.187 (4.75)	2.39 (60.7)	1.20 (30.5)	1.17 (29.7)	0.44 (11.2)	0.38 (9.7)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	0.78 (19.8)
	3/8 in.	1.5	0.90	SS-43GS6	-43S6	0.187 (4.75)	2.58 (65.5)	1.29 (32.8)		0.44 (11.2)	0.38 (9.7)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	0.78 (19.8)
		6.0	2.0	—	-44S6	0.281 (7.14)	3.05 (77.5)	1.52 (38.6)	1.43 (36.3)	0.56 (14.2)		2.00 (50.8)	3/8 (9.5)	1 1/8 (28.6)	2.07 (52.6)	1.12 (28.4)
	1/2 in.	12	4.6	—	-45S8	0.406 (10.3)	3.92 (99.6)	1.96 (49.8)	1.74 (44.2)	0.69 (17.5)		3.00 (76.2)	3/8 (9.5)	1 1/2 (38.1)	2.43 (61.7)	1.50 (38.1)
	3/4 in.	6.4	3.8	—	-45S12	0.406 (10.3)	3.92 (99.6)	1.96 (49.8)	1.74 (44.2)	0.69 (17.5)		3.00 (76.2)	3/8 (9.5)	1 1/2 (38.1)	2.43 (61.7)	1.50 (38.1)
Metric Swagelok tube fittings	3 mm	0.20	0.15	SS-41GS3MM	-41S3MM	0.093 (2.36)	2.01 (51.1)	1.01 (25.7)	0.97 (24.6)	0.34 (8.6)	0.28 (7.1)	1.12 (28.4)	1/4 (6.4)	19/32 (15.1)	1.36 (34.5)	0.58 (14.7)
	6 mm	0.60	0.35	SS-42GS6MM	-42S6MM	0.125 (3.18)	2.21 (56.1)	1.10 (27.9)	1.07 (27.2)	0.34 (8.6)	0.28 (7.1)	1.12 (28.4)	1/4 (6.4)	19/32 (15.1)	1.36 (34.5)	0.58 (14.7)
		1.4	0.90	SS-43GS6MM	-43S6MM	0.187 (4.75)	2.39 (60.7)	1.20 (30.5)	1.17 (29.7)	0.44 (11.2)	0.38 (9.7)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	0.78 (19.8)
	8 mm	1.5	0.90	SS-43GS8MM	-43S8MM	0.187 (4.75)	2.46 (62.5)	1.23 (31.2)	1.20 (30.5)	0.44 (11.2)	0.38 (9.7)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	0.78 (19.8)
	10 mm	6.0	2.0	—	-44S10MM	0.281 (7.14)	3.07 (78.0)	1.53 (38.9)	1.43 (36.3)	0.56 (14.2)		2.00 (50.8)	3/8 (9.5)	1 1/8 (28.6)	2.07 (52.6)	1.12 (28.4)
	12 mm	12	4.6	—	-45S12MM	0.406 (10.3)	3.92 (99.6)	1.96 (49.8)	1.74 (44.2)	0.69 (17.5)		3.00 (76.2)	3/8 (9.5)	1 1/2 (38.1)	2.43 (61.7)	1.50 (38.1)
Female NPT	1/8 in.	0.50	0.30	SS-42GF2	-42F2	0.125 (3.18)	1.63 (41.4)	0.81 (20.6)		0.34 (8.6)	0.28 (7.1)	1.12 (28.4)	1/4 (6.4)	19/32 (15.1)	1.36 (34.5)	0.58 (14.7)
		1.2	0.70	SS-43GF2	-43F2	0.187 (4.75)	2.00 (50.8)	1.00 (25.4)		0.44 (11.2)	0.38 (9.7)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	0.78 (19.8)
	1/4 in.	0.90	0.75	SS-43GF4	-43F4	0.187 (4.75)	2.06 (52.3)	1.03 (26.2)		0.44 (11.2)	0.38 (9.7)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	0.78 (19.8)
		3.0	1.7	—	-44F4	0.281 (7.14)	2.50 (63.5)	1.25 (31.8)		0.56 (14.2)		2.00 (50.8)	3/8 (9.5)	1 1/8 (28.6)	2.07 (52.6)	1.12 (28.4)
	3/8 in.	2.6	1.5	—	-44F6	0.281 (7.14)	2.50 (63.5)	1.25 (31.8)		0.56 (14.2)		2.00 (50.8)	3/8 (9.5)	1 1/8 (28.6)	2.07 (52.6)	1.12 (28.4)
	1/2 in.	6.3	3.5	—	-45F8	0.406 (10.3)	3.12 (79.2)	1.56 (39.6)		0.69 (17.5)		3.00 (76.2)	3/8 (9.5)	1 1/2 (38.1)	2.43 (61.7)	1.50 (38.1)
Female ISO/BSP tapered	1/4 in.	0.90	—	SS-43GF4RT	-43F4RT	0.187 (4.75)	2.06 (52.3)	1.03 (26.2)	—	0.44 (11.2)	0.38 (9.7)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	0.78 (19.8)
	3/8 in.	2.6		—	-44F6RT	0.281 (7.14)	2.50 (63.5)	1.25 (31.8)		0.56 (14.2)		2.00 (50.8)	3/8 (9.5)	1 1/8 (28.6)	2.07 (52.6)	1.12 (28.4)
	1/2 in.	6.3		—	-45F8RT	0.406 (10.3)	3.12 (79.2)	1.56 (39.6)		0.69 (17.5)		3.00 (76.2)	3/8 (9.5)	1 1/2 (38.1)	2.43 (61.7)	1.50 (38.1)
Male NPT	1/4 in.	1.2	0.75	SS-43GM4	-43M4	0.187 (4.75)	2.00 (50.8)	1.00 (25.4)	1.03 (26.2)	0.44 (11.2)	0.38 (9.7)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	0.78 (19.8)
Male NPT/ Swagelok tube fitting	1/4 in.	1.6	0.75	SS-43GM4-S4	-43M4-S4	0.187 (4.75)	2.20 (55.9)	1.20 (30.5)	1.03 (26.2)	0.44 (11.2)	0.38 (9.7)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	0.78 (19.8)
VCO fittings	1/4 in.	0.60	0.35	SS-42GVCO4	-42VCO4	0.125 (3.18)	1.75 (44.4)	0.88 (22.4)	0.94 (23.9)	0.44 (11.2)	0.38 (9.7)	1.12 (28.4)	1/8 (3.2)	19/32 (15.1)	1.36 (34.5)	0.78 (19.8)
		2.4	0.90	SS-43GVCO4	-43VCO4	0.187 (4.75)	1.88 (47.8)	0.94 (23.9)				1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	
Integral male VCR® fittings	1/4 in.	0.60	0.35	SS-42GVCR4	-42VCR4	0.125 (3.18)	2.13 (54.1)	1.06 (26.9)	1.09 (27.7)	0.44 (11.2)	0.38 (9.7)	1.12 (28.4)	1/8 (3.2)	19/32 (15.1)	1.36 (34.5)	0.78 (19.8)
		2.4	0.90	SS-43GVCR4	-43VCR4	0.187 (4.75)						1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	
	1/2 in.	6.0	—	—	-44VCR8①	0.281 (7.14)	2.88 (73.2)	1.44 (36.6)	—	0.56 (14.2)		2.00 (50.8)	3/8 (9.5)	1 1/8 (28.6)	2.07 (52.6)	1.50 (38.1)
		12		—	-45VCR8①	0.406 (10.3)	3.12 (79.2)	1.56 (39.6)		0.69 (17.5)		3.00 (76.2)		1 1/2 (38.1)	2.43 (61.7)	

① Not recommended for panel mounting.

Switching (3-Way) Valves

Flow Pattern

On-Off Switching Service

Center-Off Position

Ordering Information

40GX Series Valves

Select a 40GX series ordering number from the **40GX Series Complete Ordering Number** column, shaded *blue.*

Example: **SS-41GXS1**

To order a valve with UHMWPE packing, insert **E** into the valve ordering number.

Example: SS-41GX**E**S1

40X Series Valves

Add a body material designator to a 40X series basic ordering number from the **40X Series Basic Ordering Number** column, shaded *gray.*

Material	Valve Series	Designator
316 SS	44X, 45X	SS
Alloy 400	41X, 42X, 43X, 44X, 45X	M
Brass	41X, 42X, 43X, 44X, 45X	B

Examples: **M**-42XS4
SS-44XS6

40XT and 40XE Series Valves

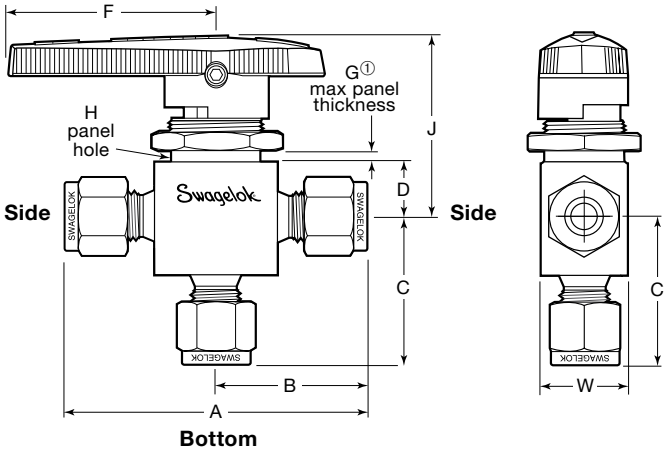
Insert a seat packing material designator.

Material	Valve Series	Designator
PFA	41, 42, 43, 44, 45	T
UHMWPE	41, 42, 43	E

Examples: M-42X**E**S4
SS-44X**T**S6

Dimensions

Dimensions are for reference only and are subject to change. Dimensions shown with Swagelok tube fitting nuts finger-tight.



① 1/8 in. (3.2 mm) minimum panel thickness.

Switching (3-Way) Valves

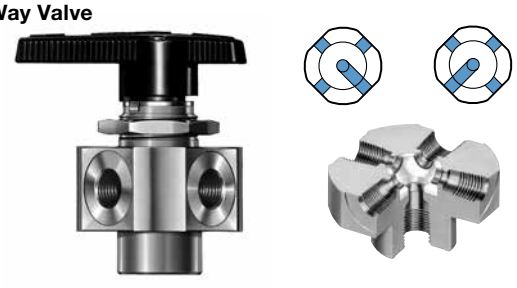
End Connections		C_v	40GX Series Complete Ordering Number	40X Series Basic Ordering Number	Orifice in. (mm)	Dimensions in. (mm)								
Side/Bottom	Size					A	B	C	D	F	G	H	J	W
Fractional Swagelok tube fittings	1/16 in.	0.08	SS-41GXS1	-41XS1	0.052 (1.32)	1.68 (42.7)	0.84 (21.3)	0.81 (20.6)	0.34 (8.6)	1.13 (28.7)	1/4 (6.4)	19/32 (15.1)	1.36 (34.5)	0.58 (14.7)
	1/8 in.	0.15	SS-41GXS2	-41XS2	0.093 (2.36)	2.01 (51.1)	1.01 (25.7)	0.97 (24.6)	0.34 (8.6)	1.13 (28.7)	1/4 (6.4)	19/32 (15.1)	1.36 (34.5)	0.58 (14.7)
	1/4 in.	0.35	SS-42GXS4	-42XS4	0.125 (3.18)	2.21 (56.1)	1.10 (27.9)	1.07 (27.2)	0.34 (8.6)	1.13 (28.7)	1/4 (6.4)	19/32 (15.1)	1.36 (34.5)	0.58 (14.7)
		0.90	SS-43GXS4	-43XS4	0.187 (4.75)	2.39 (60.7)	1.20 (30.5)	1.17 (29.7)	0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	0.78 (19.8)
	3/8 in.	2.0	—	-44XS6	0.281 (7.14)	2.89 (73.4)	1.45 (36.8)	1.43 (36.3)	0.56 (14.2)	2.00 (50.8)	3/8 (9.7)	1 1/8 (28.7)	2.07 (52.6)	1.12 (28.4)
	1/2 in.	4.6	—	-45XS8	0.406 (10.3)	3.48 (88.4)	1.74 (44.2)		0.69 (17.5)	3.00 (76.2)	3/8 (9.7)	1 1/2 (38.1)	2.43 (61.7)	1.50 (38.1)
	3/4 in.	3.8	—	-45XS12	0.406 (10.3)	3.48 (88.4)	1.74 (44.2)		0.69 (17.5)	3.00 (76.2)	3/8 (9.7)	1 1/2 (38.1)	2.43 (61.7)	1.50 (38.1)
Metric Swagelok tube fittings	3 mm	0.15	SS-41GXS3MM	-41XS3MM	0.093 (2.36)	2.01 (51.1)	1.01 (25.7)	0.97 (24.6)	0.34 (8.6)	1.13 (28.7)	1/4 (6.4)	19/32 (15.1)	1.36 (34.5)	0.58 (14.7)
	6 mm	0.35	SS-42GXS6MM	-42XS6MM	0.125 (3.18)	2.21 (56.1)	1.10 (27.9)	1.07 (27.2)	0.34 (8.6)	1.13 (28.7)	1/4 (6.4)	19/32 (15.1)	1.36 (34.5)	0.58 (14.7)
		0.90	SS-43GXS6MM	-43XS6MM	0.187 (4.75)	2.39 (60.7)	1.20 (30.5)	1.17 (29.7)	0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	0.78 (19.8)
	8 mm	0.80	SS-43GXS8MM	-43XS8MM	0.187 (4.75)	2.46 (62.5)	1.23 (31.2)	1.20 (30.5)	0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	0.78 (19.8)
	10 mm	2.0	—	-44XS10MM	0.281 (7.14)	2.89 (73.4)	1.45 (36.8)	1.43 (36.3)	0.56 (14.2)	2.00 (50.8)	3/8 (9.7)	1 1/8 (28.7)	2.07 (52.6)	1.12 (28.4)
	12 mm	4.6	—	-45XS12MM	0.406 (10.3)	3.48 (88.4)	1.74 (44.2)		0.69 (17.5)	3.00 (76.2)	3/8 (9.7)	1 1/2 (38.1)	2.43 (61.7)	1.50 (38.1)
Female NPT	1/8 in.	0.30	SS-42GXF2	-42XF2	0.125 (3.18)	1.63 (41.4)	0.81 (20.6)		0.34 (8.6)	1.13 (28.7)	1/4 (6.4)	19/32 (15.1)	1.36 (34.5)	0.58 (14.7)
	1/4 in.	0.75	SS-43GXF4	-43XF4	0.187 (4.75)	2.06 (52.3)	1.03 (26.2)		0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	0.78 (19.8)
		1.7	—	-44XF4	0.281 (7.14)	2.50 (63.5)	1.25 (31.8)		0.56 (14.2)	2.00 (50.8)	3/8 (9.7)	1 1/8 (28.7)	2.07 (52.6)	1.12 (28.4)
	3/8 in.	1.5	—	-44XF6	0.281 (7.14)	2.50 (63.5)	1.25 (31.8)		0.56 (14.2)	2.00 (50.8)	3/8 (9.7)	1 1/8 (28.7)	2.07 (52.6)	1.12 (28.4)
	1/2 in.	3.5	—	-45XF8	0.406 (10.3)	3.13 (79.5)	1.56 (39.6)		0.69 (17.5)	3.00 (76.2)	3/8 (9.7)	1 1/2 (38.1)	2.43 (61.7)	1.50 (38.1)
Female ISO/BSP tapered	1/4 in.	0.75	SS-43GXF4RT	-43XF4RT	0.187 (4.75)	2.06 (52.3)	1.03 (26.2)		0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	0.78 (19.8)
	3/8 in.	1.5	—	-44XF6RT	0.281 (7.14)	2.50 (63.5)	1.25 (31.8)		0.56 (14.2)	2.00 (50.8)	3/8 (9.7)	1 1/8 (28.7)	2.07 (52.6)	1.12 (28.4)
	1/2 in.	3.5	—	-45XF8RT	0.406 (10.3)	3.13 (79.5)	1.56 (39.6)		0.69 (17.5)	3.00 (76.2)	3/8 (9.7)	1 1/2 (38.1)	2.43 (61.7)	1.50 (38.1)
Swagelok tube fittings/ Male NPT	1/4 in.	0.80	SS-43GXS4-S4-M4	-43XS4-S4-M4	0.187 (4.75)	2.39 (60.7)	1.20 (30.5)	1.03 (26.2)	0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	0.78 (19.8)
Integral male VCR fittings	1/4 in.	0.35	SS-42GXVCR4	-42XVCR4	0.125 (3.18)	2.13 (54.1)	1.06 (26.9)	1.09 (27.7)	0.44 (11.2)	1.13 (28.7)	1/8 (3.2)	19/32 (15.1)	1.36 (34.5)	0.78 (19.8)
		0.90	SS-43GXVCR4	-43XVCR4	0.187 (4.75)					1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.47 (37.3)	

Switching (5-Way and 7-Way) Valves (40 Series)

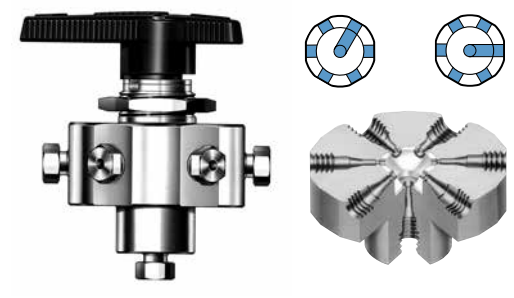
Features

- Capsule seat packing allows reliable switching.
- Flow can be switched from a single inlet to multiple outlets or from multiple inlets to a common outlet.
- 43Z and 43Z6 series valves have a spring-loaded detent for exact port positioning.
  - Detent handle components:
    Handle: nylon with brass insert
    Set screw: S17400 stainless steel
    Pins, detent plate: nickel-plated steel
    Springs: steel/ASTM A228

5-Way Valve



7-Way Valve



Pressure-Temperature Ratings

Valve Series	Temperature °F (°C)	Working Pressure psig (bar)
43Z (5-way)	PTFE packing: 50 to 150 (10 to 65)	2500 (172)
45Z (5-way)	Live-loaded PFA or UHWMPE packing: –65 to 150 (–53 to 65)	1500 (103)
43Z6 (7-way)		500 (34.4)

Pressure ratings for valves with Swagelok tube fitting ends may be lower due to the tubing pressure rating. Refer to *Tubing Data* catalog, MS-01-107, for additional information.

Ordering Information and Dimensions

Dimensions are for reference only and are subject to change. Dimensions shown with Swagelok tube fitting nuts finger-tight.

To order, add a body material designator to a 40 series basic ordering number.

Material	Designator
316 SS	SS
Alloy 400	M
Brass	B

Example: **SS**-43ZFS2

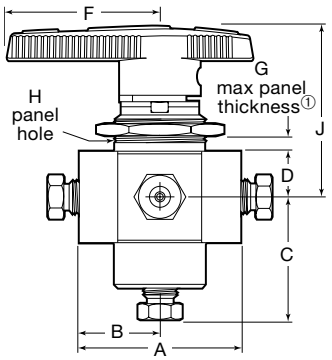
40T and 40E Series Valves

Insert a seat packing material designator.

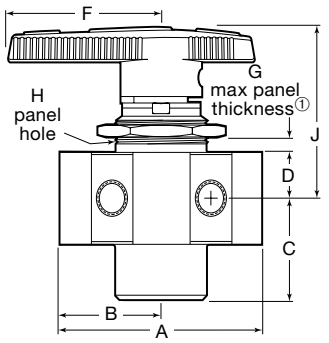
Material	Valve Series	Designator
PFA	43, 45	T
UHMWPE	43	E

Example: SS-43Z**T**FS2

5-Way Valve



7-Way Valve



① 1/8 in. (3.2 mm) minimum panel thickness.

End Connections		40 Series Basic Ordering Number	C_v	Orifice in. (mm)	Dimensions in. (mm)							
Inlets/Outlets	Size				A	B	C	D	F	G	H	J
5-Way Valves												
Female Swagelok tube fittings	1/8 in.	-43ZFS2①	0.07	0.062 (1.57)	1.94 (49.3)	0.97 (24.6)		0.44 (11.2)	1.53 (38.9)	5/32 (4.1)	29/32 (23.1)	1.69 (42.9)
Female NPT	1/8 in.	-43ZF2①	0.07	0.062 (1.57)	1.55 (39.4)	0.78 (19.8)	0.88 (22.4)	0.44 (11.2)	1.53 (38.9)	5/32 (4.1)	29/32 (23.1)	1.69 (42.9)
	1/2 in.	-45ZF8-ND②	3.5	0.406 (10.3)	3.13 (79.5)	1.56 (39.6)		0.69 (17.5)	3.00 (76.2)	3/8 (9.7)	1 1/2 (38.1)	2.43 (61.7)
7-Way Valves												
Female Swagelok tube fittings	1/16 in.	-43Z6FS1	0.05	0.052 (1.32)	1.94 (49.3)	0.97 (24.6)		0.44 (11.2)	1.53 (38.9)	5/32 (4.1)	29/32 (23.1)	1.69 (42.9)
	1/8 in.	-43Z6FS2	0.07	0.062 (1.57)	1.94 (49.3)	0.97 (24.6)		0.44 (11.2)	1.53 (38.9)	5/32 (4.1)	29/32 (23.1)	1.69 (42.9)

① Cross-port flow may occur during switching. If cross-port flow is unacceptable, specify a 0.049 in. ball orifice. Example: SS-43ZF2-**049**

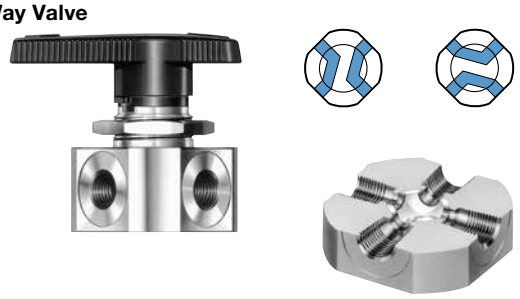
② Cross-port flow may occur during switching. If cross-port flow is unacceptable, specify a 0.093 in. ball orifice. Example: SS-45ZF8-ND-**093**

Crossover (4-Way and 6-Way) Valves (40 Series)

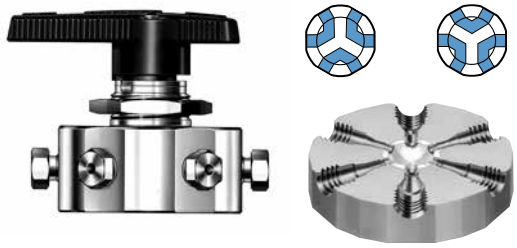
Features

- Capsule packing allows crossover of two or three streams.
- Machined stops provide positive port positioning.
  - Stop plate material: aluminum/ASTM B209 or B211.

4-Way Valve



6-Way Valve



Pressure-Temperature Ratings

Valve Series	Temperature °F (°C)	Working Pressure psig (bar)
43Y (4-way)	PTFE packing: 50 to 150 (10 to 65)	2500 (172)
45Y (4-way)	Live-loaded PFA or UHWMPE packing: –65 to 150 (–53 to 65)	1500 (103)
43Y6 (6-way)		500 (34.4)

Pressure ratings for valves with Swagelok tube fitting ends may be lower due to the tubing pressure rating. Refer to *Tubing Data* catalog, MS-01-107, for additional information.

Ordering Information and Dimensions

Dimensions are for reference only and are subject to change. Dimensions shown with Swagelok tube fitting nuts finger-tight.

To order, add a body material designator to a 40 series basic ordering number.

Material	Designator
316 SS	SS
Alloy 400	M
Brass	B

Example: **SS**-43YFS1

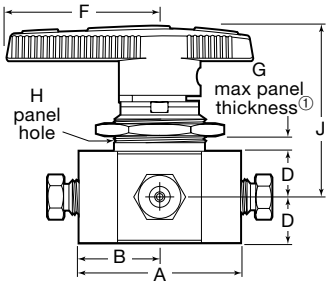
40T and 40E Series Valves

Insert a seat packing material designator.

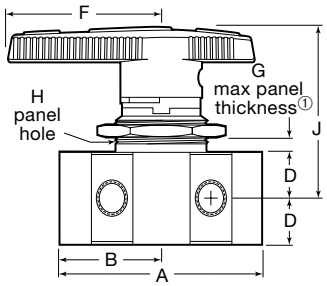
Material	Valve Series	Designator
PFA	43, 45	T
UHMWPE	43	E

Example: SS-43Y**T**FS1

4-Way Valve



6-Way Valve



① 1/8 in. (3.2 mm) minimum panel thickness.

End Connections		40 Series Basic Ordering Number	C_v	Orifice in. (mm)	Dimensions in. (mm)						
Inlets/Outlets	Size				A	B	D	F	G	H	J
4-Way Valves											
Female Swagelok tube fittings	1/16 in.	-43YFS1①	0.06	0.052 (1.32)	1.55 (39.4)	0.78 (19.8)	0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	29/32 (23.1)	1.68 (42.7)
	1/8 in.	-43YFS2①	0.08	0.062 (1.57)	1.94 (49.3)	0.97 (24.6)	0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	29/32 (23.1)	1.68 (42.7)
Female NPT	1/8 in.	-43YF2①	0.08	0.062 (1.57)	1.55 (39.4)	0.78 (19.8)	0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	29/32 (23.1)	1.69 (42.9)
	1/2 in.	-45YF8②	1.6	0.281 (7.14)	3.13 (79.5)	1.56 (39.6)	0.69 (17.5)	3.00 (76.2)	3/8 (9.7)	1 1/2 (38.1)	2.43 (61.7)
6-Way Valves											
Female Swagelok tube fittings	1/16 in.	-43Y6FS1	0.06	0.052 (1.32)	1.94 (49.3)	0.97 (24.6)	0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	29/32 (23.1)	1.68 (42.7)
	1/8 in.	-43Y6FS2	0.08	0.062 (1.57)	1.94 (49.3)	0.97 (24.6)	0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	29/32 (23.1)	1.68 (42.7)

① Cross-port flow may occur during switching. If cross-port flow is unacceptable, specify a 0.049 in. ball orifice. Example: SS-43YFS2-**049**

② Cross-port flow may occur during switching. If cross-port flow is unacceptable, specify a 0.093 in. ball orifice. Example: SS-45YF8-**093**

Flow Data at 70°F (20°C)

Flow Coefficient (C_v)	Pressure Drop to Atmosphere (Δp), psi (bar)					
	10 (0.68)	50 (3.4)	100 (6.8)	10 (0.68)	50 (3.4)	100 (6.8)
	Air Flow std ft³/min (std L/min)			Water Flow U. S. gal/min (std L/min)		
0.05	0.6 (16)	1.5 (42)	2.6 (73)	0.1 (0.3)	0.3 (1.1)	0.5 (1.8)
0.06	0.7 (19)	1.8 (50)	3.2 (90)	0.2 (0.7)	0.4 (1.5)	0.6 (2.2)
0.07	0.8 (22)	2.1 (59)	3.7 (100)	0.2 (0.7)	0.5 (1.8)	0.7 (2.6)
0.08	0.9 (25)	2.4 (67)	4.3 (120)	0.3 (1.1)	0.6 (2.2)	0.8 (3.0)
0.10	1.1 (31)	3.0 (84)	5.3 (150)	0.3 (1.1)	0.7 (2.6)	1.0 (3.7)
0.15	1.7 (48)	4.5 (120)	8.0 (220)	0.4 (1.5)	1.0 (3.7)	1.5 (5.6)
0.20	2.3 (65)	6.0 (160)	11 (310)	0.6 (2.2)	1.4 (5.2)	2.0 (7.5)
0.30	3.4 (96)	9.0 (250)	16 (450)	0.9 (3.4)	2.1 (7.9)	3.0 (11)
0.35	4.0 (110)	10 (280)	19 (530)	1.1 (4.1)	2.4 (9.0)	3.5 (13)
0.50	5.6 (150)	15 (420)	27 (760)	1.6 (6.0)	3.5 (13)	5.0 (18)
0.60	6.8 (190)	18 (500)	32 (900)	1.9 (7.1)	4.2 (15)	6.0 (22)
0.70	7.9 (220)	21 (590)	37 (1000)	2.2 (8.3)	4.9 (18)	7.0 (26)
0.75	8.5 (240)	22 (620)	40 (1100)	2.3 (8.7)	5.3 (20)	7.5 (28)
0.80	9.0 (250)	24 (670)	42 (1100)	2.5 (9.4)	5.6 (21)	8.0 (30)
0.90	10 (280)	27 (760)	48 (1300)	2.8 (10)	6.4 (24)	9.0 (34)
1.2	14 (390)	36 (1000)	64 (1800)	3.8 (14)	8.5 (32)	12 (45)
1.4	16 (450)	42 (1100)	74 (2000)	4.4 (16)	9.9 (37)	14 (52)
1.5	17 (480)	45 (1200)	80 (2200)	4.7 (17)	11 (41)	15 (56)
1.6	18 (500)	48 (1300)	85 (2400)	5.0 (18)	11 (41)	16 (60)
1.7	19 (530)	51 (1400)	90 (2500)	5.3 (20)	12 (45)	17 (64)
2.0	22 (620)	60 (1600)	100 (2800)	6.3 (23)	14 (52)	20 (75)
2.4	27 (760)	72 (2000)	120 (3300)	7.6 (28)	17 (64)	24 (90)
2.6	29 (820)	78 (2200)	140 (3900)	8.2 (31)	18 (68)	26 (98)
3.0	34 (960)	90 (2500)	160 (4500)	9.5 (35)	21 (79)	30 (110)
3.5	39 (1100)	100 (2800)	180 (5000)	11 (41)	25 (94)	35 (130)
3.8	43 (1200)	110 (3100)	200 (5600)	12 (45)	27 (100)	38 (140)
4.6	52 (1400)	140 (3900)	240 (6700)	15 (56)	33 (120)	46 (170)
6.0	68 (1900)	180 (5000)	320 (9000)	19 (71)	42 (150)	60 (220)
6.3	71 (2000)	190 (5300)	330 (9300)	20 (75)	45 (170)	63 (230)
6.4	72 (2000)	190 (5300)	340 (9600)	20 (75)	45 (170)	64 (240)
12	130 (3600)	360 (10 000)	640 (18 000)	38 (140)	85 (320)	120 (450)

Testing

Every 40G series and 40 series ball valve is factory tested with nitrogen at 1000 psig (69 bar) or at its maximum rated pressure if less than 1000 psig (69 bar). Seat tests have a maximum allowable leak rate of 0.1 std cm³/min.

Low Fugitive Emissions

The American Petroleum Institute's API 641 tests for fugitive emissions to atmosphere for quarter-turn ball valves. The tests are conducted at a third party lab and certify that at no point in the test did the valve leak in excess of 100 ppm of methane. Certificates stating that the valve is certified for Low Emissions service are available for the following 40 series valves: 40, 40G and 40T. For more information, contact your authorized Swagelok sales and service representative.

Cleaning and Packaging

All 40G series and 40 series valves are cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62.

Special cleaning and packaging 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, is available as an option. See **Process Options,** page 23.

Handle Options

Factory-Assembled Handles

Nylon Directional

Black is standard. For other colors, add a handle color designator to the valve ordering number.

Handle Color	Designator
Blue	-BL
Green	-GR
Orange	-OG
Red	-RD
Yellow	-YW

Examples:
SS-43GS4-**BL**
B-43S4-**BL**

Nylon Oval

Add **-K** to the valve ordering number.

Examples:
SS-43GS4-**K**
B-43S4-**K**

Metal

Ideal for continuous elevated ambient temperatures

■ **Stainless Steel Directional (40G Series)**

Add **-SHD** to the valve ordering number.

Example:
SS-43GS4-**SHD**

■ **316 Stainless Steel Bar (40 Series)**

Add **-SH** to the valve ordering number.

Examples:
SS-44S6-**SH**
B-43S4-**SH**

■ **Aluminum Bar (40 Series)**

Add **-BKB** to the valve ordering number.

Examples:
SS-44S6-**BKB**
B-43S4-**BKB**

No Handle

Add **-NH** to the valve ordering number.

Example: SS-43GS4-**NH**
B-43S4-**NH**

See page 21 for 40G series valves with no handle and no handle stop, typically specified for valves to be field assembled to pneumatic actuators.

Handle Kits for Field Assembly

Kits include handle and set screw.

Valve Series①	Nylon Directional②	Nylon Oval③	Stainless Steel Directional	Stainless Steel Bar	Aluminum Bar
41G, 41GX④, 42G, 42GX④	NY-5K-42G-BK	NY-5K-42GK-BK	SS-5K-42GPM	—	—
43G, 43GX④	NY-5K-43G-BK	NY-5K-43GK-BK	SS-5K-43GPM	—	—
41, 41X⑤, 42, 42X⑤	BZ-5K-42-BK	—	—	SS-5K-42B	A-5K-42B-BK
43, 43X⑤, 43Y	BZ-5K-43-BK	—	—	SS-5K-43B	A-5K-43B-BK
43Z	BZ-5K-43Z-BK	—	—	—	—
44, 44X⑤	BZ-5K-44-BK	—	—	SS-5K-44B	A-5K-44B-BK
45, 45X⑤, 45Y	BZ-5K-45-BK	—	—	SS-5K-45B	A-5K-45B-BK

① **X** designates switching (3-way) valve; **Y** designates crossover (4-way) valve; **Z** designates switching (5-way) valve.

② Ordering number specifies a black handle. For another color, replace **-BK** with a handle color designator from the table above. Example: BZ-5K-42-**BL**

③ Nylon oval handles are only available factory assembled on 40 series valves.

④ Handle kits for 40GX series 3-way valves with **L** or **H** flow paths also require a powdered metal 300 series SS stop insert, which can be ordered separately. Use ordering numbers: **SS-5SI-42G** for 41GX and 42GX series valves; and **SS-5SI-43G** for 43GX series valves.

⑤ To order handle kits for 40X series 3-way valves with **L** or **H** flow paths, contact your authorized Swagelok sales and service representative.

Locking Brackets (41G/41, 42G/42, and 43G/43 Series)

- Allows lockout of 2-way, straight-pattern valves with directional handles in the open or closed position with a standard lock.
- Additional small-diameter hole can be used to tether locking mechanism to bracket or attach ID tag.
- Available on 43G/43 series valves with Swagelok end connection sizes up to 3/8 in. and 10 mm.
- Brackets cannot be used on valves with integral VCO and VCR fitting end connections or with panel mounting.
- To order the locking bracket factory-assembled on a valve, add **-LH** to the valve ordering number.

  Example: SS-42GS4-**LH**
- To order the locking bracket for field assembly, use kit ordering numbers: **SS-51K-41G-LH** for 41G/41 and 42G/42 series valves; **SS-51K-43G-LH** for 43G/43 series valves

Handle Options

Latch-Lock Handles (43G Series; 43, 44, 45 Series)

- Lock on-off valves open and closed or closed only
- Lock switching valves at each port, (including center-off position on 3-way model)
- Lock crossover valves in both positions
- Confirm handle position with positive detent
- Assist compliance with lockout/tagout programs
- Fit padlocks with 3/16 to 5/16 in. (4.8 to 7.9 mm) shackle diameters.

⚠ **Caution:**
These handles are designed to prevent unintentional valve operation. They are not tamper resistant and can be removed, even when locked.

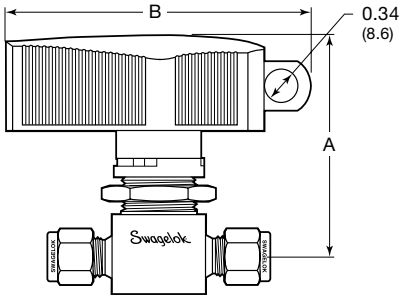
43G/43 series directional handle shown; 44 and 45 series handles are oval.

Materials of Construction

Component	Material
Handle	Reinforced nylon
Locking mechanism	304 SS
Detent base, handle base, handle pin stop	Powdered metal 300 series SS
Spring	S17700 SS
Set screw	S17400 SS
Lubricant	Hydrocarbon-based

Dimensions

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



Valve Series	Type	Dimensions in. (mm) A	B
43G 43GX	On-off (2-way) Switching (3-way)	2.27 (57.7)	3.02 (76.7)
43 43X 43Z	On-off (2-way) Switching (3-way Switching (5-way)		
43Y 43Y6 43Z6	Crossover (4-way) Crossover (6-way) Switching (7-way)	2.30 (58.4)	3.02 (76.7)
44 44X	On-off (2-way) Switching (3-way)	2.63 (66.9)	3.96 (101)
45 45X 45Y	On-off (2-way) Switching (3-way) Crossover (4-way)	2.85 (72.4)	3.96 (101)

Ordering Information

Factory Assembled

1. Select a 43G, 43, 44, or 45 series valve ordering number.
   Example: **SS-43GS4**
2. To order a valve with a black latch-lock handle, add a handle designator.
   Example: SS-43GS4-**LL**
3. To order a handle color other than black, add a handle color designator to the valve ordering number, keeping the handle and color designators in *alphabetical* order.
   Examples: SS-43GS4-**BL**-LL
   SS-43GS4-LL-**RD**

Kits for Field Assembly

1. Tor order a black handle kit, select a handle kit basic ordering number.
   Example: **NY-5K-43GLL-BK**
2. For another handle color, replace **BK** with a handle color designator from the table at right.
   Example: NY-5K-43GLL-**BL**

Handle Color	Designator
Blue	BL
Green	GR
Orange	OG
Red	RD
Yellow	YW

Valve Series	Type	Factory Assembly Handle Designators: Open/Closed	Factory Assembly Handle Designators: Closed Only	Field Assembly Handle Kit Basic Ordering Numbers: Open/Closed	Field Assembly Handle Kit Basic Ordering Numbers: Closed Only
43G	On-off (2-way)	-LL	-LLC	NY-5K-43GLL-BK	NY-5K-43GLLC-BK
43GX	Switching (3-way)		—	NY-5K-43GXLL-BK	—
43	On-off (2-way)	-LL	-LLC	NY-5K-43LL-BK	NY-5K-43LLC-BK
43X	Switching (3-way)		—	NY-5K-43XLL-BK	—
43Y	Crossover (4-way)		—	NY-5K-43YLL-BK	—
43Y6	Crossover (6-way)		—	NY-5K-43Y6LL-BK	—
43Z	Switching (5-way)		—	NY-5K-43ZLL-BK	—
43Z6	Switching (7-way)		—	NY-5K-43Z6LL-BK	—
44	On-off (2-way)		-LLC	NY-5K-44LL-BK	NY-5K-44LLC-BK
44X	Switching (3-way)		—	NY-5K-44XLL-BK	—
45	On-off (2-way)		-LLC	NY-5K-45LL-BK	NY-5K-45LLC-BK
45X	Switching (3-way)		—	NY-5K-45XLL-BK	—
45Y	Crossover (4-way)		—	NY-5K-45LL-BK	—

Vent Port and Stem Extension Options

Vented Valves

Pressure rating for vented valves is 500 psig (34.4 bar).

2-Way, Straight-Pattern Valves

When the valve is closed, the downstream port vents to atmosphere through a vent hole in the side of the valve body.

2-Way, Angle-Pattern and 3-Way Valves

When the valve is closed, the bottom port vents to atmosphere through a vent hole in the side of the valve body.

Ordering Information

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

Example: SS-43G**V**S4
B-43**V**S4

⚠ **Warning: Cross-vent flow may occur in vented valves.**

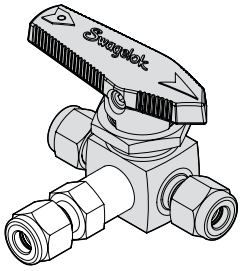
To eliminate cross-vent flow, specify a smaller ball orifice. Add a designator from the table below to the valve ordering number.

Valve Series	Orifice in. (mm)	Designator
41G, 41GX, 41, 41X, 42G, 42GX, 42, 42X	0.040 (1.02)	-040
43G, 43GX, 43, 43X, 44, 44X, 45, 45X	0.049 (1.24)	-049
45, 45X	0.093 (2.36)	-093

Examples: SS-41GVS1-**040**
B-42VS4-**040**

Welded Vent Port Connections

Stainless steel vented valves are available with a Swagelok tube fitting or a tube stub welded to the vent port. See the table below.



Swagelok Tube Fitting Connection Welded to Vent Port

40G Series Ordering Information

To order a 40G series vented valve with a welded vent port connection, add the connection designator to the vented valve ordering number.

Vent Port Connection	Size	Designator
Fractional Swagelok tube fitting	1/8 in.	-WVS2
	1/4 in.	-WVS4
	3/8 in.	-WVS6①
Metric Swagelok tube fitting	3 mm	-WVS3M
	6 mm	-WVS6M
	8 mm	-WVS8M①
Fractional tube stub	1/4 × 0.049, 2 in. long	-WV4T49-2
Metric tube stub	6 × 1.0, 50 mm long	-WV6MT10-50M

① Available for 43G series valves only.

Example: SS-43GVS4-**WVS4**

40 Series Ordering Information

To order a 40 series vented valve with welded vent port connection, contact your authorized Swagelok representative.

Stem Extensions (Manual Valves)

Standard lengths are 2, 4, and 6 in.

Factory Assembled

To order a factory-assembled stem extension, add the stem extension designator to the valve ordering number

Stem Extension Length, in. (mm)	Stem Extension Designator
2 (50.8)	-SE2
4 (102)	-SE4
6 (152)	-SE6

Examples: SS-43GS4-**SE2**
SS-44S6-**SE4**

Kits for Field Assembly

To order a stem extension kit for field assembly, add a dash and the stem extension length (2, 4, 6) in inches to the kit basic ordering number.

Valve Series	Stem Extension Kit Basic Ordering Number
41G, 42G	MS-SE-42G
43G	MS-SE-43G
41, 42	MS-SE-42
43	MS-SE-43
44	MS-SE-44
45	MS-SE-45

Examples: MS-SE-42G-**2"**
MS-SE-44-**4"**

Accessories

Directional Name Plates

- Indicate the direction of flow.
- Available for all 40G series and 40 series valves.
- Matte surface accepts ink or labels.

To order, add **-WN1** (blank nameplate) or **-WN2** (marked nameplate) to the valve ordering number.

Examples: SS-43GS4-**WN1**
B-42VS4-**WN2**

Directional name plate kits are also available. Contact your authorized Swagelok representative.

Pneumatic Actuators

Swagelok rack and pinion pneumatic actuators are compact, lightweight, and easily mountable. The actuators are available in spring-return and double-acting modes. Straight, angle-pattern, 4-way, and 3-way valves with **H** and **L** flow paths require 90° actuation; all other 3-way valves require 180° actuation.

For technical data, including materials of construction, air displacement, and weight, see the *Swagelok Ball Valve Actuation Options* catalog (MS-02-343).

⚠ **Caution: Actuated assemblies must be properly aligned and supported. Improper alignment or inadequate support of the actuated assembly may result in leakage or premature valve failure.**

Pressure-Temperature Ratings

Actuator Service	Actuator Service Designator	Temperature Range °F (°C)	Maximum Actuator Pressure, psig (bar)	
			At 100°F (37°C)	At Maximum Temperature
Standard	—	–20 to 200 (–28 to 93)	200 (13.7)	165 (11.3)
High temperature	HT	0 to 400 (–17 to 204)		100 (6.8)
Low temperature	LT	–40 to 200 (–40 to 93)		165 (11.3)
Nonfluorocarbon	NF	–20 to 200 (–28 to 93)		165 (11.3)

Actuator Pressure at Maximum System Pressure

Based on valve performance using pressurized air or nitrogen.

40G Series and 40 Series

Valve Series①	Actuator Model	Actuator Model Designator	Actuation Modes			
			Spring Return		Double Acting	
			Single	Dual	Single	Dual
			Minimum Actuator Pressure, psig (bar)			
41G, 42G, 41, 42	31 (90°)	-31	60 (4.2)	70 (4.9)	25 (1.8)	35 (2.5)
41GX, 42GX, 41X, 42X	51 (180°)	-51	60 (4.2)	70 (4.9)	25 (1.8)	35 (2.5)
43G, 43, 43Y	31 (90°)	-31	80 (5.6)	—	50 (3.5)	80 (5.6)
	33 (90°)	-33	65 (4.5)	75 (5.2)	20 (1.4)	35 (2.5)
43GX, 43X	51 (180°)	-51	70 (4.9)	—	50 (3.5)	80 (5.6)
	53 (180°)	-53	65 (4.5)	70 (4.9)	20 (1.4)	35 (2.5)
44	33 (90°)	-33	70 (4.9)	90 (6.3)	25 (1.8)	50 (3.5)
44X	53 (180°)	-53	70 (4.9)	80 (5.6)	25 (1.8)	50 (3.5)
45, 45Y	33 (90°)	-33	90 (6.3)	—	60 (4.2)	100 (6.9)
45X	53 (180°)	-53	85 (5.9)	—	60 (4.2)	100 (6.9)

40T and 40E Series for Low-Temperature Service

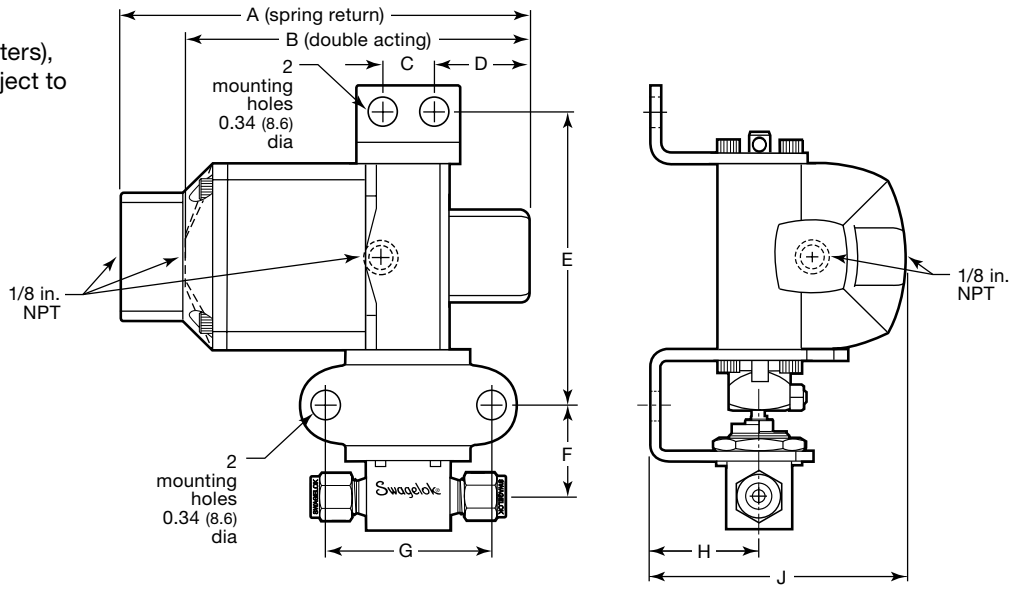
Valve Series①	Actuator Model	Actuator Model Designator	Actuation Modes			
			Spring Return		Double Acting	
			Single	Dual	Single	Dual
			Minimum Actuator Pressure, psig (bar)			
41, 42	31 (90°)	-31	65 (4.5)	80 (5.6)	25 (1.8)	45 (3.2)
41X, 42X	51 (180°)	-51	65 (4.5)	—	25 (1.8)	45 (3.2)
43, 43Y	31 (90°)	-31	—	—	60 (4.2)	100 (6.9)
	33 (90°)	-33	70 (4.9)	85 (5.9)	25 (1.8)	40 (2.8)
43X	51 (180°)	-51	—	—	60 (4.2)	100 (6.9)
	53 (180°)	-53	65 (4.5)	75 (5.2)	25 (1.8)	40 (2.8)
44	33 (90°)	-33	80 (5.6)	—	40 (2.8)	75 (5.2)
44X	53 (180°)	-53	75 (5.2)	—	40 (2.8)	75 (5.2)
45, 45Y	33 (90°)	-33	—	—	65 (4.5)	—
45X	53 (180°)	-53	—	—	65 (4.5)	—

① **X** designates switching (3-way) valve; **Y** designates crossover (4-way) valve.

Pneumatic Actuators

Dimensions

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



Valve Series①	Actuator Model	Dimensions, in. (mm)								
		A	B	C	D	E	F	G	H	J
41G, 42G, 41, 42, 41GX, 42GX, 41X, 42X	31 (90°) 51 (180°)	4.91 (125)	4.09 (104)	0.63 (16.0)	1.15 (29.2)	3.55 (90.2)	1.02 (25.9)	2.00 (50.8)	1.31 (33.3)	3.04 (77.2)
43G, 43, 43GX, 43X, 43Y	31 (90°) 51 (180°)	4.91 (125)	4.09 (104)	0.63 (16.0)	1.15 (29.2)	3.55 (90.2)	1.11 (28.2)	2.00 (50.8)	1.31 (33.3)	3.04 (77.2)
	33 (90°) 53 (180°)	7.86 (200)	5.89 (150)	0.88 (22.4)	1.73 (43.9)	4.61 (117)	1.17 (29.7)	2.00 (50.8)	1.75 (44.4)	4.07 (103)
44, 44X	33 (90°) 53 (180°)	7.86 (200)	5.89 (150)	0.88 (22.4)	1.73 (43.9)	4.88 (124)	1.56 (39.6)	2.00 (50.8)	1.75 (44.4)	4.07 (103)
45, 45X, 45Y	33 (90°) 53 (180°)	7.86 (200)	5.89 (150)	0.88 (22.4)	1.73 (43.9)	4.88 (124)	1.69 (42.9)	2.19 (55.6)	1.75 (44.4)	4.07 (103)

① **X** designates switching (3-way) valve; **Y** designates crossover (4-way) valve.

Ordering Information

Factory-Assembled Valves with Actuators

Typical Ordering Number

A		B	C	D
SS - 43GS4		**-31**	**D**	**HT**

A Valve Ordering Number

B Actuator Model

Based on valve series, select actuator designator. See **Actuator Pressure at Maximum System Pressure** table, page 16.

-31 = 90° actuation
-33 = 90° actuation
-51 = 180° actuation
-53 = 180° actuation

C Actuation Mode

C = Spring return, normally closed
D = Double acting
O = Spring return, normally open
S = Spring return, 3-way and 4-way valves

D Actuator Service

HT = High temperature
LT = Low temperature
NF = Nonfluorocarbon
None = Standard

*For dual-mounted assemblies (two valves mounted to one actuator), add **DM** to the ordering number.*

*Example: SS-43GS4-31D**DM***

Pneumatic Actuators

Ordering Information

Kits for Field Assembly

Order one actuator kit and one mounting bracket kit for each valve.

Actuator Kit Typical Ordering Number

MS-1 **A** **31** - **B** **DA** **C** **-HT**

A Actuator Model

Based on valve series, select actuator model. See **Dimensions** table, page 17.

31 = 90° actuation
33 = 90° actuation
51 = 180° actuation
53 = 180° actuation

B Actuation Mode

DA = Double acting
SR = Spring return

C Actuator Service

-HT = High temperature
-LT = Low temperature
-NF = Nonfluorocarbon
None = Standard

Mounting Bracket Kits

Mounting bracket kits contain:

- 316 stainless steel mounting bracket
- 420 stainless steel actuator roll pin
- Coupling
  - 40G series—304 stainless steel
  - 40 series—carbon steel
- Coupling pin
  - 40G series—S17400 stainless steel
  - 40 series—carbon steel
- Lock nut
  - 40G series—18-8 stainless steel
  - 40 series—carbon steel
- Four 18-8 stainless steel socket head cap screws (kit SS-MS-41G for 41G, 42G, 41GX, and 42GX series *only)*
- instructions.

Valve Series①	Actuator Model	Mounting Bracket Kit Ordering Number
41G, 42G	31 (90°)	SS-MB-41G②
41GX, 42GX	51 (180°)	SS-MB-41G②
43G	31 (90°)	SS-MB-43G
	33 (90°)	SS-MB-43G-133
43GX	51 (180°)	SS-MB-43G
	53 (180°)	SS-MB-43G-133
41, 42	31 (90°)	MS-MB-41②
41X, 42X	51 (180°)	MS-MB-41②
43	31 (90°)	MS-MB-43
	33 (90°)	MS-MB-43-133
43X	51 (180°)	MS-MB-43
	53 (180°)	MS-MB-43-133
43Y	31 (90°)	MS-MB-43Y
	33 (90°)	MS-MB-43Y-133
44	33 (90°)	MS-MB-44③
44X	53 (180°)	MS-MB-44③
45	33 (90°)	MS-MB-45
45X	53 (180°)	MS-MB-45
45Y	33 (90°)	MS-MB-45Y

① **X** designates switching (3-way) valve; **Y** designates crossover (4-way) valve.

② 42G series and 42 series valves with VCO or VCR end connections mounted to a Swagelok pneumatic actuator are only available factory assembled.

③ 44 series valves with VCR end connections require kit **MS-MB-44-VCR.**

Coupling Kits

Coupling kits enable replacement of 41, 42, or 43 series valves mounted to Swagelok pneumatic actuators with equivalent 41G, 42G, or 43G series valves. Coupling kits contain:

- 304 stainless steel coupling
- S17400 stainless steel coupling pin
- 18-8 stainless steel lock nut
- instructions.

Valve Series①	Actuator Model	Coupling Kit Ordering Number
41G, 42G	31 (90°)	304-5K-41G-131
41GX, 42GX	51 (180°)	304-5K-41G-131
43G	31 (90°)	304-5K-43G-131
	33 (90°)	304-5K-43G-133
43GX	51 (180°)	304-5K-43G-131
	53 (180°)	304-5K-43G-133

① **X** designates switching (3-way) valve; **Y** designates crossover (4-way) valve.

ISO 5211-Compliant Pneumatic Actuators

These Swagelok rack and pinion pneumatic actuators are ISO 5211 compliant and are suitable for general applications. They are available in spring-return and double-acting modes. Straight, angle-pattern, and 3-way valves with **H** and **L** flow paths require 90° actuation; all other 3-way valves require 180° actuation.

For technical data, including actuator materials of construction and weight, refer to *Ball Valve Actuation Options* catalog, MS-02-343.

For additional information on selecting and sizing ISO 5211-compliant actuators, refer to *Actuated Ball Valve Selection Guide—ISO 5211-Compliant Actuator Mounting Bracket Kits catalog,* MS-02-136.

Certifications

Factory-assembled valve assemblies with ISO 5211-compliant actuators are available with ATEX conformity on request at the time of order quotation. ATEX certification is not available for field assemblies.

⚠ **Caution: Actuated assemblies must be properly aligned and supported. Improper alignment or inadequate support of the actuated assembly may result in leakage or premature valve failure.**

Pressure-Temperature Ratings

Maximum actuator pressure is 116 psig (8.0 bar). See **Minimum Actuator Pressure** table below for minimum actuator pressures.

Actuator Service	Actuator Service Designator	Temperature Range °F (°C)
Standard	—	–40 to 176 (–40 to 80)
High temperature	HT	5 to 302 (–15 to 150)

Minimum Actuator Pressure

40G Series and 40 Series

Valve Series①	Actuator Model	Actuator Model Designators			Actuation Modes	
		Spring Return			Spring Return	Double Acting
		Normally Open	Normally Closed	Double Acting	Minimum Actuator Pressure psig (bar)	
41G, 42G, 41, 42	A10 (90°)	-A10O4	-A10C4	-A10D	50 (3.5)	36 (2.5)
	A15 (90°)	-A15O3	-A15C3	-A15D	36 (2.5)	36 (2.5)
41GX, 42GX, 41X, 42X	A15 (180°)	—	—	-A15XD	—	36 (2.5)
43G, 43	A10 (90°)	—	—	-A10D	—	43 (3.0)
	A15 (90°)	-A15O3	-A15C3	-A15D	43 (3.0)	36 (2.5)
43GX, 43X	A15 (180°)	②	②	-A15XD	—	36 (2.5)
44	A10 (90°)	—	—	-A10D	—	50 (3.5)
	A15 (90°)	-A15O4	-A15C4	-A15D	50 (3.5)	36 (2.5)
44X	A15 (180°)	②	②	-A15XD	—	36 (2.5)
45	A30 (90°)	-A30O4	-A30C4	-A30D	65 (4.5)	36 (2.5)
45X	A30 (180°)	③	③	-A30XD	—	36 (2.5)

40T and 40E Series for Low-Temperature Service

Valve Series①	Packing Material	Actuator Model	Actuator Model Designators			Actuation Modes	
			Spring Return			Spring Return	Double Acting
			Normally Open	Normally Closed	Double Acting	Minimum Actuator Pressure, psig (bar)	
41, 42	PFA, UHMWPE	A10 (90°)	-A10O4	-A10C4	-A10D	50 (3.5)	36 (2.5)
		A15 (90°)	-A15O3	-A15C3	-A15D	36 (2.5)	36 (2.5)
41X, 42X	PFA, UHMWPE	A15 (180°)	②	②	-A15XD	—	36 (2.5)
43	PFA	A10 (90°)	—	—	-A10D	—	43 (3.0)
		A15 (90°)	-A15O3	-A15C3	-A15D	43 (3.0)	36 (2.5)
	UHMWPE	A10 (90°)	—	—	-A10D	—	43 (3.0)
		A15 (90°)	-A15O3	-A15C3	-A15D	36 (2.5)	36 (2.5)
43X	PFA, UHMWPE	A15 (180°)	②	②	-A15XD	—	36 (2.5)
44	PFA	A30 (90°)	-A30O3	-A30C3	-A30D	50 (3.5)	36 (2.5)
44X	PFA	A15 (180°)	②	②	-A15XD	—	43 (3.0)
45	PFA	A60 (90°)	-A60O4	-A60C4	-A30D	50 (3.5)	36 (2.5)
45X	PFA	A30 (180°)	③	③	-A30XD	—	36 (2.5)

① **X** designates switching (3-way) valve.
② 3-way valves with **H** and **L** flow paths: **-A15S3**
③ 3-way valves with **H** and **L** flow paths: **-A30S4**

ISO 5211-Compliant Pneumatic Actuators

Ordering Information

Factory-Assembled Valves with Actuators

Typical Ordering Number

A **B** **C**
SS-43GS4 -A15D HT

A Valve Ordering Number

B Actuator Model
Based on valve series, actuation mode, and packing material, select actuator designator. See **Minimum Actuator Pressure** table, page 19.

C Actuator Service
HT = High temperature
None = Standard

Kits for Field Assembly

Order one actuator kit and one mounting bracket kit for each valve.

Actuator Kit Typical Ordering Number

A **B** **C** **D**
MS - **A15 - DA** - DIN **-HT**

A Actuator Model
Based on valve series and packing material, select actuator designator. See **Minimum Actuator Pressure** table, page 19.
A10 = A10
A15 = A15
A30 = A30
A60 = A60

B Actuation Mode
DA = Double acting (2-way valves)
XDA = Double acting (3-way valves)
3 = Spring return (41G, 42G, 43G, 41, 42, 43 series 2-way valves with A15 and A30 actuators)
4 = Spring return (41G, 41 series 2-way valves with A10 actuator; 44, 45 series 2-way valves)

C Coupling Drive Type
DIN

D Actuator Service
-HT = High temperature
None = Standard

For field assembly to ISO 5211-compliant actuators, 40G series and 40 series valves must contain a two-flat, K-style stem. K-style stems are standard for all 40G series valves and for many 44 and 45 series valves, but are optional for 41, 42, and 43 series valves. For more information, contact your Swagelok sales and service representative.

To order a valve with a two-flat, K-style stem and without a handle, if they are not standard, add -K-NH to the valve ordering number.

*Example: B-43S4-**K-NH***

Mounting Bracket Kits

Swagelok ISO 5211 mounting bracket kits contain:

- 316 stainless steel mounting bracket
- Four A4 stainless steel socket head cap screws (A4 is approximately equivalent to 316 SS)
- Coupling
  - 40G series—powdered metal 300 series stainless steel
  - 40 series—316 stainless steel
- A4 stainless steel set screw
- Instructions

Valve Series①	Mounting Bracket Kit Ordering Number
41G, 41GX, 42G, 42GX	SS-MB-41G-F04-11DIN-M②
43G, 43GX	SS-MB-43G-F04-11DIN-M
41, 41X, 42, 42X	SS-MB-41-F04-11DIN-M②
43, 43X	SS-MB-43-F04-11DIN-M
44, 44X	SS-MB-44-F04-11DIN-M
45, 45X	SS-MB-45-F05-14DIN-M

① **X** designates switching (3-way) valve.
② 42G series and 42 series valves with VCO or VCR end connections mounted to a Swagelok ISO 5211-compliant pneumatic actuator are only available factory assembled.

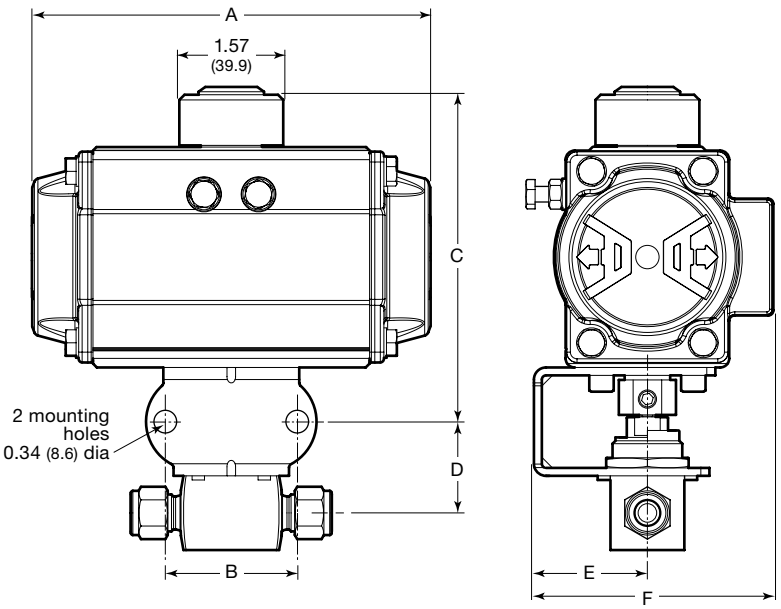
Couplings and Set Screws

Replacement of 41, 42, or 43 series valves mounted to ISO 5211-compliant pneumatic actuators with equivalent 41G, 42G, or 43G series valves requires new couplings and set screws.
To order, contact your authorized Swagelok representative.

ISO 5211-Compliant Pneumatic Actuators

Dimensions

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



Valve Series①	Actuator Model	Dimensions, in. (mm)					
		A	B	C	D	E	F
41G, 42G, 41, 42	A10 (90°)	4.65 (118)	2.00 (50.8)	4.06 (103)	1.02 (25.9)	1.44 (36.6)	2.84 (72.1)
	A15 (90°)	5.33 (135)	2.00 (50.8)	4.18 (106)	1.02 (25.9)	1.44 (36.6)	3.09 (78.5)
41GX, 42GX, 41X, 42X	A15 (180°)	7.55 (192)	2.00 (50.8)	4.18 (106)	1.02 (25.9)	1.44 (36.6)	3.09 (78.5)
43G, 43	A10 (90°)	4.65 (118)	2.00 (50.8)	4.05 (103)	1.10 (27.9)	1.44 (36.6)	2.84 (72.1)
	A15 (90°)	5.33 (135)	2.00 (50.8)	4.16 (106)	1.10 (27.9)	1.44 (36.6)	3.09 (78.5)
43GX, 43X	A15 (180°)	7.55 (192)	2.00 (50.8)	4.16 (106)	1.10 (27.9)	1.44 (36.6)	3.09 (78.5)
44	A10 (90°)	4.65 (118)	2.00 (50.8)	4.21 (107)	1.38 (35.1)	1.44 (36.6)	2.84 (72.1)
	A15 (90°)	5.33 (135)	2.00 (50.8)	4.32 (110)	1.38 (35.1)	1.44 (36.6)	3.09 (78.5)
44X	A15 (180°)	7.55 (192)	2.00 (50.8)	4.32 (110)	1.38 (35.1)	1.44 (36.6)	3.09 (78.5)
45	A30 (90°)	6.04 (153)	2.19 (55.6)	5.05 (128)	1.61 (40.9)	1.72 (43.7)	3.63 (92.2)
	A60 (90°)	8.01 (203)	2.19 (55.6)	5.73 (146)	1.61 (40.9)	1.72 (43.7)	3.71 (94.2)
45X	A30 (180°)	8.50 (216)	2.19 (55.6)	5.05 (128)	1.61 (40.9)	1.72 (43.7)	3.63 (92.2)

① **X** designates switching (3-way) valve.

Options for ISO 5211-Compliant and Swagelok Pneumatic Actuators

Swagelok offers a range of accessories to enhance instrumentation and process ball valve performance and control, including solenoid valves, limit switches, and position sensors. Factory assemblies and kits for field assembly are available.

Refer to *Ball Valve Actuation Options* catalog, MS-02-343, for additional information.

- **Valve with No Handle Stop and No Handle (40G Series)**

  provides increased accessibility to packing bolt.

  To order, add **-NHS** to the valve ordering number.

  Example: SS-43GS4-**NHS**

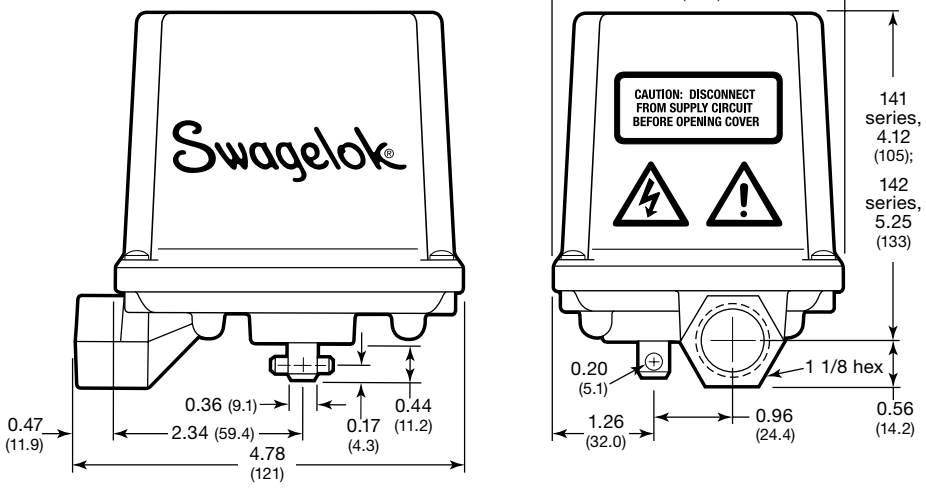
For more information on actuator options, contact your authorized Swagelok representative.

Electric Actuators

Swagelok electric actuators can be used to control the position of Swagelok instrumentation ball valves; alternating- and direct-current models are available. An electrical signal is used to change valve position from remote locations. Integral limit switches provide an output signal of the valve position, even between positions. The drive shaft of these actuators rotates in one direction.

Dimensions

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



Refer to *Electric Actuators* catalog, MS-01-35, for features, testing, materials of construction, technical data, and dimensions.

Electric actuators are not available on angle-pattern valves and vented valves.

⚠ **DO NOT USE THESE ACTUATORS ON VENTED BALL VALVES. THE DRIVE SHAFT OF THESE ACTUATORS ROTATES IN ONE DIRECTION.**

⚠ **Not CE marked.**

Ordering Information

Factory-Assembled Valve and Actuator

1. Choose the actuator series that corresponds with the selected valve series.

Valve Series①	Actuator Series
41G, 41GX, 42G, 42GX, 41, 41X, 42, 42X	141
43G, 43GX, 43, 43X, 44, 44X	142

① X designates switching (3-way) valve.

   Example: A **41G** series valve requires a **141** series actuator.

2. See the **Actuator Specifications** table in the Swagelok *Electric Actuators* catalog, MS-01-35. Based on the actuator series, select the preferred voltage/frequency/conduit connection for the required actuator.

   Example: **120 V (ac)/60 Hz/1/2 in. NPT**

3. Identify the valve flow path.

   Example: **2-way**

4. Add the actuator designator to the valve ordering number.

   Example: SS-41GS2-**41AC**

Actuator Kits for Field Assembly

Order one actuator kit and one mounting bracket kit for each valve.

1. Identify the valve series.
2. Follow steps 1 through 3 in the **Factory-Assembled Valve and Actuator** ordering information.
3. Replace the dash in the actuator designator with **MS-1**.

   Example: **MS-1**41AC

4. Select the mounting bracket kit ordering number from the table below. Kits include mounting brackets, cap screws, coupling, and instructions.

Valve Series①	Mounting Bracket Kit Ordering Number
41G, 41GX, 42G, 42GX	SS-MB-41G②
43G, 43GX	SS-MB-43G
41, 41X, 42, 42X	MS-MB-41②
43, 43X	MS-MB-43
44, 44X	MS-MB-44-131

① X designates switching (3-way) valve.

② 42G series and 42 series valves with VCO or VCR end connections mounted to a Swagelok electric actuator are only available factory assembled.

Process Options

Production Tests

To specify an optional production test in place of the standard testing, add a designator from the table at right to the valve ordering number.

Examples: SS-43GS4-**PT**
B-43S4-**PT**

Test Designator	Production Test Description
-PT	Valves are tested with nitrogen at a customer- specified pressure. Test pressure must not exceed the rated pressure of the valve. Maximum allowable leak rate depends on test pressure.
-W20	40G series—valves are hydrostatically tested with deionized water at 1.5 times the rated pressure of the valve. No visible leakage is permitted. 40 series—valves are hydrostatically tested with deionized water at 1.5 times the rated pressure of the valve. No visible leakage is permitted. Note: Due to the valve design, rated pressure is decreased to 2/3 of the standard rated pressure.
-W31	Valves are helium leak tested at a pressure of 1×10^{-4} Torr. The maximum allowable leak rate is 4×10^{-9} std cm^3/s.

Special Cleaning and Packaging (SC-11)

40G series and 40 series valves are available with optional cleaning and packaging 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.

40G Series

Special cleaning of 40G series valves changes the low-temperature rating from –65°F (–53°C) to –30°F (–34°C).

40 Series

Special cleaning of 40 series valves does not affect the temperature rating.

Ordering Information

To order, add **-SC11** to the valve ordering number.

Examples: SS-43GS4-**SC11**
B-43S4-**SC11**

Oxygen Service Hazards

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

Valves Assembled Without Lubrication

40G series and 40 series ball valves assembled without lubrication are cleaned and packaged in accordance with Swagelok *Special Cleaning and Packaging (SC-11)* catalog, MS-06-63.

40G Series

40G series valves assembled without lubrication have a pressure rating of 500 psig (34.4 bar).

40 Series

40 series valves assembled without lubrication have a pressure rating of 200 psig (13.7 bar). Brass valves are assembled with stainless steel rings, discs, and ball stem.

Ordering Information

To order, add **-1466** to the valve ordering number.

Examples: SS-43GS4-**1466**
B-43S4-**1466**

⚠ **44 and 45 series valves assembled without lubrication have a significantly higher actuation torque than valves assembled with lubrication.**

Service Options

Sour Gas Service

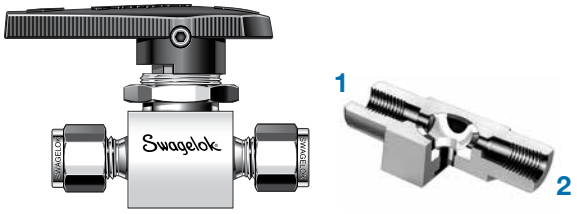
40G series and 40 series valves for sour gas service are available. Materials are selected in accordance with NACE MR0175/ISO 15156.

To order, add **-SG** to the valve ordering number.

Examples: SS-42GF2-**SG**
SS-44F4-**SG**

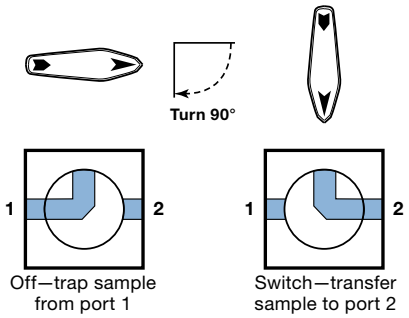
Flow Path Options

Two-Port Paths



L Flow Path

Angle porting can transfer a sample from port 1 to port 2.



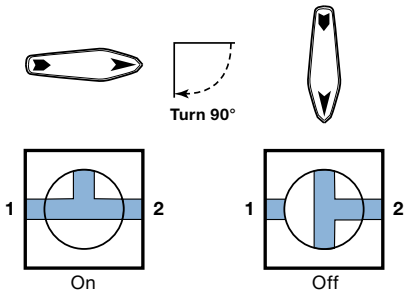
Off—trap sample from port 1

Switch—transfer sample to port 2

Valve Series	Orifice in. (mm)	Approx Ball Volume in.^{3} (cm^3)	Pressure Rating psig (bar)	Flow Path Designator
41G, 41	0.040 (1.02)	0.0004 (0.007)	2500 (172)	L
42G, 42	0.047 (1.19)	0.0005 (0.008)		
43G	0.062 (1.57)	0.0012 (0.020)		
43	0.062 (1.57)	0.0013 (0.021)		
44	0.125 (3.18)	0.0073 (0.120)	1500 (103)	
45	0.281 (7.14)	0.0473 (0.775)		

HL Flow Path

Tee porting is used for inline, on-off service when fluid must not be trapped in the stem cavity. System fluid can be evacuated through port 2 when the valve is in the off position.



On

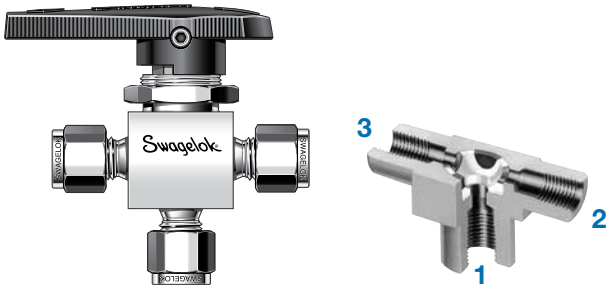
Off

Valve Series	Orifice in. (mm)	Pressure Rating psig (bar)	Flow Path Designator
41G, 41	0.093 (2.36)	2500 (172)	HL
42G, 42	0.125 (3.18)		
43G, 43	0.187 (4.75)		
44	0.281 (7.14)	1500 (103)	
45	0.406 (10.3)		

⚠ **Warning: Cross-port flow may occur in two- and three-port valves with L and HL flow paths and orifices larger than 0.049 in. (1.24 mm).**

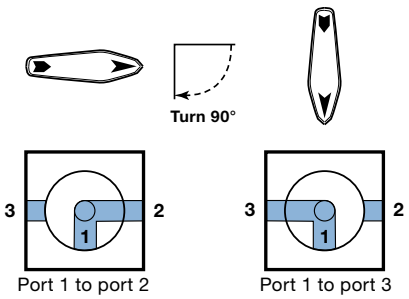
To eliminate cross-port flow, specify a smaller orifice. See **Ordering Information,** page 27.

Three-Port Paths



L Flow Path

Angle porting allows switching of port 1 to port 2 or port 1 to port 3 when the handle is rotated 90°. THERE IS NO OFF POSITION.

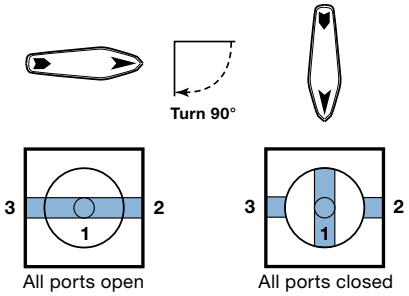


Port 1 to port 2

Port 1 to port 3

H Flow Path

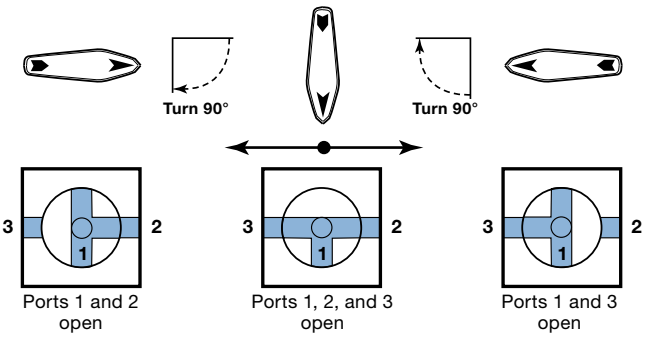
Tee porting with a leg to the bottom port (port 1) allows ports 1, 2, and 3 to be open or closed at the same time.



All ports open

All ports closed

HL Flow Path



Ports 1 and 2 open

Ports 1, 2, and 3 open

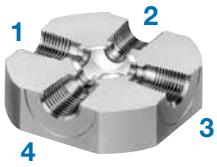
Ports 1 and 3 open

Tee porting with a leg to the bottom port (port 1) enables selection of ports 1 and 2; 1 and 3; or 1, 2, and 3. THERE IS NO OFF POSITION.

Valve Series	Orifice in. (mm)	Pressure Rating psig (bar)	Flow Path Designator
41GX, 41X	0.093 (2.36)	2500 (172)	L = Angle H = Tee (all ports open or closed)
42GX, 42X	0.125 (3.18)		
43GX, 43X	0.187 (4.75)		
44X	0.281 (7.14)	1500 (103)	HL = Tee (no off position)
45X	0.406 (10.3)		

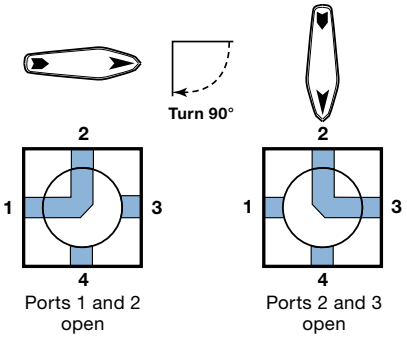
Flow Path Options (40 Series)

Four-Port Paths



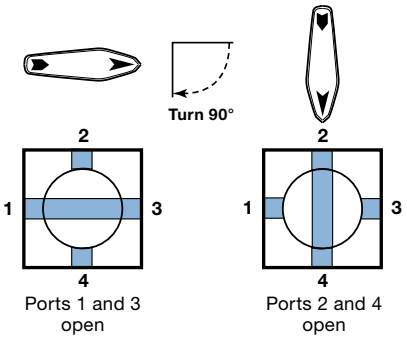
L Flow Path

Angle porting provided with four ports and 360° handle rotation; two adjacent ports are connected and the other two are closed.

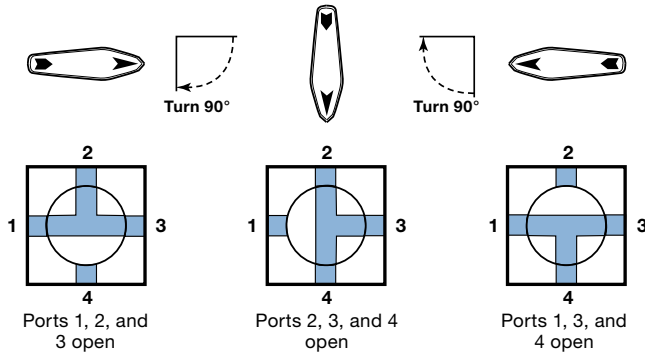


H Flow Path

Straight-pattern porting can switch two streams on and off alternately or transfer a sample from ports 1 and 3 to ports 2 and 4.



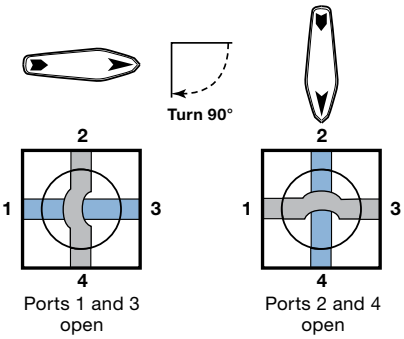
HL Flow Path



Tee porting provided with four ports and 360° rotation of the handle; three adjacent ports can be connected at the same time and the remaining port is off.

HH Flow Path

Crossover ports allow continuous flow through ports 1 and 3 and continuous flow through ports 2 and 4.



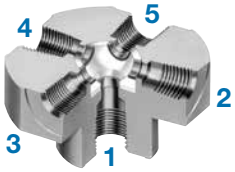
Valve Series	Orifice in. (mm)	Pressure Rating psig (bar)	Flow Path Designator
43Y	0.062 (1.57)	2500 (172)	L = Angle H = Straight HL = Tee HH = Crossover
45Y	L, H, HL: 0.281 (7.14) HH: 0.161 (4.09)	1500 (103)	

⚠ **Warning: Cross-port flow may occur in four-port valves.**

To eliminate cross-port flow, specify a smaller orifice. See **Ordering Information,** page 27.

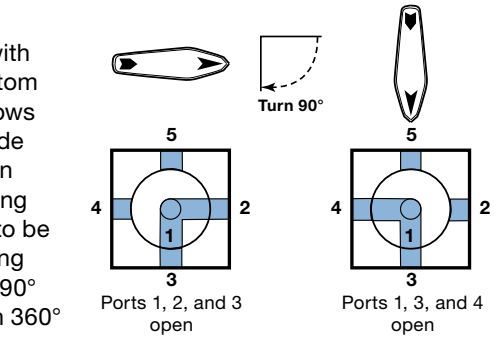
Flow Path Options (40 Series)

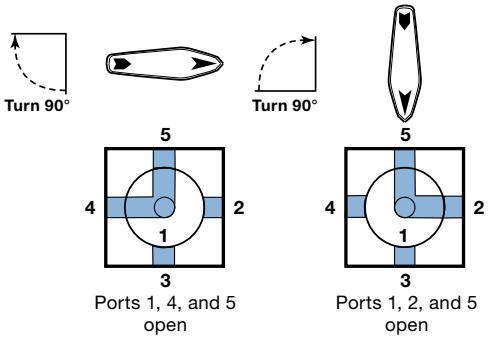
Five-Port Paths



L Flow Path

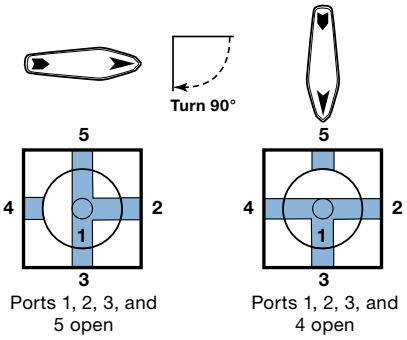
Angle porting with a leg to the bottom port (port 1) allows two adjacent side ports to be open and the remaining two side ports to be closed. Switching can be done in 90° increments with 360° handle rotation.

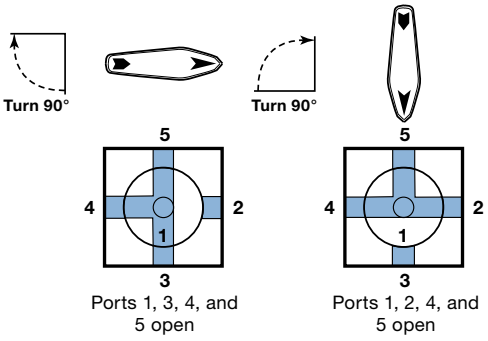




HL Flow Path

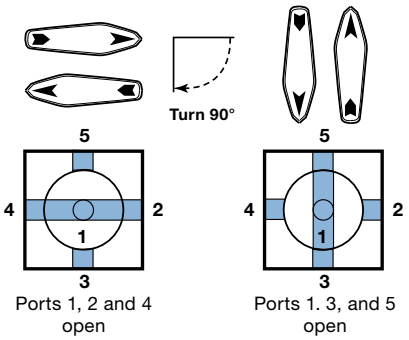
Tee porting in the ball with a leg to the bottom port (port 1) permits three side ports to be open while the fourth side port is closed. Switching can be done in 90° increments with 360° handle rotation.





H Flow Path

Tee porting in the ball with a leg to the bottom port (port 1) allows selection of ports 2 and 4 or 3 and 5 with 360° handle rotation.



Valve Series	Orifice in. (mm)	Pressure Rating psig (bar)	Flow Path Designator
43Z	0.062 (1.57)	2500 (172)	L = Angle H = Tee (2 ports close) HL = Tee (1 port closes)
45Z	0.281 (7.14)	1500 (103)	

⚠ **Warning: Cross-port flow may occur in five-port valves.**

To eliminate cross-port flow, specify a smaller orifice. See **Ordering Information,** page 27.

Flow Path Options

Ordering Information

40G Series

Two- and three-port flow paths are available. Insert a flow path designator into a 40G series ordering number as shown.

Examples: SS-41G**L**S2 for a two-port 41G series valve with **L** flow path
SS-43GX**HL**S4 for a three-port 43G series valve with **HL** flow path

40 Series

Two-and three-port paths are available for brass and alloy 400 valves. Four-and five-port paths are available for stainless steel, brass, and alloy 400 valves.

Add a material designator and insert a flow path designator into a 40 series basic ordering number as shown.

Examples: **B**-41**L**S2 for a brass two-port 41 series valve with **L** flow path
SS-44X**H**S6 for a stainless steel three-port 44 series valve with **H** flow path

Material	Valve Series	Designator
316 SS	43Y, 43Z, 44, 44X, 45, 45X, 45Y, 45Z	SS
Alloy 400	41, 41X, 42, 42X, 43, 43X, 43Y, 43Z, 44, 44X, 45, 45X, 45Y, 45Z	M
Brass	41, 41X, 42, 42X, 43, 43X, 43Y, 43Z, 44, 44X, 45, 45X, 45Y, 45Z	B

⚠ **Warning: Cross-port flow may occur in some sizes and flow paths.**

To eliminate cross-port flow, specify an orifice of:

- 0.049 in. for 41G, 42G, 43G, 41, 42, and 43 series valves whose standard orifice is larger than 0.049 in. (1.24 mm).

  Examples: SS-43GHLS4-**049**
  B-43XLS4-**049**

- 0.093 in. for 44 and 45 series valves whose standard orifice is larger than 0.093 in. (2.36 mm).

  Examples: SS-44LS6-**093**
  SS-45YHS8-**093**

Ordering Multiple Options and Accessories

Swagelok 40G series and 40 series instrumentation ball valves are available with a wide variety of options and accessories that enable valve configurations customized to meet specific system requirements. Just insert or add designators as shown.

Typical Ordering Number

1		2	3	4	5	6		7
SS	-	43G	E	V	L	S4		-LL-RD

1 Body Material

B = Brass (40 series only)
M = Alloy 400 (40 series only)
SS = 316 stainless steel (40G series, 44 series, 45 series)

2 Valve Series

On-Off (2-Way) *(page 6)*
41G, 42G, 43G, 41, 42, 43, 44, 45

Switching (3-Way) *(page 8)*
41GX, 42GX, 43GX, 41X, 42X, 43X, 44X, 45X

Switching (5-Way) *(page 10)*
43Z, 45Z

Switching (7-Way) *(page 10)*
43Z6

Crossover (4-Way) *(page 11)*
43Y, 45Y

Crossover (6-Way) *(page 11)*
43Y6

3 Packing Material

40G Series
E = UHMWPE
None = modified PTFE

40 Series
None = PTFE

40T and 40E Series
E = Live-loaded UHMWPE (41, 42, 43 series sizes only)
T = Live-loaded PFA (all sizes)

4 Optional Vent Port

V = Vent port (page 15)

5 Optional Flow Path

H, L, HH, HL (page 24)

6 End Connections, Size

Swagelok Tube Fittings

Fractional, in.
S1 = 1/16
S2 = 1/8
S4 = 1/4
S6 = 3/8
S8 = 1/2
S12 = 3/4

Metric, mm
S3MM = 3
S6MM = 6
S8MM = 8
S10MM = 10
S12MM = 12

Female NPT
F2 = 1/8 in.
F4 = 1/4 in.
F6 = 3/8 in.
F8 = 1/2 in.

Female ISO/BSP Tapered
F4RT = 1/4 in.
F6RT = 3/8 in.
F8RT = 1/2 in.

Male NPT
M4 = 1/4 in.

Male NPT to Swagelok Tube Fitting
M4-S4 = 1/4 in.

VCO Fittings
VCO4 = 1/4 in.

Integral Male VCR Fittings
VCR4 = 1/4 in.
VCR8 = 1/2 in.

7 Options and Accessories

Add multiple designators in *alphanumeric* order. Not all options available for all valves. See pages cited below.

-A = Angle-pattern body (page 6)

-BL, -GR, -OG, -RD, -YW = Nylon directional handle colors (page 13)

-K, -SHD, -SH, -BKB, -NH, -NHS, -LH, -LL, -LLC = Handle options (pages 13 and 21)

-WVS2, -WVS4, . . . -WVS8M = Swagelok tube fitting vent port connections (page 15)

-WV4T49-2, -WV6MT10-50M = Tube stub vent port connections (page 15)

-SE2, -SE4, -SE6 = Stem extensions (page 15)

-WN1, -WN2 = Directional name plates (page 15)

-PT, -W20, -W31 = Production tests (page 23)

-SC11 = Special cleaning and packaging (page 23)

-1466 = No lubrication/special cleaning and packaging (page 23)

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

Swagelok

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 Lifetime 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.

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

Modular Platform Components (MPC)

Surface-Mount Components, Substrates, Manifolds, Mounting Components, and Assembly Hardware

MPC Series

- ANSI/ISA 76.00.02-compliant design, 38.2 mm (1.5 in.) platform
- Easy to configure, assemble, and maintain
- Valves, filters, flowmeters, regulators, pressure gauges, and digital pressure-temperature transducers, as well as adapters for additional surface-mount components

Swagelok

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Swagelok Substrate and Manifold Components

Modular Platform Systems

The Swagelok modular platform component system is a system for use within process analyzer, sample-handling, and fluid distribution systems. The Swagelok MPC system includes a complete selection of MPC series components and a complementary configuration tool called the *MPC System Configurator* (page 8).

Swagelok Modular Platform Components

The components consist of a variety of Swagelok surface-mount components, which are ANSI/ISA 76.00.02-compliant, and a large selection of substrate and manifold flow components, which create the fluid distribution system.

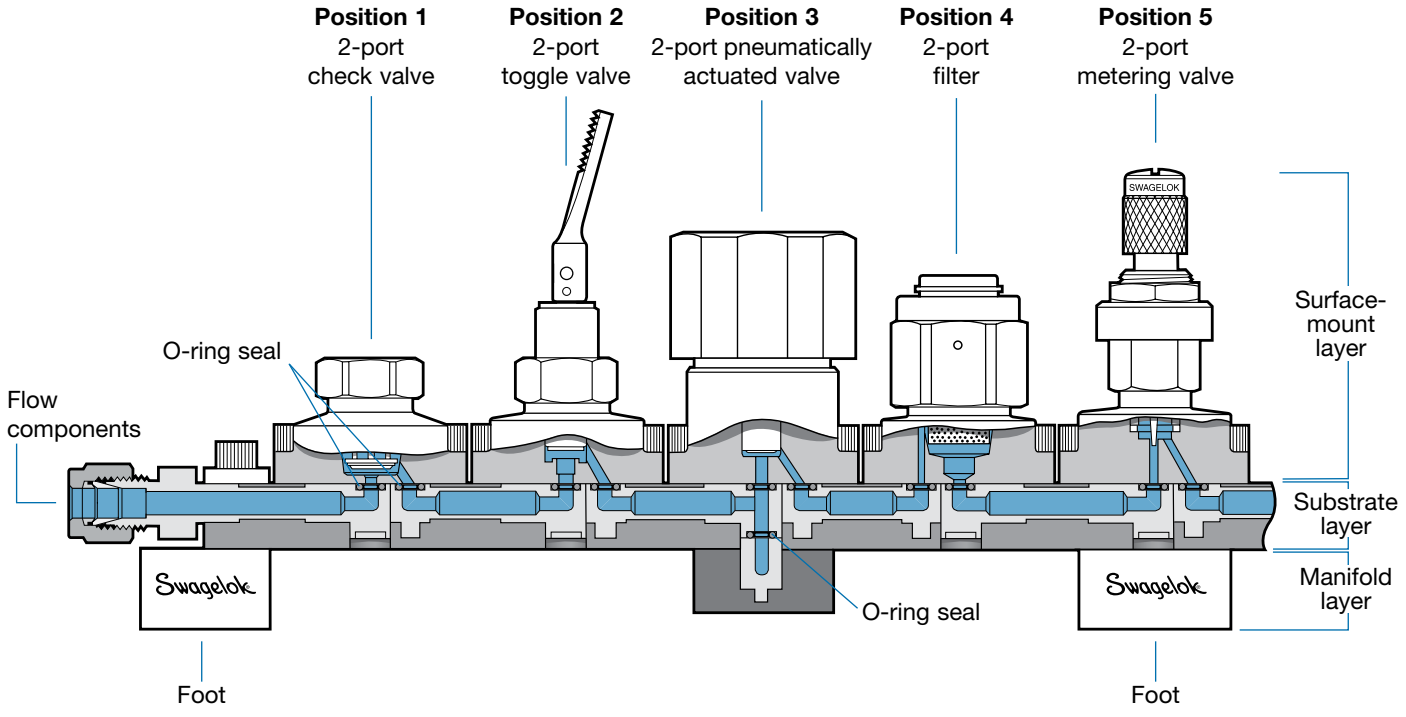
Standard O-rings provide leak-tight seals between each surface-mount and substrate flow component and between the substrate and manifold flow components.

An MPC series assembly provides a compact fluid-distribution system with a reduced footprint for efficient use of component space. Modular technology allows the user to customize each system for a specific application and reduces installation and maintenance time. Surface-mount components can be serviced easily from the top of the assembly without disturbing any other components.

Surface-mount components, adapters, and caps are interchangeable on any surface-mount position because of the modularity of components and the use of the standard ANSI/ISA 76.00.02 interface.

Typical Swagelok MPC Assembly

The system below consists of a five-position assembly with a manifold layer assembled below Position 3. At this position, flow is diverted in two directions—up to the surface-mount component and down into the manifold layer.



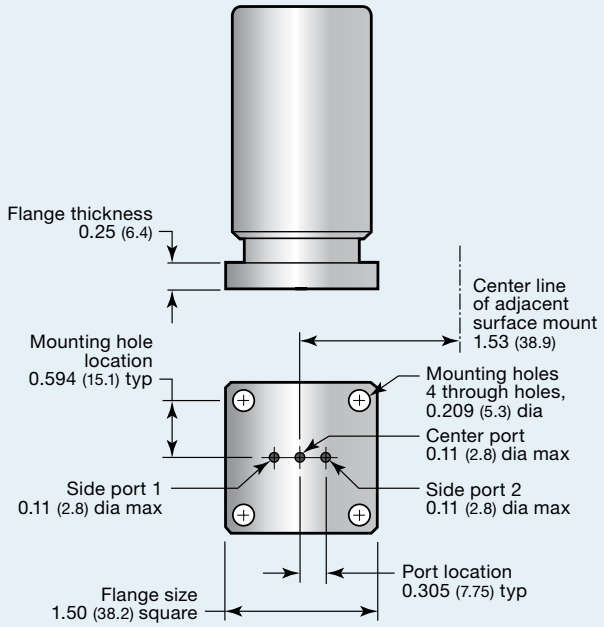
ANSI/ISA 76.00.02 Specification

Modular Component Interfaces for Surface-Mount Fluid Distribution Components

This specification establishes properties and physical dimensions that define the interface for surface-mount fluid distribution components with elastomeric sealing devices used within the process analyzer and sample-handling systems. The interface controls the dimensions and location of the sealing surfaces to allow changes of just one element of the system without modification of the entire system. This is what makes the system modular from both a design and a maintenance standpoint.

The Swagelok modular platform component system meets all the requirements of this specification for the 38.2 mm (1.5 in.) footprint. The standard dimensions of a typical Swagelok MPC series surface-mount component are shown at right.

38.2 mm (1.5 in.) Platform



Dimensions are in inches (millimeters).

Technical Data

Pressure-Temperature Ratings

Surface-Mount Components

See specific component for pressure-temperature ratings.

Substrate and Manifold Components

Seal Material	Kalrez®	Fluorocarbon FKM
Temperature, °F (°C)	**Working Pressure,** psig (bar)	
20 (–6)	1000 (68.9)	3600 (248)
40 (4)	3600 (248)	3600 (248)
100 (37)	3600 (248)	3600 (248)
150 (65)	3320 (228)	3320 (228)
200 (93)	3040 (209)	3040 (209)
250 (121)	2786 (191)	2786 (191)
300 (148)	2115 (145)	2115 (145)

Materials of Construction

Surface-Mount Components

See specific component for wetted materials of construction.

Substrate and Manifold Components

- Wetted materials: 316L SS (ASTM A276 or A479) and fluorocarbon FKM or optional Kalrez
- Nonwetted materials: aluminum (alloy 2024-T351, hard-coat anodized) and 300 series stainless steel

Seals, Mounting Blocks, and Assembly Hardware

See page 30.

Testing

Surface-Mount Components

- Every Swagelok MPC surface-mount component is factory tested with nitrogen at 1000 psig (69 bar) or at its maximum working pressure if less than 1000 psig (69 bar). Seats have a maximum allowable leak rate of 0.1 std cm^3/min. Shell testing is performed to a requirement of no detectable leakage with a liquid leak detector.
- Special testing options are available on request. Contact your authorized Swagelok representative.

Cleaning and Packaging

- All Swagelok MPC components are cleaned and packaged in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62.
- Special cleaning options are available on request. Contact your authorized Swagelok representative.

Assembly Process

- For information on the assembly of Swagelok MPC components, see pages 6 and 7.
- For detailed assembly and service instructions, see *MPC Series Modular Platform Components Assembly and Service Instructions,* MS-12-39.

Swagelok MPC Assembly Process

A typical MPC system consists of three layers—a substrate layer, a manifold layer, and a surface-mount layer.

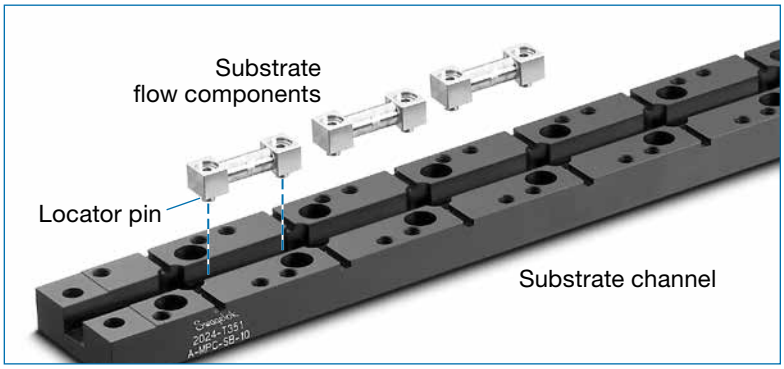
- The substrate layer provides flow through the system from one component to another.
- The manifold layer provides flow from one substrate to another. Together, the substrate and manifold layers form the conduit for the system fluid, and they can be customized for any flow configuration.
- The surface-mount layer provides shutoff, flow control, pressure regulating, and filtering capabilities for the system fluid.

The complete MPC fluid system is assembled with simple mounting components and standard hardware.

Substrate Layer

The substrate layer provides the main flow path between the surface-mount components.

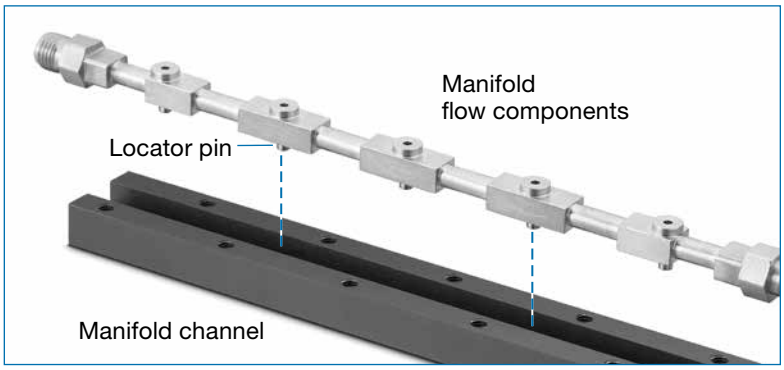
- The substrate layer consists of a **substrate channel** and a variety of drop-in **substrate flow components.**
- The substrate layer is built by aligning locator pins on the flow components into locating holes in the channel. This feature locks flow components into the channel, making assembly fast and error free.
- Substrate channels are available in a variety of lengths to accommodate up to 14 surface-mount positions.



Manifold Layer

The manifold layer provides the flow path between two or more parallel substrates.

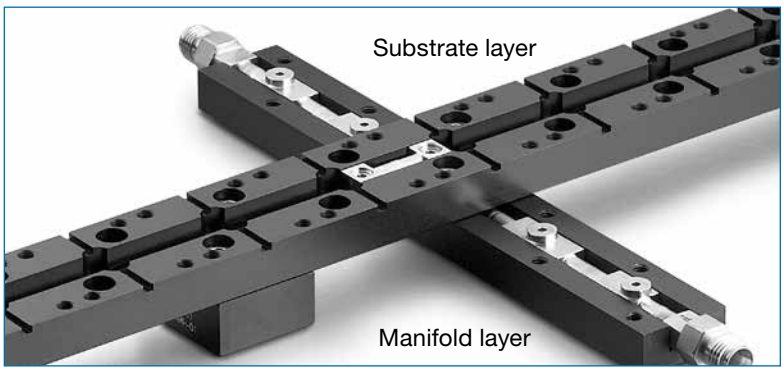
- The manifold layer consists of a **manifold channel** and a variety of drop-in **manifold flow components.**
- The manifold layer is also built with locator pins on the flow components that align in locating holes in the channel.
- Manifold channels are available in a variety of lengths to accommodate up to six parallel substrates.



Substrate-Manifold Assembly

The **substrate layer** bolts over the **manifold layer** to create the substrate-manifold assembly.

- An O-ring (not visible) provides a leak-tight seal between the substrate and manifold layers.



Swagelok MPC Assembly Process

Swagelok MPC Components

Swagelok **surface-mount components** are designed, manufactured, and tested to the same stringent quality requirements as conventional Swagelok fluid system components. They provide reliable Swagelok performance and value in a compact, ANSI/ISA 76.00.02-compliant interface.

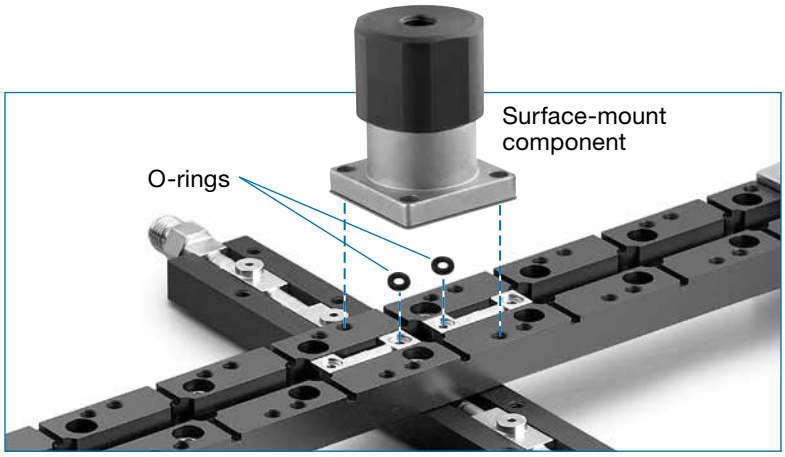
Swagelok **substrate flow components** are made by butt welding two elbows together, elimininating entrapment zones and the need for O-ring seals between positions. This exclusive Swagelok design requires fewer O-ring seals than other modular platform systems, easing assembly and reducing the number of potential leak points.

Surface-Mount Layer

Surface-Mount Components

Surface-mount components, which feature all porting through a single surface, bolt to the top of the substrate-manifold assembly to complete the fluid system.

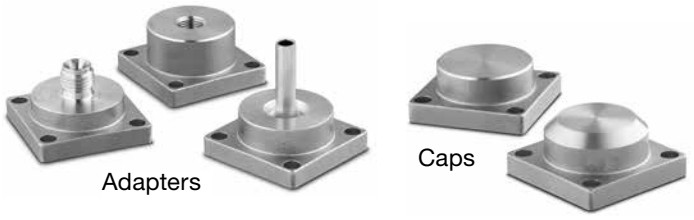
- **O-rings** provide leak-tight seals between surface-mount components and the substrate layer.
- Surface-mount components are available in a variety of shutoff, switching, metering, pressure regulating, and filtering styles with 2- or 3-port bodies.
- The porting and bolt pattern are open architecture, compliant with ANSI/ISA 76.00.02.



Surface-Mount Adapters and Caps

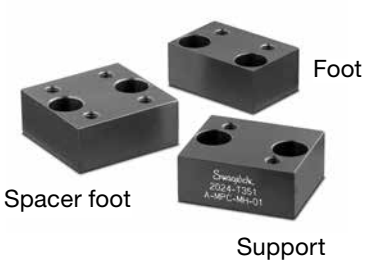
Adapters and **caps** are designed to bolt to the top of the substrate layer with the same footprint as a surface-mount component.

- **Adapters** provide a direct connection to the substrate layer and are available in several fitting styles and sizes to provide ANSI/ISA 76.00.02 interface for a variety of fluid control components.
- **Caps** cover and protect unused positions on the substrate layer.
- O-rings provide leak-tight seals.



Mounting Blocks

- **Feet** bolt to each end of the substrate layer, providing panel-mount capability.
- **Supports** bolt underneath the substrate layer, providing mid-line support for longer substrates.
- **Spacer feet** bolt two substrate assemblies together end to end, maintaining standard surface-mount spacing between them.



Swagelok MPC System Configurator

MPC system component selection and the assembly process are simplified with the use of the *MPC System Configurator,* a free Windows®-based software program that can be downloaded from your Swagelok website. The *Configurator* allows the user to create a customized system by defining, placing, and connecting surface-mount components on a layout grid.

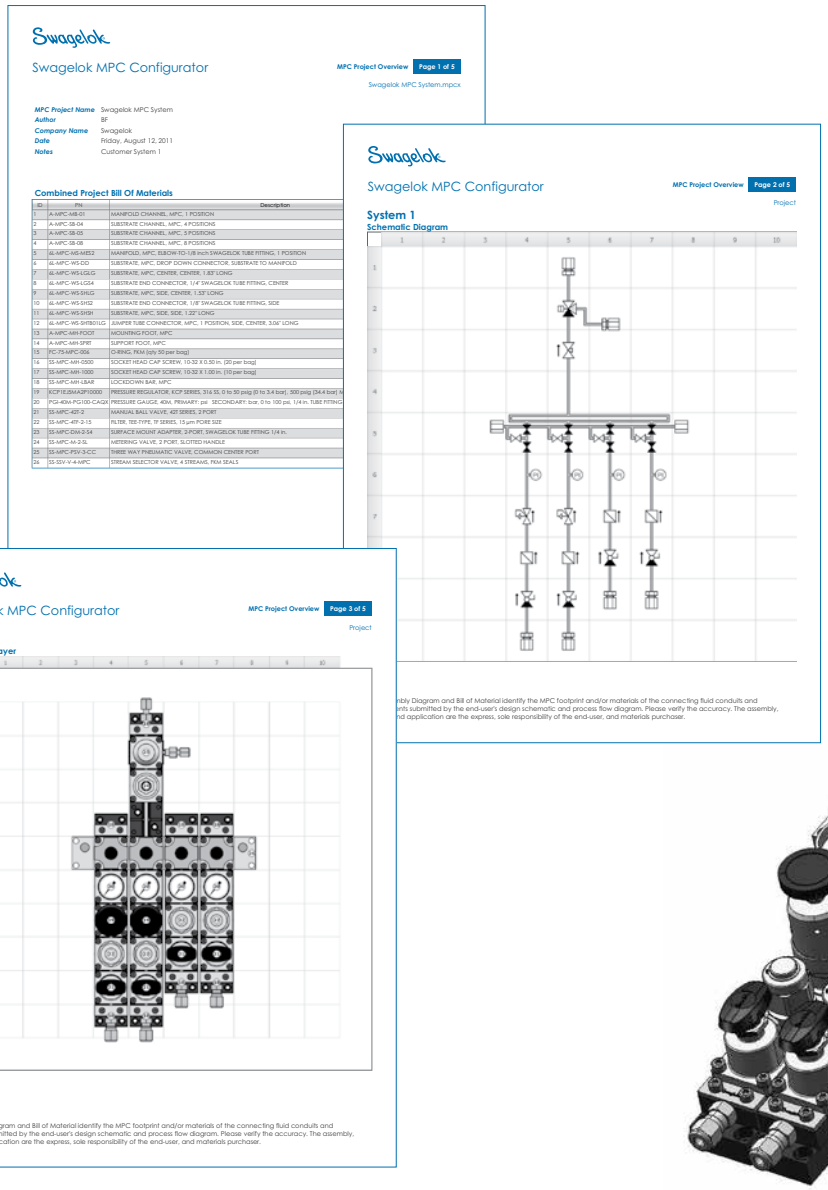
Once the layout is complete, the *Configurator* identifies the MPC series flow connectors (including substrates, manifolds, seals, and assembly hardware) that are necessary to build the complete system. A bill of material is generated for ease of ordering components, and schematics are produced to facilitate assembly. The *Configurator* also integrates with the user's AutoCAD® installation to create two-dimensional drawings and with the user's SolidWorks® installation to produce three-dimensional solid models.

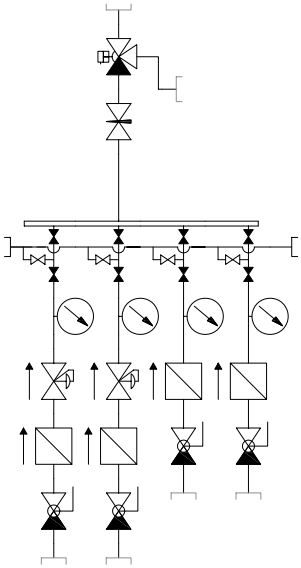
Features

- Standard Windows menus and icon buttons
- Expandable grid for unlimited configurations
- Immediate output of standard fluid system calculations, such as pressure drop, flow rate, and Joule-Thomson cooling, based on a wide range of typical system gases and liquids
- Bill of material with itemized part numbers and assembly schematics that can be exported to a Microsoft® XPS document for easy file sharing
- Two-dimensional AutoCAD schematic and assembly files
- Three-dimensional SolidWorks models

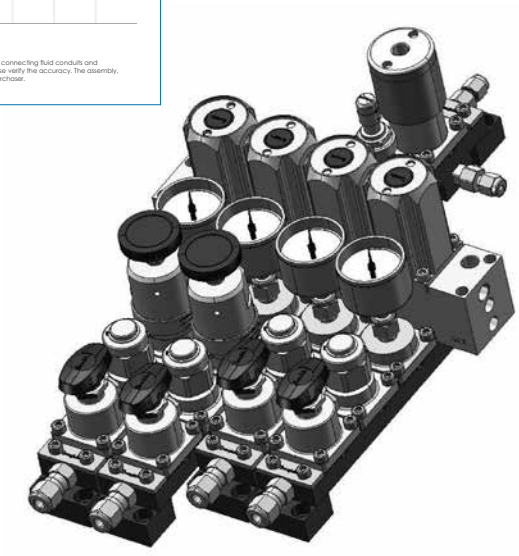
For more information, contact your authorized Swagelok representative.

***Configurator* Bill of Material and Assembly Schematics Output**





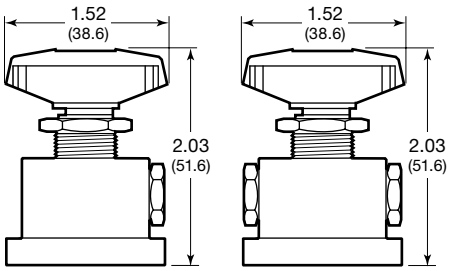
Two-Dimensional Schematic Output
(requires user's AutoCAD installation)



Three-Dimensional Model Output
(requires user's SolidWorks installation}

Swagelok Surface-Mount Components

Ball Valves, 42T Series



On-Off (2-Way) Valve **Switching (3-Way) Valve**

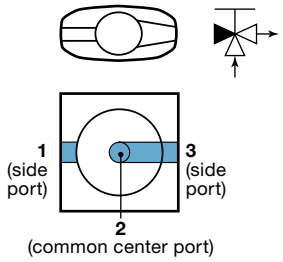
Refer to Swagelok *One-Piece Instrumentation Ball Valves—40G Series and 40 Series* catalog, MS-02-331, for additional information.

Features

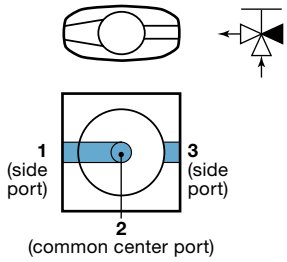
- Pressure rating: 2500 psig (172 bar)
- Temperature rating: 20 to 150°F (–6 to 65°C)
- Flow coefficient:
  - 0.11, 2-way and 3-way common center port valves
  - 0.03, 3-way common side port valves
- On-off (2-way) and switching (3-way) valves
- Wetted components:
  - CF3M body
  - 316 SS ball stem
  - PFA packing
  - powdered metal 300 series SS side rings and side discs
  - fluorocarbon FKM or Kalrez side plug seal
  - silicone-based lubricant

Switching (3-Way) Valve Flow Paths

Common Center Port

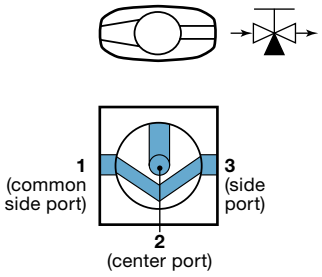


Flow is from port 2 to port 3

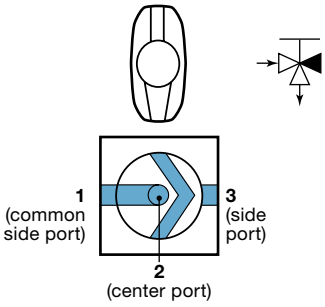


Flow is from port 2 to port 1

Common Side Port



Flow is from port 1 to port 3



Flow is from port 1 to port 2

Ordering Information

Flow Configuration	Common Port	Ordering Number	Orifice in. (mm)
On-off (2-way)	—	SS-MPC-42T-2	0.090 (2.3)
Switching (3-way)	Center	SS-MPC-42XT-3	0.090 (2.3)
	Side	SS-MPC-42XTL-3-SC	0.040 (1.0)

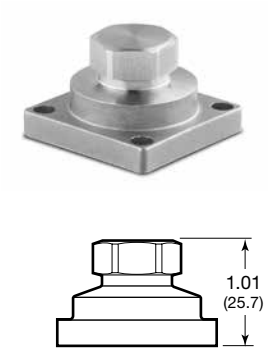
Kalrez Seal Option

Kalrez material is available in place of fluorocarbon FKM side plug seal material. To order, add **-KZ** to the ordering number.

Example: SS-MPC-42T-2-**KZ**

Swagelok Surface-Mount Components

Check Valves, CH Series



Refer to Swagelok *Check Valves—C, CA, CH, CP, and CPA Series* catalog, MS-01-176, for additional information.

Features

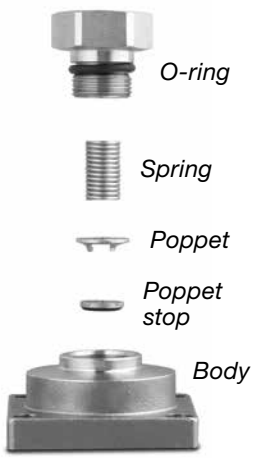
Pressure-Temperature Ratings

Seal Material	Fluorocarbon FKM
Temperature °F (°C)	**Working Pressure** psig (bar)
0 (–17) to 100 (37)	3600 (248)
150 (65)	3320 (228)
200 (93)	3040 (209)
250 (121)	2786 (191)
300 (148)	2115 (145)

- Flow coefficient: 0.09
- Wetted components: CF3M body; 316 SS poppet and poppet stop; 302 SS spring; fluorocarbon FKM seals
- Cracking pressure: 0 to 3 psi (0 to 0.20 bar); minimum reseal pressure: 6 psi (0.41 bar) back pressure

Ordering Information

2-Port Valve	3-Port Valve
SS-MPC-CH4-2	SS-MPC-CH4-3

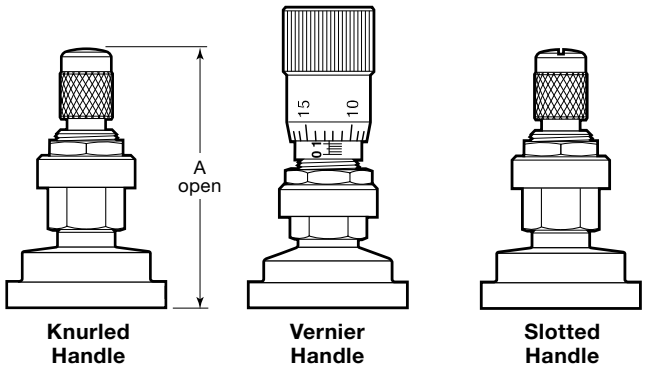


Kalrez Seal Option

Kalrez material is available in place of *wetted* fluorocarbon FKM seal material. To order, add **-KZ** to the ordering number.

Example: SS-MPC-CH4-2**-KZ**

Metering Valves, M Series



Refer to Swagelok *Metering Valves—S, M, L, and 31 Series* catalog, MS-01-142, for additional information.

Features

- Pressure rating: 1000 psig (68.9 bar)
- Temperature rating: 0 to 300°F (–17 to 148°C)
- Flow coefficient: 0.03 max
- Wetted components: CF3M body; 316 SS stem; fluorocarbon FKM stem seals
- Knurled, vernier, and slotted handles available

Ordering Information

Handle	2-Port Valve	3-Port Valve	**A,** in. (mm)
Knurled	SS-MPC-M-2	SS-MPC-M-3	2.65 (67.3)
Vernier	SS-MPC-M-2-MH	SS-MPC-M-3-MH	3.24 (82.3)
Slotted	SS-MPC-M-2-SL	SS-MPC-M-3-SL	2.65 (67.3)

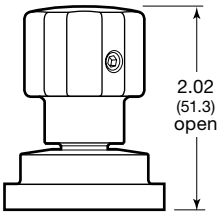
Kalrez Seal Option

Kalrez material is available in place of *wetted* fluorocarbon FKM seal material. To order, add **-KZ** to the ordering number.

Example: SS-MPC-M-2**-KZ**

Swagelok Surface-Mount Components

Nonrotating Stem Needle Valves, D Series



Refer to Swagelok *Nonrotating Stem Needle Valves—D Series* catalog, MS-01-42, for additional information.

Features

Pressure-Temperature Ratings

Stem Tip Material	PCTFE	PEEK
Temperature °F (°C)	Working Pressure psig (bar)	
0 (–17) to 100 (37)	3000 (206)	3000 (206)
150 (65)	2790 (192)	2790 (192)
200 (93)	2580 (177)	2580 (177)
250 (121)	—	2455 (169)
300 (148)	—	2115 (145)

- Flow coefficient: 0.10
- Wetted components: CF3M body; 316 SS stem; fluorocarbon FKM stem seal; PCTFE or PEEK stem tip
- Nonrotating stem provides repetitive shutoff.

Ordering Information

Stem Tip	2-Port Valve	3-Port Valve
PCTFE	SS-MPC-ODK-2	SS-MPC-ODK-3
PEEK	SS-MPC-ODP-2	SS-MPC-ODP-3

Handle Color Option

Standard handle color is black. To order an optional color, add a color designator to the ordering number.

Color	Designator
Blue	-BL
Green	-GR
Orange	-OG
Red	-RD
Yellow	-YW

Example: SS-MPC-ODK-2-**YW**

Visual Indicator Option

An optional **red band** under the handle provides visual indication of the *open* position. To order, add **-PI** to the ordering number.

Example: SS-MPC-ODK-2-**PI**

Kalrez Seal Option

Kalrez material is available in place of *wetted* fluorocarbon FKM seal material. To order, add **-KZ** to the ordering number.

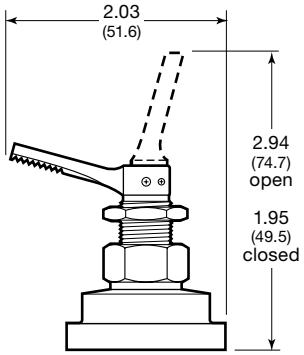
Example: SS-MPC-ODK-2-**KZ**

Multiple Options

Add designators in *alphabetical* order.

Example: SS-MPC-ODK-2-**KZ-PI-YW**

Toggle Valves, OG Series



Refer to Swagelok *Toggle Valves—OG and 1G Series* catalog, MS-01-54, for additional information.

Features

- Pressure rating: 300 psig (20.6 bar)
- Temperature rating: 0 to 200°F (–17 to 93°C)
- Flow coefficient: 0.11
- Wetted components: CF3M body; 316 SS stem; PTFE stem tip; fluorocarbon FKM stem seal
- Toggle handle is rotatable to desired position.
- Handle positioner option allows fixed positioning of handle.
- Spring-return pin option helps prevent handle from being locked open.

Ordering Information

2-Port Valve	3-Port Valve
SS-MPC-OG-2	SS-MPC-OG-3

Handle Color Option

Standard handle color is black. To order an optional color, add a color designator to the ordering number.

Color	Designator
Blue	-BL
Green	-GR
Orange	-OG
Red	-RD
Yellow	-YW

Example: SS-MPC-OG-2-**RD**

Handle Positioner Option

To order, add **-TGP** to the ordering number.

Example: SS-MPC-OG-2-**TGP**

Spring-Return Pin Option

To order, add **-SPR** to the ordering number.

Example: SS-MPC-OG-2-**SPR**

Kalrez Seal Option

Kalrez material is available in place of *wetted* fluorocarbon FKM seal material. To order, add **-KZ** to the ordering number.

Example: SS-MPC-OG-2-**KZ**

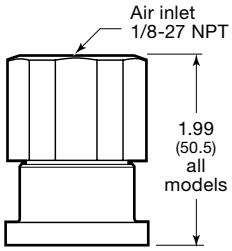
Multiple Options

Add designators in *alphabetical* order.

Example: SS-MPC-OG-2-**GR-KZ-TGP**

Swagelok Surface-Mount Components

Pneumatically Actuated Shutoff Valves, T2A Series



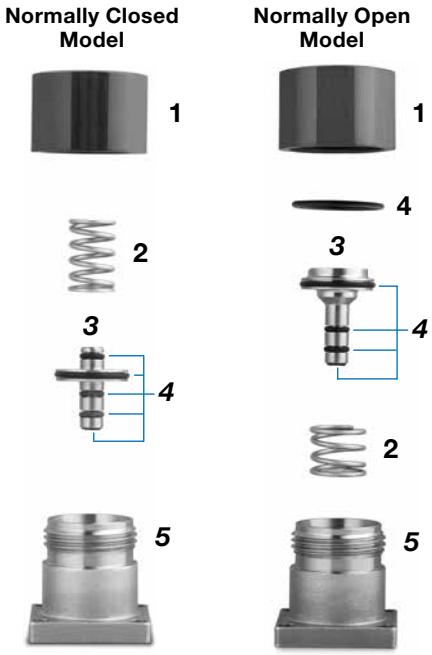
Features

- Flow coefficient: 0.07
- Wetted components: CF3M body; 316 SS stem; fluorocarbon FKM seals
- Optional indicator switch and visual indicator for normally closed valves

Pressure-Temperature Ratings

Actuation Mode	Working Pressure psig (bar)	Temperature °F (°C)	Actuator Pressure psig (bar)
Normally closed	125 (8.6)	0 to 300 (–17 to 148)①	40 to 100 (2.8 to 6.8)
Normally open	125 (8.6)		40 to 100 (2.8 to 6.8)
	300 (20.6)		65 to 100 (4.5 to 6.8)

① Cycle life may be reduced when operated below 20°F (–6°C).



Materials of Construction

Component	Grade/ASTM Specification
1 Cap	Aluminum with black anodize (normally closed); aluminum with green anodize (normally open)
2 Spring	S17700 SS (normally closed); 302 SS (normally open)
3 *Stem*	*316 SS/A276 or A479*
4 *O-rings*	*Fluorocarbon FKM*
5 *Body*	*CF3M/A351*
Lubricant	*PTFE-based*

Wetted components listed in *italics*.

Ordering Information

Actuation Mode	2-Port Valve	3-Port Valve
Normally closed	SS-MPC-T2A-2-C	SS-MPC-T2A-3-C
Normally open	SS-MPC-T2A-2-O	SS-MPC-T2A-3-O

Kalrez Seal Option

Kalrez material is available in place of *wetted* fluorocarbon FKM O-ring material. To order, add **-KZ** to the ordering number.

Example: SS-MPC-T2A-2-C**-KZ**

Visual Indicator Option

The visual indicator provides visual indication of a *normally closed* valve's open position with a pop-up button.

To order, add **-PI** to the ordering number.

Example: SS-MPC-T2A-2-C**-PI**

Indicator Switch Option

The indicator switch transmits a signal to an electrical device, indicating the open or closed position of a *normally closed* 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.
- 24 in. (61 cm) wire lead with inline clip.

To order, add **M** for a normally open switch or **M-2** for a normally closed switch to the valve ordering number.

Example: SS-MPC-T2A-2-C**M**

Electronic Position Sensor Option

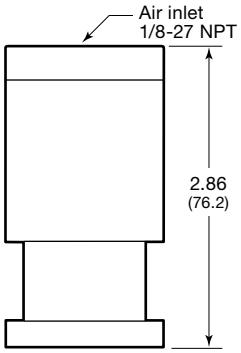
An electronic position sensor is available; see page 24. It cannot be ordered with the indicator switch or visual indicator options.

Multiple Options

Add designators in *alphabetical* order.
Example: SS-MPC-T2A-2-C**-KZ-PI**

Swagelok Surface-Mount Components

Pneumatically Actuated Switching Valves, PSV Series



Features

- Flow coefficient: 0.06
- Wetted components: CF3M body; 316 SS stem and bonnet cylinder; fluorocarbon FKM seals
- Optional visual indicator

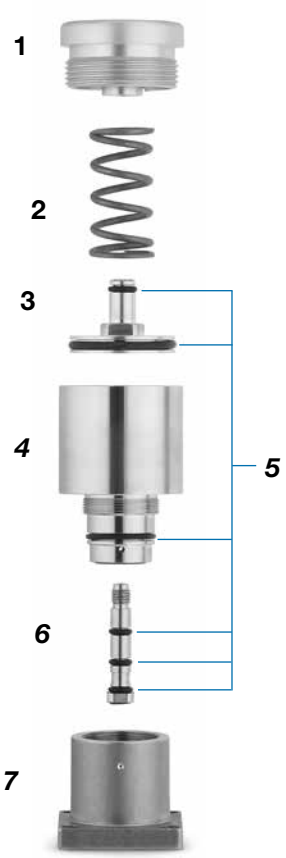
Pressure-Temperature Ratings

Working Pressure psig (bar)	Temperature °F (°C)	Actuator Pressure psig (bar)
300 (20.6)	0 to 300 (–17 to 148)	40 to 100 (2.8 to 6.8)

Materials of Construction

Component	Grade/ASTM Specification
1 Cap	Aluminum
2 Spring	S17700
3 Piston	Aluminum
4 *Bonnet cylinder*	*316 SS/A276*
5 *O-rings*	*Fluorocarbon FKM*
6 *Stem*	*316 SS/A276*
7 *Body*	*CF3M/A351*
Lubricant	*PTFE-based*

Wetted components listed in *italics*.

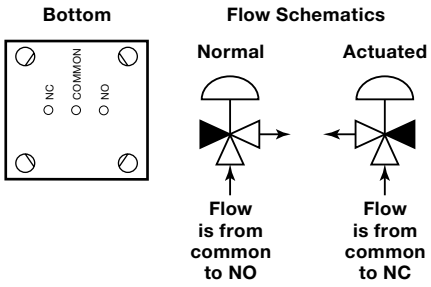


Ordering Information

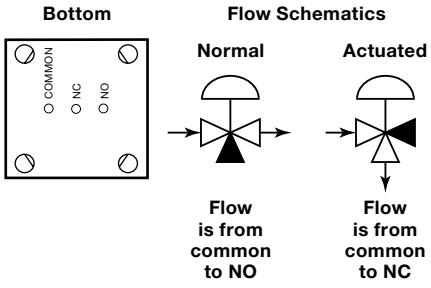
Common Port	Ordering Number
Center	SS-MPC-PSV-3-CC
Side	SS-MPC-PSV-3-SC

Switching Valve Flow Paths

Common Center Port



Common Side Port



Kalrez Seal Option

Kalrez material is available in place of *wetted* fluorocarbon FKM O-ring material. To order, add **-KZ** to the ordering number.

Example: SS-MPC-PSV-3-CC-**KZ**

Visual Indicator Option

The visual indicator provides a visual indication of the *open* position of the valve with a pop-up button. To order, add **-PI** to the ordering number.

Example: SS-MPC-PSV-3-CC-**PI**

Electronic Position Sensor Option

An electronic position sensor is available; see page 24. It cannot be ordered with the visual indicator option.

Multiple Options

Add designators in *alphabetical* order.
Example: SS-MPC-PSV-3-CC-**KZ-P**

Swagelok Surface-Mount Components

Proportional Relief Valves, R Series

Features

- Valves OPEN when system pressure reaches the set pressure and CLOSE when system pressure falls below the set pressure.
- Wetted components:
  - 316 SS bonnet, body, stem, seat, insert, and retainers
  - fluorocarbon FKM and PTFE-coated fluorocarbon FKM and 316 SS seals
  - molybdenum disulfide-based dry film and paste and silicone-based lubricants

Low-Pressure Valves (RL3 Series)

- Pressure rating: 300 psig (20.6 bar)
- Temperature rating: 10 to 275°F (–12 to 135°C)
- One spring for the full set pressure range (10 to 225 psig [0.68 to 15.5 bar])

High-Pressure Valves (R3A Series)

Pressure-Temperature Ratings

Seal Material	Fluorocarbon FKM	Neoprene
Temperature °F (°C)	Working Pressure psig (bar)	
0 (–17)	—	3600 (248)
25 (–4)	3600 (248)	3600 (248)
100 (37)	3600 (248)	3600 (248)
150 (65)	3320 (228)	3320 (228)
200 (93)	3040 (209)	3040 (209)
250 (121)	2786 (191)	2786 (191)
300 (148)	—	2115 (145)

- Multiple springs for a selection of set pressure ranges

Applications

R series relief valves are proportional relief valves that open gradually as the pressure increases. Consequently, they do not have a capacity rating at a given pressure rise (accumulation), and they are not certified to ASME or any other codes.

⚠ **Some system applications require relief valves to meet specific safety codes. The system designer and user must determine when such codes apply and whether these relief valves conform to them.**

⚠ **Swagelok proportional relief valves should never be used as ASME Boiler and Pressure Vessel Code safety relief devices.**

⚠ **Swagelok proportional relief valves are not "Safety Accessories" as defined in the Pressure Equipment Directive 2014/68/EU.**

⚠ **For valves not actuated for a period of time, initial relief pressure may be higher than the set pressure.**

Refer to Swagelok *Proportional Relief Valves—R Series* catalog, MS-01-141, for additional information.

Ordering Information

Low-Pressure Valves (RL3 Series)

Valve contains spring; set pressure must be adjusted. Select a valve ordering number and corresponding adapter ordering number.

End Connections		Ordering Number	Orifice in. (mm)	Adapter Ordering Number
Inlet/Outlet	Size			
Swagelok tube fittings	1/4 in.	SS-RL3S4	0.19 (4.8)	SS-MPC-DM-2-T4
	6 mm	SS-RL3S6MM		SS-MPC-DM-2-T6MM

High-Pressure Valves (R3A Series)

Valve does not contain spring. Select a valve ordering number, corresponding adapter ordering number, and spring kit ordering number.

End Connections		Ordering Number	Orifice in. (mm)	Adapter Ordering Number
Inlet/Outlet	Size			
Swagelok tube fittings	1/4 in.	SS-4R3A	0.14 (3.6)	SS-MPC-DM-2-T4
	6 mm	SS-6R3A-MM		SS-MPC-DM-2-T6MM

R3A series spring kits include a spring, label, 302 SS lock wire with seal, spring support, and installation instructions.

Add the spring designator for the desired set pressure range to basic kit ordering number **177-R3A-K1-.**

Example: 177-R3A-K1-**A**

Set Pressure Range psig (bar)	Spring Designator	Spring Color
50 to 350 (3.4 to 24.1)	A	Blue
350 to 750 (24.1 to 51.7)	B	Yellow
750 to 1500 (51.7 to 103)	C	Purple

Kalrez Seal Option

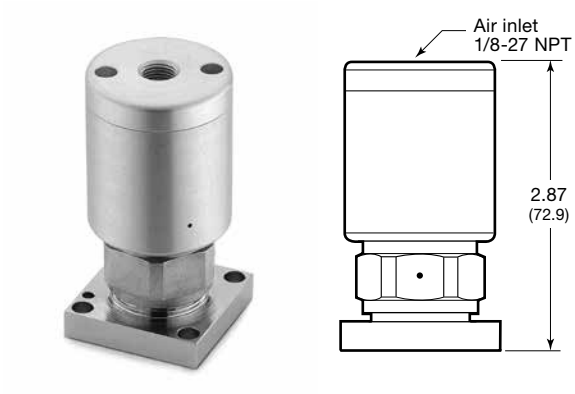
Kalrez material is available in place of *wetted* fluorocarbon FKM seal material for R3A series valves. To order, add **-KZ** to the ordering number.

Example: SS-4R3A-**KZ**

Swagelok Surface-Mount Components

Springless Diaphragm Valves, DP Series

Pneumatically Actuated Low-Pressure Valves



Features

- Pressure rating: 250 psig (17.2 bar)
- Temperature rating: 0 to 150°F (–17 to 65°C)
- Flow coefficient: 0.10
- Wetted components: 316L SS body; cobalt-based superalloy (UNS R30003) diaphragms; PCTFE seat
- Normally closed and normally open pneumatic actuators (normally open actuators are marked with a green ring on top of the cylinder)

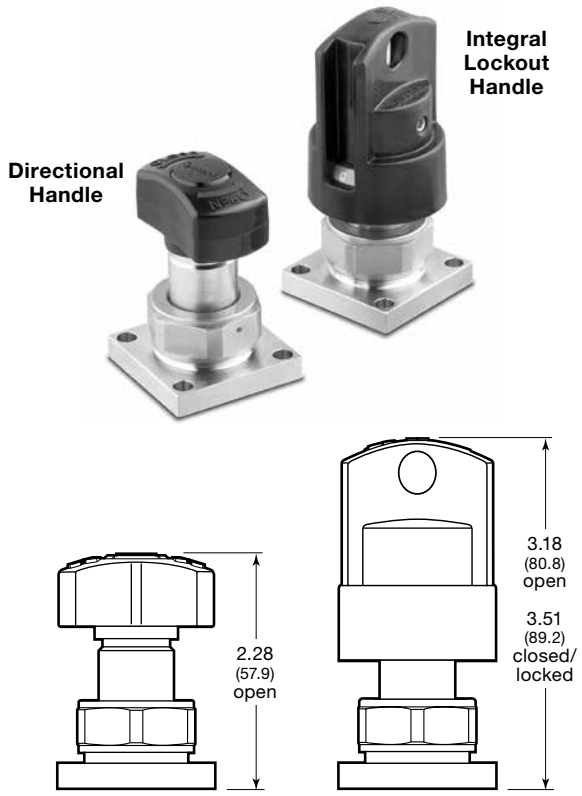
Ordering Information

Actuation Mode	2-Port Valve	3-Port Valve
Normally closed	SS-MPC-DP-2-C	SS-MPC-DP-3-C
Normally open	SS-MPC-DP-2-O	SS-MPC-DP-3-O

Electronic Position Sensor Option

An electronic position sensor is available; see page 24.

Manual High-Pressure Valves



Features

- Pressure rating: 3045 psig (210 bar)
- Temperature rating: 0 to 150°F (–17 to 65°C)
- Flow coefficient: 0.10
- Wetted components: 316L SS body; cobalt-based superalloy (UNS R30003) diaphragms; PCTFE seat
- Directional handle—quarter-turn actuation with visual indication of open and closed position
- Integral lockout handle—quarter-turn actuation with lockout safety feature to prevent actuation (can be locked in the closed position only)

Ordering Information

Handle	2-Port Valve	3-Port Valve
Directional	SS-MPC-DPH-2	SS-MPC-DPH-3
Integral lockout	SS-MPC-DPHL-2	SS-MPC-DPHL-3

Handle Color Options

Standard handle color is black. To order an optional color, add a color designator to the ordering number.

Example:
SS-MPC-DPHL-2-**RD**

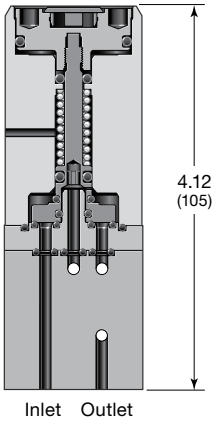
Handle Color	Designator
Blue	-BL
Green	-GR
Orange	-OG
Red	-RD
White	-WH
Yellow	-YW

Refer to Swagelok *Springless Diaphragm Valves for High Performance—DP Series* catalog, MS-01-165, for additional information.

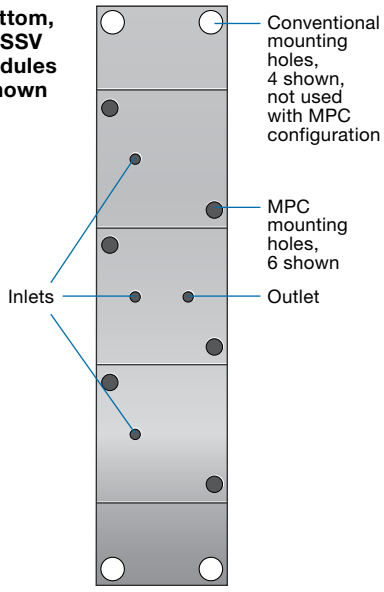
Swagelok Surface-Mount Components

Stream Selector Valves, SSV Series

Cutaway, 1 SSV Module, Access Ports Not Shown



Bottom, 3 SSV Modules Shown



Refer to Swagelok *Stream Selector System for Process Analyzer Applications—SSV Series* catalog, MS-02-326, for additional information.

Features

- Pressure rating: 250 psig (17.2 bar)
- Temperature rating: 20 to 300°F (–6 to 148°C)
- Flow coefficient: 0.20 in all streams
- Wetted components: CF3M body; 316 SS flange and insert; fluorocarbon FKM seals; PTFE-based lubricant
- Double block-and-bleed functionality in each module
- Distinctive vented air gap prevents mixing of pneumatic actuator supply and system fluid
- Compact design saves cabinet space and reduces internal volume
- Actuation pressure range: 40 to 150 psig (2.8 to 10.3 bar)
- Atmospheric reference vent option ensures a constant sample pressure in repetitive analyses.
- High-purge flow loop option provides increased purgeability and cleanliness for applications requiring a high degree of sample purity.

Ordering Information and Dimensions

Number of Streams	Ordering Numbers		
	Standard SSV	Atmospheric Reference Vent Option	High-Purge SSV Option
2	SS-SSV-V-2-MPC	SS-SSV-V-2-MPC-ARV	SS-SSVP-V-2-MPC
3	SS-SSV-V-3-MPC	SS-SSV-V-3-MPC-ARV	SS-SSVP-V-3-MPC
4	SS-SSV-V-4-MPC	SS-SSV-V-4-MPC-ARV	SS-SSVP-V-4-MPC
5	SS-SSV-V-5-MPC	SS-SSV-V-5-MPC-ARV	SS-SSVP-V-5-MPC
6	SS-SSV-V-6-MPC	SS-SSV-V-6-MPC-ARV	SS-SSVP-V-6-MPC
7	SS-SSV-V-7-MPC	SS-SSV-V-7-MPC-ARV	SS-SSVP-V-7-MPC
8	SS-SSV-V-8-MPC	SS-SSV-V-8-MPC-ARV	SS-SSVP-V-8-MPC
9	SS-SSV-V-9-MPC	SS-SSV-V-9-MPC-ARV	SS-SSVP-V-9-MPC
10	SS-SSV-V-10-MPC	SS-SSV-V-10-MPC-ARV	SS-SSVP-V-10-MPC

Vented Air Gap Threaded Test Port Option

A 1/8 in. female NPT threaded test port is available for the vented air gap. To order a Swagelok SSV system with threaded test ports, insert **T** into the valve ordering number as shown.

Example: SS-SSV-V**T**-2-MPC

Kalrez Seal Option

Kalrez seals are available in place of the *wetted* fluorocarbon FKM seals. For pressure-temperature ratings, see table at right. To order, replace **V** in the valve ordering number with **K.**

Example: SS-SSV-**K**-2-MPC

Simriz® Seal Option

Simriz seals are available in place of the *wetted* fluorocarbon FKM seals. For pressure-temperature ratings, see table at right. To order, replace **V** in the valve ordering number with **Z.**

Example: SS-SSV-**Z**-2-MPC

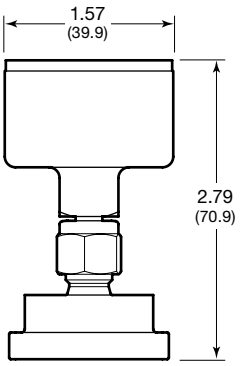
Temperature °F (°C)	Working Pressure psig (bar)
Kalrez Seals	
30 (–1)	100 (6.8)
40 (4)	250 (17.2)
70 (20)	250 (17.2)
300 (148)	250 (17.2)
Simriz Seals	
30 (–1)	200 (13.7)
40 (4)	250 (17.2)
70 (20)	250 (17.2)
250 (121)	250 (17.2)

Electronic Position Sensor Option

An electronic position sensor is available; see page 24.

Swagelok Surface-Mount Components

Pressure Gauges, M Model



Features

- 40 mm (1 1/2 in.) dial size
- Miniature size allows placement in compact spaces.
- Snap-in lens saves space compared to twist-on lens.

Materials of Construction

Component	Material
End connection	*316 SS*
Bourdon tube	
Case	304 SS
Movement	Stainless steel
Lens	Acrylic
Dial	Aluminum
Pointer	

Wetted components listed in *italics*.

Technical Data

Ranges

- Compound gauges
  - Vacuum to 15 psi through vacuum to 60 psi
  - Vacuum to 0.6 bar through vacuum to 3 bar
- Positive-pressure gauges
  - 0 to 15 psi through 0 to 5000 psi
  - 0 to 1 bar through 0 to 250 bar

Accuracy

- ±2.5 % of span (ASME B40.100 Grade C, EN 837-1 Class 2.5, JIS B7505 Class 2.5)

Configuration

- Center-back mount

End Connections

- 1/4 in. Swagelok tube adapter
- 6 mm Swagelok tube adapter

Operating Temperature

- Ambient
  –40 to 140°F (–40 to 60°C)
- Media
  212°F (100°C) maximum

Temperature Error

- ±0.4 % for every 18°F (10°C) temperature change from 68°F (20°C)

Refer to Swagelok *Pressure Gauges, Industrial and Process—PGI Series* catalog, MS-02-170, for additional information.

Ordering Information

The selected dial range should be approximately two times the system working pressure, and the system working pressure should be in the middle half (25 to 75 %) of the dial range. Contact your authorized Swagelok representative if the system working pressure will exceed 75 % of the dial range.

Dial Range in psi, 1/4 in. Swagelok Tube Adapter End Connection

Insert a dial range designator from the table below into basic ordering number **PGI-40M-_____-CAQX**

Example: PGI-40M-**PC15**-CAQX

Dial Range, psi (primary scale: psi; secondary scale: bar)		
Minimum	**Maximum**	**Designator**
Vacuum –0.30 in. Hg	15	PC15
	30	PC30
	60	PC60
0	15	PG15
	30	PG30
	60	PG60
	100	PG100
	200	PG200
	300	PG300
	400	PG400
	1000	PG1000
	2000	PG2000
	5000	PG5000

A surface-mount adapter is required.

Ordering number: **SS-MPC-DM-2-S4**

Dial Range in bar, 6 mm Swagelok Tube Adapter End Connection

Insert a dial range designator from the tables below into basic ordering number **PGI-40M-_____-CASX**

Example: PGI-40M-**BC.6**-CASX

Dial Range, bar (primary scale: bar; secondary scale: psi)		
Minimum	**Maximum**	**Designator**
Vacuum –1 bar	0.6	BC.6
	1.5	BC1.5
	3	BC3
0	1	BG1
	2.5	BG2.5
	4	BG4
	10	BG10
	16	BG16
	25	BG25
	60	BG60
	100	BG100
	250	BG250

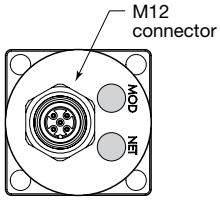
A surface-mount adapter is required.

Ordering number: **SS-MPC-DM-2-S6MM**

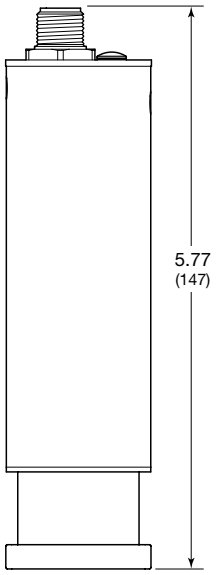
See **Surface-Mount Adapters,** page 23, for more information.

Swagelok Surface-Mount Components

Digital Pressure and Temperature Transducers, PTX Series



Top



Front

Refer to Swagelok *Digital Pressure and Temperature Transducers* catalog, MS-02-434, for additional information.

Features

- MEMS pressure-sensing technology, fast response, excellent long-term stability
- Network connectivity allows for one cable both to power the unit and to send pressure and temperature feedback in near real time
- One-piece machined stainless steel diaphragm
- Innovative flow path with no dead legs
- UL certified for use in hazardous areas
- Measures temperature from 23 to 158°F (–5 to 70°C)

Materials of Construction

Component	Material Grade/ ASTM Specification
1 Top cap	300 series SS
2 Housing O-ring	Fluorocarbon FKM
3 Housing	316 SS/A479
4 *Diaphragm with MEMS sensing element*	*316 SS/A479*
5 *Sensor O-ring*	*Kalrez 6375*
6 *Body*	*316 SS/A479*

Wetted components listed in *italics*.

Ordering Information

Build a PTX series transducer ordering number by adding the designators in the sequence shown below.

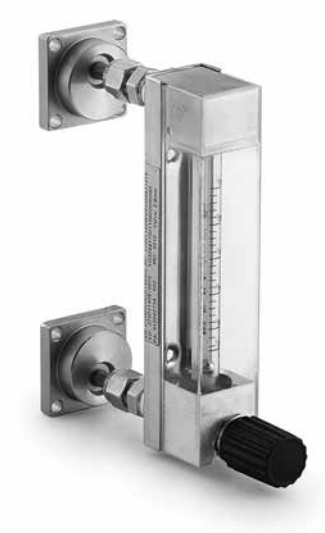
SS - PTX - D - **G050** - SM - K

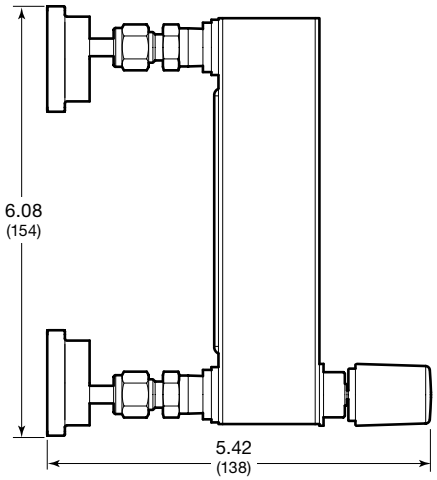
A **Full-Scale Range**
G050 = 0 to 50 psig (3.4 bar)
G250 = 0 to 250 psig (17.2 bar)
G500 = 0 to 500 psig (34.4 bar)

B **End Connections**
SM = 1.5 in. Swagelok MPC modular surface mount in accordance with ANSI/ISA 76.00.02

Swagelok Surface-Mount Components

Variable Area Flowmeters, G2 Model





Refer to Swagelok *Variable Area Flowmeters—G Series and M Series* catalog, MS-02-346, for additional information.

Features

- Maximum inlet pressure: 145 psig (10 bar) at 70°F (20°C)
- Temperature ranges
  - Process: 23 to 212°F (–5 to 100°C); 149°F (65°C) max with limit switches
  - Ambient: –4 to 212°F (–20 to 100°C); 149°F (65°C) max with limit switches
- Accuracy class: 2.5
- Wetted components: 316L SS head piece, foot piece, and needle; 316Ti SS needle valve housing and spring; 316 SS float; borosilicate glass measuring tube; PFA, PTFE, fluorocarbon FKM, perfluorocarbon FFKM, or EDPM float stops, gaskets, and O-rings
- Polycarbonate cover for protection
- Integral fine-metering needle valve
- Optional limit switches

Ordering Information

Build a G2 model variable area flowmeter ordering number by combining the designators in the sequence shown below. Standard flow ranges in other units of measure and custom calibrated flowmeters are available. Refer to Swagelok *Variable Area Flowmeters—G Series and M Series* catalog, MS-02-346.

				4		5	6		7	
VAF	-	G2	-	**01L**	-	**1**	**1**	-	**A**	

4 Measured Flow Range

Air, NL/min	*Water, L/min*
01L = 0.011 to 0.11	**A1L** = 0.004 to 0.04
02L = 0.013 to 0.13	**A2L** = 0.008 to 0.08
03L = 0.027 to 0.27	**A3L** = 0.02 to 0.2
04L = 0.07 to 0.7	**A4L** = 0.04 to 0.4
05L = 0.1 to 1.0	**A5L** = 0.065 to 0.65
06L = 0.17 to 1.7	**A6L** = 0.1 to 1.0
07L = 0.42 to 4.2	**A7L** = 0.17 to 1.7
08L = 0.83 to 8.3	**A8L** = 0.2 to 2.0
09L = 1.3 to 13	**A9L** = 0.28 to 2.8
10L = 1.7 to 17	
11L = 3.0 to 30	
12L = 4.0 to 40	
13L = 5.0 to 50	
14L = 6.8 to 68	
15L = 8.4 to 84	

5 Flowmeter Gasket, Valve O-Ring Material

- **1** = Fluorocarbon (FKM) (standard)
- **2** = Perfluorocarbon (FFKM)
- **3** = EPDM

6 Limit Switches

Most G2 model flowmeters can accept up to two limit switches; see footnote below.

Limit switch amplifiers are required. Amplifiers can be ordered with the flowmeter or customer supplied.

- **0** = None
- **1** = One switch
- **2** = Two switches①
- **3** = One switch and a one-channel isolated switch amplifier with relay output, 115 V (ac)
- **4** = Two switches and a two-channel isolated switch amplifier with relay output, 115 V (ac)①
- **5** = One switch and a one-channel isolated switch amplifier with relay output, 230 V (ac)
- **6** = Two switches and a two-channel isolated switch amplifier with relay output, 230 V (ac)①

① Not available with measured air flow ranges **13L, 14L,** and **15L** or with measured water flow ranges **A7L, A8L,** and **A9L.**

7 Options

Add multiple designators in alphabetical order; omit final dash (-) if no options are ordered. Refer to Swagelok Variable Area Flowmeters—G Series and M Series catalog *MS-02-346, for additional information about options.*

- **A** = Limit switch junction box
- **G** = 5-point calibration record
- **H** = Pressure test, certificate
- **J** = Material certification
- **X** = Oil- and grease-free cleaning, test report (**required** for oxygen service)
- **Y** = No needle valve
- **Z** = Top-mounted needle valve

Two surface-mount adapter sets are required. Ordering numbers:

- **SS-MPC-DM-1-T4-OFFSET-165** and **SS-400-1-4** for 1/4 in. connections
- **SS-MPC-DM-1-T6MMOFFSET165** and **SS6M0-1-4** for 6 mm connections.

Swagelok Surface-Mount Components

Pressure-Reducing Regulators, KCP Series

Features

- Maximum inlet pressure: 3600 psig (248 bar)
- Pressure control ranges: 0 to 10 psig (0 to 0.68 bar) through 0 to 1500 psig (0 to 103 bar)
- Maximum operating temperature: 176°F (80°C)
- Flow coefficients: 0.02 and 0.06
- Wetted components:
  - 316 SS body, seat retainer, piston
  - S17400 SS poppet
  - 302 SS poppet spring
  - PCTFE seat
  - fluorocarbon FKM or Kalrez seals
  - PTFE-based lubricant

Refer to Swagelok *Pressure Regulators, K Series* catalog, MS-02-230, for additional information.

Ordering Information

Build a KCP series pressure regulator ordering number by combining the designators in the sequence shown below.

4	5	6	7	8	9	10	11	12	13	14	15	16
KCP	1	**C**	**F**	**5**	M	**A**	**2**	P	1	0	0	0	0

4 Body Material
1 = 316 SS

5 Pressure Control Range
C = 0 to 10 psig (0 to 0.68 bar)
D = 0 to 25 psig (0 to 1.7 bar)
E = 0 to 50 psig (0 to 3.4 bar)
F = 0 to 100 psig (0 to 6.8 bar)
G = 0 to 250 psig (0 to 17.2 bar)
J = 0 to 500 psig (0 to 34.4 bar)
L = 0 to 1000 psig (0 to 68.9 bar)
M = 0 to 1500 psig (0 to 103 bar)

6 Maximum Inlet Pressure①
F = 100 psig (6.8 bar)
J = 500 psig (34.4 bar)
L = 1000 psig (68.9 bar)
R = 3600 psig (248 bar)

① For better resolution and control, select a pressure that closely matches system pressure.

7 Port Configuration
5, 6
See ***Port Configurations,*** *right.*

8 Ports
M = MPC platform

9 Seat, Seal Material
A = PCTFE, fluorocarbon FKM
B = PCTFE, Kalrez

10 Flow Coefficient (C_v)
1 = 0.02
2 = 0.06

11 Sensing Mechanism
P = 316 SS piston

12 Handle
1 = Thumbwheel

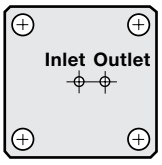
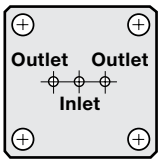
13 Isolation Valves
0 = No valves

14 Cylinder Connections
0 = No connections

15 Gauges
0 = No gauges

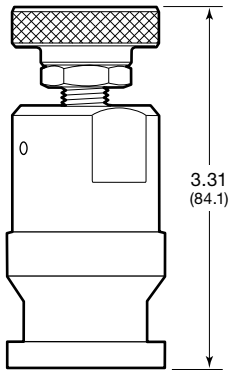
16 Options
0 = No options

Port Configurations

2-Port Regulator	Designator	3-Port Regulator	Designator
	5		6

Swagelok Surface-Mount Components

Back-Pressure Regulators, KCB Series



Features

- Maximum inlet pressure: equal to pressure control range
- Pressure control ranges: 0 to 10 psig (0 to 0.68 bar) through 0 to 250 psig (17.2 bar)
- Maximum operating temperature: 176°F (80°C)
- Flow coefficient: 0.10
- Wetted components:
  - 316 SS body, seat retainer, piston
  - fluorocarbon FKM or Kalrez seat and piston seal
  - PCTFE retainer seal
  - PTFE-based lubricant

Refer to Swagelok *Pressure Regulators, K Series* catalog, MS-02-230, for additional information.

Ordering Information

Build a KCB series back-pressure regulator ordering number by combining the designators in the sequence shown below.

4	5	6	7	8	9	10	11	12	13	14	15	16
KCB	1	**F**	0	**7**	M	**A**	4	P	1	0	0	0	0

4 Body Material
1 = 316 SS

5 Pressure Control Range
C = 0 to 10 psig (0 to 0.68 bar)
D = 0 to 25 psig (0 to 1.7 bar)
E = 0 to 50 psig (0 to 3.4 bar)
F = 0 to 100 psig (0 to 6.8 bar)
G = 0 to 250 psig (0 to 17.2 bar)

6 Maximum Inlet Pressure
0 = Not applicable (equal to pressure control range)

7 Port Configuration
7, 8
*See **Port Configurations,** right.*

8 Ports
M = MPC platform

9 Seat, Seal Material
A = Fluorocarbon FKM, PCTFE
B = Kalrez, PCTFE

10 Flow Coefficient (C_v)
4 = 0.10

11 Sensing Mechanism
P = 316 SS piston

12 Handle
1 = Thumbwheel

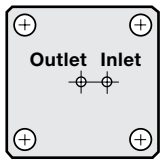
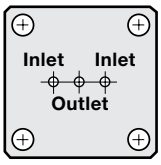
13 Valves
0 = No valves

14 Cylinder Connections
0 = No connections

15 Gauges
0 = No gauges

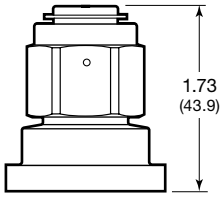
16 Options
0 = No options

Port Configurations

2-Port Regulator	Designator	3-Port Regulator	Designator
	7		8

Swagelok Surface-Mount Components

Tee-Type Filters, TF Series



Refer to Swagelok *Filters—FW, F, and TF Series* catalog, MS-01-92, for additional information.

Features

Pressure-Temperature Ratings

Seal Material	Fluorocarbon FKM
Temperature °F (°C)	**Working Pressure** psig (bar)
0 (–17) to 100 (37)	3600 (248)
150 (65)	3320 (228)
200 (93)	3040 (209)
250 (121)	2786 (191)
300 (148)	2115 (145)

- Wetted components: 316L SS body; 316 SS bonnet, elements, and gasket (silver plated); 302 SS spring
- Replaceable elements in a variety of nominal pore sizes

Flow Data at 70°F (20°C)

Element Nominal Pore Size µm	Inlet Pressure,① psig (bar)			Pressure Drop, psi (bar)		
	5 (0.34)	10 (0.68)	15 (1.0)	10 (0.68)	50 (3.4)	100 (6.8)
	Air Flow, std ft³/min (std L/min)			Water Flow, U.S. gal/min (L/min)		
0.5	0.13 (3.6)	0.20 (5.6)	0.26 (7.3)	0.04 (0.15)	0.10 (0.37)	0.14 (0.52)
2	0.39 (11)	0.59 (16)	0.77 (21)	0.13 (0.49)	0.30 (1.1)	0.42 (1.5)
7	0.55 (15)	0.83 (23)	1.1 (31)	0.19 (0.71)	0.42 (1.5)	0.59 (2.2)
15	0.61 (17)	0.93 (26)	1.2 (33)	0.21 (0.79)	0.47 (1.7)	0.66 (2.4)
60	0.76 (21)	1.2 (33)	1.5 (42)	0.26 (0.98)	0.58 (2.1)	0.82 (3.1)
90	0.82 (23)	1.2 (33)	1.6 (45)	0.28 (1.0)	0.62 (2.3)	0.88 (3.3)
40, 140, 230, 440						

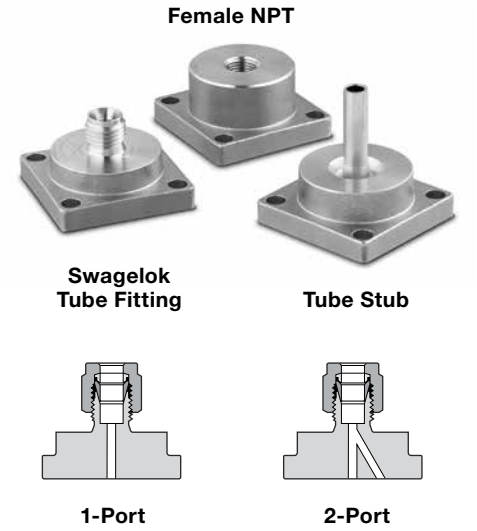
① Outlet is discharged to atmosphere.

Ordering Information

Element Nominal Pore Size µm	2-Port Filter	3-Port Filter
Sintered Elements		
0.5	SS-MPC-4TF-2-05	SS-MPC-4TF-3-05
2	SS-MPC-4TF-2-2	SS-MPC-4TF-3-2
7	SS-MPC-4TF-2-7	SS-MPC-4TF-3-7
15	SS-MPC-4TF-2-15	SS-MPC-4TF-3-15
60	SS-MPC-4TF-2-60	SS-MPC-4TF-3-60
90	SS-MPC-4TF-2-90	SS-MPC-4TF-3-90
Strainer Elements		
40	SS-MPC-4TF-2-40	SS-MPC-4TF-3-40
140	SS-MPC-4TF-2-140	SS-MPC-4TF-3-140
230	SS-MPC-4TF-2-230	SS-MPC-4TF-3-230
440	SS-MPC-4TF-2-440	SS-MPC-4TF-3-440

Swagelok Surface-Mount Components

Surface-Mount Adapters



Features

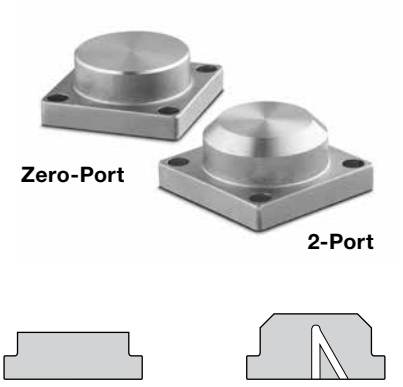
- Material: CF3M
- Surface-mount component designed with a vertical port on the top of the adapter and a choice of one or two ports to the substrate layer below
- Vertical ports available with Swagelok tube fitting, female NPT, or tube stub connections

Ordering Information

Vertical Port		1-Port Adapter	2-Port Adapter	Height① in. (mm)
Type	Size			
Swagelok tube fitting	1/8 in.	SS-MPC-DM-1-S2	SS-MPC-DM-2-S2	1.20 (30.5)
	1/4 in.	SS-MPC-DM-1-S4	SS-MPC-DM-2-S4	1.30 (33.0)
	3 mm	SS-MPC-DM-1-S3MM	SS-MPC-DM-2-S3MM	1.20 (30.5)
	6 mm	SS-MPC-DM-1-S6MM	SS-MPC-DM-2-S6MM	1.30 (33.0)
Female NPT	1/8 in.	SS-MPC-DM-1-F2	SS-MPC-DM-2-F2	0.78 (19.8)
	1/4 in.	SS-MPC-DM-1-F4	SS-MPC-DM-2-F4	
Tube stub	1/4 × 0.035 in.	SS-MPC-DM-1-T4	SS-MPC-DM-2-T4	1.50 (38.2)
	6 × 1.0 mm	SS-MPC-DM-1-T6MM	SS-MPC-DM-2-T6MM	

① Dimensions shown with Swagelok tube fitting nuts finger-tight.

Substrate Caps



Features

- Material: CF3M
- Surface-mount component designed to cover an unused position on the substrate layer
- Choice of a zero-port cap to block flow across the surface-mount position, or a two-port cap to provide a flow path across the surface-mount position

Ordering Information

Zero-Port Cap	2-Port Cap
SS-MPC-DM-0-CAP	SS-MPC-DM-2-CAP

Swagelok Surface-Mount Components

Electronic Position Sensors

Select surface-mount valves are available with electronic position sensors, which transmit a signal to an electrical device indicating:

- the *open* position of:
  - pneumatically actuated DP series low-pressure valves, normally open and normally closed
  - PSV series switching valves
  - T2A series shutoff valves, normally open and normally closed.
- the *closed* position of SSV series stream selector valves.

Features

Standard industrial and intrinsically safe sensor models are available. Both models:

- offer instant, remote confirmation of valve actuator position
- validate valve response.

The industrial model aids troubleshooting with a local LED indicator.

The intrinsically safe model is designed for use in applications where intrinsically safe ratings are required, such as hazardous environments or media.

Surface-mount valves with standard industrial electronic position sensors: normally closed DP series valve, left, and normally closed T2A series valve.

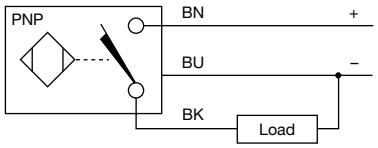
Standard Industrial Sensor

Electrical Specifications

Turck Part Number	Bi 1-EG05-AP6X-V1331① Bi 1-EH04-AP6X-V1131/S1164②
Connection	Turck picofast® snap lock, 3-pin (PKG 3Z cable)
Output	3-wire V (dc)—transistor (PNP current-sourcing)
Voltage	10 to 30 V (dc) polarity protected—pulsed SCP
Output Function	Normally open
Operating Temperature	–23 to 70°C (–10 to 158°F)

① For DP and PSV series
② For T2 series

Wiring Diagram

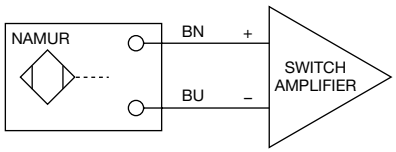


Intrinsically Safe Sensor

Electrical Specifications

Turck Part Number	Bi 1-EH04-Y1-V1130/S1164
Connection	Turck picofast snap lock, 3-pin (PKG 3Z cable)
Output	2-wire NAMUR-style (IEC60947-5-6 [EN60947-5-6])
Voltage	NAMUR switch amplifier required
Output Function	Normally open
Operating Temperature	–23 to 70°C (–10 to 158°F)

Wiring Diagram



Ordering Information

To order an electronic position sensor factory assembled, add:

- **-PS** for a standard industrial sensor
- **-PS-IS** for an intrinsically safe sensor

to a pneumatically actuated DP series, PSV series, T2A series, or SSV series surface-mount component ordering number.

Examples: SS-MPC-DP-2-C**-PS**
SS-MPC-PSV-3-SC**-PS-IS**

Surface-Mount Accessories

Digital Valve Control Modules (VCM)

The Swagelok VCM uses a sophisticated control and monitoring system to operate up to six pneumatic stream selecting valves or other discrete valves. This compact system reduces complicated cabling and minimizes overall power consumption.

Features

- 300 series stainless steel construction
- Network-controlled automatic valve actuation with DeviceNet™ network interface
- Indicator LEDs for pilot valve state, network status, and module status
- Threaded end connections for inlet, outlets, and exhaust; push-to-connect fittings available for 1/8 in. plastic tubing
- UL certified for use in hazardous areas
- Proximity sensor interface option to ensure proper valve actuation

Ordering Information

Select an ordering number.

Proximity Sensor Interface	Ordering Number
No interface	SS-VCM-D-6-0
Terminal strip with sealed enclosure	SS-VCM-D-6-2

The SS-VCM-D-6-2 model is designed to work with the MPC surface-mount components equipped with the Turck Bi 1-EG05-AP6X posiion sensor; see page 24.

No Proximity Sensor Interface

Terminal Strip Proximity Sensor Interface
(shown enlarged, without sealed enclosure)

Terminal Strip Proximity Sensor Interface With Sealed Enclosure

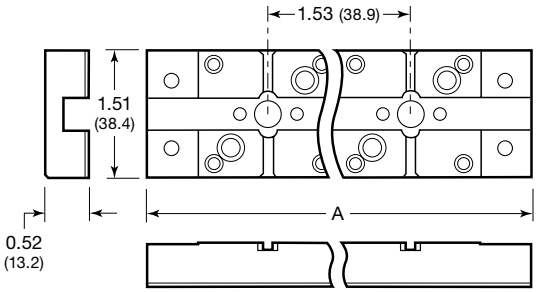
Refer to Swagelok *Digital Valve Control Module (VCM)* catalog, MS-02-435, for additional information.

Swagelok Substrate and Manifold Components

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

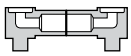
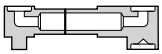
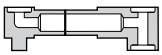
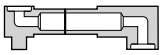
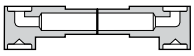
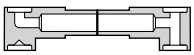
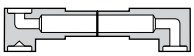
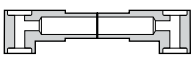
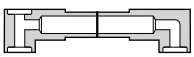
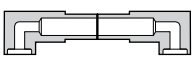
Substrate Channels

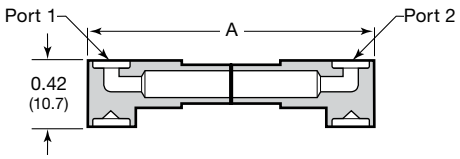
Number of Surface-Mount Positions	Ordering Number	A in. (mm)	Number of Surface-Mount Positions	Ordering Number	A in. (mm)
1	A-MPC-SB-01	2.60 (66.0)	8	A-MPC-SB-08	13.3 (338)
2	A-MPC-SB-02	4.13 (105)	9	A-MPC-SB-09	14.8 (376)
3	A-MPC-SB-03	5.66 (144)	10	A-MPC-SB-10	16.4 (417)
4	A-MPC-SB-04	7.19 (183)	11	A-MPC-SB-11	17.9 (455)
5	A-MPC-SB-05	8.72 (221)	12	A-MPC-SB-12	19.4 (493)
6	A-MPC-SB-06	10.2 (259)	13	A-MPC-SB-13	21.0 (533)
7	A-MPC-SB-07	11.8 (300)	14	A-MPC-SB-14	22.5 (572)



Substrate Flow Components

Surface-Mount Connectors

Cutaway	Description		Ordering Number	A in. (mm)
	Port 1	Port 2		
	Side	Side	6L-MPC-WS-SHSH	1.22 (31.0)
	Side	Center	6L-MPC-WS-SHLG	1.53 (38.9)
	Side	Center and manifold	6L-MPC-WS-SHDT	1.53 (38.9)
	Side	Manifold	6L-MPC-WS-SHDE	1.53 (38.9)
	Center	Center	6L-MPC-WS-LGLG	1.83 (46.5)
	Center	Center and manifold	6L-MPC-WS-LGDT	1.83 (46.5)
	Center	Manifold	6L-MPC-WS-LGDE	1.83 (46.5)
	Center and manifold	Center and manifold	6L-MPC-WS-DTDT	1.83 (46.5)
	Center and manifold	Manifold	6L-MPC-WS-DTDE	1.83 (46.5)
	Manifold	Manifold	6L-MPC-WS-DEDE	1.83 (46.5)



Swagelok Substrate and Manifold Components

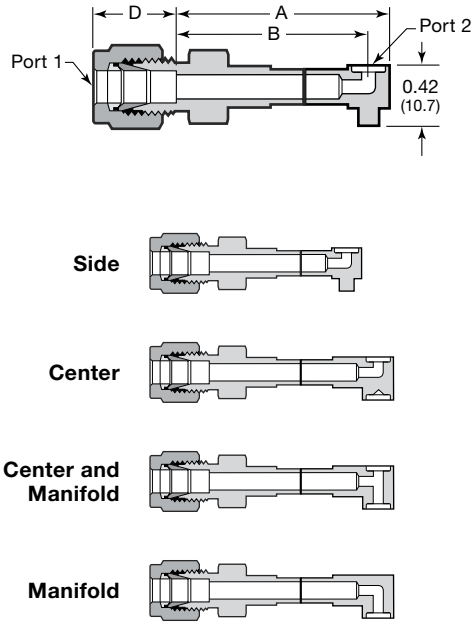
Dimensions, in inches (millimeters), are for reference only and are subject to change.

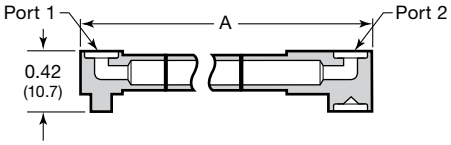
Substrate Flow Components

Substrate End Connectors

Description		Ordering Number	Dimensions, in. (mm)		
Port 1	Port 2		A	B	D
1/8 in. Swagelok tube fitting	Side	6L-MPC-WS-SHS2	1.65 (41.9)	1.50 (38.1)	0.50 (12.7)
	Center	6L-MPC-WS-LGS2	1.96 (49.8)	1.81 (46.0)	
	Center and manifold	6L-MPC-WS-DTS2			
	Manifold	6L-MPC-WS-DES2			
1/4 in. Swagelok tube fitting	Side	6L-MPC-WS-SHS4	1.59 (40.4)	1.44 (36.6)	0.60 (15.2)
	Center	6L-MPC-WS-LGS4	1.90 (48.31)	1.75 (44.4)	
	Center and manifold	6L-MPC-WS-DTS4			
	Manifold	6L-MPC-WS-DES4			
3 mm Swagelok tube fitting	Side	6L-MPC-WS-SHS3MM	1.65 (41.9)	1.50 (38.1)	0.50 (12.7)
	Center	6L-MPC-WS-LGS3MM	1.96 (49.8)	1.81 (46.0)	
	Center and manifold	6L-MPC-WS-DTS3MM			
	Manifold	6L-MPC-WS-DES3MM			
6 mm Swagelok tube fitting	Side	6L-MPC-WS-SHS6MM	1.59 (40.4)	1.44 (36.6)	0.60 (15.2)
	Center	6L-MPC-WS-LGS6MM	1.90 (48.31)	1.75 (44.4)	
	Center and manifold	6L-MPC-WS-DTS6MM			
	Manifold	6L-MPC-WS-DES6MM			

Dimensions shown with Swagelok tube fitting nuts finger-tight.

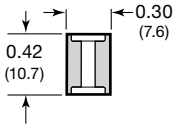




Jumper Tube Connectors

Number of Surface-Mount Positions Skipped	Ordering Number	A in. (mm)
1	6L-MPC-WS-SHTB01SH①	2.75 (69.8)
	6L-MPC-WS-SHTB01LG	3.06 (77.7)
2	6L-MPC-WS-SHTB02LG	4.59 (117)
3	6L-MPC-WS-SHTB03LG	6.12 (155)
4	6L-MPC-WS-SHTB04LG	7.65 (194)
5	6L-MPC-WS-SHTB05LG	9.18 (233)
6	6L-MPC-WS-SHTB06LG	10.7 (272)
7	6L-MPC-WS-SHTB07LG	12.2 (310)
8	6L-MPC-WS-SHTB08LG	13.8 (351)

① Used with SSV stream selector valve outlet.



Drop-Down Connector and Plug

Cutaway	Description	Ordering Number
	Drop-down connector for substrate to manifold	6L-MPC-WS-DD
	Plug for manifold port with no substrate component above	6L-MPC-WS-DP

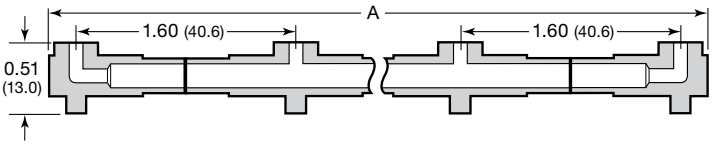
Swagelok Substrate and Manifold Components

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

Manifold Flow Components

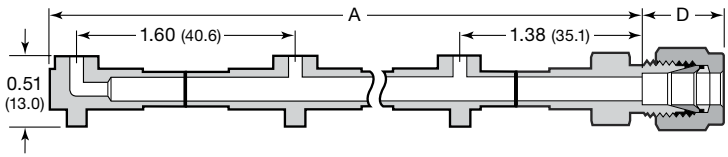
Tee Connectors

Elbow-to-Elbow



Number of Surface-Mount Positions	Ordering Number	A in. (mm)
2	6L-MPC-MS-MEME	2.00 (50.8)
3	6L-MPC-MS-MEMT01ME	3.60 (91.4)
4	6L-MPC-MS-MEMT02ME	5.20 (132)
5	6L-MPC-MS-MEMT03ME	6.80 (173)
6	6L-MPC-MS-MEMT04ME	8.40 (213)
7	6L-MPC-MS-MEMT05ME	10.0 (254)
8	6L-MPC-MS-MEMT06ME	11.6 (295)
9	6L-MPC-MS-MEMT07ME	13.2 (335)
10	6L-MPC-MS-MEMT08ME	14.8 (376)

Elbow-to-Swagelok Tube Fitting



Number of Surface-Mount Positions	Basic Ordering Number	A in. (mm)
1	6L-MPC-MS-ME	1.58 (40.1)
2	6L-MPC-MS-MEMT01	3.18 (80.8)
3	6L-MPC-MS-MEMT02	4.78 (121)
4	6L-MPC-MS-MEMT03	6.38 (162)
5	6L-MPC-MS-MEMT04	7.98 (203)
6	6L-MPC-MS-MEMT05	9.60 (244)
7	6L-MPC-MS-MEMT06	11.2 (284)
8	6L-MPC-MS-MEMT07	12.8 (325)
9	6L-MPC-MS-MEMT08	14.4 (366)
10	6L-MPC-MS-MEMT09	16.0 (406)

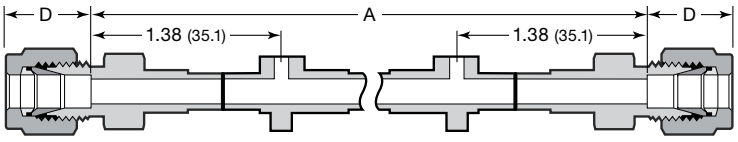
Dimensions shown with Swagelok tube fitting nuts finger-tight.

To order, add a Swagelok tube fitting size designator to a basic ordering number.

Example: 6L-MPC-MS-ME**S4**

Swagelok Tube Fitting Size	Designator	D in. (mm)
1/8 in.	S2	0.50 (12.7)
1/4 in.	S4	0.60 (15.2)
3 mm	S3MM	0.50 (12.7)
6 mm	S6MM	0.60 (15.2)

Swagelok Tube Fitting-to-Swagelok Tube Fitting



Number of Surface-Mount Positions	Basic Ordering Number	A in. (mm)
1	6L-MPC-MS-___MT01	3.01 (76.5)
2	6L-MPC-MS-___MT02	4.61 (117)
3	6L-MPC-MS-___MT03	6.21 (158)
4	6L-MPC-MS-___MT04	7.81 (198)
5	6L-MPC-MS-___MT05	9.40 (239)
6	6L-MPC-MS-___MT06	11.0 (279)
7	6L-MPC-MS-___MT07	12.6 (320)
8	6L-MPC-MS-___MT08	14.2 (361)
9	6L-MPC-MS-___MT09	15.8 (401)
10	6L-MPC-MS-___MT10	17.4 (442)

Dimensions shown with Swagelok tube fitting nuts finger-tight.

To order, insert a Swagelok tube fitting size designator as shown *and* add the same designator to a basic ordering number.

Example: 6L-MPC-MS-**S4**MT01**S4**

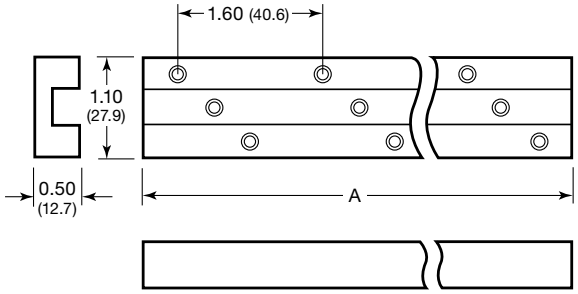
Swagelok Tube Fitting Size	Designator	D in. (mm)
1/8 in.	S2	0.50 (12.7)
1/4 in.	S4	0.60 (15.2)
3 mm	S3MM	0.50 (12.7)
6 mm	S6MM	0.60 (15.2)

Swagelok Substrate and Manifold Components

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

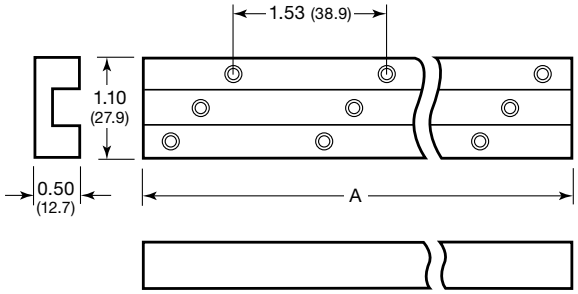
Manifold Channels

Number of Surface-Mount Positions	Ordering Number	A in. (mm)
1	A-MPC-MB-01	1.59 (40.4)
2	A-MPC-MB-02	3.19 (81.0)
3	A-MPC-MB-03	4.79 (122)
4	A-MPC-MB-04	6.39 (162)
5	A-MPC-MB-05	7.99 (203)
6	A-MPC-MB-06	9.59 (244)
7	A-MPC-MB-07	11.2 (284)
8	A-MPC-MB-08	12.8 (325)
9	A-MPC-MB-09	14.4 (366)
10	A-MPC-MB-10	16.0 (406)



Parallel Manifold Channels

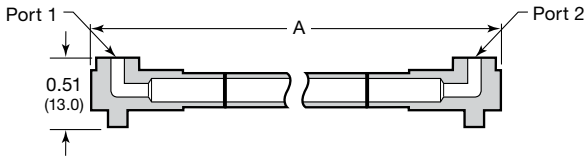
Number of Surface-Mount Positions	Ordering Number	A in. (mm)
3	A-MPC-PB-03	4.30 (109)
4	A-MPC-PB-04	5.83 (148)
5	A-MPC-PB-05	7.36 (187)
6	A-MPC-PB-06	8.89 (226)



Parallel Manifold Components

Jumper Tube Connectors

Number of Surface-Mount Positions	Ordering Number	A in. (mm)
3	6L-MPC-MS-METB01ME	3.50 (88.9)
4	6L-MPC-MS-METB02ME	5.03 (128)
5	6L-MPC-MS-METB03ME	6.56 (167)
6	6L-MPC-MS-METB04ME	8.09 (205)

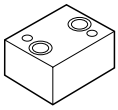
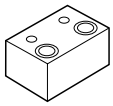
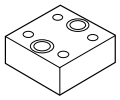


Seals, Mounting Blocks, and Assembly Hardware

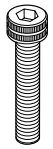
Seals

Item	Description	Ordering Number	Function	Material
	O-ring	FC-75-MPC-006 (50 per bag)	Seals the surface-mount component to the substrate and manifold	Fluorocarbon FKM (75 durometer)
		KZ-7075-OR-006 (quantity of 1)		Kalrez 7075 compound

Mounting Blocks

Item	Description	Ordering Number	Function	Material
	Support	A-MPC-MH-SPRT	Bolts to the bottom of a substrate channel to provide midline support to a channel with five or more surface-mount positions	Aluminum alloy 2024-T351
	Foot	A-MPC-MH-FOOT	Bolts to each end of the substrate channel to provide mounting capability to the base plate	
	Spacer foot	A-MPC-MH-SPCR	Bolts two inline substrates together to maintain standard surface-mount spacing	

Assembly Hardware

Item	Description	Ordering Number	Function	Material
	Lockdown bar	SS-MPC-MH-LBAR	Holds down the substrate components at each end of the substrate channel	300 series stainless steel
	Hex socket cap screw, 10-32 × 0.50 in.	SS-MPC-MH-0500 (20 per bag)	Secures the substrate assembly to the manifold assembly and secures the surface-mount component to the substrate assembly	316 series stainless steel
	Hex socket cap screw, 10-32 × 1.00 in.	SS-MPC-MH-1000 (10 per bag)	Secures the substrate assembly to the foot	

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 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 or contact your authorized Swagelok representative.

Ball Valves

General Purpose and Special Application

60 Series

- 1/8 to 2 in. and 6 to 25 mm sizes
- Stainless steel, carbon steel, brass, and special alloy materials
- On-off (2-way) and switching (3-way) valves
- Compensating seat design
- Live-loaded, two-piece stem packing

Contents

Important Information About Swagelok Process Ball Valves

⚠ **Swagelok ball valves are designed to be operated in a fully open or fully closed position.**

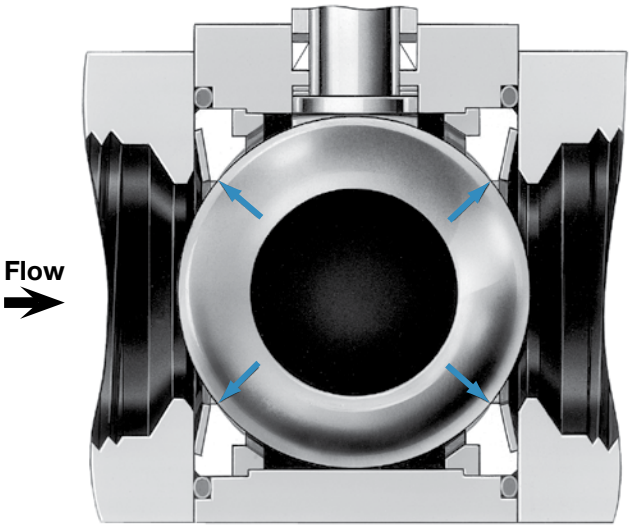
⚠ **A packing adjustment may be required periodically to increase service life and to prevent leakage.**

Features

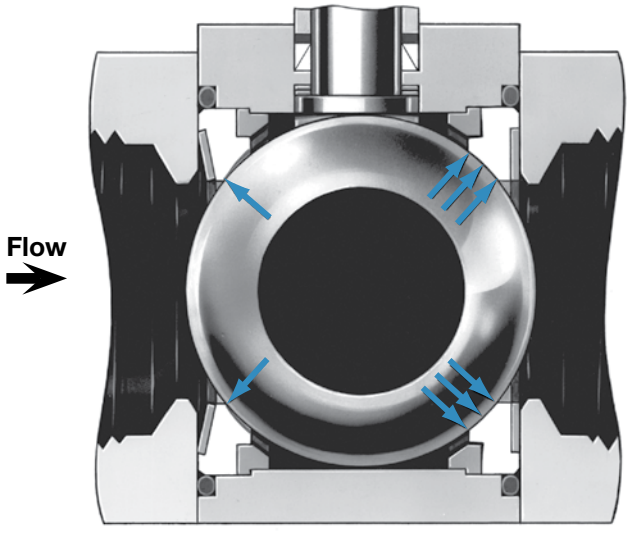
- Quarter-turn actuation
- Stainless steel, carbon steel, brass, and special alloys
- Wide selection of seat materials
- Variety of end connections in 1/8 to 2 in. and 6 to 25 mm sizes
- Pneumatic and electric actuators
- Optional vent porting
- Low Emissions certification per API 641 available

Flexing seat design ensures leak-tight seal in both low- and high-pressure systems

Under low pressure, seals are created by the coned-disc spring-loaded seats pushing against the ball. Pressure is not required to create a seal.

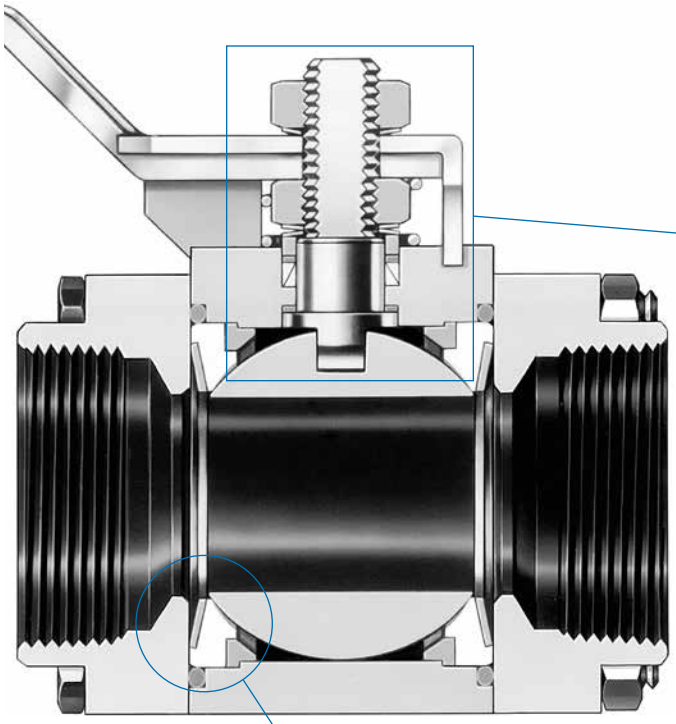


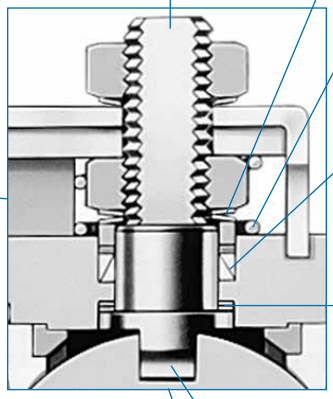
Under high pressure, the ball is forced downstream, flexing the downstream seat and creating a seal. The upstream seat also flexes with the ball movement and maintains a seal.



Features

On-Off (2-Way) Valve





Directional stem flats
show open or closed position

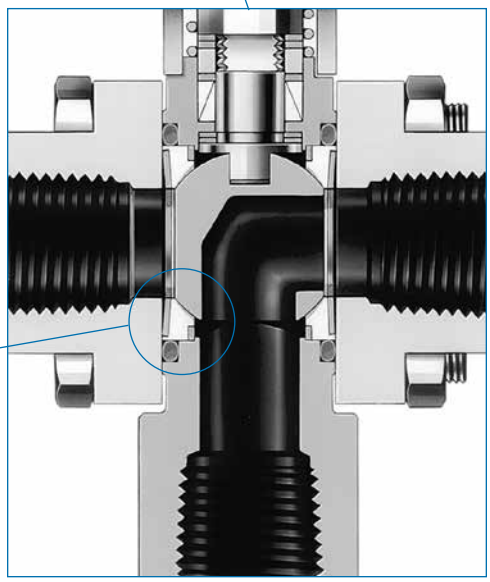
Stem springs
compensate for changes in pressure and temperature, and wear

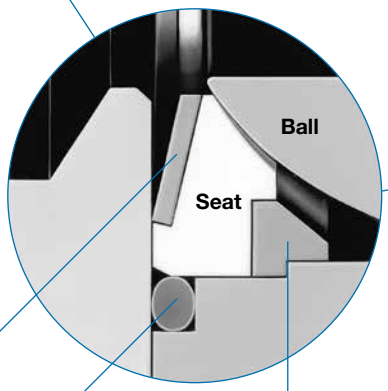
Grounding spring
grounds stem to provide continuity for antistatic protection

Live-loaded, 2-piece chevron stem packing
- requires less operating torque
- improves performance
- compensates for stem wear

High-strength stem bearings
- provide smooth actuation
- eliminate galling between valve stem and body
- resist wear

Bottom-loaded stem
- prevents stem blowout
- enhances system safety





Unique coned-disc spring-loaded seat
- compensates for seat wear, pressure, and temperature changes
- reduces seat wear from pressure surges
- seals regardless of flow direction

Coned-disc spring

Flange seal
provides leak-tight seal between flange and center body

Support ring
contains the seat and protects against seat bulge, premature wear, and deformation

Switching (3-Way) Valve

All stainless steel switching ball valves incorporate many of the features of the on-off (2-way) design. The one-piece center body uses no welding and allows 180° actuation. The switching design allows the user to:

- divert flow from a common inlet to one of two outlets
- block flow from one inlet port and bleed out the opposite port.

Materials of Construction

Component	Valve Body Materials①		
	Stainless Steel	Carbon Steel	Brass
	Material Grade/ASTM Specification		
1 Stem nut	316 SS	Low-alloy steel grade 7/A194	
2 Stem spring②	Strain-hardened 316 SS/A240		
3 Stop plate②	304 SS/A240 or 316 SS/A240		
4 Handle			
5 Handle sleeve	Vinyl		
6 Grounding spring	302 SS/A313		
7 Stem nut③	316 SS	Low-alloy steel grade 7/A194	
8 Stem springs (2)	Strain-hardened 316 SS/A240		
9 Gland	PTFE-coated 316 SS/B783		PTFE-coated brass CDA 360/B16
10 Packing support	Polyetheretherketone (PEEK)		
11 *Top packing*	*Reinforced PTFE④*		
12 *Bottom packing*			
13 *Body*	*316 SS/A479 or CF3M/A351 W60—316L SS/A479*	*WCB⑤/A216*	*Brass CDA 356 or 360/B16*
14 *Stem bearing(s)⑥*	*Alloy X-750/AMS 5542*		*PEEK*
15 *Stem*	*316 SS/A276 or A479*		
16 *Ball*	*316 SS/A276 or A479*		*62 series—316 SS/A276; 63, 65 series—brass CDA 360/B16*
17 *Support rings (2)*	*316 SS/A240, A276, or A479*		
18 *Seats (2)*	*Reinforced PTFE④*		
19 *Coned-disc springs (2)*	*Strain-hardened 316 SS/A240 or A666*		
20 *Flange seals (2)*	*Fluorocarbon FKM⑦*		
21 *Flanges (2)*	*316L SS/A479 or CF3M/A351*	*WCB⑤/A216*	*Brass CDA 360/B16*
22 Body fasteners (4)	316 SS gr B8M cl 2/A193	Cadmium-plated carbon steel grade 8/SAE J429⑧	
23 Body hex nuts (8 or 4)	316 SS gr 8M str hd/A194	Cadmium-plated carbon steel grade 8/SAE J995⑨	
Lubricants	*Silicone-based and PTFE-based; other lubricants available*		

Wetted components listed in *italics.*

① **Special alloy materials** available include alloy 400, alloy C-276, alloy 600, and titanium. Contact your authorized Swagelok sales and service representative.

② 62 series—no upper stem spring and stop plate integral with handle.

③ Valves assembled with pneumatic actuators contain a lock tab (not shown) to secure the nut to the stem.

④ Additional materials available; see **Additional Seat Materials,** below.

⑤ Coated with hydrocarbon rust-preventive compound.

⑥ Coated with molybdenum disulfide with hydrocarbon binder. Alloy X-750—2 bearings; PEEK—1 bearing.

⑦ Additional materials available; see **Additional Flange Seal Materials,** page 8.

⑧ 62 series—material specification is ASTM A574.

⑨ 62 series—nuts are grade 4130 or 4140/ASTM A322 or A331.

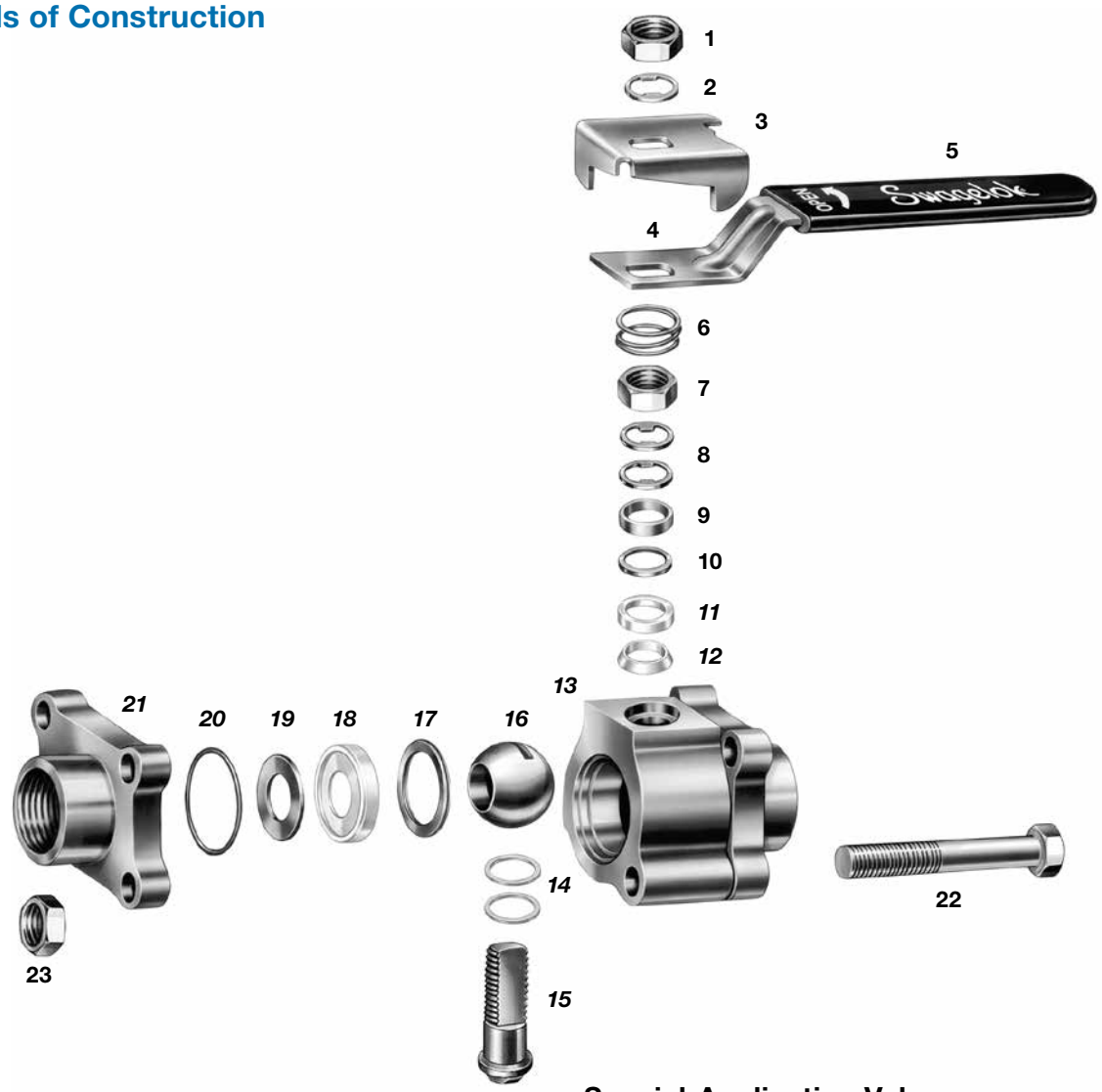
Additional Seat Materials

Valves with Seats of...	Also Contain...	And These Lubricants
Alloy X-750①	S17400 SS ball① and 316 SS back seats	Silicone-based, fluorinated tungsten disulfide-based, and PTFE-based
Carbon/glass PTFE	Same as valves with PTFE seats	
PEEK①②	PEEK stem bearing① and packing①	PTFE-based
UHMWPE	UHMWPE packing, PEEK stem bearing,① ethylene propylene O-rings, and uncoated packing gland	Hydrocarbon-based and silicone-based
Virgin PTFE	Virgin PTFE packing	Silicone-based and PTFE-based

① Molybdenum disulfide coated.

② 62 and 65 series—Grafoil®-lined coned-disc springs; 67 and 68 series—PEEK-lined coned-disc springs.

Materials of Construction



Testing

Plastic-Seated Valves

Every 60 series ball valve is factory tested with nitrogen at 1000 psig (69 bar) or its maximum working pressure if less than 1000 psig (69 bar). Seats have a maximum allowable leak rate of 0.1 std cm^3/min, lower than allowable in FCI 70-2 Specification Class VI.

Shell testing with nitrogen at 1000 psig (69 bar) or the maximum rated pressure if less than 1000 psig (69 bar) is performed to a requirement of no detectable leakage with a liquid leak detector.

Shell testing at 1.5 times the maximum working pressure is performed on CE-marked 67 and 68 series valves.

Metal-Seated Valves and 3-Way PEEK-Seated Valves

Every 60 series ball valve is factory tested with nitrogen at 50 psig (3.4 bar) for leak-tight integrity of the seats as specified by FCI 70-2 Specification Class VI.

Shell testing with nitrogen at 1000 psig (69 bar) or the maximum rated pressure if less than 1000 psig (69 bar) is performed to a requirement of no detectable leakage with a liquid leak detector.

Shell testing at 1.5 times the maximum working pressure is performed on CE-marked, stainless steel 67 and 68 series valves.

Special-Application Valves

Certain valves may have different testing requirements, as described in **Special-Application Valves.**

Cleaning and Packaging

Every 60 series ball valve is cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62. Cleaning and packaging 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 is available. Contact your authorized Swagelok representative.

Low Fugitive Emissions

The American Petroleum Institute's API 641 tests for fugitive emissions to atmosphere for quarter turn ball valves. The tests are conducted at a third party lab and certify that at no point in the test did the valve leak in excess of 100 ppm of methane. Certificates stating that the valve is certified for Low Emissions service are available for the following 60 series valves: 60T, 60C, 60M, W60C, W60V, 60P, W60P, A60T, R60T, 60E and L60. For more information, contact your authorized Swagelok sales and service representative.

Pressure-Temperature Ratings

Pressure-temperature ratings are based on standard materials of construction, as listed on page 4 and in the table notes below. Ratings for valves with alternative materials of construction may not match those shown. For example, 2-way, stainless steel 67 and 68 series valves with reinforced PTFE seats are rated at 2200 psig at 100°F (151 bar at 37°C) when assembled with optional cadmium-plated carbon steel grade 8 fasteners.

Reinforced PTFE Seats (60T Series)

Flow Pattern	On-Off (2-Way)					Switching (3-Way)	
Series	62, 63, 65, W63, W65	67, 68	62, 63, 65, 67, 68	62	63, 65	62, 63, 65	67, 68
Material	Stainless Steel		Steel	Brass		Stainless Steel	
Temperature, °F (°C)	Working Pressure, psig (bar)						
–20 (–28) to 100 (37)	2200 (151)	1500 (103)	2200 (151)	2000 (137)	1500 (103)	1000 (68.9)	500 (34.4)
150 (65)	1850 (127)	1210 (83.3)	1850 (127)	1680 (115)	1260 (86.8)	1000 (68.9)	500 (34.4)
200 (93)	1500 (103)	930 (64.0)	1500 (103)	1360 (93.7)	1030 (70.9)	1000 (68.9)	500 (34.4)
250 (121)	1150 (79.2)	880 (60.6)	1150 (79.2)	1050 (72.3)	800 (55.1)	1000 (68.9)	500 (34.4)
300 (148)	800 (55.1)	780 (53.7)	800 (55.1)	780 (53.7)	560 (38.5)	800 (55.1)	500 (34.4)
350 (176)	560 (38.5)	560 (38.5)	560 (38.5)	410 (28.2)	330 (22.7)	560 (38.5)	500 (34.4)
400 (204)	330 (22.7)	330 (22.7)	330 (22.7)	100 (6.8)	100 (6.8)	330 (22.7)	330 (22.7)
450 (232)	100 (6.8)	100 (6.8)	100 (6.8)	—	—	100 (6.8)	100 (6.8)

Ratings based on reinforced PTFE seats and packings and alloy X-750 stem bearings on stainless steel or steel, PEEK stem bearings on brass, and fluorocarbon FKM O-rings.

Fastener materials: 316 SS on stainless steel valves and carbon steel grade 8 on steel or brass valves.

Steel valves with Swagelok tube fitting end connections: 375°F (190°C) max.

Alloy X-750 Seats (60M Series)

Flow Pattern	On-Off (2-Way)			
Series	63, 65	67, 68	63, 65	67, 68
Material	Stainless Steel		Steel	
Temperature, °F (°C)	Working Pressure, psig (bar)			
–20 (–28) to 350 (176)	1000 (68.9)	500 (34.4)	1000 (68.9)	500 (34.4)
400 (204)	970 (66.8)	500 (34.4)	1000 (68.9)	500 (34.4)
450 (232)	800 (55.1)	500 (34.4)	800 (55.1)	500 (34.4)

Ratings based on alloy X-750 seats and stem bearings, reinforced PTFE packings, and fluorocarbon FKM O-rings.

Fastener materials: 316 SS on stainless steel valves and carbon steel grade 8 on steel valves.

Steel valves with Swagelok tube fitting end connections: 375°F (190°C) max.

Carbon/Glass PTFE Seats (60C Series)

Flow Pattern	On-Off (2-Way)								Switching (3-Way)	
Series	62	W63, W65	63, 65	67, 68	62, 63, 65	67, 68	62	63, 65	62, 63, 65	67, 68
Material	Stainless Steel				Steel		Brass		Stainless Steel	
Temperature, °F (°C)	Working Pressure, psig (bar)									
–20 (–28) to 100 (37)	2500 (172)	2500 (172)	2500 (172)	1500 (103)	2500 (172)	2200 (151)	2000 (137)	1500 (103)	1000 (68.9)	500 (34.4)
150 (65)	2430 (167)	2500 (172)	2030 (139)	1210 (83.3)	2250 (155)	1960 (135)	1680 (115)	1260 (86.8)	1000 (68.9)	500 (34.4)
200 (93)	1870 (128)	2000 (137)	1560 (107)	930 (64.0)	2000 (137)	1760 (121)	1360 (93.7)	1030 (70.9)	1000 (68.9)	500 (34.4)
250 (121)	1620 (111)	1620 (111)	1480 (101)	880 (60.6)	1620 (111)	1570 (108)	1050 (72.3)	800 (55.1)	1000 (68.9)	500 (34.4)
300 (148)	1240 (85.4)	1240 (85.4)	1240 (85.4)	780 (53.7)	1240 (85.4)	1240 (85.4)	730 (50.2)	560 (38.5)	1000 (68.9)	500 (34.4)
350 (176)	860 (59.2)	860 (59.2)	860 (59.2)	680 (46.8)	860 (59.2)	860 (59.2)	410 (28.2)	330 (22.7)	860 (59.2)	500 (34.4)
400 (204)	480 (33.0)	480 (33.0)	480 (33.0)	480 (33.0)	480 (33.0)	480 (33.0)	100 (6.8)	100 (6.8)	480 (33.0)	480 (33.0)
450 (232)	100 (6.8)	100 (6.8)	100 (6.8)	100 (6.8)	100 (6.8)	100 (6.8)	—	—	100 (6.8)	100 (6.8)

Ratings based on carbon/glass PTFE seats, reinforced PTFE packings, and alloy X-750 stem bearings on stainless steel or steel; PEEK stem bearings on brass; and fluorocarbon FKM O-rings.

Fastener materials: 316 SS on stainless steel valves and carbon steel grade 8 on steel or brass valves.

Steel valves with Swagelok tube fitting end connections: 375°F (190°C) max.

Pressure-Temperature Ratings

PEEK Seats (60P Series)

Flow Pattern	On-Off (2-Way)						Switching (3-Way)		
Series	62	63, 65	67, 68	62	63, 65	67, 68	62	63, 65	67, 68
Material	Stainless Steel			Steel			Stainless Steel		
Temperature, °F (°C)	Working Pressure, psig (bar)								
–20 (–28) to 100 (37)	3000 (206)	2500 (172)	1500 (103)	3000 (206)	2500 (172)	2200 (151)	1000 (68.9)	1000 (68.9)	500 (34.4)
150 (65)	2420 (166)	2030 (139)	1210 (83.3)	2250 (155)	2250 (155)	1960 (135)	1000 (68.9)	1000 (68.9)	500 (34.4)
200 (93)	1870 (128)	1560 (107)	930 (64.0)	2010 (138)	2010 (138)	1760 (121)	1000 (68.9)	1000 (68.9)	500 (34.4)
250 (121)	1770 (121)	1480 (101)	880 (60.6)	1770 (121)	1770 (121)	1570 (108)	1000 (68.9)	1000 (68.9)	500 (34.4)
300 (148)	1600 (110)	1310 (90.2)	780 (53.7)	1520 (104)	1520 (104)	1370 (94.3)	1000 (68.9)	1000 (68.9)	500 (34.4)
350 (176)	1430 (98.5)	1140 (78.5)	690 (47.5)	1280 (88.1)	1280 (88.1)	1180 (81.3)	1000 (68.9)	1000 (68.9)	500 (34.4)
400 (204)	1260 (86.8)	970 (66.8)	590 (40.6)	1040 (71.6)	1040 (71.6)	990 (68.2)	1000 (68.9)	970 (66.8)	500 (34.4)
450 (232)	800 (55.1)	800 (55.1)	500 (34.4)	800 (55.1)	800 (55.1)	800 (55.1)	800 (55.1)	800 (55.1)	500 (34.4)

Ratings based on PEEK seats, packings, and stem bearings, and fluorocarbon FKM quad-seal flange seals.

Fastener materials: 316 SS on stainless steel valves and carbon steel grade 8 on steel valves.

Steel valves with Swagelok tube fitting end connections: 375°F (190°C) max.

Polyethylene Seats (60E Series)

Flow Pattern	On-Off (2-Way)								Switching (3-Way)	
Series	62, W63, W65	63, 65	67, 68	62	63, 65	67, 68	62	63, 65	62, 63, 65	67, 68
Material	Stainless Steel			Steel			Brass		Stainless Steel	
Temperature, °F (°C)	Working Pressure, psig (bar)									
–20 (–28) to 100 (37)	3000 (206)	2500 (172)	1500 (103)	3000 (206)	2500 (172)	2200 (151)	2000 (137)	1500 (103)	1000 (68.9)	500 (34.4)
150 (65)	2080 (143)	2030 (139)	1210 (83.3)	2080 (143)	2030 (139)	1960 (135)	1680 (115)	1260 (86.8)	1000 (68.9)	500 (34.4)
200 (93)	1160 (79.9)	1160 (79.9)	930 (64.0)	1160 (79.9)	1160 (79.9)	1160 (79.9)	1160 (79.9)	1030 (70.9)	1000 (68.9)	500 (34.4)
250 (121)	250 (17.2)	250 (17.2)	250 (17.2)	250 (17.2)	250 (17.2)	250 (17.2)	250 (17.2)	250 (17.2)	250 (17.2)	250 (17.2)

Ratings based on UHMWPE seats and packings, PEEK stem bearings, and ethylene propylene O-rings.

Fastener materials: 316 SS on stainless steel valves and carbon steel grade 8 on steel or brass valves.

Steel valves with Swagelok tube fitting end connections: 375°F (190°C) max.

Virgin PTFE Seats (60V Series)

Flow Pattern	On-Off (2-Way)					Switching (3-Way)	
Series	62, 63, 65, W63, W65	67, 68	62, 63, 65, 67, 68	62	63, 65	62, 63, 65	67, 68
Material	Stainless Steel		Steel	Brass		Stainless Steel	
Temperature, °F (°C)	Working Pressure, psig (bar)						
–20 (–28) to 100 (37)	1500 (103)	1500 (103)	1500 (103)	1500 (103)	1500 (103)	1000 (68.9)	500 (34.4)
150 (65)	1500 (103)	1210 (83.3)	1500 (103)	1500 (103)	1260 (86.8)	1000 (68.9)	500 (34.4)
200 (93)	1500 (103)	930 (64.0)	1500 (103)	1360 (93.7)	1030 (70.9)	1000 (68.9)	500 (34.4)
250 (121)	1150 (79.2)	880 (60.6)	1150 (79.2)	1050 (72.3)	800 (55.1)	1000 (68.9)	500 (34.4)
300 (148)	800 (55.1)	780 (53.7)	800 (55.1)	730 (50.2)	560 (38.5)	800 (55.1)	500 (34.4)
350 (176)	560 (38.5)	560 (38.5)	560 (38.5)	410 (28.2)	330 (22.7)	560 (38.5)	500 (34.4)
400 (204)	330 (22.7)	330 (22.7)	330 (22.7)	100 (6.8)	100 (6.8)	330 (22.7)	330 (22.7)
450 (232)	100 (6.8)	100 (6.8)	100 (6.8)	—	—	100 (6.8)	100 (6.8)

Ratings based on virgin PTFE seats and packings and alloy X-750 stem bearings on stainless steel or steel, PEEK stem bearings on brass, and fluorocarbon FKM O-rings.

Fastener materials: 316 SS on stainless steel valves and carbon steel grade 8 on steel or brass valves.

Steel valves with Swagelok tube fitting end connections: 375°F (190°C) max.

Ordering Information

On-Off (2-Way) Valves

Select an ordering number from the **Dimensions** tables starting on page 9.

See the table at right for availability of other valve body materials. To order, replace **SS** with **B** or **S.**

Examples: **B**-62TS4
S-62TS4

Valve Body Material	Designator	Availability
316 SS	SS	Not available in chlorine series
Brass	B	2-way 62, 63, 65 series only; not available in steam, thermal, fire, chlorine, all-welded, PEEK-seated, or rapid-cycle service valves
Carbon steel	S	2-way only; required in chlorine series

Additional Seat Materials

Most valve ordering numbers specify reinforced PTFE seat material. For other seat materials, replace **T** with the desired designator. Not all seat material and flange seal combinations are available. Contact your authorized Swagelok representative.

Examples: SS-62**P**S4
S-62**E**S4

Seat Material	Designator	Availability
Reinforced PTFE	T	Not available in steam, thermal, or chlorine series
Alloy X-750	M	Not available in steam, fire, chlorine, or all-welded series; required in thermal series
Carbon/glass PTFE	C	Not available in steam, thermal, or chlorine series
PEEK	P	Not available in fire, thermal, chlorine, brass, or all-welded series; carbon filled PEEK standard in steam series
UHMWPE	E	Not available in steam, fire, thermal, chlorine, or all-welded series
Virgin PTFE	V	Not available in steam, fire, or thermal series; required in chlorine series

Additional Flange Seal Materials

Fluorocarbon FKM is standard. For other materials, add a flange seal material designator to the valve ordering number. Not all flange seal and seat material combinations are available. Contact your authorized Swagelok representative.

Examples: SS-62TS4-**B**
S-62ES4-**IN**

Flange Seal Material	Designator	Temperature Range °F (°C)
Alloy X-750, PTFE coated①	IN	–65 to 450 (–53 to 232)
Buna N	B	–20 to 250 (–28 to 121)
Buna C①	BC	–65 to 250 (–53 to 121)
Ethylene propylene	E	–20 to 250 (–28 to 121)
Neoprene	N	–20 to 250 (–28 to 121)
PTFE	T	50 to 150 (10 to 65)

① 62, 63, and 65 series valves only.

Switching (3-Way) Valves

Switching (3-way) valves are available with:

- stainless steel valve body material
- standard or low-temperature service
- all seat materials except alloy X-750
- bottom end connections shown below at right.

To order a switching (3-way) valve with three of the **same end connections,** insert **X** into the valve ordering number.

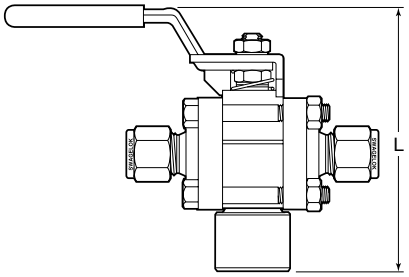
Example: SS-62**X**TF4

To order a switching (3-way) valve with a **different bottom end connection,** insert **X** into the valve ordering number and add a bottom end connection designator.

Example: SS-62**X**TF4-**S4**

To order **three different end connections,** contact your authorized Swagelok representative.

To order a switching (3-way) valve with **an L flow pattern,** contact your authorized Swagelok representative.



Valve Series	Bottom End Connection	Designator	L in. (mm)
62	1/4 in. female NPT 1/4 in. female ISO tapered 1/4 in. Swagelok tube fitting	-F4 -F4RT -S4	3.12 (79.2) 3.12 (79.2) 3.35 (85.1)
63	3/8 in. Swagelok tube fitting 1/2 in. female NPT 1/2 in. female ISO tapered 1/2 in. Swagelok tube fitting	-S6 -F8 -F8RT -S8	4.37 (111) 4.19 (106) 4.19 (106) 4.48 (114)
65	3/4 in. female NPT 3/4 in. female ISO tapered 1 in. female NPT 1 in. female ISO tapered	-F12 -F12RT -F16 -F16RT	5.45 (138)
67	1 1/2 in. female NPT	-F24	6.86 (174)
68	2 in. female NPT	-F32	7.21 (183)

Cross-Port Mixing of Fluids

A spherical ball is available in valves with UHMWPE or PEEK seats to prevent cross-port mixing of fluids. To order, insert **O** into the ordering number.

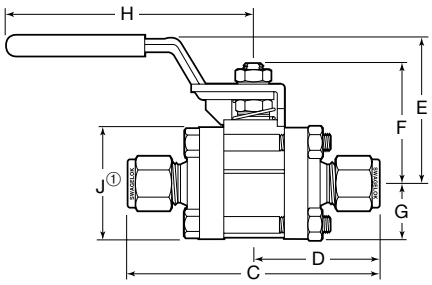
Example: SS-62X**O**PF4

Dimensions

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

Swagelok Tube Fitting End Connections

Dimensions shown with Swagelok nuts finger-tight. See **Ordering Information,** page 8.



Size	Ordering Number	Orifice in. (mm)	C_v	Dimensions, in. (mm)						
				C	D	E	F	G	H	J①
1/4 in.	SS-62TS4	0.188 (4.8)	1.2	3.17 (80.5)	1.59 (40.4)	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)
3/8 in.	SS-62TS6	0.281 (7.1)	3.8	3.17 (80.5)	1.59 (40.4)	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)
1/2 in.	SS-63TS8	0.406 (10.3)	7.5	4.04 (103)	2.02 (51.3)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
3/4 in.	SS-63TS12	0.516 (13.1)	13.6	4.04 (103)	2.02 (51.3)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
1 in.	SS-65TS16	0.875 (22.2)	40	5.36 (136)	2.68 (68.1)	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)
1 1/2 in.	SS-67TS24	1.250 (31.8)	100	7.59 (193)	3.79 (96.3)	4.03 (102)	3.14 (79.8)	1.53 (38.9)	9.14 (232)	3.06 (77.7)
2 in.	SS-68TS32	1.500 (38.1)	130	9.95 (253)	4.97 (126)	4.16 (106)	3.36 (85.3)	1.74 (44.2)	9.14 (232)	3.47 (88.1)
6 mm	SS-62TS6MM	0.188 (4.8)	1.2	3.17 (80.5)	1.59 (40.4)	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)
8 mm	SS-62TS8MM	0.250 (6.4)	2.5	3.17 (80.5)	1.59 (40.4)	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)
10 mm	SS-62TS10MM	0.281 (7.1)	3.8	3.20 (81.3)	1.60 (40.6)	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)
12 mm	SS-63TS12MM	0.375 (9.5)	7.5	4.04 (103)	2.02 (51.3)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
18 mm	SS-63TS18MM	0.516 (13.1)	13.6	4.04 (103)	2.02 (51.3)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
25 mm	SS-65TS25MM	0.875 (22.2)	40	5.36 (136)	2.68 (68.1)	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)

All 67 and 68 stainless steel steam and thermal series valves and 67 and 68 series valves with UHMWPE seats are assembled with silver-plated front ferrules. All other 67 and 68 series stainless steel valves are assembled with PFA-coated front ferrules.

① Height and width of 63 through 68 series flanges. Height of 62 series flange is 1.59 in. (40.4 mm); width is J dimension.

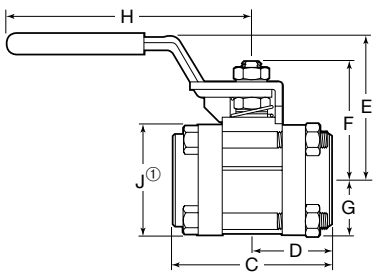
Swagelok Hydraulic Swaging Unit

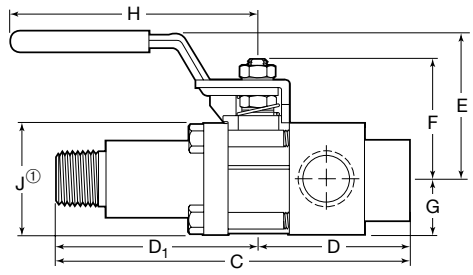
When installing a Swagelok 60 series ball valve with tube fittings larger than 1 in., the Swagelok MHSU hydraulic swaging unit is needed. The unit swages the ferrules onto the tubing without applying stress to fitting body threads. Refer to *Gaugeable Tube Fittings and Adapter Fittings* catalog, MS-01-140, for additional information.

Dimensions

Female Pipe Thread End Connections

Female NPT pipe thread dimensions conform to ASME B1.20.1. ISO tapered thread dimensions conform to ISO 7/1, EN 10226-1, DIN 2999, and JIS B0203. See **Ordering Information,** page 8.





Size	Ordering Number	Orifice in. (mm)	C_v	Dimensions, in. (mm)							
				C	D	D_1	E	F	G	H	J①
Female NPT											
1/8 in.	SS-62TF2	0.281 (7.1)	3.8	2.16 (54.9)	1.08 (27.4)	—	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)
1/4 in.	SS-62TF4	0.281 (7.1)	3.8	2.16 (54.9)	1.08 (27.4)	—	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)
3/8 in.	SS-63TF6	0.516 (13.1)	12	2.70 (68.6)	1.35 (34.3)	—	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
1/2 in.	SS-63TF8	0.516 (13.1)	12	2.70 (68.6)	1.35 (34.3)	—	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
3/4 in.	SS-65TF12	0.875 (22.2)	31	3.59 (91.2)	1.80 (45.7)	—	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)
1 in.	SS-65TF16	0.875 (22.2)	38	3.59 (91.2)	1.80 (45.7)	—	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)
1 1/4 in.	SS-67TF20	1.250 (31.8)	90	4.39 (112)	2.19 (55.6)	—	4.03 (102)	3.14 (79.8)	1.53 (38.9)	9.14 (232)	3.06 (77.7)
1 1/2 in.	SS-67TF24	1.250 (31.8)	100	4.39 (112)	2.19 (55.6)	—	4.03 (102)	3.14 (79.8)	1.53 (38.9)	9.14 (232)	3.06 (77.7)
2 in.	SS-68TF32	1.500 (38.1)	130	4.94 (125)	2.47 (62.7)	—	4.16 (106)	3.36 (85.3)	1.74 (44.2)	9.14 (232)	3.47 (88.1)
Female ISO Tapered											
1/4 in.	SS-62TF4RT	0.281 (7.1)	3.8	2.16 (54.9)	1.08 (27.4)	—	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)
1/2 in.	SS-63TF8RT	0.516 (13.1)	12	2.70 (68.6)	1.35 (34.3)	—	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
3/4 in.	SS-65TF12RT	0.875 (22.2)	31	3.59 (91.2)	1.80 (45.7)	—	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)
1 in.	SS-65TF16RT	0.875 (22.2)	38	4.45 (113)	2.23 (56.6)	—	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)
1 1/2 in.	SS-67TF24RT	1.250 (31.8)	100	5.45 (138)	2.72 (69.1)	—	4.03 (102)	3.14 (79.8)	1.53 (38.9)	9.14 (232)	3.06 (77.7)
2 in.	SS-68TF32RT	1.500 (38.1)	130	7.00 (178)	3.50 (88.9)	—	4.29 (109)	3.36 (85.3)	1.74 (44.2)	9.14 (232)	3.47 (88.1)
Male Lagging Extension to Female NPT with Gauge Ports											
1/2 to 1/2 in.	SS-63TM8L-GF8	0.411 (10.4)	7.5	5.44 (138)	2.34 (59.4)	3.09 (78.5)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
3/4 to 1/2 in.	SS-63TM12L-GF8	0.500 (12.7)	11.3	5.44 (138)	2.34 (59.4)	3.09 (78.5)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)

① Height and width of 63 through 68 series flanges. Height of 62 series flange is 1.59 in. (40.4 mm); width is J dimension.

Steam Trap Test Assembly

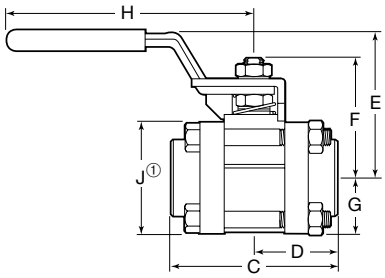
Designed for use with saturated steam systems, the Swagelok TVA series integrated test valve assembly consists of two 63 series ball valves and a universal mount for use with a customer-supplied steam trap. The test assembly offers fast visual monitoring of condensate removal with a simple quarter turn of the test valve.

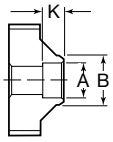
Refer to *Steam Trap Test Station with Universal Mount* catalog, MS-02-221, for additional information.

Dimensions

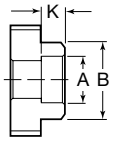
Tube and Pipe Socket Weld End Connections

Pipe socket diameter and depth conform to ASME B16.11. See **Ordering Information,** page 8.





Tube Socket Weld



Pipe Socket Weld

Size	Ordering Number	Orifice in. (mm)	C_v	Dimensions, in. (mm)									
				A	B	C	D	E	F	G	H	J①	K
Tube Socket Weld													
1/4 in.	SS-62TSW4T	0.188 (4.8)	1.2	0.257 (6.5)	0.540 (13.7)	2.16 (54.9)	1.08 (27.4)	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)	0.28 (7.1)
3/8 in.	SS-62TSW6T	0.281 (7.1)	3.8	0.382 (9.7)	0.675 (17.1)	2.16 (54.9)	1.08 (27.4)	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)	0.31 (7.9)
1/2 in.	SS-63TSW8T	0.411 (10.4)	7.5	0.507 (12.9)	0.840 (21.3)	2.70 (68.6)	1.34 (34.0)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)	0.38 (9.7)
3/4 in.	SS-63TSW12T	0.516 (13.1)	13.6	0.757 (19.2)	1.050 (26.7)	2.70 (68.6)	1.34 (34.0)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)	0.44 (11.2)
1 in.	SS-65TSW16T	0.875 (22.2)	40	1.009 (25.6)	1.315 (33.4)	3.59 (91.2)	1.80 (45.7)	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)	0.62 (15.7)
1 1/4 in.	SS-67TSW20T	1.125 (28.6)	80	1.259 (32.0)	1.660 (42.2)	4.39 (112)	2.19 (55.6)	4.03 (102)	3.14 (79.8)	1.53 (38.9)	9.14 (232)	3.06 (77.7)	0.62 (15.7)
1 1/2 in.	SS-67TSW24T	1.250 (31.8)	100	1.509 (38.3)	2.450 (62.2)	4.39 (112)	2.19 (55.6)	4.03 (102)	3.14 (79.8)	1.53 (38.9)	9.14 (232)	3.06 (77.7)	0.75 (19.1)
2 in.	SS-68TSW32T	1.500 (38.1)	130	2.012 (51.1)	2.760 (70.1)	4.94 (125)	2.47 (62.7)	4.16 (106)	3.36 (85.3)	1.74 (44.2)	9.14 (232)	3.47 (88.1)	0.75 (19.1)
Pipe Socket Weld													
1/2 in.	SS-63TSW8P	0.516 (13.1)	15	0.860 (21.8)	1.165 (29.6)	2.70 (68.6)	1.34 (34.0)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)	0.38 (9.7)
3/4 in.	SS-65TSW12P	0.875 (22.2)	36	1.070 (27.2)	1.660 (42.2)	3.59 (91.2)	1.80 (45.7)	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)	0.50 (12.7)
1 in.	SS-65TSW16P	0.875 (22.2)	42	1.335 (33.9)	1.700 (43.2)	3.59 (91.2)	1.80 (45.7)	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)	0.50 (12.7)
1 1/4 in.	SS-67TSW20P	1.250 (31.8)	90	1.680 (42.7)	2.450 (62.2)	4.51 (115)	2.25 (57.2)	4.03 (102)	3.14 (79.8)	1.53 (38.9)	9.14 (232)	3.06 (77.7)	0.50 (12.7)
1 1/2 in.	SS-67TSW24P	1.250 (31.8)	100	1.920 (48.8)	2.350 (59.7)	4.57 (116)	2.29 (58.2)	4.03 (102)	3.14 (79.8)	1.53 (38.9)	9.14 (232)	3.06 (77.7)	0.50 (12.7)
2 in.	SS-68TSW32P	1.500 (38.1)	130	2.411 (61.2)	2.957 (75.1)	4.94 (125)	2.47 (62.7)	4.16 (106)	3.36 (85.3)	1.70 (43.2)	9.14 (232)	3.41 (86.6)	0.63 (16.0)

① Height and width of 63 through 68 series flanges. Height of 62 series flange is 1.59 in. (40.4 mm); width is J dimension.

Swagelok Welding System

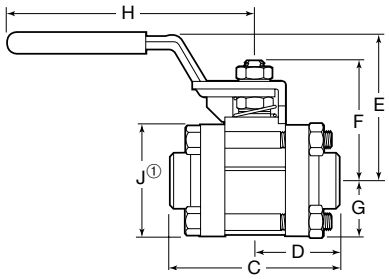
The Swagelok welding system offers consistent, repeatable orbital gas tungsten arc welds (GTAW). It can be used to weld a variety of weld end connections available on Swagelok 60 series ball valves.

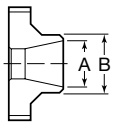
Refer to *Welding System M200 Power Supply* catalog, MS-02-342, for additional information.

Dimensions

Pipe Butt Weld End Connections

Pipe butt weld end connections conform to ASME B16.25. See **Ordering Information,** page 8.





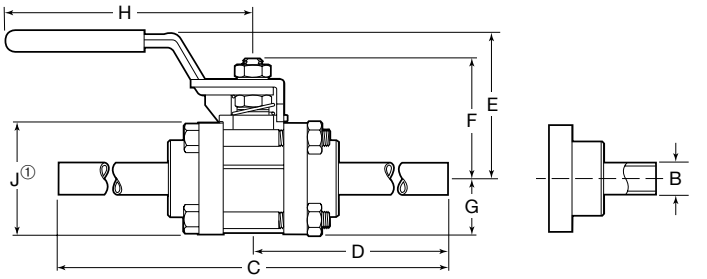
Size	Ordering Number	Orifice in. (mm)	C_v	Dimensions, in. (mm)								
				A	B	C	D	E	F	G	H	J①
Schedule 10												
1/4 in.	SS-62TW4P10	0.188 (4.8)	1.2	0.410 (10.4)	0.540 (13.7)	2.08 (52.8)	1.04 (26.4)	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)
1/2 in.	SS-63TW8P10	0.516 (13.1)	15	0.674 (17.1)	0.840 (21.3)	2.69 (68.3)	1.34 (34.0)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
3/4 in.	SS-65TW12P10	0.875 (22.2)	36	0.884 (22.5)	1.050 (26.7)	3.59 (91.2)	1.80 (45.7)	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)
1 in.	SS-65TW16P10	0.875 (22.2)	40	1.097 (27.9)	1.315 (33.4)	3.46 (87.9)	1.73 (43.9)	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)
1 1/2 in.	SS-67TW24P10	1.250 (31.8)	100	1.682 (42.7)	1.900 (48.3)	4.47 (114)	2.23 (56.6)	4.03 (102)	3.14 (79.8)	1.53 (38.9)	9.14 (232)	3.06 (77.7)
2 in.	SS-68TW32P10	1.500 (38.1)	130	2.157 (54.8)	2.375 (60.3)	4.78 (121)	2.39 (60.7)	4.16 (106)	3.36 (85.3)	1.74 (44.2)	9.14 (232)	3.47 (88.1)
Schedule 40												
1/4 in.	SS-62TW4P40	0.188 (4.8)	1.2	0.364 (9.2)	0.540 (13.7)	2.08 (52.8)	1.04 (26.4)	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)
1/2 in.	SS-63TW8P40	0.516 (13.1)	15	0.622 (15.8)	0.840 (21.3)	2.69 (68.3)	1.34 (34.0)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
3/4 in.	SS-65TW12P40	0.824 (20.9)	36	0.824 (20.9)	1.050 (26.7)	3.59 (91.2)	1.80 (45.7)	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)
1 in.	SS-65TW16P40	0.875 (22.2)	90	1.049 (26.6)	1.315 (33.4)	3.46 (87.9)	1.73 (43.9)	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)
1 1/2 in.	SS-67TW24P40	1.250 (31.8)	100	1.610 (40.9)	1.900 (48.3)	4.47 (114)	2.23 (56.6)	4.03 (102)	3.14 (79.8)	1.53 (38.9)	9.14 (232)	3.06 (77.7)
2 in.	SS-68TW32P40	1.500 (38.1)	130	2.067 (52.5)	2.375 (60.3)	4.86 (123)	2.43 (61.7)	4.16 (106)	3.36 (85.3)	1.74 (44.2)	9.14 (232)	3.47 (88.1)
Schedule 80												
1/4 in.	SS-62TW4P80	0.188 (4.8)	1.2	0.302 (7.7)	0.540 (13.7)	2.08 (52.8)	1.04 (26.4)	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)
3/8 in.	SS-62TW6P80	0.281 (7.1)	3.8	0.423 (10.7)	0.675 (17.1)	2.08 (52.8)	1.04 (26.4)	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)
1/2 in.	SS-63TW8P80	0.516 (13.1)	6.8	0.546 (13.9)	0.840 (21.3)	2.69 (68.3)	1.34 (34.0)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
3/4 in.	SS-63TW12P80	0.516 (13.1)	13.6	0.742 (18.8)	1.050 (26.7)	2.69 (68.3)	1.34 (34.0)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
1 in.	SS-65TW16P80	0.875 (22.2)	40	0.942 (23.9)	1.315 (33.4)	3.46 (87.9)	1.73 (43.9)	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)
1 1/4 in.	SS-67TW20P80	1.125 (28.6)	80	1.281 (32.5)	1.660 (42.2)	4.57 (116)	2.28 (57.9)	4.03 (102)	3.14 (79.8)	1.53 (38.9)	9.14 (232)	3.06 (77.7)
1 1/2 in.	SS-67TW24P80	1.250 (31.8)	100	1.500 (38.1)	1.900 (48.3)	4.57 (116)	2.28 (57.9)	4.03 (102)	3.14 (79.8)	1.53 (38.9)	9.14 (232)	3.06 (77.7)
2 in.	SS-68TW32P80	1.500 (38.1)	130	1.939 (49.3)	2.375 (60.3)	5.09 (129)	2.55 (64.8)	4.16 (106)	3.36 (85.3)	1.74 (44.2)	9.14 (232)	3.47 (88.1)

① Height and width of 63 through 68 series flanges. Height of 62 series flange is 1.59 in. (40.4 mm); width is J dimension.

Dimensions

Tube Extension End Connections

Tube extensions are available on stainless steel valves only. Tube extension material is 316L SS. See **Ordering Information,** page 8.

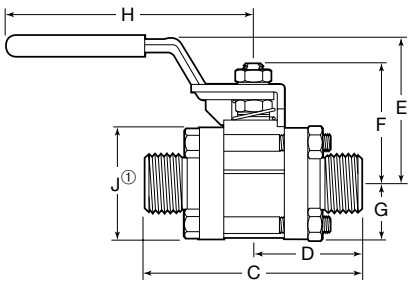


Size	Wall Thickness	Ordering Number	Orifice in. (mm)	C_v	Dimensions, in. (mm)							
					B	C	D	E	F	G	H	J①
1/4 in.	0.035 in.	SS-62TW4T35-3	0.180 (4.6)	1.1	0.250 (6.4)	8.12 (206)	4.05 (103)	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)
3/8 in.	0.035 in.	SS-62TW6T35-3	0.281 (7.1)	3.8	0.375 (9.5)	8.12 (206)	4.05 (103)	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)
1/2 in.	0.049 in.	SS-63TW8T49-3	0.402 (10.2)	7.2	0.500 (12.7)	8.51 (216)	4.26 (108)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
1/2 in.	0.065 in.	SS-63TW8T65-3	0.370 (9.4)	6.1	0.500 (12.7)	8.51 (216)	4.26 (108)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
3/4 in.	0.065 in.	SS-65TW12T65-3	0.620 (15.7)	18	0.750 (19.1)	9.53 (242)	4.77 (121)	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)
1 in.	0.065 in.	SS-65TW16T65-3	0.870 (22.1)	36	1.000 (25.4)	9.53 (242)	4.77 (121)	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)
1 1/2 in.	0.065 in.	SS-67TW24T65-3	1.250 (31.8)	100	1.500 (38.1)	10.5 (267)	5.27 (134)	4.03 (102)	3.14 (79.8)	1.53 (38.9)	9.14 (232)	3.06 (77.7)
2 in.	0.065 in.	SS-68TW32T65-3	1.500 (38.1)	130	2.000 (50.8)	11.3 (287)	5.65 (144)	4.16 (106)	3.36 (85.3)	1.74 (44.2)	9.14 (232)	3.47 (88.1)

① Height and width of 63 through 68 series flanges. Height of 62 series flange is 1.59 in. (40.4 mm); width is J dimension.

VCO O-Ring Face Seal and VCR Metal Gasket Face Seal Fitting End Connections

Face seal fitting end connections require minimal axial clearance for ease of installation and service. VCO fitting contains fluorocarbon FKM O-ring. See **Ordering Information,** page 8.



Size	Ordering Number	Orifice in. (mm)	C_v	Dimensions, in. (mm)						
				C	D	E	F	G	H	J①
VCO O-Ring Face Seal Fitting										
1/4 in.	SS-62TVCO4	0.188 (4.8)	1.2	2.60 (66.0)	1.30 (33.0)	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)
1/2 in.	SS-63TVCO8	0.406 (10.3)	7.5	3.25 (82.6)	1.62 (41.1)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
VCR Metal Gasket Face Seal Fitting										
1/4 in.	SS-62TVCR4	0.188 (4.8)	1.2	2.47 (62.7)	1.23 (31.2)	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.32 (33.5)
1/2 in.	SS-63TVCR8	0.406 (10.3)	7.5	3.63 (92.2)	1.81 (46.0)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.75 (44.5)

Ratings of valves with VCR or VCO fitting end connections are affected by the ratings of the mating fitting; refer to *VCR Metal Gasket Face Seal Fittings* catalog, MS-01-24 and Swagelok *VCO O-Ring Face Seal Fittings* catalog, MS-01-28.

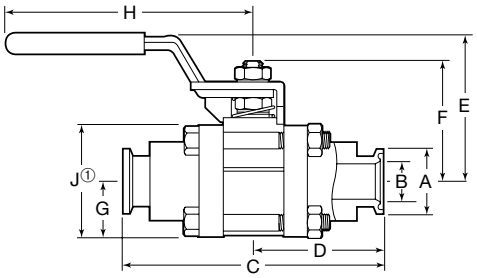
① Height and width of 63 series flange. Height of 62 series flange is 1.59 in. (40.4 mm); width is J dimension.

Dimensions

Sanitary Fitting End Connections

Valves with Swagelok TS and SC sanitary fitting end connections are available in stainless steel only. The maximum pressure rating is 300 psig (20.6 bar); working pressure and temperature ratings of these valves may be limited by the gasket material and clamp used.

TS sanitary fitting end connections have a machined surface finish roughness average (R_a) of 20 µin. (0.51 µm). Refer to *Biopharm Fittings—TS Series* catalog, MS-03-13, for additional information.



SC sanitary clamp end connections 1 in. and larger are compatible with ISO 2852 geometrical requirements.

See **Ordering Information,** page 8.

To order a valve with a ball inside diameter surface roughness average (R_a) of 15 µin. (0.38 µm), add **-RB** to the valve ordering number.

Example: SS-63TTS8**-RB**

TS Sanitary Fittings

Size	Ordering Number	Orifice in. (mm)	C_v	Dimensions, in. (mm)								
				A	B	C	D	E	F	G	H	J①
1/2 in.	SS-63TTS8	0.370 (9.4)	7.5	0.99 (25.1)	0.37 (9.4)	3.50 (88.9)	1.75 (44.4)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
3/4 in.	SS-63TTS12	0.516 (13.1)	15	0.99 (25.1)	0.62 (15.7)	3.50 (88.9)	1.75 (44.4)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
1 in.	SS-65TTS16	0.873 (22.2)	42	1.99 (50.5)	0.87 (22.1)	4.50 (114)	2.25 (57.2)	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)
1 1/2 in.	SS-67TTS24	1.250 (31.8)	100	1.99 (50.5)	1.37 (34.8)	5.50 (140)	2.75 (69.9)	4.03 (102)	3.14 (79.8)	1.53 (38.9)	9.14 (232)	3.06 (77.7)
2 in.	SS-68TTS32	1.500 (38.1)	130	2.52 (64.0)	1.87 (47.5)	6.25 (159)	3.12 (79.2)	4.16 (106)	3.36 (85.3)	1.74 (44.2)	9.14 (232)	3.47 (88.1)

① Height and width of 63 through 68 series flanges. Height of 62 series flange is 1.59 in. (40.4 mm); width is J dimension.

SC Sanitary Clamp Fittings

Size	Ordering Number	Orifice in. (mm)	C_v	Dimensions, in. (mm)								
				A	B	C	D	E	F	G	H	J①
1/2 in.	SS-62TSC8	0.281 (7.1)	7.1	0.99 (25.1)	0.37 (9.4)	3.56 (90.4)	1.78 (45.2)	1.66 (42.2)	1.26 (32.0)	0.68 (17.3)	2.37 (60.2)	1.35 (34.3)
3/4 in.	SS-63TSC12	0.516 (13.1)	13.2	0.99 (25.1)	0.62 (15.7)	4.06 (103)	2.03 (51.5)	2.35 (59.7)	1.79 (45.5)	0.89 (22.6)	4.50 (114)	1.78 (45.2)
1 in.	SS-65TSC16	0.872 (22.1)	42	1.99 (50.5)	0.87 (22.1)	4.50 (114)	2.25 (57.2)	2.94 (74.7)	2.52 (64.0)	1.25 (31.8)	6.00 (152)	2.50 (63.5)
1 1/2 in.	SS-67TSC24	1.250 (31.8)	100	1.98 (50.3)	1.37 (34.8)	5.50 (140)	2.75 (69.9)	4.03 (102)	3.14 (79.8)	1.53 (38.9)	9.14 (232)	3.06 (77.7)
2 in.	SS-68TSC32	1.500 (38.1)	130	2.52 (64.0)	1.87 (47.5)	6.25 (159)	3.12 (79.2)	4.16 (106)	3.36 (85.3)	1.74 (44.2)	9.14 (232)	3.47 (88.1)

① Height and width of 63 through 68 series flanges. Height of 62 series flange is 1.59 in. (40.4 mm); width is J dimension.

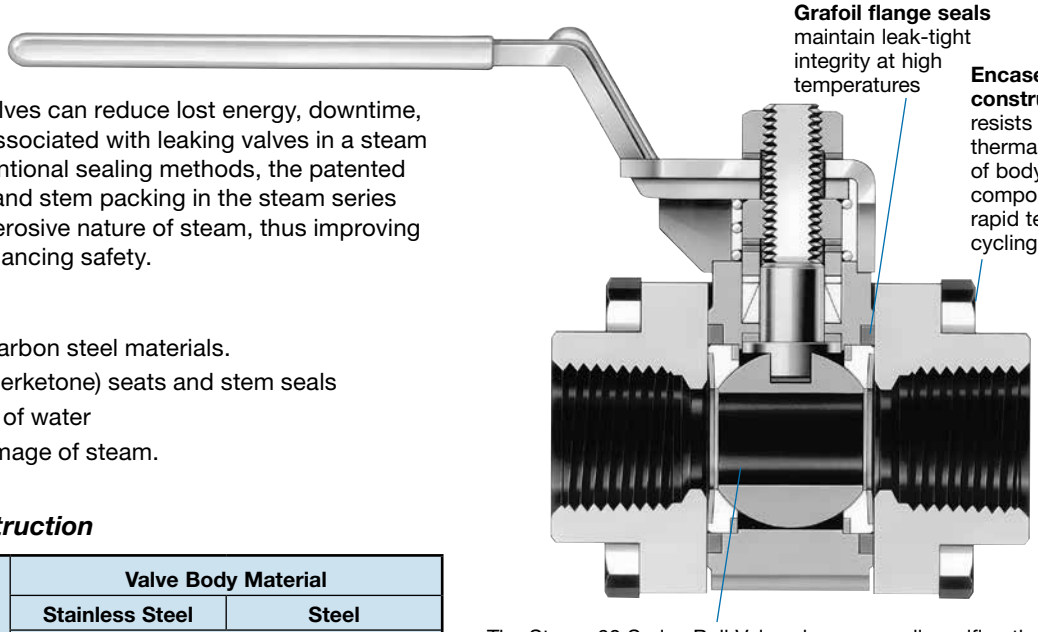
Mixed End Connections

60 series valves can be ordered with two different end connections. Contact your authorized Swagelok representative for ordering information.

Special-Application Valves

Steam Service (S60P Series)

Steam service ball valves can reduce lost energy, downtime, and safety hazards associated with leaking valves in a steam system. Unlike conventional sealing methods, the patented designs of the seats and stem packing in the steam series ball valves resist the erosive nature of steam, thus improving performance and enhancing safety.



Features

- Stainless steel or carbon steel materials.
- PEEK (polyetheretherketone) seats and stem seals
  - resist absorption of water
  - resist erosive damage of steam.

Materials of Construction

Component	Valve Body Material	
	Stainless Steel	Steel
	Material Grade/ASTM Specification	
Packings, stem bearing	*Molybdenum disulfide-coated PEEK*	
Seats (2)	*Carbon filled PEEK*	
Back sheets (2)	*S62P, S65P, S67P, S68P series—Grafoil; S63P series—N/A*	
Flange seals (2)	*Grafoil*	
Body fasteners (8)	Grade B8M class 2/ A193	Zinc phosphate-coated grade
Lubricant	*PTFE-based*	

Wetted components listed in *italics*.
All other components same as shown on page 4.

The Steam 60 Series Ball Valves have a smaller orifice than the standard valves for improved seat sealing performance after thermal cycling. The maximum C_v of the Steam 60 Series valves is shown in the table below. User should compare this to the C_v in the end connection tables above, to see if the maximum C_v is reduced.

Valve Series	Orifice in. (mm)	Maximum C_v
S62P	0.245 (6.2)	2.3
S63P	0.472 (12.0)	11.6
S65P	0.84 (21.3)	40
S67P	1.20 (30.5)	84.7
S68P	1.45 (36.8)	125

Pressure-Temperature Ratings

Valve Series	62	63, 65	67, 68	62, 63, 65	67, 68
Material	Stainless Steel			Steel	
Temperature, °F (°C)	Working Pressure, psig (bar)				
–20 (–28) to 100 (37)	2500 (172)	2500 (172)	2000 (137)	2500 (172)	2000 (137)
150 (65)	2420 (166)	2320 (159)	1920 (132)	2250 (155)	1820 (125)
200 (93)	2350 (161)	2150 (148)	1830 (126)	2010 (138)	1650 (113)
250 (121)	2280 (157)	1980 (136)	1750 (120)	1770 (121)	1480 (101)
300 (148)	2200 (151)	1910 (131)	1670 (115)	1520 (104)	1310 (90.2)
350 (176)	2120 (146)	1840 (126)	1600 (110)	1280 (88.1)	1140 (78.5)
400 (204)	2050 (141)	1770 (121)	1530 (105)	1040 (71.6)	970 (66.8)
450 (232)	1980 (136)	1700 (117)	1460 (100)	800 (55.1)	800 (55.1)
500 (260)	1910 (131)	1660 (114)	1410 (97.1)	710 (48.9)	710 (48.9)
550 (287)	1100 (75.7)	1100 (75.7)	1100 (75.7)	620 (42.7)	620 (42.7)
600 (315)	200 (13.7)	200 (13.7)	200 (13.7)	200 (13.7)	200 (13.7)

Steel valves with Swagelok tube fitting end connections: 375°F (190°C) max.

Saturated Steam Ratings

Stainless Steel Valves

1050 psig at 550°F (72.3 bar at 287°C)

Carbon Steel Valves

680 psig at 500°F (46.8 bar at 260°C)

Ordering Information

To order, insert **S** before the series designator and replace **T** with **P.**

Example: SS-**S**62**P**S4

To order steel valve body material, replace **SS** with **S.**

Example: **S**-S62PS4

Seal Kits

Seal kits contain stem springs, gland, packing support, packings, stem bearing, seats, seat springs, back sheets, flange seals, lubricant and instructions.

Kit components are the same materials and grades listed in **Materials of Construction.**

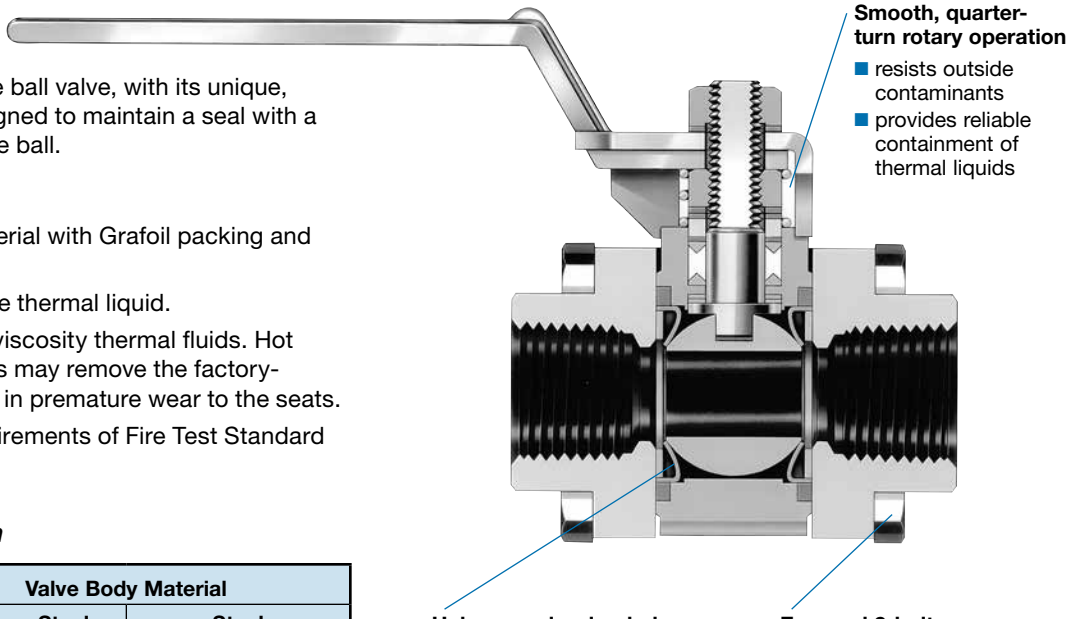
Select a kit ordering number.

Valve Series	Kit Ordering Number
S62P	SS-91K-S62P
S63P	SS-91K-S63P
S65P	SS-91K-S65P
S67P	SS-91K-S67P
S68P	SS-91K-S68P

Special-Application Valves

Thermal Service (T60M Series)

The Swagelok thermal service ball valve, with its unique, spring-like metal seat, is designed to maintain a seal with a minimum seat load against the ball.



Features

- 316 SS or carbon steel material with Grafoil packing and alloy X-750 seats
- Resists contamination of the thermal liquid.
- Intended for use with high-viscosity thermal fluids. Hot gases or low-viscosity fluids may remove the factory-applied lubricant and result in premature wear to the seats.
- Exceeds performance requirements of Fire Test Standard API 607, 6th edition.

Materials of Construction

Component	Valve Body Material	
	Stainless Steel	Steel
	Material Grade/ASTM Specification	
Packing bearing	*Alloy X-750①/AMS 5542*	
Packing supports (2), back seats (2)	*316 SS/A276*	
Packing,② flange seals (2)③	*Grafoil with 316 SS*	
Ball	*S17400 SS①/A564*	
Seats	*Alloy X-750①/AMS 5542*	
Body fasteners (8)	Grade B8M class 2/ A193	Zinc phosphate-coated grade B7/A193
Lubricant	*Fluorinated tungsten disulfide*	

Wetted components listed in *italics.*

All other components same as shown on page 4.

① Coated with molybdenum disulfide with hydrocarbon binder.

② Impregnated with fluorocarbon-based lubricant.

③ Impregnated with anaerobic adhesive. T63M and T65M series—RTV silicone sealant.

Pressure-Temperature Ratings

Series	63, 65	67, 68	63, 65	67, 68
Material	Stainless Steel		Steel	
Temperature, °F (°C)	Working Pressure, psig (bar)			
–65 (–53) to 400 (204)	1000 (68.9)	500 (34.4)	1000 (68.9)	500 (34.4)
450 (232)	1000 (68.9)	500 (34.4)	800 (55.1)	500 (34.4)
500 (260)	1000 (68.9)	500 (34.4)	710 (48.9)	500 (34.4)
550 (287)	1000 (68.9)	500 (34.4)	620 (42.7)	500 (34.4)
600 (315)	1000 (68.9)	500 (34.4)	540 (37.2)	500 (34.4)
650 (343)	1000 (68.9)	500 (34.4)	450 (31.0)	450 (31.0)
700 (371)	1000 (68.9)	500 (34.4)	370 (25.4)	370 (25.4)
750 (398)	1000 (68.9)	500 (34.4)	280 (19.2)	280 (19.2)
800 (426)	1000 (68.9)	500 (34.4)	200 (13.7)	200 (13.7)
850 (454)	1000 (68.9)	500 (34.4)	—	—

Steel valve ratings limited to –20°F (–28°C).

Steel valves with Swagelok tube fitting end connections: 375°F (190°C) max.

Testing

All thermal service ball valves are tested with pure nitrogen at 50 psig (3.4 bar) for leak-tight integrity of the ball seats as specified by FCI 70-2 Class VI. Stem packing and body seals are tested for no visible leakage using a liquid leak detector.

Valve Series	Maximum Allowable Seat Leak Rate std cm^3/min
T63M, T65M	0.15
T67M	0.30
T68M	0.45

Ordering Information

Thermal service ball valves are available in 63, 65, 67, and 68 series sizes. To order, insert **T** before the series designator and replace the second **T** with **M.**

Example: SS-**T**63**M**S8

To order steel valve body material, replace **SS** with **S.**

Example: **S**-T63MS8

Seal Kits

Seal kits contain ball, seats, packing, flange seals, stem bearings, back seats, packing supports, stem springs, lubricant, sealant, and instructions.

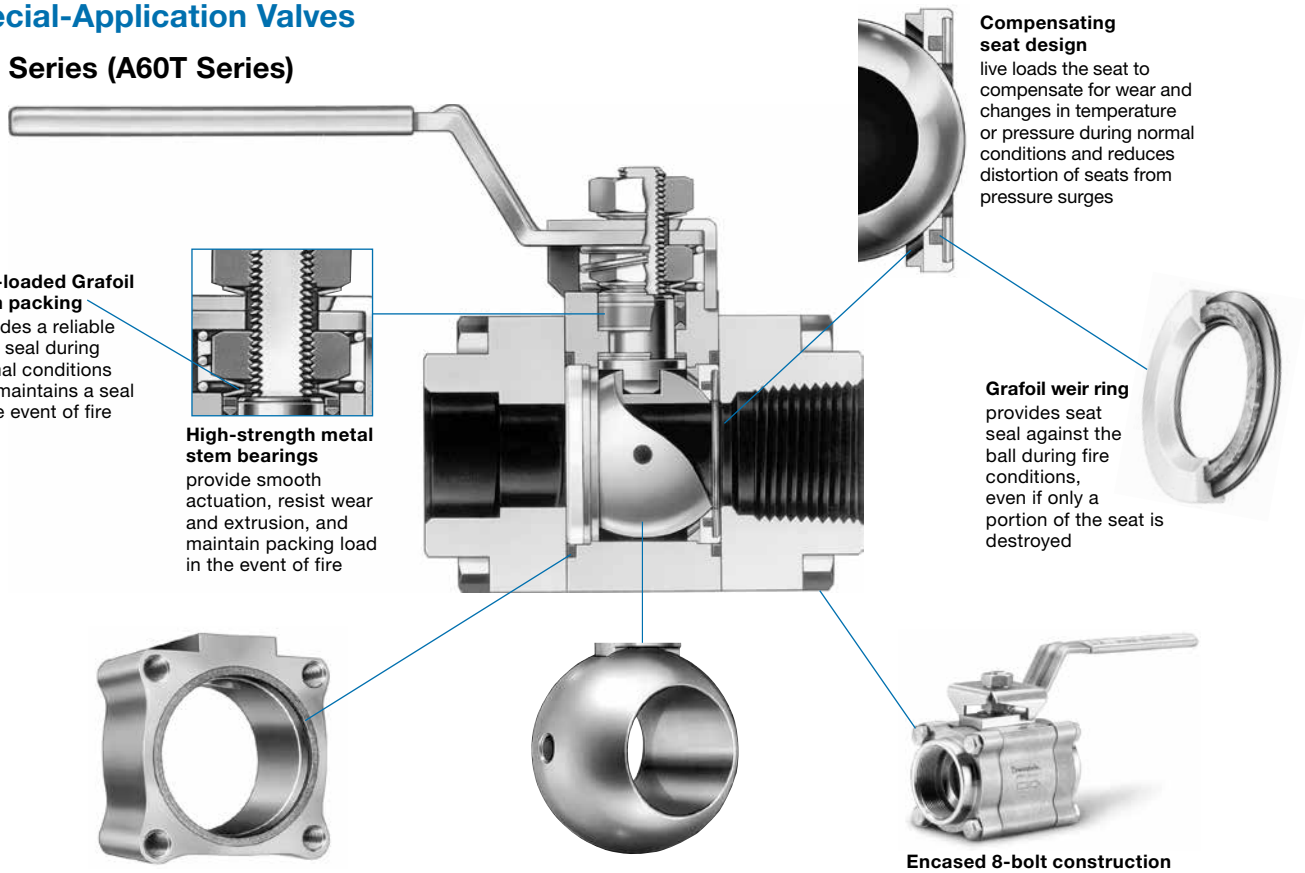
Valve Series	Kit Ordering Number
T63M	SS-91K-T63M
T65M	SS-91K-T65M
T67M	SS-91K-T67M
T68M	SS-91K-T68M

Kit components are the same materials and grades listed in **Materials of Construction.**

Select a kit ordering number.

Special-Application Valves

Fire Series (A60T Series)



Compensating seat design
live loads the seat to compensate for wear and changes in temperature or pressure during normal conditions and reduces distortion of seats from pressure surges

Live-loaded Grafoil stem packing
provides a reliable stem seal during normal conditions and maintains a seal in the event of fire

High-strength metal stem bearings
provide smooth actuation, resist wear and extrusion, and maintain packing load in the event of fire

Grafoil weir ring
provides seat seal against the ball during fire conditions, even if only a portion of the seat is destroyed

Grafoil flange seals
provide leak-tight containment under normal and fire conditions, eliminating the need for a secondary flange seal

Vented ball
allows pressure to equalize between valve body and upstream port, preventing overpressurization and potential seal blowout under fire conditions

Encased 8-bolt construction
maintains body integrity and body seals during rapid temperature changes resulting from fire exposure and water quenching

Materials of Construction

Component	Valve Body Material	
	Stainless Steel	Steel
	Material Grade/ASTM Specification	
Packing supports (2)	*Polyimide*	
*Packing, flange seals (2)*①	*Grafoil with 316 SS wire*	
Seats with integral weir rings (2)	*Glass-filled reinforced PTFE; Grafoil with 316 SS wire*	
Coned-disc springs (2)	*Grafoil-lined 316 SS/A167*	
Body fasteners (8)	Grade B8M class 2/ A193	Zinc phosphate-coated grade B7/A193
Lubricants	*Fluorinated tungsten disulfide; molybdenum disulfide with hydrocarbon binder; nickel antiseize in hydrocarbon carrier*	

Wetted components listed in *italics.*
All other components same as shown on page 4.
① RTV silicone sealant on flange seals.

Testing

In addition to the requirements given in **Testing,** page 5, fire series ball valves meet those of API Standard 607, 6th edition, and Swagelok fire test specification SEI-00334. Refer to *Fire Series Ball Valves—A60T Series* catalog, MS-02-47, for additional information.

Pressure-Temperature Ratings

Series	63, 65	67, 68
Material Name	Stainless Steel, Steel	
Temperature °F (°C)	Working Pressure, psig (bar)	
–40 (–40) to 100 (37)	2200 (151)	2000 (137)
150 (65)	1600 (110)	1600 (110)
200 (93)	1000 (68.9)	1000 (68.9)
250 (121)	400 (27.5)	400 (27.5)
300 (148)	300 (20.6)	300 (20.6)
350 (176)	200 (13.7)	200 (13.7)
400 (204)	100 (6.8)	100 (6.8)

Steel valve ratings limited to –20°F (–28°C).
Steel valves with Swagelok tube fitting end connections: 375°F (190°C) max.

Ordering Information

Fire series ball valves are available in 63, 65, 67, and 68 series sizes. To order, insert **A** into the ordering number.

Example: SS-**A**63**T**S8

To order steel valve body material, replace **SS** with **S.**

Example: **S**-A63TS8

Seal Kits

Seal kits contain stem springs, gland, packing, packing supports, stem bearings, seats with integral weir rings, seat springs, flange seals, and instructions.

Select a kit ordering number.

Valve Series	Kit Ordering Number
A63T	SS-91K-A63T
A65T	SS-91K-A65T
A67T	SS-91K-A67T
A68T	SS-91K-A68T

Special-Application Valves

Chlorine Series (C60V Series)

Features

- Materials include carbon steel valve body with virgin PTFE seats and packing, in accordance with the guidelines of the Chlorine Institute Pamphlet 6, *Piping Systems for Dry Chlorine.*
- Upstream ball vent prevents overpressurization in ball and body when valve is closed.

Materials of Construction

Component	Material Grade/ASTM Specification
Lower stem nut	Alloy 400
Packing support	ECTFE
Stem bearing	*ECTFE*
Packing	*Virgin PTFE/ASTM D1710*
Vented ball	*Alloy 400/B164*
Support rings (2)	*62, 63 series—alloy 400/B127* *65, 67, 68 series—316 SS/A167*
Seats (2)	*Virgin PTFE*
Coned-disc springs (2)	*Alloy X-750/AMS 5542*
Flanges (2)	*WCB/A216*
Body fasteners (4)	Cadmium-plated carbon steel grade 8/ SAE J429
Lubricant	*Fluorinated-based with PTFE*

Wetted components listed in *italics.*

All other components same as shown on page 4.

Pressure-Temperature Ratings

300 psig at –20 to 250°F (20.6 bar at –28 to 121°C).

Cleaning and Packaging

C60V series valve bodies and flanges are cleaned in mineral spirits followed by an aqueous cleaning solution containing a surfactant. All other wetted components are cleaned in accordance with Swagelok *Special Cleaning and Packaging (SC-11)* catalog, MS-06-63.

C60V series ball valves are capped and sealed individually in desiccant packaging and are tagged for chlorine service.

Testing

Every chlorine series valve is factory seat and shell tested with nitrogen at 300 psig (20.6 bar). Seats have a maximum allowable leak rate of 0.04 std cm^3/min.

Ordering Information

Select an ordering number from the **Dimensions** tables for Swagelok tube fitting, female NPT, or tube and pipe socket weld end connections. Insert **C** before the series designator. Replace **SS** and **T** with **S** and **V,** respectively.

Example: **S**-**C**62**V**S4

Seal Kits

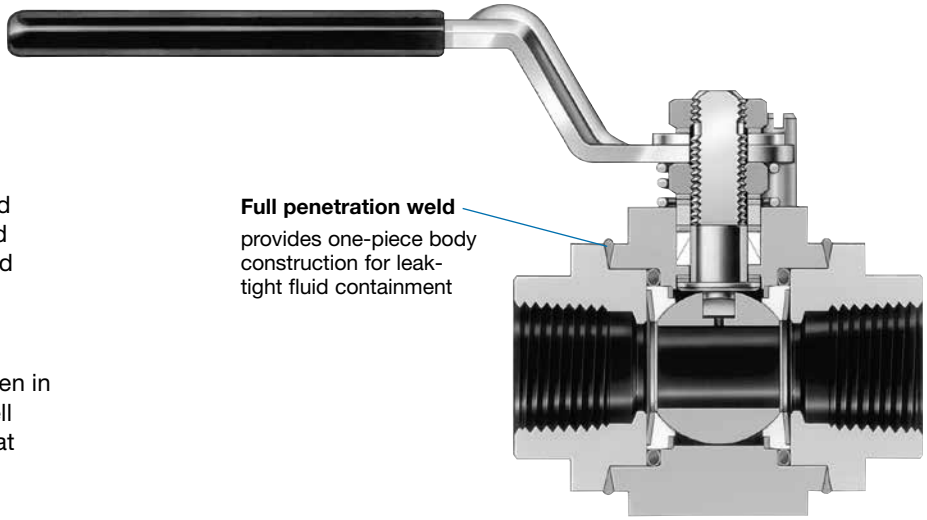
Seal kits contain stem springs, gland, packing support, packings, stem bearing, seat subassemblies, flange seals, lubricant, and instructions.

Select a kit ordering number.

Valve Series	Kit Ordering Number
C62V	S-91K-C62V
C63V	S-91K-C63V
C65V	S-91K-C65V
C67V	S-91K-C67V
C68V	S-91K-C68V

Special-Application Valves

All-Welded Valves (W60T Series)



Features

All-welded ball valves incorporate the proven design features of the on-off (2-way) ball valve, all-welded body construction, and live-loaded packing to ensure total system fluid containment.

Testing

In addition to the requirements given in **Testing,** page 5, a hydrostatic shell test is performed with pure water at 1.5 times the working pressure.

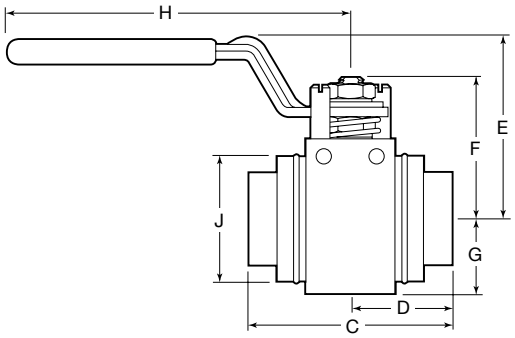
Dimensions and Ordering Information

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

Select an ordering number from the table below.

To order other seat materials, replace **T** with **C** for carbon/glass PTFE or **V** for virgin PTFE.

Example: SS-W63**C**F8



Size	Ordering Number	Orifice in. (mm)	C_v	Dimensions, in. (mm)						
				C	D	E	F	G	H	J
Female NPT End Connections										
1/2 in.	SS-W63TF8	0.516 (13.1)	12	2.69 (68.3)	1.34 (34.0)	2.32 (58.9)	1.79 (45.5)	0.96 (24.4)	4.50 (114)	1.60 (40.6)
1 in.	SS-W65TF16	0.875 (22.2)	38	3.59 (91.2)	1.79 (45.5)	2.93 (74.4)	2.52 (64.0)	1.26 (32.0)	6.00 (152)	2.24 (56.9)

Special-Application Valve

Valves for Low-Temperature Service (L60 Series)

Features

- Temperature rating –65 to 250°F (–53 to 121°C).
- Available in on-off (2-way) and switching (3-way) 62, 63, and 65 series sizes in stainless steel and in on-off (2-way) 62, 63, and 65 series sizes in brass.
- Available with seat materials shown in the **Pressure-Temperature Ratings** table below.

Materials of Construction

Component	Valve Body Material	
	Stainless Steel	Brass
	Material Grade/ASTM Specification	
Stem nut	316 SS	
Stem bearing	*Molybdenum disulfide-coated PEEK*	
Flange seals	*Buna C*	
Body fasteners (4)	316 SS gr B8M cl 2/A193	
Body hex nuts (8 or 4)	316 SS gr 8M str hd/A194	

Wetted components listed in *italics.*
All other components same as shown on page 4.

Pressure-Temperature Ratings

Temperature °F (°C)	Seat Material	Valve Body Material					
		Stainless Steel				Brass	
		Reinforced PTFE	Carbon/ Glass PTFE	Polyethylene	Virgin PTFE	Reinforced PTFE, Carbon/ Glass PTFE, Polyethylene	Virgin PTFE
	Valve Series	Working Pressure, psig (bar)					
On-Off (2-Way)							
–65 (–53) to 100 (37)	62	2200 (151)	2500 (172)	3000 (206)	1500 (103)	2000 (137)	1500 (103)
	63	2200 (151)	2500 (172)	2500 (172)	1500 (103)	1500 (103)	1500 (103)
	65	2200 (151)	2500 (172)	2500 (172)	1500 (103)	1500 (103)	1500 (103)
Switching (3-Way)							
–65 (–53) to 100 (37)	62, 63, 65	1000 (68.9)	1000 (68.9)	1000 (68.9)	1000 (68.9)	—	—

See **Pressure-Temperature Ratings,** page 6, for ratings from 100 to 250°F (37 to 121°C).

Ordering Information

To order, insert **L** in the ordering number.

Examples: SS-**L**62TS4
SS-**L**62XTS4

Seal Kits

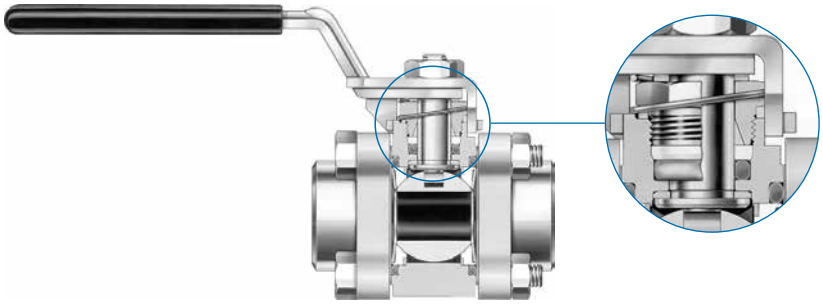
Seal kit components are the same materials and grades listed in **Materials of Construction.**

See **Seal Kits,** page 27, for ordering information.

Special-Application Valves

Valves for Rapid-Cycle Service (R60T Series)

The ball valve with an O-ring stem seal may be more effective in applications requiring rapid cycling of a valve or when packing adjustments may be difficult.



Materials of Construction

Component	Material Grade/ ASTM Specification
Packing bolt①, spacer ring	316 SS/A276
Top O-ring support	PEEK
Stem bearing	*PEEK*
Bottom O-ring support	Reinforced PTFE
Flange seal, stem O-ring	*Fluorocarbon FKM*

Wetted components listed in *italics.*

All other components same as shown on page 4.

① Coated with molybdenum disulfide with hydrocarbon binder.

Pressure-Temperature Ratings

Valve Series	Pressure Rating at 0 to 100°F (–17 to 37°C)	Pressure Rating at 400°F (204°C)
R62T, R63T, R65T	2200 psig (151 bar)	330 psig (22.7 bar)
R67T, R68T	1500 psig (103 bar)	

Ordering Information

To order, insert **R** before the series designator in the valve ordering number.

Example: SS-**R**63TS8

Seal Kits

Seal kits contain stem spring, stem O-ring supports, spacer ring, stem O-ring, stem bearing, seats, seat springs, flange seals, lubricant, and instructions.

Kit components are the same materials and grades listed in **Materials of Construction.**

Select a kit ordering number.

Valve Series	Kit Ordering Number
R62T	SS-91K-R62T
R63T	SS-91K-R63T
R65T	SS-91K-R65T
R67T	SS-91K-R67T
R68T	SS-91K-R68T

Valve Handle Options

Lever handles are standard. Also available are:

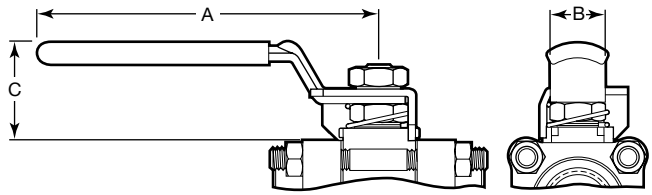
- oval handles
- locking brackets for lever and oval handles
- oval latch-lock handles
- replacement vinyl sleeves.

Lever Handles

Lever handles with vinyl sleeves are standard, except for thermal service (T60M) valve handles, which have no sleeves.

Ordering Information and Dimensions

Dimensions are for reference only and are subject to change.



Valve Series	Kit Ordering Number	Dimensions, in. (mm)		
		A	B	C
62	SS-51K-62-BK	2.37 (60.2)	0.69 (17.5)	0.98 (24.9)
62 3-way	SS-51K-62X-BK			
63	SS-51K-63-BK	4.50 (114)	0.88 (22.4)	1.46 (37.1)
63 3-way	SS-51K-63X-BK			
T63M	SS-51K-63			
W63	SS-51K-W63-BK			1.31 (33.3)
65	SS-51K-65-BK	6.00 (152)	1.12 (28.4)	1.69 (42.9)
65 3-way	SS-51K-65X-BK			
T65M	SS-51K-65			
W65	SS-51K-W65-BK			1.45 (36.8)
67, 68	SS-51K-67-BK	9.14 (232)	1.38 (35.1)	2.50 (63.5)
67, 68 3-way	SS-51K-67X-BK			
T67M, T68M	SS-51K-67			

Sleeve Color Designators

Color	Designator	Color	Designator
Black	BK	Orange	OG
Blue	BL	Red	RD
Green	GR	Yellow	YW

Lever-Handle Valves with Colored Sleeves

To order valves with sleeves of colors other than black, add a dash and a sleeve color designator to the valve ordering number.

Example: SS-62TS4-**BL**

Lever Handle Kits

Kits include:

- stainless steel lever handle with black vinyl sleeve
- stop plate (not required for 62 or W60 series valves)
- stem spring (not required for 62 series valves).

To order a lever handle kit, select a kit ordering number from the table at left.

For sleeve colors other than black, replace **BK** in the ordering number with a sleeve color designator.

Example: SS-51K-62-**BL**

Replacement Vinyl Lever-Handle Sleeves

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

Valve Series	Basic Kit Ordering Number	Valve Series	Basic Kit Ordering Number
62	VNL-51K-62-	65, W65	VNL-51K-65-
62 3-way	VNL-51K-62X-	65 3-way	VNL-51K-65X-
63, W63	VNL-51K-63-	67, 68	VNL-51K-67-
63 3-way	VNL-51K-63X-	67, 68 3-way	VNL-51K-67X-

Example: VNL-51K-62-**BK**

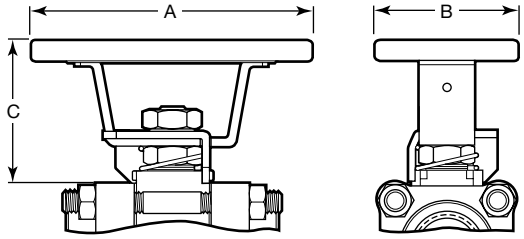
Valve Handle Options

Oval Handles

Oval handles are available. The standard sleeve color is orange, except for thermal service (T60M) handles, which have no sleeves.

Ordering Information and Dimensions

Dimensions are for reference only and are subject to change.



Valve Series	Kit Ordering Number	Dimensions, in. (mm)		
		A	B	C
62	SS-51K-62K-OG	2.09 (53.1)	1.59 (40.4)	0.88 (22.4)
62 3-way	SS-51K-62XK-OG			
63	SS-51K-63K-OG	4.09 (104)	2.34 (59.4)	2.07 (52.6)
63 3-way	SS-51K-63XK-OG			
T63M	SS-51K-63K			
W63	SS-51K-W63K-OG			2.06 (52.3)
65	SS-51K-65K-OG	4.72 (120)	2.46 (62.5)	2.43 (61.7)
65 3-way	SS-51K-65XK-OG			
T65M	SS-51K-65K			
W65	SS-51K-W65K-OG			2.45 (62.2)
67, 68	SS-51K-67K-OG	5.59 (142)	2.59 (65.8)	2.79 (70.9)
67, 68 3-way	SS-51K-67XK-OG			
T67M, T68M	SS-51K-67K			

Oval-Handle Valves

To order 60 series valves with oval handles and orange vinyl sleeves, add **-JK** to the valve ordering number.

Example: SS-62TS4**-JK**

For other colors, add or insert a dash and a sleeve color designator so that the designators are in *alphabetical* order.

Examples: SS-62TS4**-BK**-JK
SS-62TS4-JK**-YW**

Oval Handle Kits

Kits include:

- stainless steel oval handle with orange vinyl sleeve
- stop plate (not required for 62 or W60 series valves)
- stem springs (not required for 62 series valves)
- stem nut (62 series valves only)
- instructions.

To order an oval handle kit, select a kit ordering number from the table at left. For sleeve colors other than orange, replace **OG** in the ordering number with a sleeve color designator.

Example: SS-51K-62K-**BK**

Replacement Vinyl Oval-Handle Sleeves

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

Valve Series	Basic Kit Ordering Number	Valve Series	Basic Kit Ordering Number
62	VNL-51K-62K-	65, W65	VNL-51K-65K-
62 3-way	VNL-51K-62XK-	65 3-way	VNL-51K-65XK-
63, W63	VNL-51K-63K-	67, 68	VNL-51K-67K-
63 3-way	VNL-51K-63XK-	67, 68 3-way	VNL-51K-67XK-

Example: VNL-51K-62K**-BK**

Handle Extensions

Two- and four-inch handle extensions are available. Contact your authorized Swagelok representative.

Valve Handle Options

Locking Brackets for Lever and Oval Handles

Locking brackets can lock valves open or closed with shackle diameters smaller than:

- 0.344 in. (8.7 mm)—62, 63, and 65 series
- 0.375 in. (9.5 mm)—67 and 68 series

Valves with locking brackets cannot be panel mounted.

Ordering Information and Dimensions

A, B, and *C* dimensions of valves with locking brackets are the same as those of standard valves.

Lever-Handle Valves with Locking Brackets

To order 60 series lever-handle valves with locking brackets, add **-JL** to the valve ordering number.

Example: SS-62TS4**-JL**

For a sleeve color other than black, add or insert a dash and a sleeve color designator so that the designators are in *alphabetical* order.

Examples: SS-62TS4**-BL**-JL
SS-62TS4-JL**-RD**

Oval-Handle Valves with Locking Brackets

To order 60 series oval-handle valves with locking brackets, add **-JLK** to the valve ordering number.

Example: SS-62TS4**-JLK**

For a sleeve color other than orange, add or insert a dash and a sleeve color designator so that the designators are in *alphabetical* order.

Examples: SS-62TS4**-BL**-JLK
SS-62TS4-JLK**-YW**

Locking Bracket/Handle Kits

Kits include:

- stainless steel locking bracket
- stainless steel stop lock plate (not required for 62 series valves)
- stem spring (not required for 62 series valves)
- body hex nuts (4-bolt valve kits only)
- body fasteners (all 4-bolt valve kits and 62 series 8-bolt valve kits)
- stainless steel lever handle with black vinyl sleeve (62 series lever-handle valves only)
- stainless steel oval handle with orange vinyl sleeve (62 series oval-handle valves only)
- instructions.

62 Series Valves

Kits include lever or oval handle. Select a kit ordering number. For a sleeve color other than black for lever handles or orange for oval handles, replace **BK** or **OG** in the kit ordering number with a sleeve color designator.

Valve Series	Lever Handle Kit Ordering Numbers	
	4-Bolt Valves	8-Bolt Valves
62	SS-51K-62L-BK	SS-51K-S62L-BK
62 3-way	SS-51K-62XL-BK	—

Valve Series	Oval Handle Kit Ordering Numbers	
	4-Bolt Valves	8-Bolt Valves
62	SS-51K-62LK-OG	SS-51K-S62LK-OG
62 3-way	SS-51K-62XLK-OG	—

Examples: SS-51K-62L-**BL** for a locking bracket kit with lever handle and blue sleeve
SS-51K-62LK-**GR** for a locking bracket kit with oval handle and green sleeve

63, 65, 67, and 68 Series Valves

Kits are for use for valves with either lever or oval handles. Select a kit ordering number.

Valve Series	Kit Ordering Numbers	
	4-Bolt Valves	8-Bolt Valves
63	SS-51K-63L	SS-51K-S63L
63 3-way	SS-51K-63XL	—
65	SS-51K-65L	SS-51K-S65L
65 3-way	SS-51K-65XL	—
67	SS-51K-67L	SS-51K-S67L
67 3-way	SS-51K-67XL	—
68	SS-51K-68L	SS-51K-S68L
68 3-way	SS-51K-68XL	—

Valve Handle Options

Oval Latch-Lock Handles

Oval latch-lock handles are available for 63 and 65 series 2-way valves. The handles can be latched in the open and closed position and can be locked with shackle diameters smaller than 0.328 in. (8.3 mm) if desired. Valves with oval latch-lock handles cannot be panel mounted.

Ordering Information and Dimensions

Dimensions are for reference only and are subject to change.

Valves with Oval Latch-Lock Handles

To order 60 series valves with oval latch-lock handles, add **-LLK** to the valve ordering number.

Example: SS-63TS8**-LLK**

For a sleeve color other than orange, add or insert a dash and a sleeve color designator so that the designators are in *alphabetical* order.

Examples: SS-63TS8**-BL**-LLK
SS-63TS8-LLK**-RD**

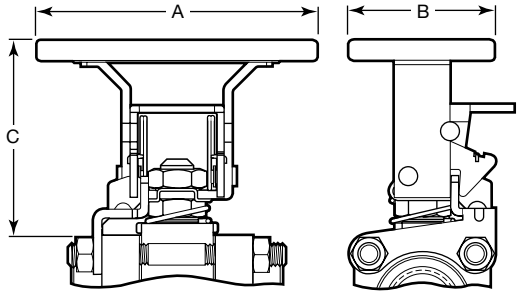
Oval Latch-Lock Handle Kits

Kits include:

- stainless steel oval handle with trigger mechanism and orange vinyl sleeve
- stainless steel stop lock-plate bracket (not required for W60 series valves)
- body hex nuts (4-bolt valve kits only)
- body fasteners (4-bolt valve kits only)
- stem spring
- instructions.

Select a kit ordering number from the table at right. For a sleeve color other than orange, replace **OG** in the ordering number with a sleeve color designator.

Example: SS-51K-63LLK-**BL**



Valve Series	Kit Ordering Numbers		Dimensions, in. (mm)		
	4-Bolt Valves	8-Bolt and Welded Valves	A	B	C
Lock in open and closed position					
63	SS-51K-63LLK-OG	SS-51K-S63LLK-OG	4.09 (104)	2.34 (59.4)	3.05 (77.5)
W63	—	SS-51K-W63LLK-OG			2.06 (52.3)
65	SS-51K-65LLK-OG	SS-51K-S65LLK-OG	4.72 (120)	2.46 (62.5)	3.35 (85.1)
W65	—	SS-51K-W65LLK-OG			2.45 (62.2)
Lock in open position					
63	SS-51K-63LLKO-OG	SS-51K-S63LLKO-OG	4.09 (104)	2.34 (59.4)	3.05 (77.5)
65	SS-51K-65LLKO-OG	SS-51K-S65LLKO-OG	4.72 (120)	2.46 (62.5)	3.35 (85.1)
Lock in closed position					
63	SS-51K-63LLKC-OG	SS-51K-S63LLKC-OG	4.09 (104)	2.34 (59.4)	3.05 (77.5)
W63	—	SS-51K-W63LLKC-OG			2.06 (52.3)
65	SS-51K-65LLKC-OG	SS-51K-S65LLKC-OG	4.72 (120)	2.46 (62.5)	3.35 (85.1)
W65	—	SS-51K-W65LLKC-OG			2.45 (62.2)

Options and Accessories

Low Dead Space Inserts

- Reduce fluid entrapment around the ball, stem, and seats while the valve is in the open or closed position.
- For use in select ball valves; not for use on steam, thermal, or fire series valves.
- Made from carbon/glass reinforced PTFE.

To order, add **-LD** to the valve ordering number.

Examples: SS-62TS4**-LD;** SS-62XTS4-F8**-LD**

Kits for Field Assembly

Select an ordering number.

Valve Series	Kit Ordering Numbers	
	Low Temperature	All Other
On-Off (2-Way) Valves		
62	TGC-91K-L62-LD	TGC-91K-62-LD
63	TGC-91K-L63-LD	TGC-91K-63-LD
65	TGC-91K-L65-LD	TGC-91K-65-LD
67	TGC-91K-L67-LD	TGC-91K-67-LD
68	TGC-91K-L68-LD	TGC-91K-68-LD
Switching (3-Way) Valves		
62	TGC-91K-L62X-LD	TGC-91K-62X-LD
63	TGC-91K-L63X-LD	TGC-91K-63X-LD
65	TGC-91K-L65X-LD	TGC-91K-65X-LD
67	TGC-91K-L67X-LD	TGC-91K-67X-LD
68	TGC-91K-L68X-LD	TGC-91K-68X-LD

Panel Mount Kits

- Allow vertical or horizontal mounting.
- be installed on panels up to 3/16 in. (4.8 mm) for 62 series and 1/4 in. (6.4 mm) thick for 63, 65, 67, and 68 series.
- Fit oval and lever handle.
- Provide template for drilling holes.

Ordering Information

Select an ordering number.

For 4-Bolt Valves Assembled with Carbon Steel or Stainless Steel Bolts

Kits include self-cinching nut, cover plate, cap screws, panel mount brackets, two stainless and two carbon steel bolts, and instructions.

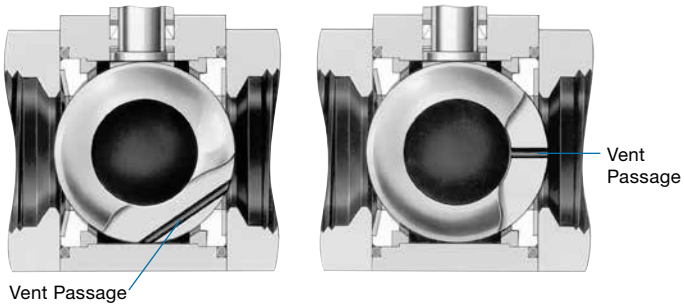
Valve Series	Kit Ordering Number
62	MS-PMK-62
63	MS-PMK-63
65	MS-PMK-65
67	MS-PMK-67
68	MS-PMK-68

For 4-Bolt Valves Assembled with Stainless Steel Studs and All 8-Bolt Valves

Kits include self-cinching nut, cover plate, cap screws, panel mount brackets, and instructions.

Valve Series	Kit Ordering Number
62	MS-PMK-S62
63	MS-PMK-S63
65	MS-PMK-S65
67	MS-PMK-S67
68	MS-PMK-S68

Vented Valves



External Vent Option **Internal Vent Option**

On-off (2-way) ball valves are available with either an internal or an external vent. These vents are available for either upstream or downstream service. For details and ordering information, refer to *Process Ball Valve Vent Options* catalog, MS-02-28.

Options and Accessories

Seal Kits

The swing-out design of 4-bolt valves allows fast and easy maintenance with the valve inline.

Kits contain:

- gland
- packing support
- packings
- stem bearings
- stem springs (not included in 62 series seal kits)
- seat subassemblies
- flange seals
- ball (alloy X-750 seal kit only)
- lubricant appropriate to seat material, shown on page 4
- instructions.

To order a seal kit for a stainless steel or steel valve, add a seat material designator to the basic ordering number.

Example: SS-91K-62**T**

To order a seal kit for a brass valve, replace **SS** with **B.**

Example: **B**-91K-62T

To order a seal kit for a low-temperature service valves, insert **L** before the series designator.

Example: SS-91K-**L**62T

Valve Series	Basic Ordering Number	Seat Material Designator
62	SS-91K-62	**T** Reinforced PTFE **M** Alloy X-750 **C** Carbon/glass reinforced PTFE **P** PEEK **E** UHMWPE **V** Virgin PTFE
63	SS-91K-63	
65	SS-91K-65	
67	SS-91K-67	
68	SS-91K-68	

Flange Seal Kits

Each 4-bolt valve kit contains two flange seals, lubricant, and instructions. To order, add a flange seal material designator and a uniform size number to basic ordering number **-91K-**.

Example: **VA70**-91K-**121**

Flange Seal Material	Designator	Temperature Range °F (°C)	Uniform Size Number
Alloy X-750, PTFE coated①	INCX	–65 to 450 (–53 to 232)	
Buna N	BN70	–20 to 250 (–28 to 121)	**017** 62 series
Buna C①	BC70	–65 to 250 (–53 to 121)	**121** 63 series
Ethylene propylene	EP70	–20 to 250 (–28 to 121)	**129** 65 series
Fluorocarbon FKM	VA70	–20 to 450 (–28 to 232)	**141** 67 series
Neoprene	NE70	–20 to 250 (–28 to 121)	**147** 68 series
PTFE	T	50 to 150 (10 to 65)	

① 62, 63, and 65 series valves only.

Fastener Kits

Each 4-bolt valve kit contains stem nuts, body fasteners, and body nuts. Select an ordering number.

Valve Series	Valve Body Material	
	Stainless Steel	Brass, Steel
	Fastener Kit Ordering Number	
62	316-61K-62	S-61K-62
63	316-61K-63	S-61K-63
65	316-61K-65	S-61K-65
67	316-61K-67	S-61K-67
68	316-61K-68	S-61K-68

Pneumatic Actuators

Swagelok rack and pinion pneumatic actuators are compact, lightweight, easily mountable, and can be operated with standard shop air. They are available in spring-return and double-acting modes. On-off (2-way) valves require 90° actuation; switching (3-way) valves require 180° actuation.

Valve-actuator assemblies on this page are:

- for standard 4-bolt cast stainless steel valve bodies with seat materials shown
- based on a –20 to 100°F (–28 to 37°C) system temperature and the valve cycling at least once per day but not more than once per hour.

For other valve body materials or if your application falls outside of this scope, contact your authorized Swagelok representative.

Low-pressure spring-return actuators for applications with lower-pressure actuator air supply are available. Contact your authorized Swagelok representative.

For technical data, including materials of construction, air displacement, and weight, refer to *Ball Valve Actuation Options* catalog, MS-02-343.

⚠ **Caution: Actuated assemblies must be properly aligned and supported. Inadequate alignment or improper support of the actuated assembly may result in leakage or premature valve failure.**

Pressure-Temperature Ratings

Actuator Service	Actuator Service Designator	Temperature Range °F (°C)	Maximum Actuator Pressure psig (bar)	
			At 100°F (37°C)	At Maximum Temperature
Standard	—	–20 to 200 (–28 to 93)	200 (13.7)	165 (11.3)
High temperature	HT	0 to 400 (–17 to 204)		100 (6.8)
Low temperature	LT	–40 to 200 (–40 to 93)		165 (11.3)
Nonfluorocarbon	NF	–20 to 200 (–28 to 93)		165 (11.3)

Actuator Pressure at System Pressure—On-Off (2-Way) Valves

Based on valve performance using pressurized air or nitrogen.

Valve Series	Seat Material Designator	System Pressure psig (bar)	Actuator Model	Actuator Model Designator	Actuation Mode			
					Spring Return		Double Acting	
					Single	Dual	Single	Dual
					Minimum Actuator Pressure psig (bar)			
62	C, E, T, V	Maximum valve rating	31 (90°)	-31	75 (5.2)	—	45 (3.2)	80 (5.6)
			33 (90°)	-33	70 (4.9)	80 (5.6)	15 (1.1)	20 (1.4)
	P	1050 (72.3)	31 (90°)	-31	75 (5.2)	—	50 (3.5)	85 (5.9)
		1500 (103)	31 (90°)	-31	—	—	55 (3.8)	100 (6.9)
		2500 (172)	31 (90°)	-31			70 (4.9)	—
		1050 (72.3)	33 (90°)	-33	70 (4.9)	80 (5.6)	20 (1.4)	35 (2.5)
		2500 (172)	33 (90°)	-33	80 (5.6)	90 (6.3)	25 (1.8)	45 (3.2)
63	C, E, T, V	Maximum valve rating	31 (90°)	-31	—	—	100 (6.9)	—
			33 (90°)	-33	80 (5.6)		40 (2.8)	70 (4.9)
	M		33 (90°)	-33	—		90 (6.3)	—
	P	1050 (72.3)	31 (90°)	-31	—		100 (6.9)	—
			33 (90°)	-33	80 (5.6)		35 (2.5)	60 (4.2)
		1500 (103)	33 (90°)	-33	85 (5.9)		45 (3.2)	75 (5.2)
		2000 (137)	33 (90°)	-33	95 (6.6)		55 (3.8)	100 (6.9)
		2500 (172)	33 (90°)	-33	—		70 (4.9)	—
	T (fire)	Maximum valve rating	33 (90°)	-33	70 (4.9)		—	—
65	C, E, T, V	Maximum valve rating	33 (90°)	-33	—	—	100 (6.9)	—
			35 (90°)	-35	75 (5.2)	80 (5.6)	40 (2.8)	70 (4.9)
	M		35 (90°)	-35	—	—	60 (4.2)	—
	P	1050 (72.3)	33 (90°)	-33	95 (6.6)		50 (3.5)	90 (6.3)
		1500 (103)	33 (90°)	-33	—		85 (5.9)	—
		1050 (72.3)	35 (90°)	-35	65 (4.5)	80 (5.6)	25 (1.8)	40 (2.8)
		1500 (103)	35 (90°)	-35	75 (5.2)	—	35 (2.5)	60 (4.2)
		2500 (172)	35 (90°)	-35	80 (5.6)		50 (3.5)	90 (6.3)
	T (fire)	Maximum valve rating	35 (90°)	-35	70 (4.9)		—	—
67	C, E, T, V	Maximum valve rating	35 (90°)	-35	90 (6.3)	—	50 (3.5)	90 (6.3)
	M		35 (90°)	-35	—		80 (5.6)	—
	P	1050 (72.3)	35 (90°)	-35	80 (5.6)		45 (3.2)	70 (4.9)
		1500 (103)	35 (90°)	-35	90 (6.3)		60 (4.2)	100 (6.9)
		2000 (137)	35 (90°)	-35	—		75 (5.2)	—
	T (fire)	Maximum valve rating	35 (90°)	-35	80 (5.6)		—	—
68	C, E, T, V	Maximum valve rating	35 (90°)	-35	—	—	85 (5.9)	—
	M		35 (90°)	-35	—		100 (6.9)	—
	P	1050 (72.3)	35 (90°)	-35	90 (6.3)		60 (4.2)	100 (6.9)
		1500 (103)	35 (90°)	-35	—		75 (5.2)	—
		2000 (137)	35 (90°)	-35			90 (6.3)	—

Pneumatic Actuators

Actuator Pressure at System Pressure—Switching (3-Way) Valves

Based on valve performance using pressurized air or nitrogen.

Valve Series	Seat Material Designator	System Pressure psig (bar)	Actuator Model	Actuator Model Designator	Actuation Mode			
					Spring Return		Double Acting	
					Single	Dual	Single	Dual
					Minimum Actuator Pressure psig (bar)			
62	C, E, T, V	Maximum valve rating	51 (180°)	-51	75 (5.2)	—	45 (3.2)	70 (4.9)
			53 (180°)	-53	75 (5.2)	80 (5.6)	15 (1.1)	25 (1.8)
	P		51 (180°)	-51	—	—	50 (3.5)	85 (5.9)
			53 (180°)	-53	65 (4.5)	75 (5.2)	20 (1.4)	35 (2.5)
63	C, E, T, V	Maximum valve rating	51 (180°)	-51	—	—	95 (6.6)	—
			53 (180°)	-53	80 (5.6)		40 (2.8)	70 (4.9)
	P		51 (180°)	-51	—		85 (5.9)	—
			53 (180°)	-53	80 (5.6)		30 (2.1)	60 (4.2)
65	C, E, T, V	Maximum valve rating	53 (180°)	-53	—	—	85 (5.9)	—
			55 (180°)	-55	80 (5.6)		30 (2.1)	50 (3.5)
	P		53 (180°)	-53	—		50 (3.5)	90 (6.3)
			55 (180°)	-55	75 (5.2)	85 (5.9)	20 (1.4)	30 (2.1)
67	C, E, T, V	Maximum valve rating	55 (180°)	-55	85 (5.9)	—	50 (3.5)	80 (5.6)
	P		55 (180°)	-55	60 (4.2)		35 (2.5)	65 (4.5)
68	C, E, T, V	Maximum valve rating	55 (180°)	-55	90 (6.3)	—	60 (4.2)	100 (6.9)
	P		55 (180°)	-55	—		55 (3.8)	100 (6.9)

Ordering Information

Factory-Assembled Valves with Actuators

Typical Ordering Number

A B C D

SS-63TS8 - 33 D HT

A Valve Ordering Number

B Actuator Model

Based on valve series and seat material, select actuator designator. See **Actuator Pressure at System Pressure** tables, page 28 for on-off (2-way) valves and on this page for switching (3-way) valves.

- **31** = 90° actuation
- **33** = 90° actuation
- **35** = 90° actuation
- **51** = 180° actuation
- **53** = 180° actuation
- **55** = 180° actuation

C Actuation Mode

- **C** = Spring return, normally closed
- **D** = Double acting
- **O** = Spring return, normally open
- **S** = Spring return, switching (3-way) valves

D Actuator Service

- **FP** = Fusible plug①
- **HT** = High temperature②
- **LT** = Low temperature
- **NF** = Nonfluorocarbon③
- **None** = Standard

① Available for fire series valves: a fail-safe pneumatic actuator that contains a Swagelok fusible plug and a Swagelok mud-dauber fitting. The fusible plug melts if the external temperature reaches 280°F (137°C), relieving pressure in the actuator and allowing the valve to cycle closed.

② Suggested for steam service and thermal service valves.

③ Suggested for factory-assembled valves with UHMWPE seats and packing.

*For dual-mounted assemblies (two valves mounted to one actuator), add **DM** to the ordering number.*

*Example: SS-63TS8-33D**DM***

Pneumatic Actuators

Ordering Information

Kits for Field Assembly

Order one actuator kit and one mounting bracket kit for each valve.

Actuator Kit Typical Ordering Number

MS - 1 **A** **31** - **B** **DA** **C** **-HT**

A Actuator Model

Based on valve series and seat material, select actuator designator. See **Actuator Pressure at System Pressure** tables, page 28 for on-off (2-way) valves and page 29 for switching (3-way) valves.

- **31** = 90° actuation
- **33** = 90° actuation
- **35** = 90° actuation
- **51** = 180° actuation
- **53** = 180° actuation
- **55** = 180° actuation

B Actuation Mode

- **DA** = Double acting
- **SR** = Spring return

C Actuator Service

- **-FP** = Fusible plug①
- **-HT** = High temperature②
- **-LT** = Low temperature
- **-NF** = Nonfluorocarbon
- **None** = Standard

① Available for fire series valves: a fail-safe pneumatic actuator that contains a Swagelok fusible plug and a Swagelok mud-dauber fitting. The fusible plug melts if the external temperature reaches 280°F (137°C), relieving pressure in the actuator and allowing the valve to cycle closed.

② Suggested for steam service and thermal service valves.

Mounting Bracket Kits

Mounting bracket kits for standard 4-bolt cast stainless steel valves contain:

- 304 stainless steel mounting bracket
- 420 stainless steel actuator roll pin (31, 33, 51, and 53 actuators) or cadmium-plated carbon steel shoulder screw and lock nut (35 and 55 actuators)
- cadmium-plated carbon steel coupling
- 316 stainless steel lock tab
- two cadmium-plated carbon steel socket head cap screws
- two 316 SS gr 8M body hex nuts
- two 316 SS gr B8M cl 2 body fasteners
- two cadmium-plated carbon steel gr 8 body fasteners
- instructions.

Mounting bracket kits for all-welded (W60T series) valves contain:

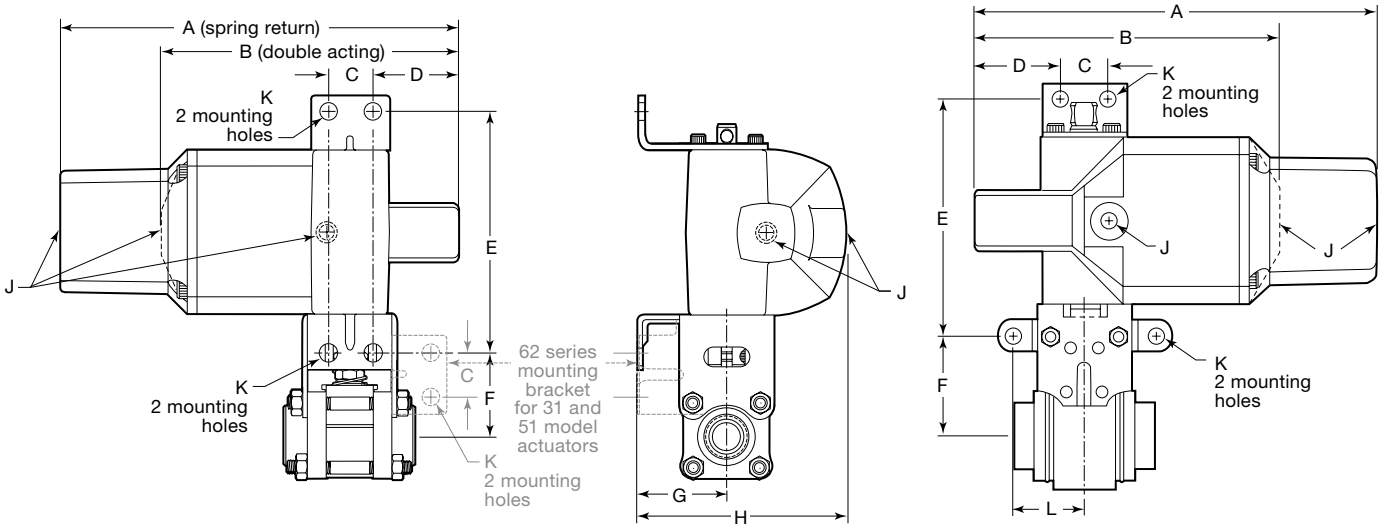
- 304 stainless steel top plate
- two 304 stainless steel side plates
- cadmium-plated carbon steel shoulder screw and lock nut (35 and 55 actuator models)
- 304 stainless steel coupling (W63T series) or cadmium plated carbon steel coupling (W65T series)
- two 316 stainless steel (33 actuator with W65T series) or two 18-8 stainless steel (all other combinations) hex bolts
- two 316 stainless steel (33 actuator with W65T series) or two 18-8 stainless steel (all other combinations) hex nuts
- two 316 stainless steel (33 actuator with W65T series) or two 18-8 stainless steel (all other combinations) lock washers
- two 18-8 stainless steel socket head cap screws
- 304 stainless steel wall mount (33 actuator with W63T series only)
- instructions.

Valve Series	Actuator Model	Flow Pattern or Valve Type	Mounting Bracket Kit Ordering Number
62	31 (90°), 51 (180°)	On-off, switching	MS-MB-62
		Steam	MS-MB-S62
	33 (90°), 53 (180°)	On-off, switching	MS-MB-62-133
		Steam	MS-MB-S62-133
63	31 (90°), 51 (180°)	On-off, switching, steam	MS-MB-63-131
		All welded	MS-MB-73-131
63	33 (90°), 53 (180°)	On-off, switching, fire, steam, thermal	MS-MB-63
		All welded	MS-MB-73-133
65	33 (90°), 53 (180°)	On-off, switching, steam, thermal	MS-MB-65
		All welded	MS-MB-75-133
65	35 (90°), 55 (180°)	On-off, switching, fire, steam, thermal	MS-MB-65-135
		All welded	MS-MB-75-135
67	35 (90°), 55 (180°)	All	MS-MB-67
68	35 (90°), 55 (180°)	All	MS-MB-68

Pneumatic Actuators

Dimensions

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



All Welded

Valve Series	Flow Pattern or Valve Type	Dimensions, in. (mm)										
		A	B	C	D	E	F	G	H	J	K	L
31 and 51 Models												
62	On-off, switching	4.91 (125)	4.09 (104)	0.63 (16.0)	1.15 (22.9)	3.50 (88.9)	1.33 (33.8)	1.31 (33.3)	3.04 (77.2)	1/8 in. NPT	0.34 (8.6)	—
63	On-off, switching	4.91 (125)	4.09 (104)	0.63 (16.0)	1.15 (22.9)	3.38 (85.9)	1.92 (488)	1.31 (33.3)	3.04 (77.2)	1/8 in. NPT	0.34 (8.6)	—
	All welded	4.91 (125)	4.09 (104)	0.63 (16.0)	1.15 (22.9)	3.52 (89.4)	1.86 (47.2)	1.31 (33.3)	3.04 (77.2)	1/8 in. NPT	0.34 (8.6)	1.41 (35.8)
33 and 53 Models												
62	On-off, switching	7.86 (200)	5.89 (150)	0.88 (22.4)	1.73 (44.0)	4.63 (118)	1.21 (30.7)	1.75 (44.4)	4.07 (103)	1/8 in. NPT	0.34 (8.6)	—
63	On-off, switching	7.86 (200)	5.89 (150)	0.88 (22.4)	1.73 (44.0)	4.63 (118)	1.64 (41.7)	1.75 (44.4)	4.07 (103)	1/8 in. NPT	0.34 (8.6)	—
	All welded	7.86 (200)	5.89 (150)	0.88 (22.4)	1.73 (44.0)	4.51 (115)	1.87 (47.5)	1.75 (44.4)	4.07 (103)	1/8 in. NPT	0.34 (8.6)	1.41 (35.8)
65	On-off, switching	7.86 (200)	5.89 (150)	0.88 (22.4)	1.73 (44.0)	4.63 (118)	2.54 (64.5)	1.75 (44.4)	4.07 (103)	1/8 in. NPT	0.34 (8.6)	—
	All welded	7.86 (200)	5.89 (150)	0.88 (22.4)	1.73 (44.0)	4.68 (119)	2.47 (62.7)	1.75 (44.4)	4.07 (103)	1/8 in. NPT	0.34 (8.6)	1.72 (43.7)
35 and 55 Models												
65	On-off, switching	11.9 (302)	8.41 (214)	2.88 (73.0)	1.71 (43.5)	4.75 (121)	4.41 (112)	2.00 (50.8)	5.15 (131)	1/2 in. NPT	0.53 (13.5)	—
	All welded	11.9 (302)	8.41 (214)	2.88 (73.0)	1.71 (43.5)	6.53 (166)	2.63 (66.8)	2.00 (50.8)	5.15 (131)	1/2 in. NPT	0.53 (13.5)	2.13 (54.1)
67	On-off, switching	11.9 (302)	8.41 (214)	2.88 (73.0)	1.71 (43.5)	4.75 (121)	4.93 (125)	2.00 (50.8)	5.15 (131)	1/2 in. NPT	0.53 (13.5)	—
68	On-off, switching	11.9 (302)	8.41 (214)	2.88 (73.0)	1.71 (43.5)	4.75 (121)	5.20 (132)	2.00 (50.8)	5.15 (131)	1/2 in. NPT	0.53 (13.5)	—

ISO 5211-Compliant Pneumatic Actuators

Swagelok 63 series valve with actuator, solenoid, and proximity sensor.

These Swagelok rack and pinion pneumatic actuators are ISO 5211 compliant and are suitable for general applications. They are available in spring-return and double-acting modes. On-off (2-way) valves require 90° actuation; switching (3-way) valves require 180° actuation (90° actuation for valves with L flow pattern).

Valve-actuator assemblies on this page are:

- for standard 4-bolt cast stainless steel valve bodies with reinforced PTFE seats and packings
- based on a –20 to 100°F (–28 to 37°C) system temperature and the valve cycling at least once per day but not more than once per hour.

For other valve body and seat materials or if your application falls outside of this scope, contact your Swagelok sales and service representative.

For technical data, including actuator materials of construction and weight, refer to *Ball Valve Actuation Options* catalog, MS-02-343.

For additional information on selecting and sizing ISO 5211-compliant actuators, refer to *Actuated Ball Valve Selection Guide—ISO 5211-Compliant Actuator Mounting Bracket Kits* catalog, MS-02-136.

⚠ Caution: Actuated assemblies must be properly aligned and supported. Improper alignment or inadequate support of the actuated assembly may result in leakage or premature valve failure.

Pressure-Temperature Ratings

Maximum actuator pressure is 116 psig (8.0 bar). See **Minimum Actuator Pressure** table below for minimum actuator pressures.

Actuator Service	Actuator Service Designator	Temperature Range °F (°C)
Standard	—	–40 to 176 (–40 to 80)
High temperature	HT	5 to 302 (–15 to 150)

Minimum Actuator Pressure

Valve Series	Actuator Model	Spring Return Model Designators		Actuator Model	Double Acting Model Designator	Actuation Mode	
		Normally Closed	Normally Open			Spring Return	Double Acting
						Minimum Actuator Pressure, psig (bar)	
On-Off (2-Way) Valves							
62	A15	-A15C4	-A15O4	A10	-A10D	—	36 (2.5)
				A15	-A15D	50 (3.5)	36 (2.5)
63	A30	-A30C4	-A30O4	A30	-A30D	50 (3.5)	36 (2.5)
65	A60	-A60C5	-A60O5	A60	-A60D	72 (5.0)	36 (2.5)
67	A100	-A100C5	-A100O5	A100	-A100D	65 (4.5)	43 (3.0)
	A150	-A150C4	-A150O4			61 (4.2)	
68	A150	-A150C5	-A150O5	A100	-A100D	65 (4.5)	58 (4.0)
	A220	-A220C4	-A220O4			50 (3.5)	
Switching (3-Way) Valves							
62	A15	—	—	A15	-A15XD	—	36 (2.5)
63	A30			A30	-A30XD		36 (2.5)
65	A60			A60	-A60XD		36 (2.5)
67	A100			A100	-A100XD		43 (3.0)
68	A100			A100	-A100XD		58 (4.0)
Switching (3-Way) Valves with L Flow Pattern							
62	A15	-A15S4	—	A15	-A15D	50 (3.5)	36 (2.5)
63	A30	-A30S4		A30	-A30D	50 (3.5)	36 (2.5)
65	A60	-A60S5		A60	-A60D	72 (5.0)	36 (2.5)
67	A100	-A100S5		A100	-A100D	65 (4.5)	43 (3.0)
	A150	-A150S4				61 (4.2)	
68	A150	-A150S5		A100	-A100D	65 (4.5)	58 (4.0)
	A220	-A220S4				50 (3.5)	

ISO 5211-Compliant Pneumatic Actuators

Ordering Information

Factory-Assembled Valves with Actuators

Typical Ordering Number

A **B** **C**

SS-63TS8 -A30D HT

A Valve Ordering Number

B Actuator Model
Based on valve series, actuation mode, and flow pattern, select actuator designator. See **Minimum Actuator Pressure** table, page 32.

C Actuator Service
HT = High temperature
None = Standard

Kits for Field Assembly

Order one actuator kit and one mounting bracket kit for each valve.

Actuator Kit Typical Ordering Number

A **B** **C**

MS - **A30-4** - DIN **-HT**

A Actuator Model
Based on valve series, actuation mode, and flow pattern, select actuator designator. See **Minimum Actuator Pressure** table, page 32, and **Actuator Model Designators** table below.

B Coupling Drive Type
DIN

C Actuator Service
-HT = High temperature
None = Standard

Actuator Model Designators

Valve Series	Spring Return Actuator Model	Spring Return Model Designator	Double Acting Model	Double Acting Model Designator
On-Off (2-Way) Valves and Switching (3-Way) Valves with L Flow Pattern				
62	A15	A15-4	A10	A10-DA
			A15	A15-DA
63	A30	A30-4	A30	A30-DA
65	A60	A60-5	A60	A60-DA
67	A100	A100-5	A100	A100-DA
	A150	A150-4		
68	A150	A150-4	A100	A100-DA
	A220	A220-4①		
Switching (3-Way) Valves				
62	A15	—	A15	A15-XDA
63	A30		A30	A30-XDA
65	A60		A60	A60-XDA
67, 68	A100		A100	A100-XDA

① Requires adapter insert **MS-ADH22/17,** available separately, to reduce actuator coupling receptacle to 0.67 in. (17 mm) square.

Mounting Bracket Kits

Swagelok ISO 5211 mounting bracket kits for 4-bolt cast stainless steel valves contain:

- 316 stainless steel mounting bracket
- four A4 stainless steel socket head cap screws (A4 is approximately equivalent to AISI 316.)
- 316 stainless steel coupling
- 316 stainless steel wall mounting bracket
- two 316 stainless steel lock washers
- 302 stainless steel upper and lower grounding springs
- 316 stainless steel lock tab
- two 316 stainless steel hex nuts and bolts
- lubricant and MSDS
- instructions.

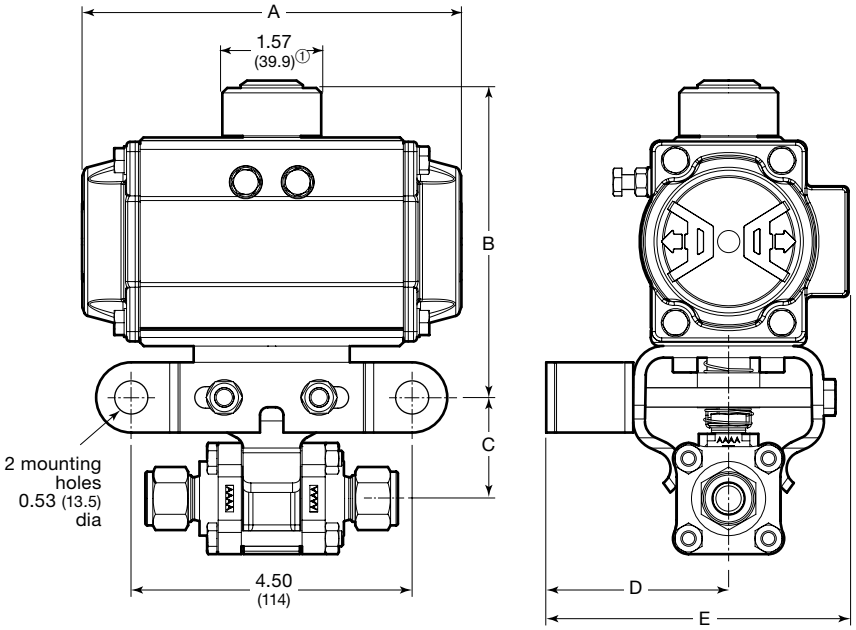
Valve Series	Mounting Bracket Kit Ordering Number
62	SS-MB-62-F04-11DIN-M
63	SS-MB-63-F05-14DIN-M
65	SS-MB-65-F05-14DIN-M
67	SS-MB-67-F07-17DIN-M
68	SS-MB-68-F07-17DIN-M

For 60 series valves with other body materials and for 8-bolt 60 series valves, contact your authorized Swagelok representative.

ISO 5211-Compliant Pneumatic Actuators

Dimensions

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



① A220 model: 2.56 (65.0).

Valve Series	Actuator Model	Dimensions, in. (mm)				
		A	B	C	D	E
On-Off (2-Way) Valves						
62	A10	4.65 (118)	4.21 (107)	1.54 (39.1)	2.90 (73.7)	4.61 (117)
	A15	5.33 (135)	4.33 (110)	1.54 (39.1)	2.90 (73.7)	4.61 (117)
63	A30	6.04 (153)	4.96 (126)	1.62 (41.1)	2.92 (74.2)	4.83 (123)
65	A60	8.01 (203)	6.42 (163)	2.18 (55.4)	3.30 (83.8)	5.41 (137)
	A100	9.46 (240)	6.93 (176)	2.18 (55.4)	3.30 (83.8)	5.52 (140)
67	A100	9.46 (240)	7.17 (182)	2.43 (61.7)	3.58 (90.9)	5.98 (152)
	A150	10.2 (259)	7.65 (194)	2.43 (61.7)	3.58 (90.9)	6.06 (154)
68	A100	9.46 (240)	7.17 (182)	2.58 (65.5)	3.57 (90.7)	5.98 (152)
	A150	10.2 (259)	7.65 (194)	2.58 (65.5)	3.57 (90.7)	6.05 (154)
	A220	11.9 (302)	8.75 (222)	2.58 (65.5)	3.57 (90.7)	6.41 (163)
Switching (3-Way) Valves						
62	A15XD	7.55 (192)	4.33 (110)	1.54 (39.1)	2.90 (73.7)	4.61 (117)
63	A30XD	8.50 (216)	4.96 (126)	1.62 (41.1)	2.92 (74.2)	4.83 (123)
65	A60XD	11.4 (290)	6.42 (163)	2.18 (55.4)	3.30 (83.8)	5.41 (137)
67	A100XD	13.2 (335)	7.17 (182)	2.43 (61.7)	3.58 (90.9)	5.98 (152)
68	A100XD	13.2 (335)	7.17 (182)	2.58 (65.5)	3.57 (90.7)	5.98 (152)

Options for ISO 5211-Compliant and Swagelok Pneumatic Actuators

Swagelok offers a range of accessories to enhance instrumentation and process ball valve performance and control, including solenoid valves, limit switches, and position sensors. Factory assemblies and kits for field assembly are available.

Refer to *Ball Valve Actuation Options* catalog, MS-02-343, for additional information.

Electric Actuators

Swagelok electric actuators are rugged and lightweight, and connect alternating- or direct-current power sources. Refer to *Electric Actuators—141 and 142 Series* catalog, MS-01-35, for additional information.

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.

Swagelok

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 Lifetime 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.

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

Bellows-Sealed Valve for Switching Service

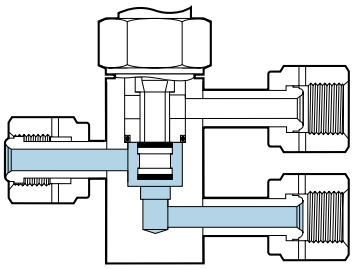
BY Series

Features

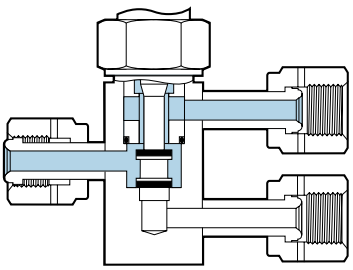
- Compact, packless valve switches flow from one line to another.
- Torlon® stem guide ensures proper alignment for consistent shutoff performance.
- Manual and spring-return and double-acting pneumatic actuators are available.
- End connections include 1/4 in. Swagelok® VCR® metal gasket face seal fittings and 1/4 in. Swagelok tube fittings. Other end connections are available; contact your authorized Swagelok sales and service representative for information.

Operation

With pressure to the miniature spring-return pneumatic actuator, the stem tip seals the upper port, allowing flow through the lower port.



When there is no pressure to the actuator, the stem tip seals the lower port, allowing flow through the upper port.



Pressure-Temperature Ratings

Valve Ratings		Actuator Ratings	
Pressure psig (bar)	**Temperature** °F (°C)	**Pressure** psig (bar)	**Temperature** °F (°C)
Vacuum to 150 (10.3)	0 to 200 (–18 to 93)	65 to 150 (4.5 to 10.3)	–10 to 300 (–23 to 148)

Testing

Every BY series valve is factory vacuum tested with helium at room temperature for five seconds to a maximum leak rate of 4×10^{-9} std cm^3/s at the seat, envelope, and all seals.

Cleaning and Packaging

Swagelok BY series switching valves with VCR end connections are processed in accordance with Swagelok *Special Cleaning and Packaging (SC-11),* MS-06-63, to ensure compliance with product cleanliness requirements stated in ASTM G93 Level C.

BY series switching valves with Swagelok tube fitting end connections are processed in accordance with Swagelok *Standard Cleaning and Packaging (SC-10),* MS-06-62.

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.

Swagelok

Materials of Construction

Valve

Component	Material Grade/ ASTM Specification
Bonnet nut, bonnet	316 SS/ A276 and A479
Stem, weld ring, stem extension, spool, body	*316 SS/ A276 and A479*
Bellows	*321 SS/A240*
Gasket	*PTFE-coated 316 SS/A240*
Guide	*Torlon*
Stem tip	*Fluorocarbon FKM-bonded① 316 SS/A276 and A479*
O-rings	*Fluorocarbon FKM*

Wetted components listed in *italics.*

① Material Safety Data Sheet for bonding agent available on request.

Pneumatic Actuator

Component	Material
Housing	Aluminum
External hardware	Stainless steel
O-rings	Fluorocarbon FKM

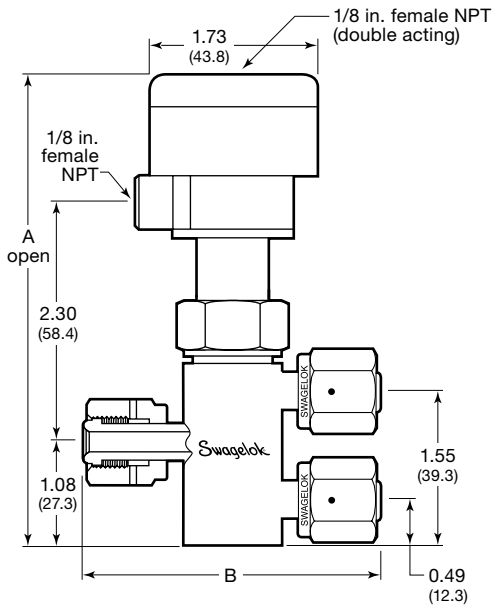
⚠ To increase service life, ensure proper valve performance, and prevent leakage, apply only as much torque as is required to achieve positive shutoff.

Ordering Information and Dimensions

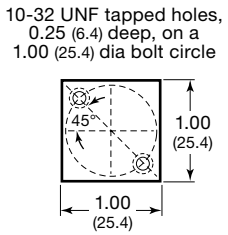
Select an ordering number.

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

Pneumatic Actuator shown



VCR Fittings shown



Bottom

End Connections		Ordering Number	Dimensions, in. (mm)	
Type	**Size**		**A**	**B**
Manual Actuator (Not Shown)				
VCR fitting	1/4 in.	SS-4BY-V35	4.81 (122)	3.27 (83.1)
Swagelok tube fitting	1/4 in.	SS-4BY-W4		3.93 (99.8)
Spring-Return Pneumatic Actuator				
VCR fitting	1/4 in.	SS-4BY-V35-1C	4.75 (121)	3.27 (83.1)
Swagelok tube fitting	1/4 in.	SS-4BY-W4-1C		3.93 (99.8)
Double-Acting Pneumatic Actuator				
VCR fitting	1/4 in.	SS-4BY-V35-1D	4.75 (121)	3.27 (83.1)
Swagelok tube fitting	1/4 in.	SS-4BY-W4-1D		3.93 (99.8)

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

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Printed in U.S.A., AGS
MS-02-58, R9

Bellows-Sealed Valves

Maintenance Kits

Bellows Kits

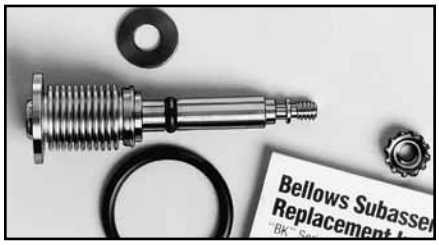
BG, BK, BKT, BMG, BMRG, BRG, UG, and UK Series

Manual Valves and Valves with 5, 6, and 8 Series Pneumatic Actuators

Kits include welded subassembly (stem, bellows, and weld ring), pin(s), and instructions.

Valve Series	Kit Ordering Number	
	Stainless Steel and Brass Valves	Alloy 400 Valves
4BG, 4BK, 4BKT	SS-4BK-K1	M-4B-K1
BMG	SS-4BM-K1	M-4BM-K1
BMRG	SS-4BMR-K1	M-4BMR-K1
4BRG, 6BK, 8BK, 6BG, 8BG	SS-8B-K1	M-8B-K1
4UG, 4UK, 6UG, 6UK, 8UG, 8UK	SS-4U-K1	—
12UG, 12UK	SS-12U-K1	—

BK Series with 1 Series Pneumatic Actuators



Kits include welded subassembly (stem, bellows, weld ring), piston and stem O-rings, lock nut, washer, and instructions. The ordering number specifies stainless steel **(SS)** for stainless steel and brass valves. For alloy 400 valve kits, replace **SS** with **M.**

Example: **M**-4BA-K1

Valve Series	Kit Ordering Number
4BK, 6BK, 8BK	SS-4BA-K1

Stem Tip/Adapter Kits

Kits include stem tip/adapter subassembly and instructions. Ordering numbers specify stainless steel **(SS)** for stainless steel and brass valves. For alloy 400 valve kits, replace **SS** with **M.**

Example: **M**-4BR-K5

BG, BM, BMRG, BRG, UG, and UK Series

Valve Series	Kit Ordering Number
4BG, 4UG	SS-4B-ST-K5①
BMRG, 4BRG, 4URG	SS-4BR-K5
4UK	SS-4BA-K5
6UK, 8UK	SS-8BA-K5
6BG, 6UG, 8BG, 8UG	SS-8B-K5
12UG	SS-12U-ST-K5
12UK	SS-12UK-K5

① For alloy 400 valves, replace **SS** with **M** and **ST** with **M5.**

Example: **M**-4B-**M5**-K5

BK and BKT Series

Valve Series	Kit Ordering Number	
	Manual Valves and Valves with 5 Series Pneumatic Actuators	Valves with 1 Series Pneumatic Actuators
4BK	SS-4BA-K5	SS-4BK-K5
4BKT	SS-4BK-K5	—
6BK, 8BK	SS-8BA-K5	SS-8BK-K5

Manual BN Series

Valve Series	Kit Ordering Number
BN4	KF-BN4-K5
BN8	KF-BN8-K5

Swagelok

Bellows/Stem/Stem Tip/ Adapter Kits

BN, HB, and HK Series

Kits include bellows/stem tip/adapter subassembly, and gasket① of the original materials specified in the product catalog and instructions.

① Not included for HG and HK series; not required for BN series.

Valve Series	Kit Ordering Number	
	Manual Valves	Pneumatically Actuated Valves
BN4	SS-BN4-KF-K6	SS-BN4-K1
BN8	SS-BN8-KF-K6	SS-BN8-K1
HB	—	SS-HB-KF-K5
HK	B-4HK-KA	
HK with copper stem tip	B-4HG-KA	—

Gasket Kits

BG, BK, BKT, BMG, BMRG, BRG, HB, HK, UG, and UK Series

Kits include body-to-bonnet gasket of the original material specified in the product catalog and instructions. Ordering numbers specify stainless steel **(SS)** for stainless steel and brass valves. For alloy 400 valve kits, replace **SS** with **M.**

Example: **M**-4BGO-K5-T

Valve Series	Kit Ordering Number
BG, BRG, BMG, BMRG, 4UG, 6UG, 8UG	SS-4BGO-K5-SV①
BK, BKT, 4UK, 6UK, 8UK	SS-4BGO-K5-T
HB	6L-HB-K28
HK	CU-4HG-K12T
HK with copper stem tip	CU-4HG-K12
12UG, 12UK	SS-12UGO-K5-SV

① For brass valves, replace **SV** with **T.** Example: **SS**-4BGO-K5-**T**

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

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Printed in U.S.A., AGS
MS-02-66, R4

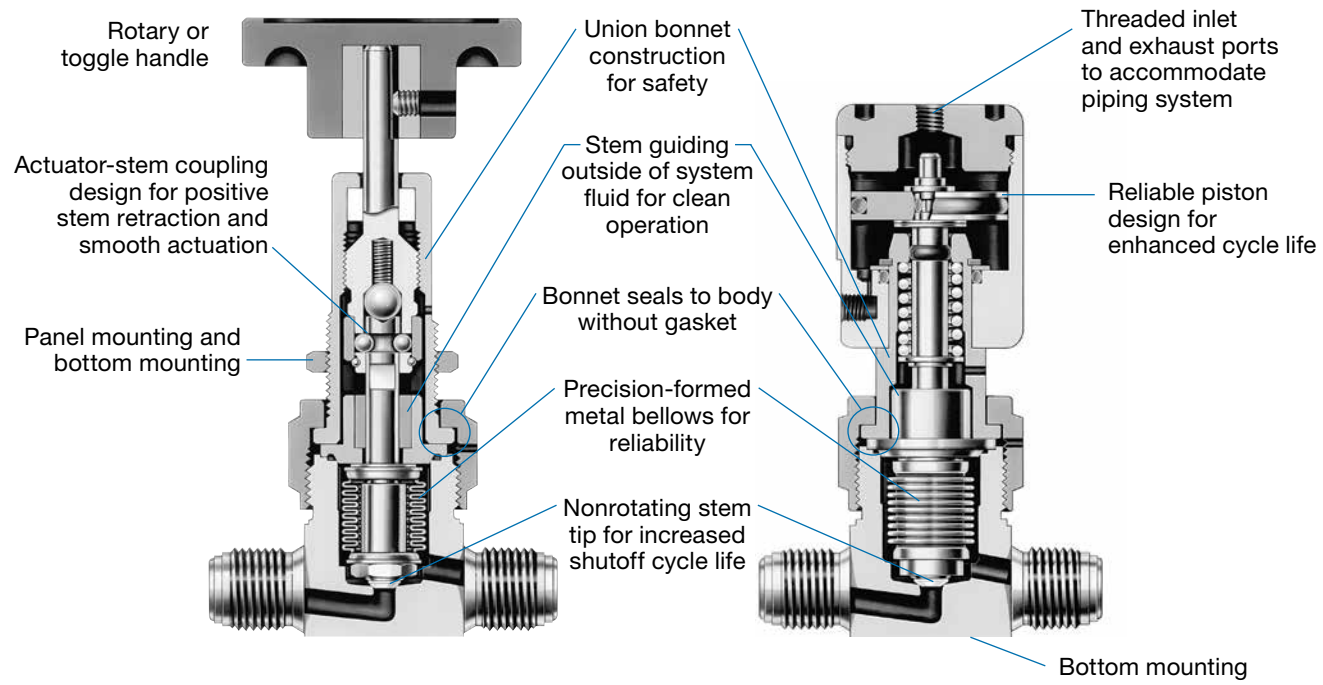
Bellows-Sealed Valves

BN Series

- Packless valves with all-metal seal to atmosphere
- Working pressures up to 500 psig (34.4 bar)
- Temperatures up to 200°F (93°C)
- 1/4 to 1/2 in. and 6 to 12 mm end connections

Contents

Features



Valve

- 316L stainless steel construction—316L VAR for bodies with butt weld end connections
- Flow coefficients (C_v): 0.30 and 0.70
- Swagelok tube fitting, weld, and VCR® and VCO® fitting end connections
- Butt-weld ended valves are weldable with the Swagelok welding system
- Full pressure rating in either flow direction for system versatility
- Easily purged to maintain clean operation

Pneumatic Actuator

- Normally closed (C) model requires air to open and spring to close.
- Normally open (O) model requires air to close and spring to open.
- Pneumatic actuator rotates 360° for ease of installation.
- Green cap identifies normally open model.

Performance Specifications

Refer to *BN Series Bellows Valve Technical Report,* MS-06-12, for additional information on surface finish specifications, particle counting, moisture analysis, hydrocarbon analysis, ionic cleanliness, and lab cycle testing data.

Materials of Construction

Valve

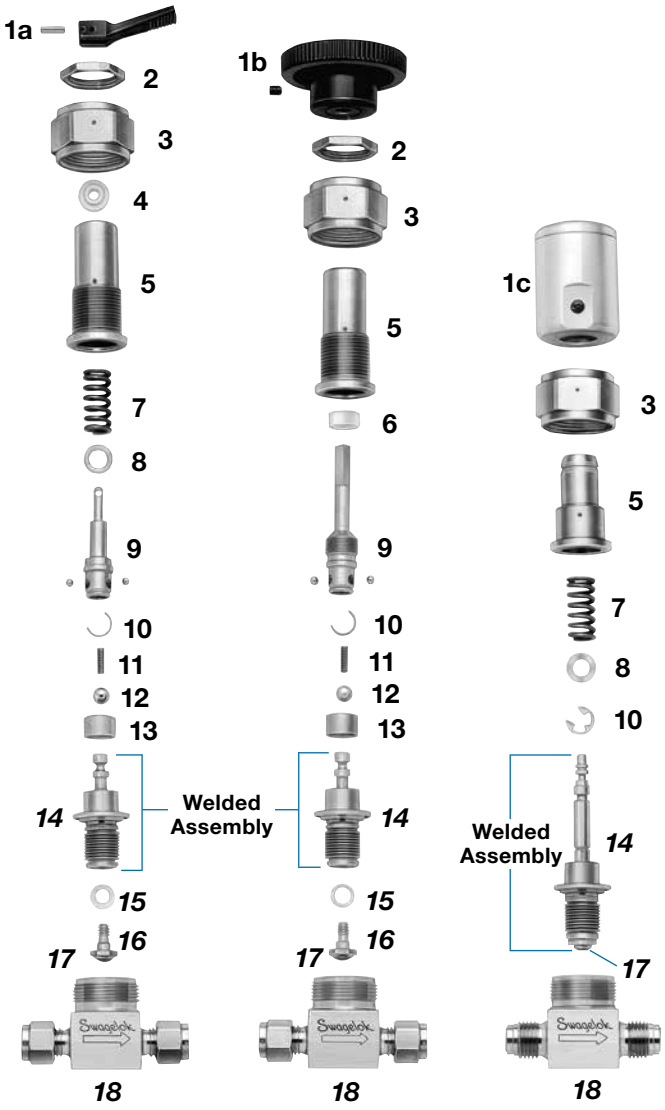
	Component	Material Grade/ ASTM Specification
1a	Toggle handle	Black nylon
	Handle pin	302 SS
1b	Rotary handle	Green phenolic
	Set screw	Alloy steel/ANSI 18.3
1c	Pneumatic actuator	See table below
2	Panel mount nut	316 SS/A479
3	Bonnet nut	Silver-plated 316 SS/A479
4	Stem guide	6/6 nylon/D4066
5	Bonnet①	316 SS/A479
6	Stem wiper	PTFE/AMS 3656
7	Spring	S17700 SS/AMS 5678
8	Washer	304 SS/A276
9	Actuator②	S17400 SS/A564
	Bearings (3)②	Chrome steel
10	Retaining ring	302 SS or 15-7 PH® SS
11	Spring	302 SS/A313
12	Ball bearing②	440C SS
13	Bearing retainer	316 SS/A479
14	*Stem*	*316L SS/A479*
	Bushing	Phosphor bronze C54400/B139
	Weld ring	*316L SS/A479*
	Bellows	*300 series SS/A269 or A240*
15	*Gasket*	*PCTFE/ASTM D1430*
16	*Adapter*	*316L SS/A479*
17	*Stem insert*	*PCTFE/ASTM D1430*
18	*Body*	*316L SS/A479③*

Wetted components listed in *italics*.

① Molybdenum disulfide-based lubricant.

② Petroleum-based lubricant.

③ Bodies with butt weld ends are 316L VAR SS/SEMI F20 High-Purity, 20 % minimum elongation allowed.



Pneumatic Actuator

Component	Material Grade/ ASTM Specification
Cap, piston, cylinder	Aluminum
O-rings	Fluorocarbon FKM
Spring washer	301 SS
Flat washers	304 SS/A240
Retaining ring	15-7 PH SS

Technical Data

Valve Series	Orifice in. (mm)	Flow Coefficient (C_v)①	Internal Volume① in.³ (cm³)	Valve Ratings		Actuator Ratings		
				Pressure vacuum to...psig (bar)	Temperature °F (°C)	Pressure psig (bar)	Temperature °F (°C)	Air Displacement (Actual Volume) in.³ (cm³)
BN4	0.157 (4.0)	0.30	0.18 (2.9)	Rotary handle—500 (34.4) Toggle handle—100 (6.8) Normally closed—125 (8.6) Normally open—400 (27.5)	–40 to 200 (–40 to 93)	45 to 120 (3.1 to 8.2)	–10 to 300 (–23 to 148)	0.045 (0.73)
BN8	0.313 (8.0)	0.70	0.27 (4.4)					

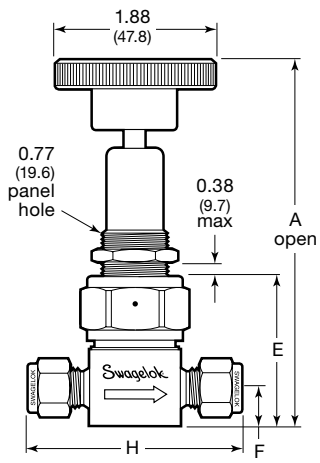
① Determined using valves with male VCR fitting end connections.

Ordering Information and Dimensions

Select an ordering number from the table at right.

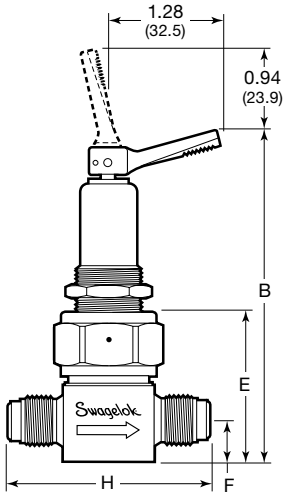
Dimensions, in inches (millimeters), are for reference only and are subject to change. Dimensions shown with Swagelok tube fitting nuts finger-tight.

Rotary Handle



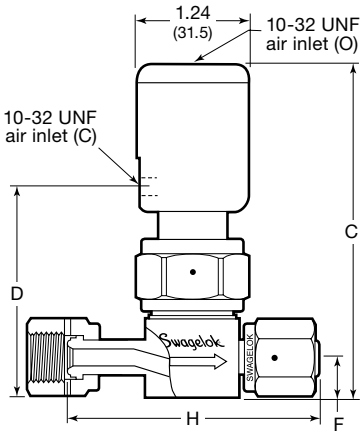
Swagelok Tube Fittings

Toggle Handle



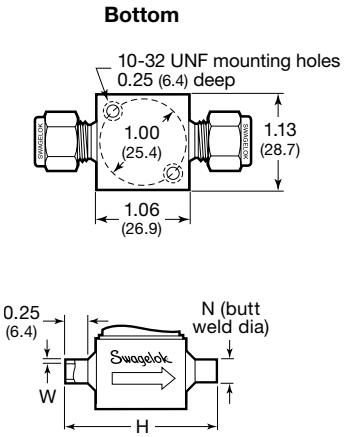
Male VCR Fittings

Pneumatic Actuator



Female VCR Fittings

Bottom



Weld Body

End Connections		Ordering Number	Dimensions, in. (mm)								
			Rotary	Toggle	Pneumatic		All Models			Weld Bodies	
Inlet/Outlet	Size		A	B	C	D	E	F	H	N	W
BN4 Series											
Swagelok tube fittings	1/4 in.	SS-BNS4	4.33 (110)	3.85 (97.8)	3.67 (93.2)	2.31 (58.7)	1.72 (43.7)	0.45 (11.4)	2.46 (62.5)	—	—
	3/8 in.	SS-BNS6							2.58 (65.5)		
	6 mm	SS-BNS6MM							2.46 (62.5)		
	8 mm	SS-BNS8MM							2.53 (64.3)		
Butt weld ends	1/4 in.	6LV-BNBW4							1.74 (44.2)	0.25 (6.4)	0.035 (0.89)
	3/8 in.	6LV-BNBW6								0.38 (9.6)	
	6 mm	6LV-BNBW6MM								(6)	(1)
Tube weld ends	1/4 in.	SS-BNTW4							1.75 (44.4)	0.38 (9.6)	0.060 (1.5)
Integral male VCR fittings	1/4 in.	SS-BNVCR4							2.30 (58.4)	—	—
Integral male VCO fittings	1/4 in.	SS-BNVCO4							2.00 (50.8)		
Female VCR fittings	1/4 in.	SS-BNV51①							2.76 (70.1)		
Female/male VCR fitting	1/4 in.	SS-BNV51-VCR4							2.54 (64.5)		

① Use ordering number **SS-BNFR4-P** to obtain processing and surface finish in accordance with *Ultrahigh-Purity Process Specification (SC-01)* catalog, MS-06-61.

Ordering Information and Dimensions

End Connections		Ordering Number	Dimensions, in. (mm)								
			Rotary	Toggle	Pneumatic		All Models			Weld Bodies	
Inlet/Outlet	Size		A	B	C	D	E	F	H	N	W
BN8 Series											
Swagelok tube fittings	3/8 in.	SS-BN8S6	4.42 (112)	3.93 (99.8)	3.76 (95.5)	2.40 (61.0)	1.81 (46.0)	0.53 (13.5)	2.58 (65.5)	—	—
	1/2 in.	SS-BN8S8							2.80 (71.1)		
	10 mm	SS-BN8S10MM							2.60 (66.0)		
	12 mm	SS-BN8S12MM							2.80 (71.1)		
Butt weld ends	3/8 in.	6LV-BN8BW6							1.74 (44.2)	0.38 (9.6)	0.035 (0.89)
	1/2 in.	6LV-BN8BW8								0.50 (12.7)	0.049 (1.2)
Tube extension ends	1/2 in.	SS-BN8T8A							3.40 (86.4)	—	—
Integral male VCR fittings	1/2 in.	SS-BN8VCR8	4.60 (117)	4.11 (104)	3.93 (99.8)	2.58 (65.5)	1.99 (50.5)	0.66 (16.8)	2.58 (65.5)	—	—
Female VCR fittings	1/2 in.	SS-BN8FR8	4.54 (115)	4.06 (103)	3.88 (98.6)	2.53 (64.3)	1.93 (49.0)		3.15 (80.0)		

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
Special cleaning with non–ozone-depleting chemicals	Performed in specially cleaned areas; valves are individually bagged.	None	*Special Cleaning and Packaging (SC-11)*	20 µin. (0.51 µm) 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
High-purity cleaning with a continuously monitored, deionized water, ultrasonic cleaning system	Performed in specially cleaned areas; valves are individually bagged.	-SC06	*Photovoltaic Process Specification (SC-06)*	20 µin. (0.51 µm) average, machine finished	
High-purity cleaning with a continuously monitored, deionized water, ultrasonic cleaning system	Performed in specially cleaned areas; valves are individually bagged.	-P6	*Photovoltaic Process Specification (SC-06)*	8 µin. (0.20 µm) average, machine finished and electropolished	
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)*	8 µin. (0.20 µm) average, machine finished and electropolished	

Standard (SC-11)

Swagelok BN 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 as stated in ASTM G93 Level C.

Photovoltaic (SC-06)

Swagelok BN series valves with VCR or weld end connections are available cleaned and packaged in accordance with Swagelok *Photovoltaic Process Specification (SC-06)* catalog, MS-06-64, to meet the process requirements of solar cell production. To order, add **-SC06** to the ordering number.

Example: SS-BNBW4-**SC06**

SC-06–cleaned BN series valves with VCR or weld end connections are available with controlled wetted surface finishes and electropolishing. To order, add **-P6** to the ordering number.

Example: SS-BNVCR4-**P6**

Ultrahigh-Purity (SC-01)

Swagelok BN series valves with VCR or weld end connections are available with wetted surface finishing, cleaning, and packaging in accordance with Swagelok *Ultrahigh-Purity Process Specification (SC-01)* catalog, MS-06-61. To order, add **-P** to the ordering number.

Example: SS-BNBW4-**P**

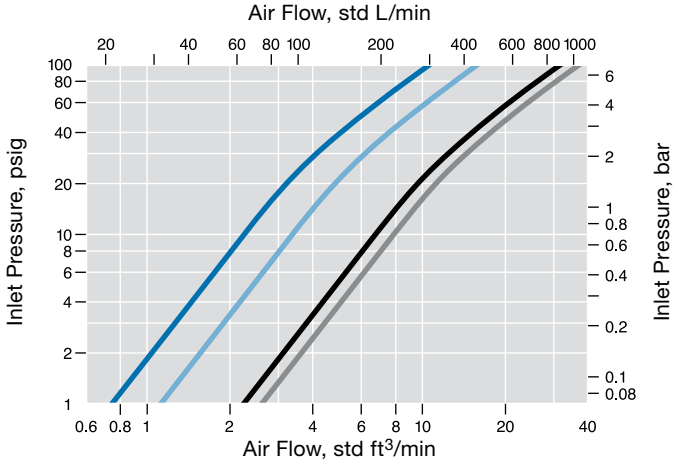
Exception: Use ordering number **SS-BNFR4-P** to obtain SC-01 processing and surface finish for SS-BNV51.

Flow Data at 70°F (20°C)

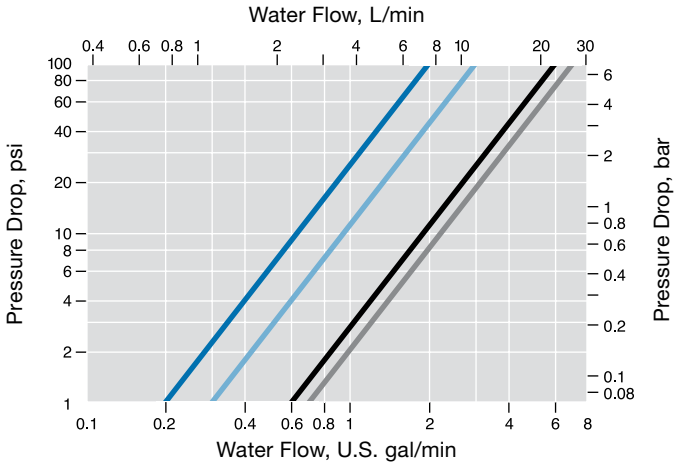
BN4 Series — Toggle Handle
— Rotary Handle and Pneumatic Actuator

BN8 Series — Toggle Handle
— Rotary Handle and Pneumatic Actuator

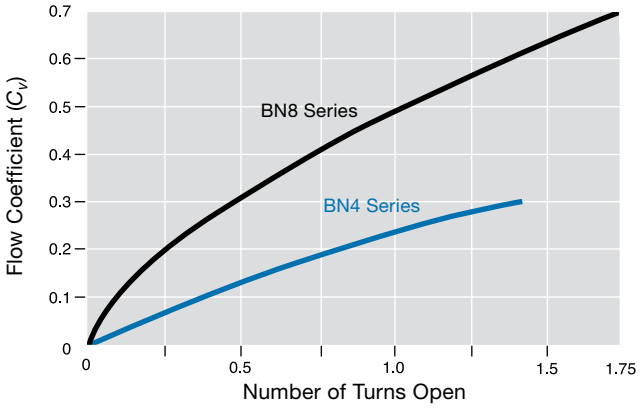
Air



Water



Rotary Model Flow Coefficient at Turns Open



Pneumatic Actuators

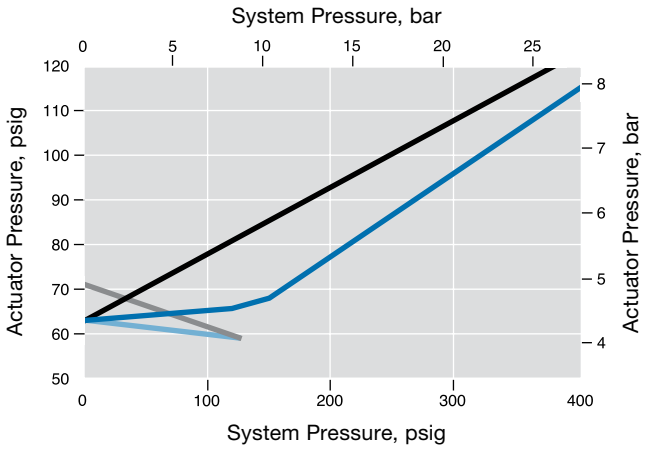
To order a pneumatically actuated valve, add **-C** for normally closed or **-O** for normally open to the valve ordering number.

Examples: SS-BNS4-**C**
SS-BNS4-**O**

Pneumatic Actuator Performance

Actuator Pressure at System Pressure

BN4 Series — Normally Open — Normally Closed
BN8 Series — Normally Open — Normally Closed



Optional Pneumatic Actuator Inlet Port

Standard inlet port is 10-32 UNF. A 1/8-27 NPT inlet port is available. The normally closed model has a cylinder extension to accommodate the larger port. To order, insert **2** in the valve ordering number.

Examples: SS-BNS4-**2**C
SS-BNS4-**2**O

Hose Adapter Kits

Allows for use of soft plastic or rubber tubing at the inlet of the pneumatic actuator.

- Adapts pneumatic actuator port from the 10-32 UNF thread to 1/8 in. hose barb.
- Includes a nickel-plated brass hose barb fitting and Buna N gasket.

Kit ordering number: **B-BN4-K62**

Pneumatic Actuators

Bonnet Sniffer Tubes

Bonnet sniffer tubes allow monitoring of bellows integrity.

- 3/16 in. (4.7 mm) outside diameter, 1.38 in. (34.9 mm) long.
- 316 stainless steel material with fluorocarbon FKM O-ring.
- Threads to test port of bonnet.
- Pneumatically actuated valves only.

To order, add **-T** to the valve ordering-number.

Example: 6LV-BNBW4-C**-T**

Indicator Switches

- Transmits a signal to an electrical device indicating either the open or closed position of a pneumatically actuated valve.
- Features a single-pole, single-throw switch rated at:
  - 1/2 A for 115 V (ac) for 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 BN series or 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: SS-BNS4-C**M**
SS-BNS4-C**M-2**

Indicator Switch Kits

To order a kit for an existing valve, use ordering number **MS-ISK-BN-CM** for a normally open switch or **MS-ISK-BN-CM-2** for a normally closed switch.

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

Options and Accessories

Polyimide Stem Tips

A PCTFE stem tip is standard. Polyimide stem tips are available in BN4 series valves, for temperatures up to 400°F (204°C) or where PCTFE is not compatible with the system fluid.

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

Example: SS-BN**V**S4-C

Polyimide Stem Tip
(Manually operated valve stem tip shown)

Replacement polyimide stem tips are available for manually operated valves. Replacement stem tips for pneumatically actuated valves are part of the bellows/stem/stem tip subassembly. Refer to *Bellows Valve Maintenance Kits* catalog, MS-02-66, for additional information.

Toggle Handles

Ordering numbers specify rotary handle valves. To order a toggle-operated valve, insert **T** in the valve ordering number.

Example: SS-BN**T**S4

Black handles are standard for toggle-operated BN series valves. To order a colored toggle handle, add a handle color designator to the valve ordering number.

Example: SS-BNTS4**-BL**

Handle Color	Designator
Blue	-BL
Green	-GR
Orange	-OG
Red	-RD
White	-WH
Yellow	-YW

Maintenance Kits

Stem tip/adapter kits are available for manual BN series valves; bellows/stem/stem tip/adapter kits are available for manual and pneumatic BN series valves. Refer to *Bellows-Sealed Valve Maintenance Kits* catalog, MS-02-66.

Oxygen Service Hazards

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

Multiport and Elbow Valves and Monoblock Manifolds

BN 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.

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

Swagelok

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 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.

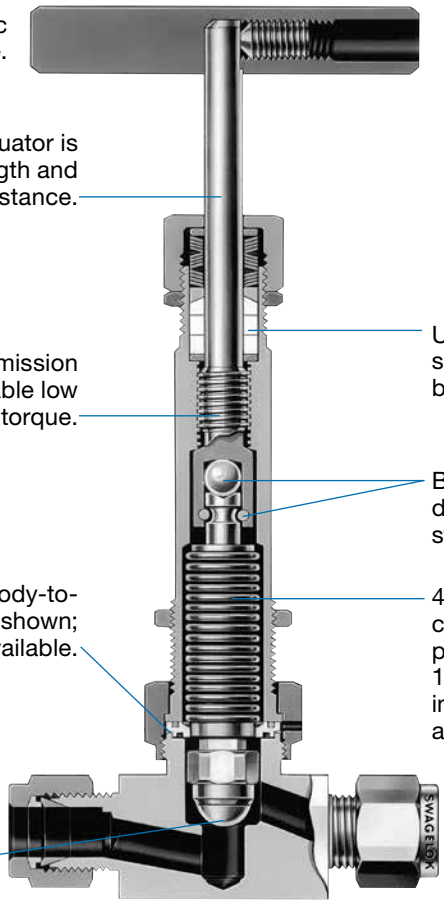
Warranty Information

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

Bellows-Sealed Valves

U Series

- Secondary containment system above the bellows
- Working pressures up to 2500 psig (172 bar)
- Temperatures up to 1200°F (648°C)
- 1/4, 3/8, 1/2, 3/4, and 1 in.; 6, 10, and 12 mm end connections
- Stainless steel material



Features

Swagelok® U series bellows-sealed valves enhance reliability, versatility, and safety—with a secondary containment system that prevents leaks to atmosphere even if the primary seal fails.

- Gasketed or welded body-to-bellows seals
- Stem tips for shutoff or regulating service
- Flow coefficients (C_v) from 0.36 to 5.3
- Variety of end connections:
  - Swagelok tube fittings—1/4 to 1/2 in. and 6 to 12 mm
  - Tube socket weld ends—1/4 to 3/4 in.
  - Tube butt weld ends—3/8 to 1 in.
  - Female VCR® face seal fittings—1/4 and 1/2 in.
- Panel, bottom, and side mounting available

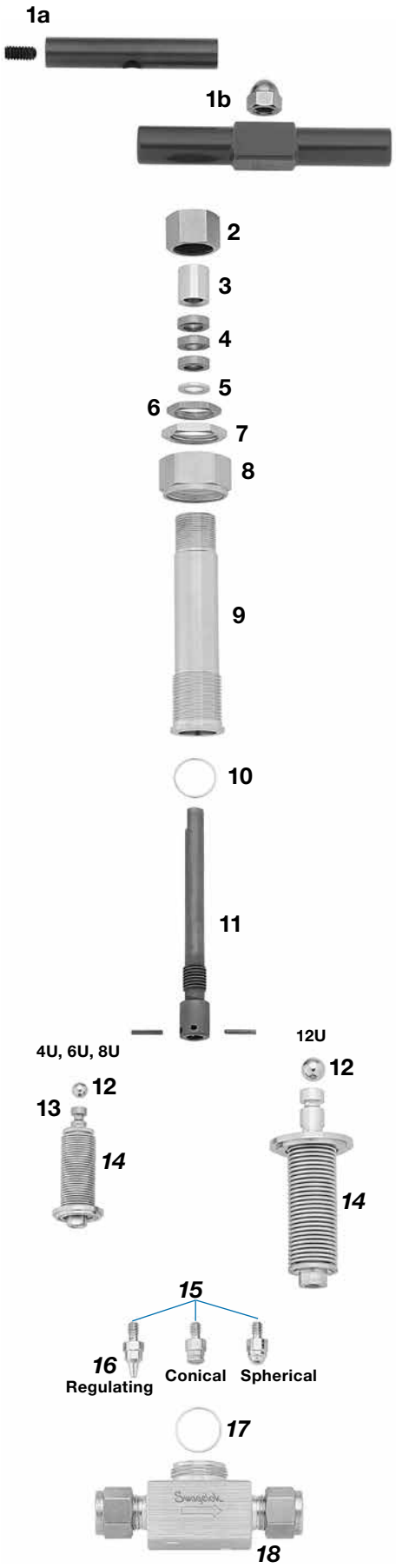
Technical Data

Body-to-Bellows Seal	Stem Tip	Flow Pattern	C_v ①	Internal Volume ① in.^{3} (cm^3)	Series ②
Gasket	Metal (regulating)	Straight	0.36	0.11 (1.8)	4URG
	Metal (spherical)		0.36	0.11 (1.8)	4UG
			1.0	0.25 (4.1)	6UG
			1.2	0.27 (4.4)	8UG
			3.1	1.46 (23.9)	12UG
		Angle	5.3	1.22 (20.0)	12UAG
	PCTFE and Polyimide (conical)	Straight	0.36	0.11 (1.8)	4UK
			1.0	0.25 (4.1)	6UK
			1.2	0.27 (4.4)	8UK
			3.1	1.46 (23.9)	12UK
	Polyimide (conical)	Angle	5.3	1.22 (20.0)	12UAK
	PCTFE (cylindrical)	Angle	2.9	1.22 (20.0)	12UAK
Weld	Metal (regulating)	Straight	0.36	0.11 (1.8)	4URW
	Metal (spherical)		0.36	0.11 (1.8)	4UW
			1.0	0.25 (4.1)	6UW
			1.2	0.27 (4.4)	8UW
			3.1	1.46 (23.9)	12UW
		Angle	5.3	1.22 (20.0)	12UAW

① Determined using valves with Swagelok tube fitting end connections.

② **R** designates regulating stem tip; **G** designates gasket body-to-bellows seal; **A** designates angle pattern; **K** designates PCTFE or Polyimide stem tip; **W** designates welded body-to-bellows seal.

Materials of Construction

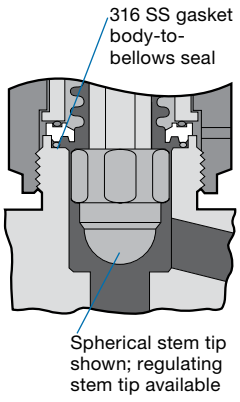


Component		Series	Material Grade/ ASTM Specification
1a	Handle	All 4U, 6U, 8U	Green-anodized aluminum/B211
	Set screw		Alloy steel/ANSI 18.3
1b	Handle	All 12U, 12UA	Green-painted aluminum/B211
	Cap nut		18-8 SS
2	Gland nut	All	316 SS/A479
3	Gland		
4	Packing (3)	All UK, UAK	PTFE/D1710
		All UG, UAG, UW, UAW	Grafoil®
5	Spacer	All	316 SS/A240
6	Jam nut	All	316 SS/A479
7	Panel mount nut	All	
8	Bonnet nut	All	Silver-plated 316 SS/A479
9	Bonnet	All	316 SS/A479
10	Lower seal O-ring	All	316 SS/A580
11	Actuator	All	440C SS/A276
	Actuator pin (2)		416 SS
12	Ball bearing	All	440C SS
13	Stem extension	All 4U, 6U, 8U	440C SS/A276
14	*Stem*	*All*	*316 SS/A479*
	Bellows	*All 4U, 6U, 8U*	*347 SS/A269*
		All 12U, 12UA	*316 SS/A240*
	Weld ring	*All*	*316 SS/A479*
15	*Stem adapter*	*All*	*316 SS/A479*
16	*Stem tip*	*4URG, 4URW*	*316 SS/A479 (regulating)*
		All UK, UAK	*PCTFE/D1430 (cylindrical) Polyimide (conical)*
		All UG, UAG, UW, UAW	*Cobalt-based alloy (spherical)*
17	*Gasket*	*All UK, UAK*	*PTFE-coated 316 SS/A580*
		All UG, UAG	*Silver-plated 316 SS/A580*
18	*Body*	*All*	*316 SS/A479*
	Wetted lubricant	*All UG, UAG, UW, UAW*	*Fluorinated-based (spherical stem tip, pneumatically actuated valves)*
	Nonwetted lubricant	All	Molybdenum disulfide based; silicone based;

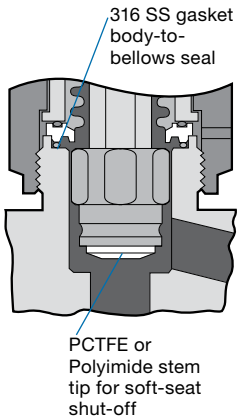
Wetted components listed in *italics*.

Gasket Seal

UG Series

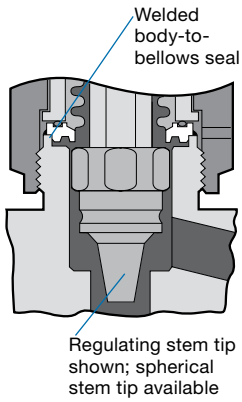


UK Series



Welded Seal

UW Series



Pressure-Temperature Ratings

UW, URW, UG, and URG Series

W designates welded body-to-bellows seal; **R** designates regulating stem tip; **G** designates gasket body-to-bellows seal.

Ratings limited to 1000°F (537°C) for valves with VCR fitting end connections.

Ratings apply to manual valves and to valves with 6 series or 8 series pneumatic actuators. For actuator ratings, see page 6.

Material	316 SS	
Series	UW, URW	UG, URG
Temperature, °F (°C)	Working Pressure, psig (bar)	
Standard Model		
–20 (–28) to 650 (343)	2500 (172)	2500 (172)
700 (371)	2120 (146)	—
750 (398)	1740 (119)	—
800 (426)	1360 (93.7)	—
850 (454)	980 (67.5)	—
900 (482)	600 (41.3)	—
UW High-Temperature Model		
950 (510)	540 (37.2)	—
1000 (537)	480 (33.0)	—
1050 (565)	425 (29.2)	—
1100 (593)	360 (24.8)	—
1150 (621)	300 (20.6)	—
1200 (648)	250 (17.2)	—

For more information about pressure ratings of valves with tube fitting end connections, see Swagelok *Tubing Data* (MS-01-107).

Handle Temperature Gradient

When Valve Seat Is	Valve Handle Is
600°F (315°C)	135°F (57°C)
900°F (482°C)	140°F (60°C)
1200°F (648°C)	150°F (65°C)

UK Series

K designates PCTFE or polyimide stem tip. See page 8.

2500 psig (172 bar) at –20 to 200°F (–28 to 93°C) for PCTFE.

Testing

Every U series valve is factory vacuum tested with helium at room temperature for 5 s to a maximum leak rate of 4×10^{-9} std cm^3/s at the seat, envelope, and all seals.

Cleaning and Packaging

Swagelok U series valves with VCR end connections are processed in accordance with Swagelok *Special Cleaning and Packaging (SC-11)* (MS-06-63) to ensure compliance with product cleanliness requirements stated in ASTM G93 Level C.

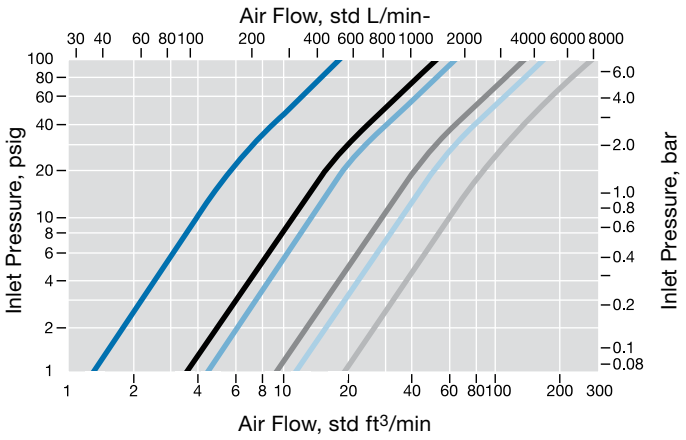
Swagelok U series valves with other end connections are processed in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* (MS-06-62); special cleaning and packaging are available as an option.

Flow Data at 70°F (20°C)

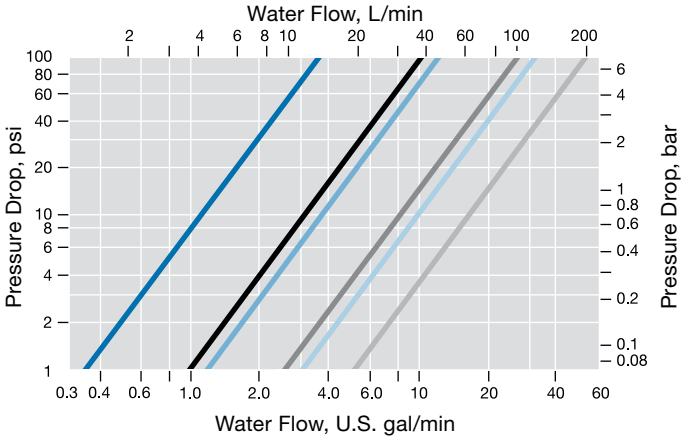
A designates angle pattern.

4U 6U 8U 12UAK① 12U 12UA

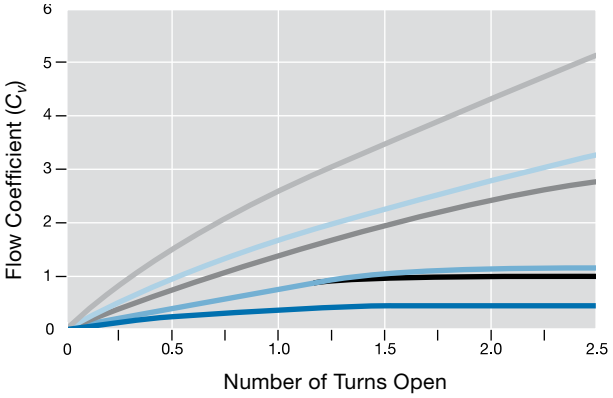
Air



Water



Flow Coefficient at Turns Open



① 12U Series pneumatically actuated angle valves with the PCTFE stem tip have a Cv of 2.9.

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

Ordering Information and Dimensions

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

UW Series Valves

Select an ordering number.

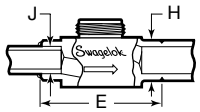
UG and UK Series Valves

Replace **W** with **G** or **K.**

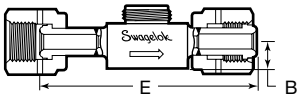
Example: SS-4U**G**

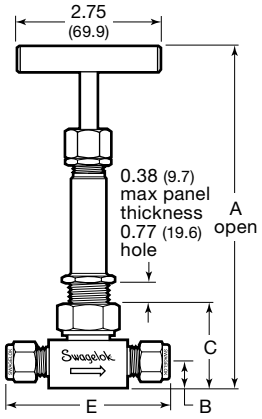
For UK, add -VP for a polyimide stem tip. See page 8.

Tube Socket Weld and Tube Butt Weld Ends

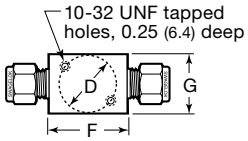


Butt Welded Female VCR Fitting Ends





Bottom



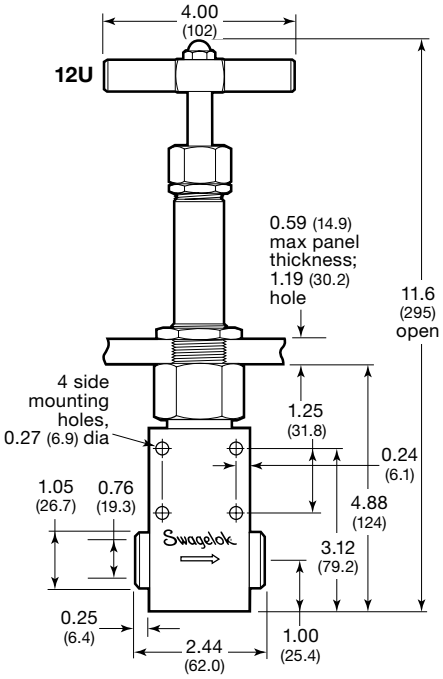
4U, 6U, and 8U Series

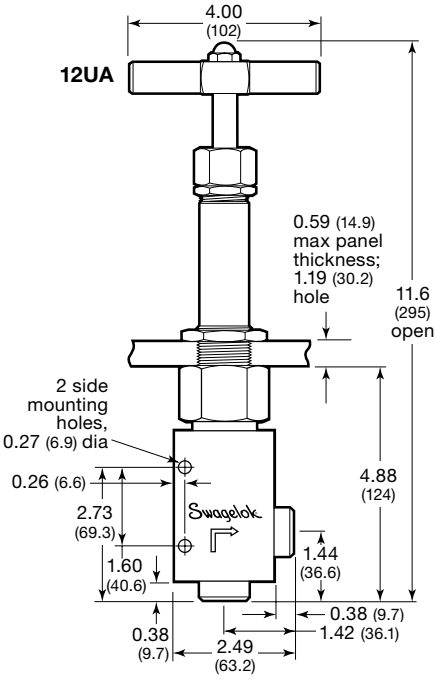
End Connections		Ordering Number	Series	Dimensions, in. (mm)									
Type	Size			Orifice	A	B	C	D	E	F	G	H	J
Fractional Swagelok tube fitting	1/4 in.	SS-4UW	4U	0.172 (4.37)	6.48 (165)	0.56 (14.2)	1.49 (37.8)	1.00 (25.4)	2.46 (62.5)	1.06 (26.9)	1.00 (25.4)	—	—
	3/8 in.	SS-6UW	6U	0.265 (6.73)	6.59 (167)	0.50 (12.7)	1.61 (40.9)	1.13 (28.7)	3.09 (78.5)	1.57 (39.9)	1.13 (28.7)		
	1/2 in.	SS-8UW	8U	0.312 (7.92)					3.30 (83.8)				
Metric Swagelok tube fitting	6 mm	SS-6UW-MM	4U	0.172 (4.37)	6.48 (165)	0.56 (14.2)	1.49 (37.8)	1.00 (25.4)	2.46 (62.5)	1.06 (26.9)	1.00 (25.4)		
	10 mm	SS-10UW-MM	6U	0.281 (7.14)	6.59 (167)	0.50 (12.7)	1.61 (40.9)	1.13 (28.7)	3.11 (79.0)	1.57 (39.9)	1.13 (28.7)		
	12 mm	SS-12UW-MM	8U	0.281 (7.14)					3.30 (83.8)				
Tube socket and tube butt weld	1/4 and 3/8 in.	SS-4UW-TW	4U	0.156 (3.96)	6.48 (165)	0.56 (14.2)	1.49 (37.8)	1.00 (25.4)	1.68 (42.7)	1.00 (25.4)	1.00 (25.4)	0.38 (9.7)	0.25 (6.4)
	3/8 and 1/2 in.	SS-6UW-TW	6U	0.281 (7.14)	6.59 (167)	0.50 (12.7)	1.61 (40.9)	1.13 (28.7)	2.27 (57.7)	1.52 (38.6)	1.13 (28.7)	0.50 (12.7)	0.38 (9.7)
	1/2 and 3/4 in.	SS-8UW-TW	8U	0.312 (7.92)								0.75 (19.1)	0.50 (12.7)
Butt welded female VCR fitting	1/4 in.	SS-4UW-V51	4U	0.156 (3.96)	6.48 (165)	0.56 (14.2)	1.49 (37.8)	1.00 (25.4)	2.76 (70.1)	1.00 (25.4)	1.00 (25.4)	—	—
	1/2 in.	SS-6UW-V19	6U	0.281 (7.14)	6.59 (167)	0.50 (12.7)	1.61 (40.9)	1.13 (28.7)	5.19 (132)	1.52 (38.6)	1.13 (28.7)		
		SS-8UW-V47	8U	0.297 (7.54)		0.57 (14.5)			3.12 (79.2)	1.25 (31.8)			

Dimensions shown with Swagelok nuts finger-tight.
H = butt weld diameter; **J** = socket weld diameter.

12U Series

End Connections	Ordering Number	Orifice in. (mm)
3/4 in. tube socket weld, 3/4 in. pipe butt weld, and 1 in. tube butt weld	SS-12UW-TW	0.500 (12.7)
	SS-12UAW-TW	0.610 (15.5)





Pneumatic Actuators

Features

- Reliable piston design for enhanced cycle life
- Low actuation pressures
- Cast construction
- Aluminum and stainless steel components

Actuator Series

- 6 series actuator for 4U, 6U, and 8U series valves
- 8 series actuator for 12U series valves

Actuation Modes

Normally closed—air opens, spring closes

Normally open—air closes, spring opens

Double acting—air opens and closes

Materials of Construction

Component	Material
Housing	Cast aluminum
External hardware	Stainless steel
O-rings	Fluorocarbon FKM

Technical Data

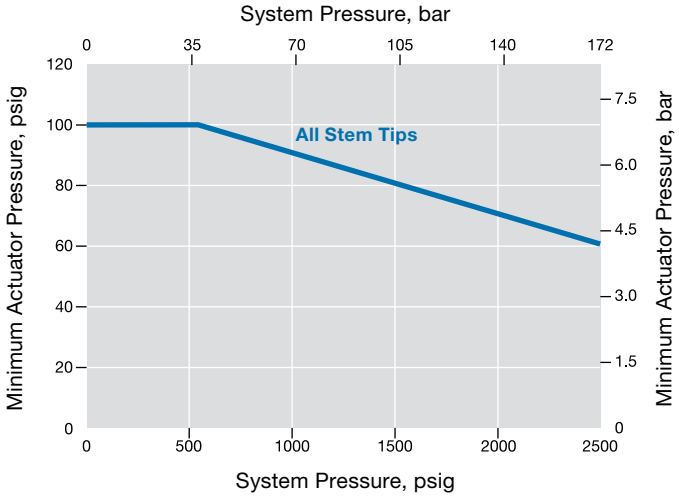
Valve Series	Actuator Series	Pressure Rating psig (bar)	Temperature Rating °F (°C)	Air Displacement in.^{3} (cm^3)	Weight lb (kg)
4U, 6U, 8U	6	65 to 150 (4.4 to 10.3)	–10 to 300 (–23 to 148)	0.88 (14.4)	C—7.3 (3.3) O—4.9 (2.2) D—4.8 (2.1)
12U, 12UA	8	40 to 150 (2.7 to 10.3)		C—2.9 (47.5) O—3.0 (49.2) D—2.4 (39.3)	C—24 (10.9) O—13 (5.9) D—11.5 (5.2)

Pneumatic Actuator Performance

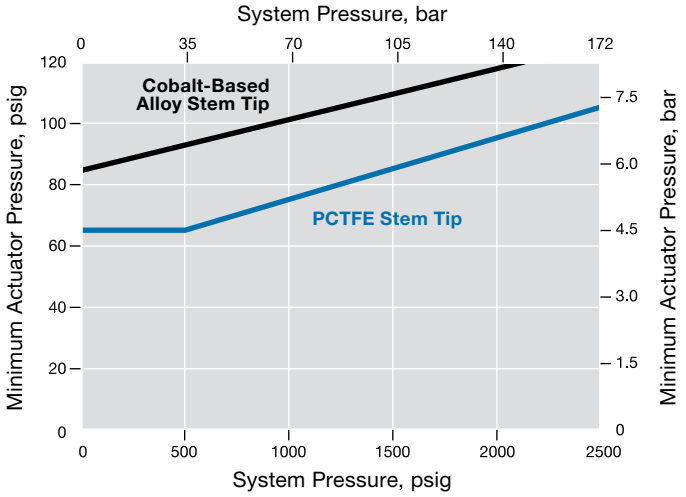
6 Series

The minimum actuation pressure for normally closed, normally open, and double-acting actuators is 65 psig (4.5 bar).

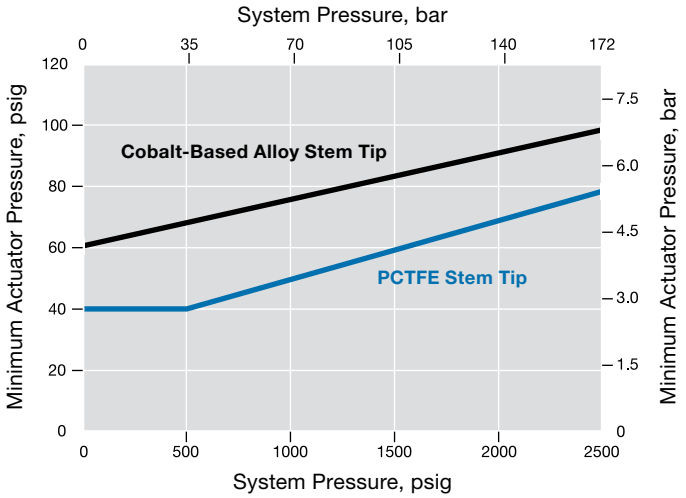
8 Series Normally Closed



8 Series Normally Open



8 Series Double-Acting



Pneumatic Actuators

Dimensions and Ordering Information

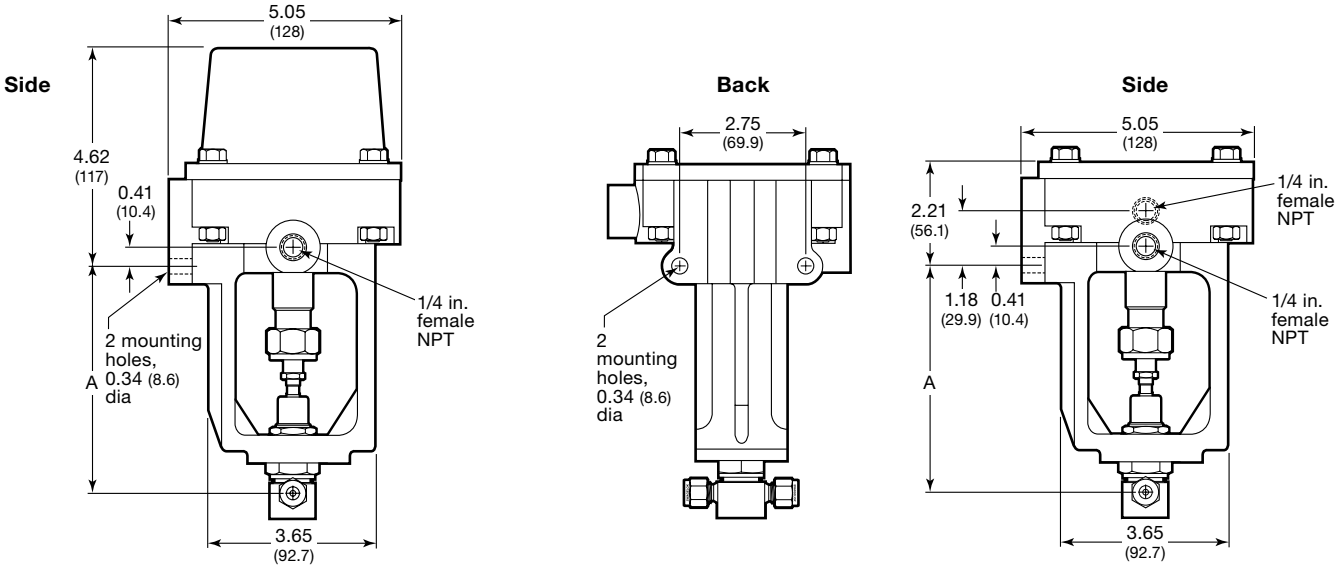
Dimensions, in inches (millimeters), are for reference only and are subject to change.

Add an actuator series designator, then an actuation mode designator to the valve ordering number.

Example: SS-4UW-**6C**

Actuator Series	Designator	Actuation Mode	Designator
6	-6	Normally closed	C
		Normally open	O
8	-8	Double acting	D

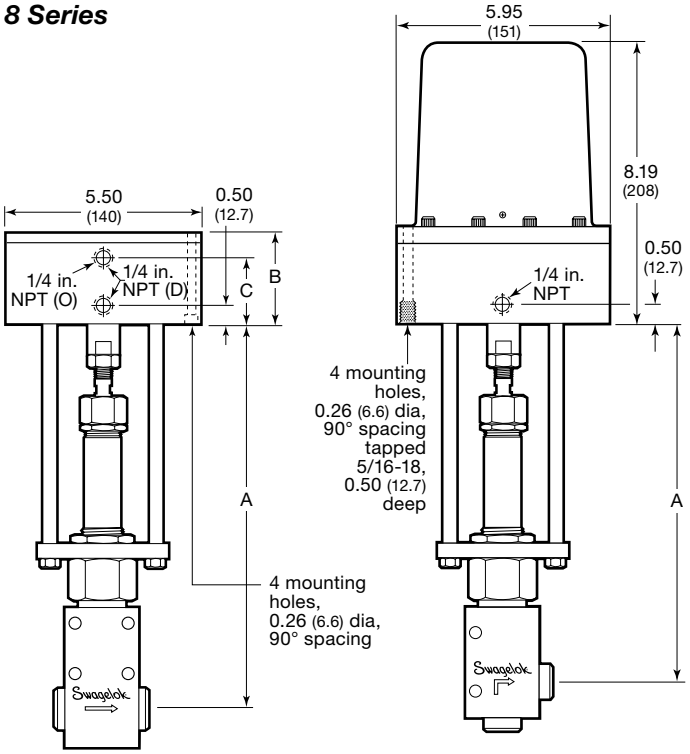
6 Series



Normally Closed

Normally Open and Double Acting

8 Series



Normally Open and Double Acting

Normally Closed

Valve Series	Actuator Series	Dimensions, in. (mm)		
		A	B	C
4U	6	6.60 (168)	—	—
6U, 8U		6.76 (172)		
12U	8	10.5 (267)	O—2.75 (69.9)	D—1.88 (47.8)
12UA		10.0 (254)	D—2.56 (65.0)	O—1.75 (44.5)

Actuator Conversion Kits

The actuator conversion kit converts a U series valve with a Swagelok 4 series pneumatic actuator to a valve with a 6 series pneumatic actuator.

Valve Series	Actuation Mode	Actuator Conversion Kit Ordering Number
4U, 6U, 8U	Normally closed	MS-6CK
	Normally open	MS-6OK
	Double acting	MS-6DK

Options and Accessories

Special Cleaning and Packaging (SC-11)

Swagelok U series valves with VCR end connections are processed in accordance with Swagelok *Special Cleaning and Packaging (SC-11)* (MS-06-63) to ensure compliance with product cleanliness requirements stated in ASTM G93 Level C.

To order special cleaning and packaging for U series valves with other end connections, add **-SC11** to the valve ordering number.

Example: SS-4UW-**SC11**

UW High-Temperature Model

- Nickel-based lubricant prevents seizing of actuator threads.
- Valve rating extends to:
  - 1000°F (537°C) for valves with VCR fittings.
  - 1200°F (648°C) for valves with Swagelok tube fittings.

To order, add **-HT** to the valve ordering number.

Examples: SS-4UW-**HT**
SS-4UW-**HT**-6C

UG, UW Series Low-Temperature Model

- For temperatures from –325 to 400°F (–200 to 204°C).

To order a UG or UW series valve with PTFE secondary packing, add **-TF** to the valve ordering number.

Examples: SS-4UW-**TF**
SS-4UW-**TF**-6C

UG and UK Series Polyimide Stem Tips

- Provide soft-seat shutoff for temperatures up to 400°F (204°C) or where PCTFE is not compatible with the system fluid.
- Are available in manually or pneumatically actuated UG and UK series valves.
- Are rated to the same pressure as the standard valve.

To order, add **-VP** to the valve ordering number.

Example: SS-4UG-**VP**

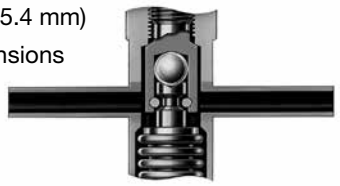
- Not available with the UW welded option.

4U, 6U, and 8U Alloy 600 Bellows

To order, add **-IN** to the valve ordering number.

Examples: SS-4UW-**IN**
SS-4UW-**IN**-6C

Bonnet Sniffer Tubes



Bonnet sniffer tubes are 1 in. (25.4 mm) long, 1/4 in. (6.4 mm) tube extensions that enable monitoring of bellows integrity.

- 4U, 6U, and 8U series tubes are welded to the bonnet.
- 12U series tubes are attached to the bonnet with 1/8 in. female NPT threads. Sniffer tube not included.

To order, add **-T1** for one bonnet sniffer tube or **-T2** for two bonnet sniffer tubes to the valve ordering number.

Examples: SS-4UW-**T1**
SS-12UW-TW-**T2**

Bellows-Sealed 3-Valve Manifolds

The Swagelok 3-valve manifold uses B or U series bellows-sealed valves for systems with difficult fluid containment requirements.

For more information, see the Swagelok *Bellows-Sealed 3-Valve Manifolds—V3 Series* catalog, MS-02-07.

6 Series Pneumatic Actuator Microswitches

- Signal OPEN or CLOSED position of valve to panel or process controller
- Feature single-pole, double-throw switch
- Meet NEMA standard for type 1 and type 3 enclosures
- Include stainless steel mounting bracket
- Are available factory assembled on 4U, 6U, and 8U series valves with 6 series pneumatic actuator or in kits for field assembly.

Factory-Assembled Microswitches

To order a valve with a microswitch, add **M** to the valve ordering number.

Example: SS-4UW-6C**M**

Microswitch Kits for Field Assembly

To order a kit for an existing valve, use ordering number **MS-6CMK-U.**

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).

Maintenance Kits

Stem tip/adapter kits, bellows kits, and gasket kits are available for UG, URG, and UK series valves. See the Swagelok *Bellows-Sealed Valve Maintenance Kits* catalog, MS-02-66.

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

Swagelok

About this document

Thank you for downloading this electronic catalog, which is part of General Product catalog Swagelok published in print. This type of electronic catalog is updated as new information arises or revisions, which may be more current than the printed version.

Swagelok Company is a major developer and provider of fluid system solutions, including products, integration solutions and services for industry research, instrumentation, pharmaceutical, oil and gas, power, petrochemical, alternative fuels, and semiconductor. Our manufacturing facilities, research, service and distribution facilities support a global network of more than 200 authorized sales and service centers in 57 countries.

Visit www.swagelok.com to locate your Swagelok representative and obtain any information on features, technical information and product references, or to learn about the variety of services available only through authorized sales centers and service Swagelok.

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.

Warranty Information

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

Bellows-Sealed Metering Valves

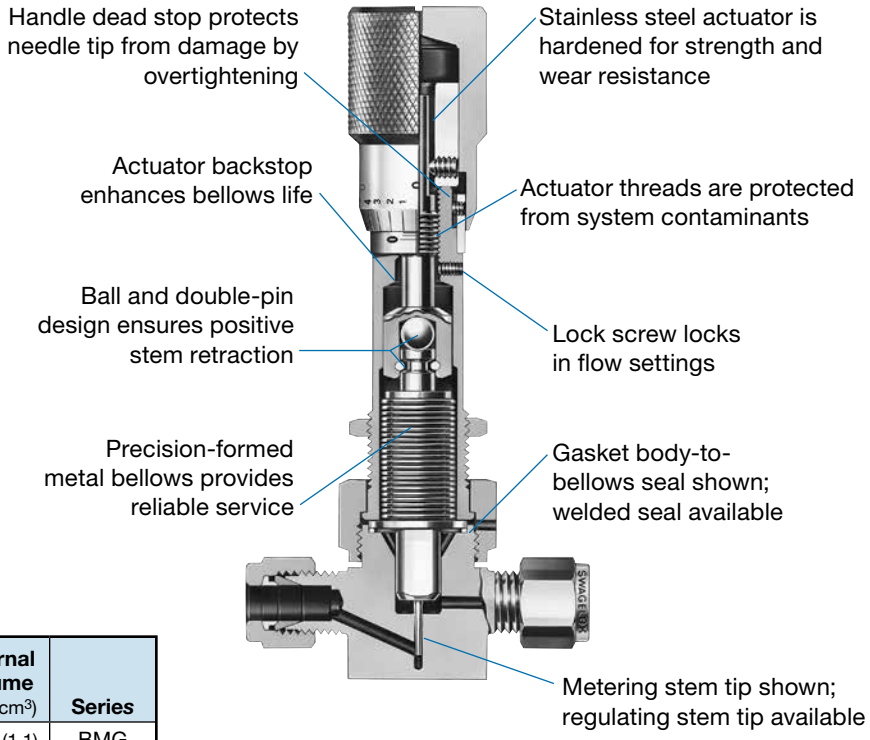
BM Series

- Micrometer handle for precise, repeatable flow settings
- Working pressures up to 700 psig (48.2 bar)
- Temperatures up to 900°F (482°C)
- 316 stainless steel construction

Swagelok

Features

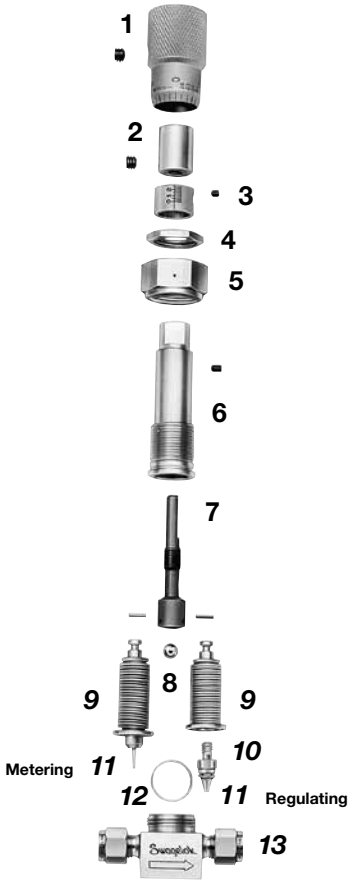
- Flow coefficients:
  - 0.019 with metering stem tip
  - 0.30 with regulating stem tip
- Micrometer handles measure stem position in 0.001 in. (0.025 mm) increments.
- Valves open to maximum flow in six turns.
- Slotted handle tops enable adjustments with a screwdriver.
- Panel and bottom mounting are standard.
- Swagelok® tube fitting, tube socket weld, tube butt weld, and Swagelok VCR® fitting end connections are available.



Technical Data

Body-to-Bellows Seal	Stem Tip	Stem Taper	C_v	Internal Volume in.^{3} (cm^3)	Series
Gasket	Metering	3°	0.019	0.07 (1.1)	BMG
	Regulating	20°	0.30	0.11 (1.6)	BMRG
Welded	Metering	3°	0.019	0.07 (1.1)	BMW
	Regulating	20°	0.30	0.11 (1.6)	BMRW

Materials of Construction



	Component	Series	Material Grade/ASTM Specification
1	Handle	All	Silver-mist chrome-plated 303 SS/A582
	Set screw		Alloy steel/ANSI 18.3
2	Bushing	All	303 SS/A582
	Set screw		Alloy steel/ANSI 18.3
3	Barrel	All	Silver-mist chrome-plated 303 SS/A582
	Set screw		Alloy steel/ANSI 18.3
4	Panel mount nut	All	316 SS/B783
5	Bonnet nut	All	Silver-plated 316 SS/A479
6	Bonnet	All	316 SS/A479
	Lock screw		Alloy steel/ANSI 18.3
7	Actuator	All	416 SS/A582
	Actuator pins		420 SS/A276
8	Bearing	All	420C SS
9	*Stem*	All	*316 SS/A479*
	Bellows		*321 SS/A269*
	Weld ring		*316 SS/A479*
10	*Stem adapter*	BMRG, BMRW	*316 SS/A479*
11	*Stem tip*	All	*Hard chrome-plated 316 SS/A479*
12	*Gasket*	BMG, BMRG	*Silver-plated 316 SS/A580*
13	*Body*	All	*316 SS/A479*
	Lubricants	All	Molybdenum disulfide-based dry film and paste

Wetted components listed in *italics*.

Pressure-Temperature Ratings

Material	316 SS	
Series	BMW, BMRW	BMG, BMRG
Temperature, °F (°C)	Working Pressure, psig (bar)	
–20 (–28) to 100 (37)	700 (48.2)	700 (48.2)
200 (93)	610 (42.0)	610 (42.0)
300 (148)	530 (36.5)	530 (36.5)
400 (204)	450 (31.0)	450 (31.0)
500 (260)	375 (25.8)	375 (25.8)
600 (315)	300 (20.6)	300 (20.6)
650 (343)	260 (17.9)	—
700 (371)	230 (15.8)	—
750 (398)	200 (13.7)	—
800 (426)	160 (11.0)	—
850 (454)	130 (8.9)	—
900 (482)	100 (6.8)	—

Handle Temperature Gradient

When Valve Seat Is	Valve Handle Is
600°F (315°C)	250°F (121°C)
900°F (482°C)	325°F (162°C)

Testing

Every BM series metering valve is helium leak tested to a maximum leak rate of 4×10^{-9} std cm³/s at the envelope and body seal.

Cleaning and Packaging

Swagelok BM series metering valves with VCR end connections are processed in accordance with Swagelok *Special Cleaning and Packaging (SC-11)* (MS-06-63), to ensure compliance with product cleanliness requirements stated in ASTM G93 Level C.

Swagelok BM series metering valves with other end connections are processed in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* (MS-06-62); special cleaning and packaging are available as an option.

Oxygen Service Hazards

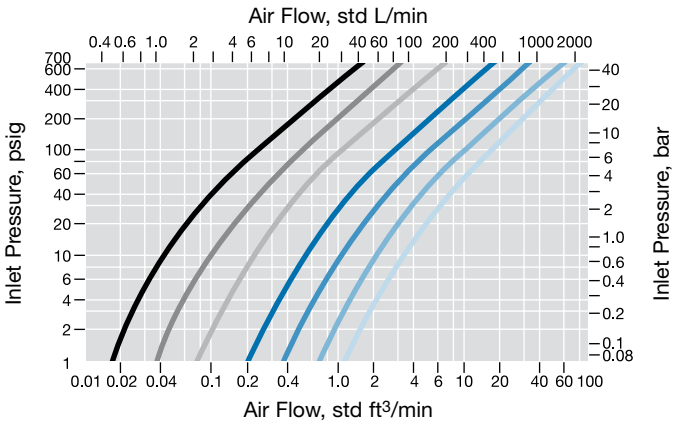
For more information about hazards and risks of oxygen-enriched systems, see the Swagelok *Oxygen System Safety* technical report (MS-06-13).

Flow Data at 70°F (20°C)

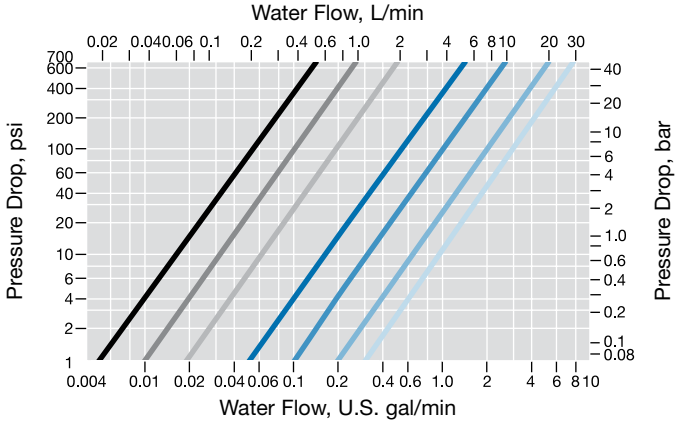
BMG, BMW C_v — 0.005 — 0.010 — 0.019

BMRG, BMRW C_v — 0.05 — 0.10 — 0.20 — 0.30

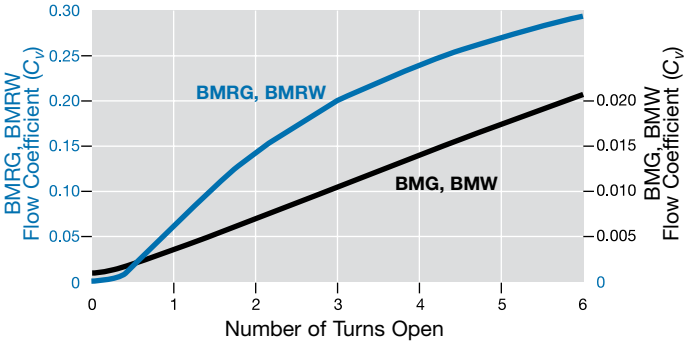
Air



Water



Flow Coefficient at Turns Open



Factory Flow Settings

BMG and BMW Series

With 10 psig (0.68 bar) inlet pressure and the flow rate from 10 to 15 cm³/min, the handle is set at 0. BMG and BMW series valves are not intended for shutoff service.

BMRG and BMRW Series

Following a helium leak test of the valve seat to a maximum leak rate of 7×10^{-7} std cm³/s, the handle is set at 0. BMRW series valves are not recommended for shutoff above 600°F (315°C).

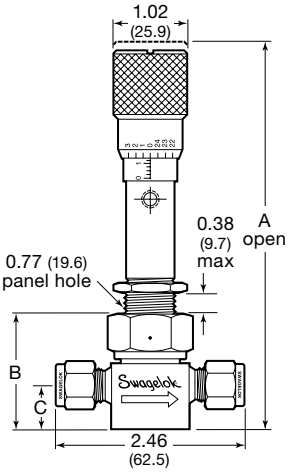
⚠ **To increase service life, ensure proper valve performance, and prevent leakage, apply only as much torque as is required to achieve positive shutoff in valves rated for shutoff service.**

Ordering Information and Dimensions

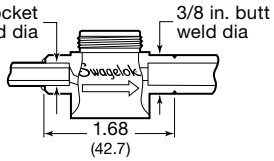
Select an ordering number.

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

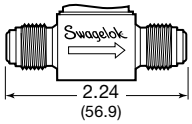
Swagelok tube fittings



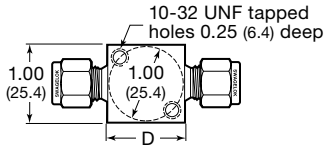
Tube socket weld and tube butt weld ends



Integral male VCR fittings



Bottom



End Connections		Series	Ordering Number	Dimensions, in. (mm)				
Type	Size			Orifice	A	B	C	D
Fractional Swagelok tube fitting	1/4 in.	BMG	SS-4BMG	0.057 (1.4)	5.24 (133)	1.45 (36.8)	0.56 (14.2)	1.06 (26.9)
		BMRG	SS-4BMRG	0.166 (4.2)	5.22 (133)			
		BMW	SS-4BMW	0.057 (1.4)	5.17 (131)	1.42 (36.1)		
		BMRW	SS-4BMRW	0.166 (4.2)	5.15 (131)			
Metric Swagelok tube fitting	6 mm	BMG	SS-6BMG-MM	0.057 (1.4)	5.24 (133)	1.45 (36.8)	0.56 (14.2)	1.06 (26.9)
		BMRG	SS-6BMRG-MM	0.166 (4.2)	5.22 (133)			
		BMW	SS-6BMW-MM	0.057 (1.4)	5.17 (131)	1.42 (36.1)		
		BMRW	SS-6BMRW-MM	0.166 (4.2)	5.15 (131)			
Tube socket and tube butt weld	1/4 in. and 3/8 in.	BMG	SS-4BMG-TW	0.057 (1.4)	5.24 (133)	1.45 (36.8)	0.56 (14.2)	1.00 (25.4)
		BMRG	SS-4BMRG-TW	0.166 (4.2)	5.22 (133)			
		BMW	SS-4BMW-TW	0.057 (1.4)	5.17 (131)	1.42 (36.1)		
		BMRW	SS-4BMRW-TW	0.166 (4.2)	5.15 (131)			
Integral male VCR fitting	1/4 in	BMG	SS-4BMG-VCR	0.057 (1.4)	5.24 (133)	1.45 (36.8)	0.44 (11.2)	1.00 (25.4)
		BMRG	SS-4BMRG-VCR	0.166 (4.2)	5.22 (133)			
		BMW	SS-4BMW-VCR	0.057 (1.4)	5.17 (131)	1.42 (36.1)		
		BMRW	SS-4BMRW-VCR	0.166 (4.2)	5.15 (131)			

Dimensions shown with Swagelok tube fitting nuts finger-tight.

Special Cleaning and Packaging (SC-11)

Swagelok BM series metering valves with VCR end connections are processed in accordance with Swagelok *Special Cleaning and Packaging (SC-11)* (MS-06-63), to ensure compliance with product cleanliness requirements stated in ASTM G93 Level C.

To order special cleaning and packaging for BM series valves with other end connections, add **-SC11** to the valve ordering number.

Example: SS-4BMG-**SC11**

Welded Female VCR Face Seal Fittings

- Factory welded to valves with tube butt weld end connections
- 316 SS fittings on stainless steel valves

To order, add a designator to the ordering number for a valve with fractional Swagelok tube fitting end connections.

Fitting Size	Designator	Overall Length in. (mm)
1/4 in.	-V51	2.76 (70.1)
1/2 in.	-V16	4.60 (117)

Example: SS-4BMG-**V51**

Special Alloys

Many BM series valves are available in brass and alloy 400 materials. BMW and BMRW series valves are not available in brass. Contact your authorized Swagelok sales and service representative for more information.

Maintenance Kits

Bellows, stem tip/adapter, and gasket kits are available for BMG and BMRG series valves. See the Swagelok *Bellows-Sealed Valve Maintenance Kits* catalog, MS-02-66.

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

Swagelok

About this document

Thank you for downloading this electronic catalog, which is part of General Product catalog Swagelok published in print. This type of electronic catalog is updated as new information arises or revisions, which may be more current than the printed version.

Swagelok Company is a major developer and provider of fluid system solutions, including products, integration solutions and services for industry research, instrumentation, pharmaceutical, oil and gas, power, petrochemical, alternative fuels, and semiconductor. Our manufacturing facilities, research, service and distribution facilities support a global network of more than 200 authorized sales and service centers in 57 countries.

Visit www.swagelok.com to locate your Swagelok representative and obtain any information on features, technical information and product references, or to learn about the variety of services available only through authorized sales centers and service Swagelok.

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.

Warranty Information

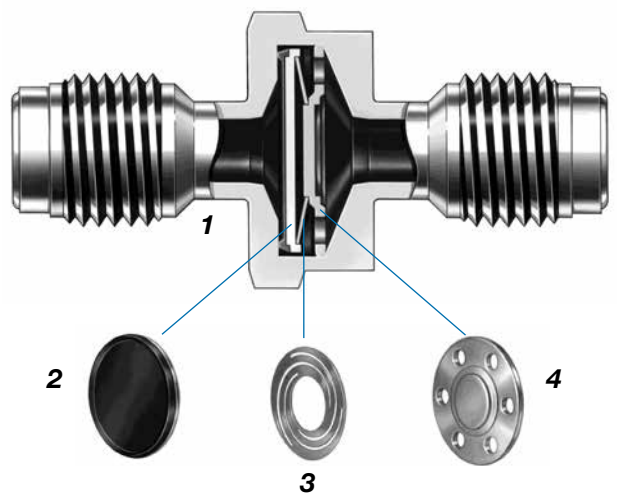
Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit your Swagelok Web site or contact your authorized Swagelok representative.

All-Welded Check Valves

CW Series

Features

- All-welded design provides reliable containment of system fluid.
- Forward flow starts at less than 2 psig (0.14 bar) pressure differential.
- Valve closes with less than 2 psig (0.14 bar) back pressure.
- 316L SS body offers enhanced material purity.
- Choice of standard or high-purity wetted surface finishes.
- Processing in accordance with Swagelok® *Ultrahigh-Purity Process Specification (SC-01)* catalog, MS-06-61 , is available.
- Tube butt weld, female VCR® fitting, integral male VCR fitting, rotatable male VCR fitting, and Swagelok tube fitting end connections are available.



Materials of Construction

Component	Material Grade/ASTM Specification
1 *Body*	*316L SS/A479*①
2 *Poppet*	*Fluorocarbon FKM*②*-bonded*③ *316 SS/A479*
3 *Guidance wafer*	*Alloy X-750/B637*
4 *Poppet stop*	*316L SS/A240*

All components are wetted.

① Bodies with tube butt weld ends are 316L VAR SS/SEMI F20 High-Purity, 20 % minimum elongation allowed.

② Aflas®, Buna N, ethylene propylene, and neoprene also available; see **Options.**

③ Material Safety Data Sheet for bonding agent available on request.

⚠ **Check valves are designed for directional flow control only. Swagelok check valves should never be used as code safety relief devices.**

Technical Data

Cracking Pressure psi (bar)	**Maximum Back Pressure** psig (bar)	**Maximum Pressure Drop** psi (bar)	**Minimum Burst Pressure at 70°F (20°C)** psig (bar)	**Flow Coefficients (C_v)**
Less than 2 (0.14)	Full pressure rating	145 (10.0)	12 000 (826)	0.55 (1/4 in., 6 mm Swagelok tube fitting and tube butt weld ends) 0.70 (1/4 and 1/2 in. VCR fittings, 3/8 and 1/2 in. tube butt weld ends)

⚠ **For valves not actuated for a period of time, initial cracking pressure may be higher than the set cracking pressure.**

Pressure-Temperature Ratings

Material Name	**316L SS**
Temperature °F (°C)	**Working Pressure** psig (bar)
–10 (–23) to 100 (37)	3000 (206)
200 (93)	2530 (174)
300 (148)	2270 (156)
400 (204)	2065 (142)

Flow Data at 70°F (20°C)

Pressure Drop psi (bar)	**Air Flow** std ft³/min (std L/min)	
	0.55 C_v	**0.70 C_v**
10 (0.68)	6.2 (170)	7.9 (220)
50 (3.4)	16 (450)	21 (590)
100 (6.8)	29 (820)	37 (1040)

Process Specifications

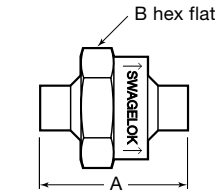
See Swagelok process specifications for details on processes, process controls, and process verification.

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	*Special Cleaning and Packaging (SC-11)*	20 µin. (0.51 µm) average, machine finished	Factory tested for crack and reseal performance
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)*	8 µin. (0.20 µm) average, machine finished and electropolished	

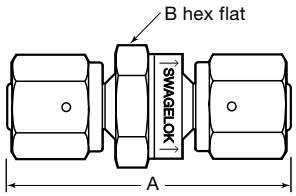
Ordering Information and Dimensions

Select an ordering number.

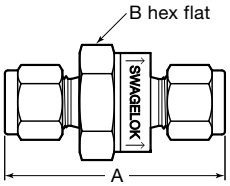
Dimensions are for reference only and are subject to change.



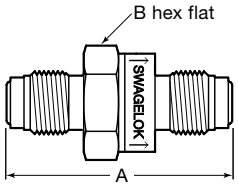
Tube butt weld ends



Female VCR fittings



Swagelok tube fittings



Male VCR fittings

End Connections		Ordering Number	Dimensions, in. (mm)	
Inlet/Outlet	Size		A	B
Tube butt welds	1/4 in.	6LV-CW4BW4	1.24 (31.5)	7/8
	3/8 in.	6LV-CW4BW6		
	1/2 in.	6LV-CW4BW8		
	6 mm	6LV-CW4BW6M		
Female VCR fittings	1/4 in.	6L-CW4FR4	2.43 (61.7)	
	1/2 in.	6L-CW4FR8		
Integral male VCR fittings	1/4 in.	6L-CW4VR4	1.80 (45.7)	
	1/2 in.	6L-CW4VR8	2.06 (52.3)	1
Female/integral male VCR fitting	1/4 in.	6L-CW4FR4-VR4	2.12 (53.8)	7/8
Rotatable male VCR fittings	1/4 in.	6L-CW4MR4	2.87 (72.9)	
Swagelok tube fittings	1/4 in.	6L-CW4S4	1.96 (49.8)	
	6 mm	6L-CW4S6M		

Dimensions shown with Swagelok tube fitting nuts finger-tight.

Options

Seal Materials

Fluorocarbon FKM is standard. For an optional seal material, add a designator to the valve ordering number.

Seal Material	Designator
Aflas	-AF
Buna N	-BU
Ethylene propylene	-EP
Neoprene	-NE

Example: 6LV-CW4BW4**-AF**

Ultrahigh-Purity Process Specification (SC-01)

Swagelok CW 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 optional cleaning and packaging in accordance with Swagelok *Ultrahigh-Purity Process Specification (SC-01)* catalog, MS-06-61, for valves with VCR or tube butt weld end connections, add **-P** to the valve ordering number.

Example: 6LV-CW4BW4**-P**

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.

Swagelok

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 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
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Warranty Information

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Check Valves

C, CA, CH, CP, and CPA Series

- Working pressures up to 6000 psig (413 bar)
- Adjustable and fixed cracking pressures
- Variety of end connections
- 316 stainless steel and brass materials

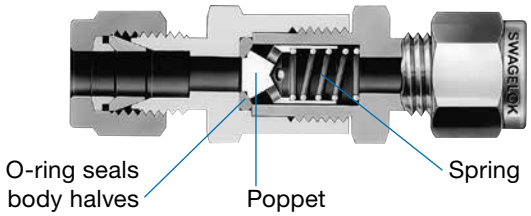
Contents

Features

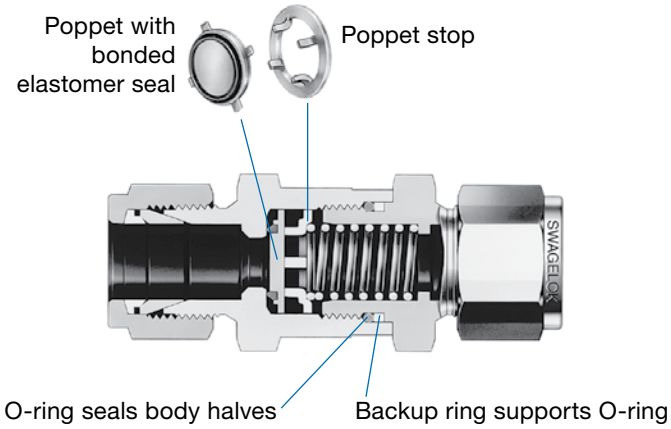
Fixed Cracking Pressures

From 1/3 to 25 psi (0.03 to 1.8 bar)

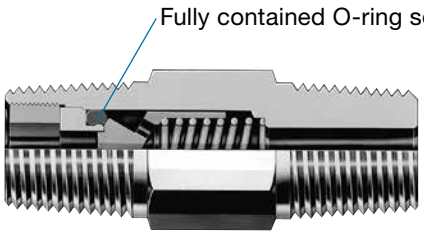
C Series



CH Series



CP Series

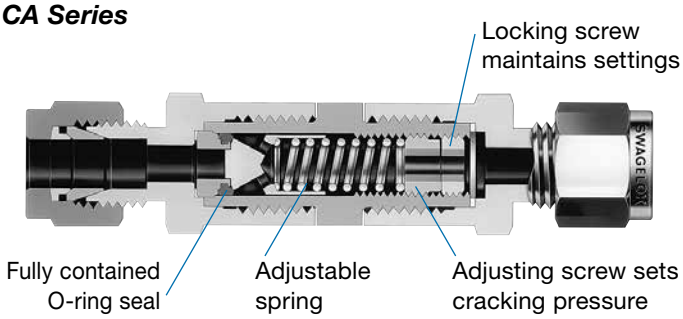


Compact, one-piece body

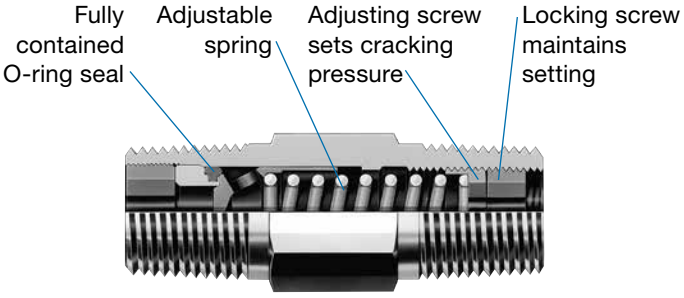
Adjustable Cracking Pressures

From 3 to 600 psi (0.21 to 41.4 bar)

CA Series



CPA Series



Compact, one-piece body

Technical Data

Cracking pressure—the inlet pressure at which the first indication of flow occurs (steady stream of bubbles).

Reseal pressure—the pressure at which there is no indication of flow.

Back pressure—the differential pressure between the inlet and outlet pressures.

⚠ **For valves not actuated for a period of time, initial cracking pressure may be higher than the set cracking pressure.**

Series	Maximum Flow Coefficient (C_v)	Nominal Cracking Pressure① psi (bar)	Maximum Back Pressure at 70°F (20°C) psig (bar)
Fixed Cracking Pressure			
2C	0.10	1/3, 1, 10 and 25 (0.03, 0.07, 0.69, and 1.8)	1000 (68.9)②
4C	0.47		
6C	1.47		200 (13.7)
8C	1.68		
12C, 16C	4.48		
CH4	0.67	1/3, 1, 5, 10 and 25 (0.03, 0.07, 0.35 0.69, and 1.8)	6000 (413)③
CH8	1.8		
CH16	4.7		5000 (344)③
4CP	0.35	1/3, 1, 10 and 25 (0.03, 0.07, 0.69, and 1.8)	3000 (206)
8CP	1.20		
Adjustable Cracking Pressure			
CA	0.37	3 to 50 (0.21 to 3.5) 50 to 150 (3.5 to 10.4) 150 to 350 (10.4 to 24.2) 350 to 600 (24.2 to 41.4)	3000 (206)
4CPA	0.35		
8CPA	1.20		

For more information about pressure ratings of valves with tube fitting end connections, see Swagelok® *Tubing Data* (MS-01-107), page 224.

① Other cracking pressures are available; contact your authorized Swagelok sales and service representative.

② For cracking pressure of 25 psi (1.8 bar), maximum back pressure is 3000 psig (206 bar).

③ Maximum back pressure may be limited by the end connection. See **Dimensions,** page 12.

Pressure-Temperature Ratings

C (2C, 4C, 6C, and 8C), CA, CP, and CPA Series

Ratings based on fluorocarbon FKM O-rings in 316 stainless steel valves and Buna N O-rings in brass valves.

Material	316 SS	Brass
Temperature, °F (°C)	**Working Pressure,** psig (bar)①	
–10 (–23) to 100 (37)	3000 (206)	3000 (206)
200 (93)	2575 (177)	2600 (179)
250 (121)	2450 (168)	2405 (165)
300 (148)	2325 (160)	—
375 (190)	2185 (150)	—

① To reduce the possibility of dislodging the O-ring in systems where pressure surges, shock, or pulses occur, for all 2C and 4C series valves and for 6C and 8C series valves with cracking pressures lower than 50 psi (3.5 bar), an optional inlet gasket is available. See page 14 for ordering information. Cracking and reseal pressures may decrease slightly from the ranges listed in this catalog.

Alternatively, CH or CP series valves should be considered.

CH Series

Ratings based on fluorocarbon FKM seals.

Material	316 SS	
Series	**CH4, CH8**	**CH16**
Temperature, °F (°C)	**Working Pressure,** psig (bar)	
–10 (–23) to 100 (37)	6000 (413)①	5000 (344)①
200 (93)	5160 (355)	4290 (295)
250 (121)	4910 (338)	4080 (281)
300 (148)	4660 (321)	3875 (266)
400 (204)	4280 (294)	3560 (245)

For more information about pressure ratings of valves with tube fitting end connections, see Swagelok *Tubing Data* (MS-01-107), page 224.

① Pressure ratings may be limited by the end connection. See **Dimensions**, page 12.

C Series (12C and 16C)

Ratings based on fluorocarbon FKM O-rings in 316 stainless steel valves and Buna N O-rings in brass valves.

Material	316 SS	Brass
Temperature, °F (°C)	**Working Pressure,** psig (bar)	
–10 (–23) to 100 (37)	2000 (137)	1500 (103)
200 (93)	1715 (118)	1300 (89.5)
250 (121)	1630 (112)	1200 (82.6)
300 (148)	1545 (106)	—
375 (190)	1450 (99.9)	—

Cracking and Reseal Pressures at 70°F (20°C)

Cracking pressure—the inlet pressure at which the first indication of flow occurs (steady stream of bubbles).

Reseal pressure—the pressure at which there is no indication of flow.

Back pressure—the differential pressure between the inlet and outlet pressures.

⚠ For valves not actuated for a period of time, initial cracking pressure may be higher than the set cracking pressure.

C Series

Nominal Cracking Pressure psi (bar)	Cracking Pressure Range psi (bar)	Reseal Pressure psi (bar)
1/3 (0.03)	Up to 3 (0.21)	Up to 6 (0.42) back pressure
1 (0.07)	Up to 4 (0.28)	Up to 6 (0.42) back pressure
10 (0.69)	7 to 15 (0.49 to 1.1)	3 (0.21) or more inlet pressure
25 (1.8)	20 to 30 (1.4 to 2.1)	17 (1.2) or more inlet pressure

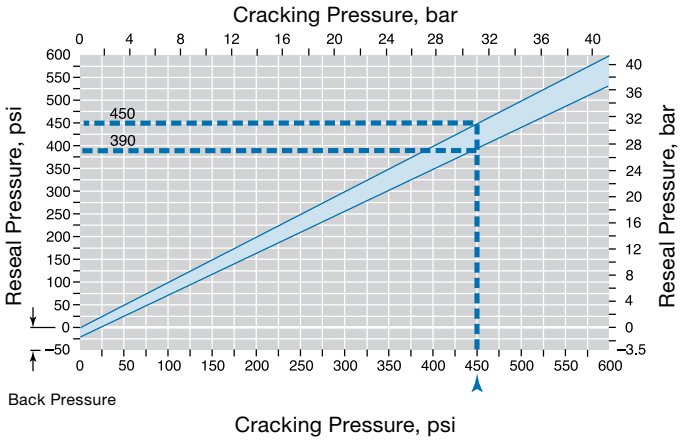
CH Series

Nominal Cracking Pressure psi (bar)	Cracking Pressure Range psi (bar)	Reseal Pressure psi (bar)
1/3 (0.03)	Up to 3 (0.21)	Up to 6 (0.42) back pressure
1 (0.07)	Up to 4 (0.28)	Up to 5 (0.35) back pressure
5 (0.35)	3 to 9 (0.21 to 0.63)	Up to 2 (0.14) back pressure
10 (0.69)	7 to 15 (0.49 to 1.1)	3 (0.21) or more inlet pressure
25 (1.8)	20 to 30 (1.4 to 2.1)	17 (1.2) or more inlet pressure

CP Series

Nominal Cracking Pressure psi (bar)	Cracking Pressure Range psi (bar)	Reseal Pressure psi (bar)
1/3 (0.03)	Up to 3 (0.21)	Up to 20 (1.4) back pressure
1 (0.07)	Up to 4 (0.28)	Up to 20 (1.4) back pressure
10 (0.69)	7 to 13 (0.49 to 0.90)	Up to 10 (0.69) back pressure
25 (1.8)	21 to 29 (1.5 to 2.0)	5 (0.35) or more inlet pressure

CA and CPA Series

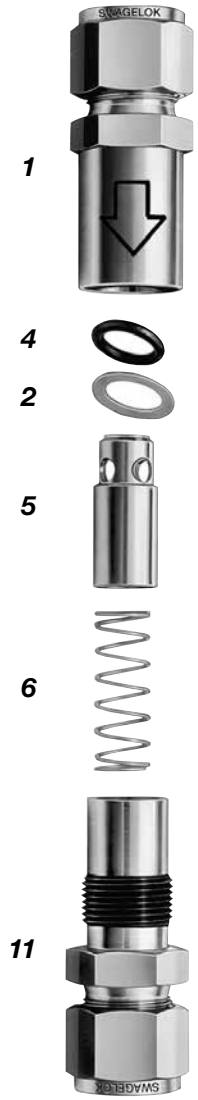


Materials of Construction

C and CA Series

Component	Valve Body Materials	
	316 SS	Brass
	Material Grade/ASTM Specification	
1 *Inlet body*	*316 SS/A479*	*Brass 360/B16*
2 *Inlet gasket (CA series)*	*PTFE-coated 316 SS/A240*	
Inlet gasket (standard for 6C and 8C series with ≥ 50 psi [3.5 bar] spring; optional for 2C and 4C series and all other 6C and 8C series)		
Inlet gasket (12C and 16C series)	*PTFE-coated 316 SS/A240*	*PTFE-coated aluminum/B209*
3 *Insert (CA series)*	*316 SS/A479*	*Naval brass 485/ B21*
4 *O-ring*	*Fluorocarbon FKM*	*Buna N*
5 *Poppet*	*316 SS/A479*	*Brass 360/B16*
6 *Spring*	*302 SS/A313*	
7 *Center body (CA series)*	*316 SS/A479*	*Brass 360/B16*
8 *Adjusting screw (CA series)*	*316 SS/A276*	
9 *Locking screw (CA series)*		
10 *Outlet gasket (CA series)*	*PTFE-coated 316 SS/A240*	
11 *Outlet body*	*316 SS/A479*	*Brass 360/B16*
Wetted lubricant	*Silicone-based (C series); PTFE-based (CA series)*	
Nonwetted lubricant	Molybdenum disulfide-based	—

Wetted components listed in *italics*.



12C Series shown

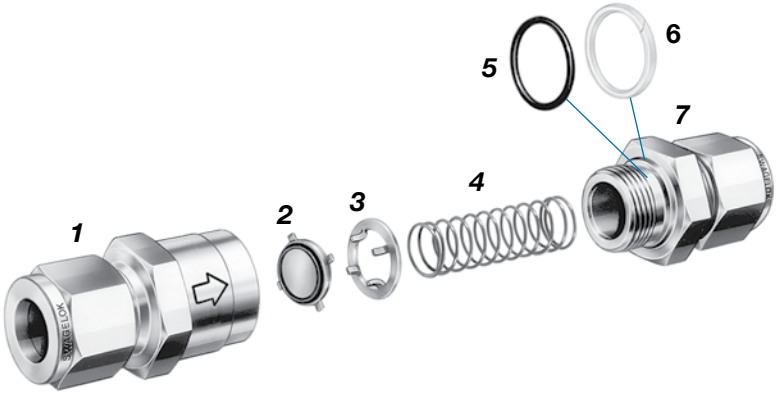
CA Series

CH Series

Component	Material Grade/ ASTM Specification
1 *Inlet body*	*316 SS/A479*
2 *Poppet*	*Fluorocarbon FKM-bonded① 316 SS/A479*
3 *Poppet stop*	*316 SS/A240*
4 *Spring*	*302 SS/A313*
5 *O-ring*	*Fluorocarbon FKM*
6 Backup ring	PTFE/D1710
7 *Outlet body*	*316 SS/A479*
Lubricant	*PTFE-based*

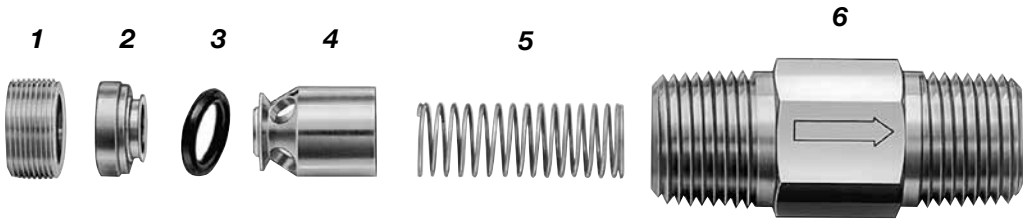
Wetted components listed in *italics*.

① Material Safety Data Sheet for bonding agent available on request.

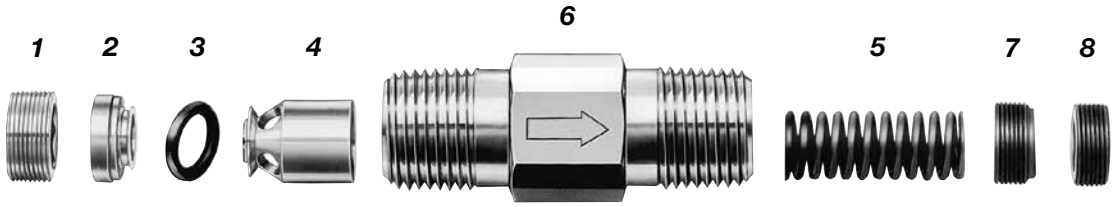


Materials of Construction

CP Series



CPA Series



Component	Valve Body Materials				
	316 SS	Brass			
		4CP	8CP	4CPA	8CPA
	Material Grade/Specification				
1 *Insert lock screw*	*316 SS/ASTM A276 or A479*	*Brass CW710R/ EN 12163*	*Brass 360/ ASTM B16*	*Brass CW710R/ EN 12163*	*Brass 360/ ASTM B16*
2 *Insert*	*316 SS/ASTM A479*				
3 *O-ring*	*Fluorocarbon FKM*	*Buna N*			
4 *Poppet*	*316 SS/ASTM A479*	*Brass 360/ASTM B16*			
5 *Spring*	*302 SS①/ASTM A313*				
6 *Body*	*316 SS/ASTM A479*	*Brass 360/ASTM B16*			
7 *Adjusting screw (CPA series)*	*316 SS/ASTM A276*	—		*316 SS/ ASTM A276*	*Brass 360②/ ASTM B16*
8 *Locking screw (CPA series)*					
Lubricant	*Silicone-based and PTFE-based (CP series) PTFE-based (CPA series)*	*Silicone-based and PTFE-based*		*PTFE-based*	

Wetted components listed in *italics.*

① Spring in 316 SS and brass 8CPA series valves is PTFE coated.

② Adjusting screw in valve with 150 or 350 psi (10.4 or 24.2 bar) spring is 316 SS.

Flow Data at 70°F (20°C)

The flow curves shown here were generated in optimal laboratory conditions. Flow results in individual applications may vary due to specific system parameters.

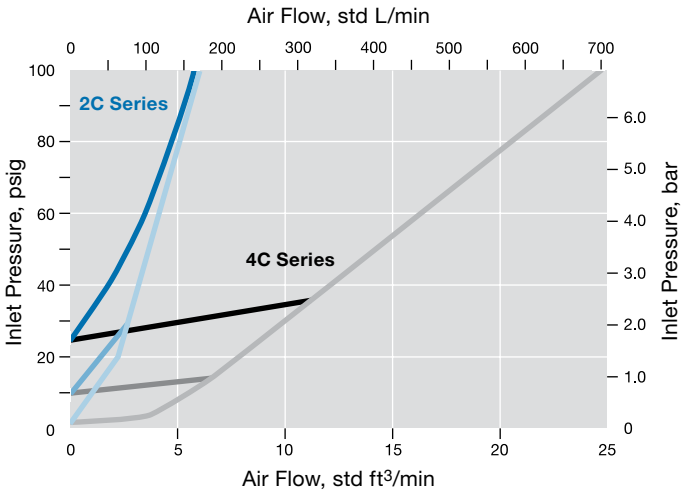
C Series

Nominal Cracking Pressures

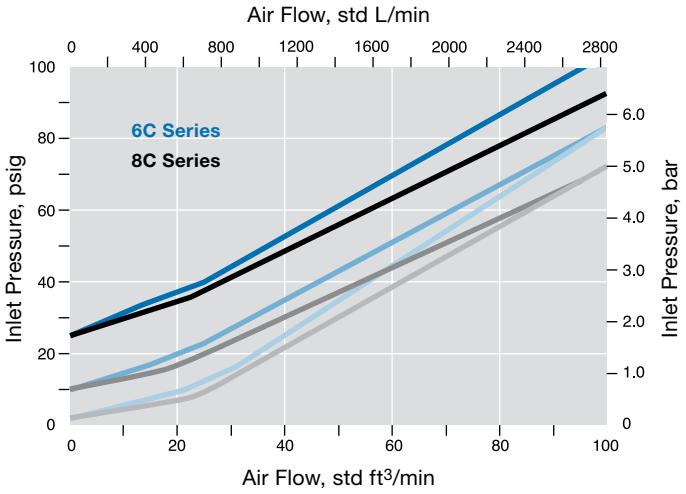
2C, 6C, 12C, 16C Series	1 psi (0.07 bar)	10 psi (0.69 bar)	25 psi (1.8 bar)
4C, 8C Series	1 psi (0.07 bar)	10 psi (0.69 bar)	25 psi (1.8 bar)

Air

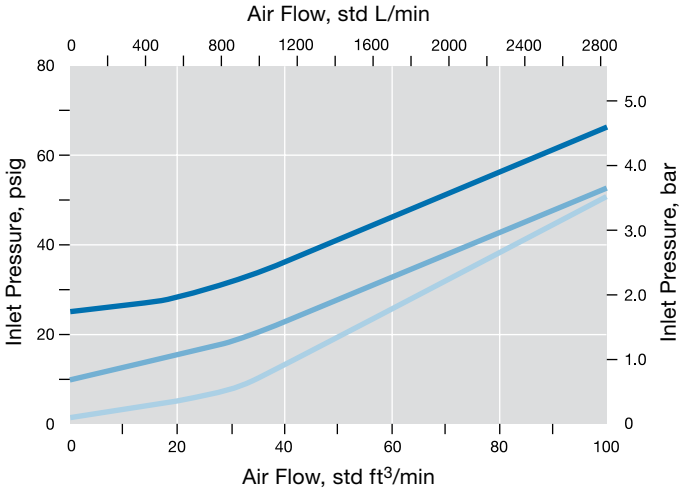
2C, 4C Series



6C, 8C Series

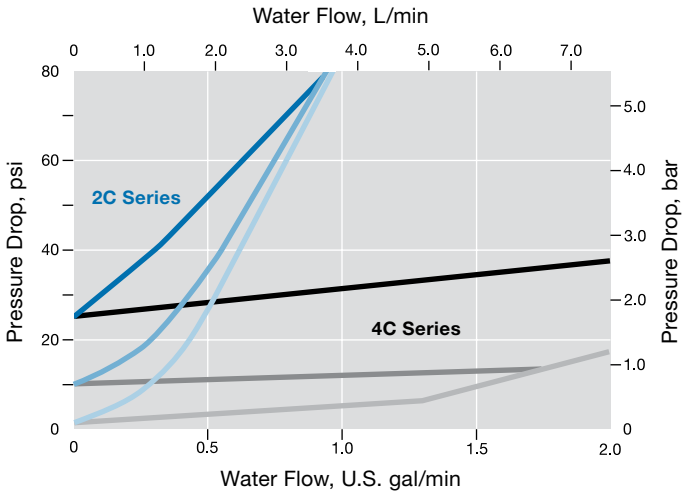


12C, 16C Series

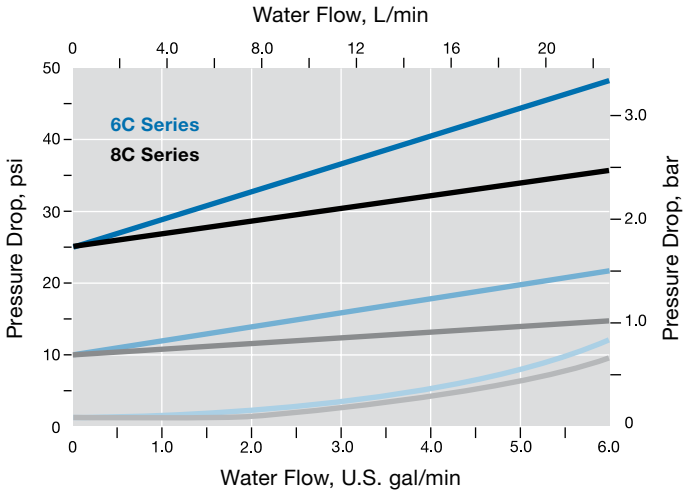


Water

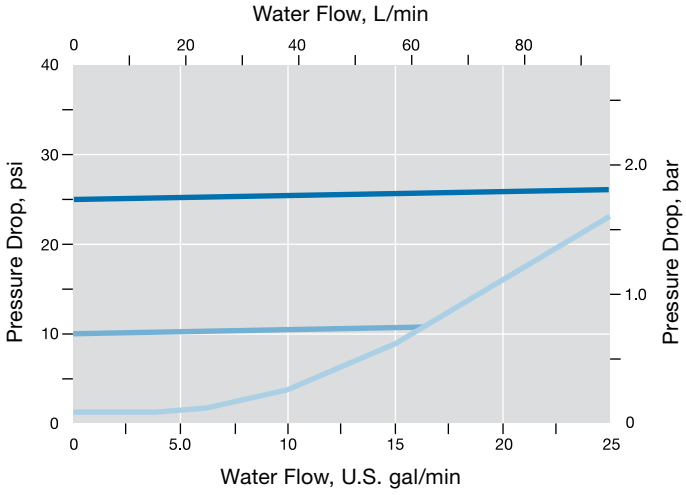
2C, 4C Series



6C, 8C Series



12C, 16C Series



Flow Data at 70°F (20°C)

The flow curves shown here were generated in optimal laboratory conditions. Flow results in individual applications may vary due to specific system parameters.

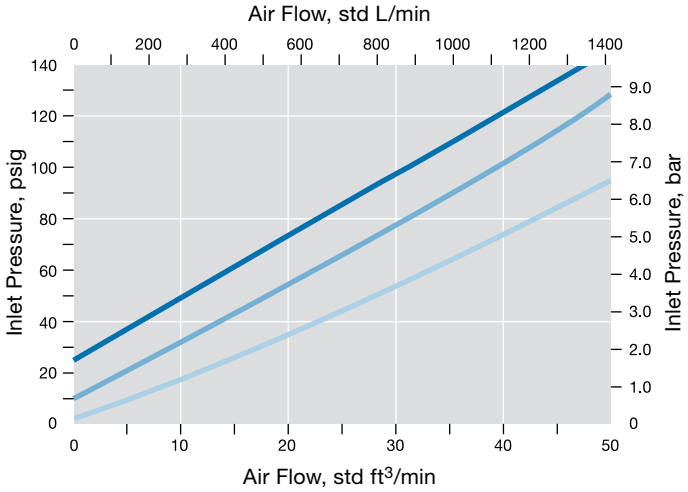
CH Series

Nominal Cracking Pressures

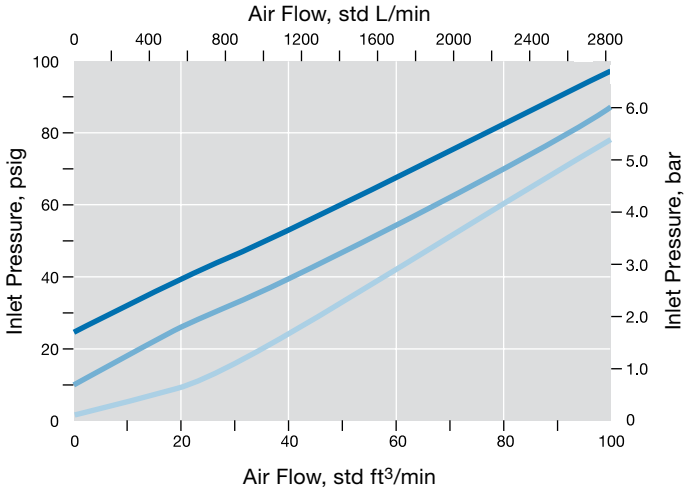
1 psi (0.07 bar) 10 psi (0.69 bar) 25 psi (1.8 bar)

Air

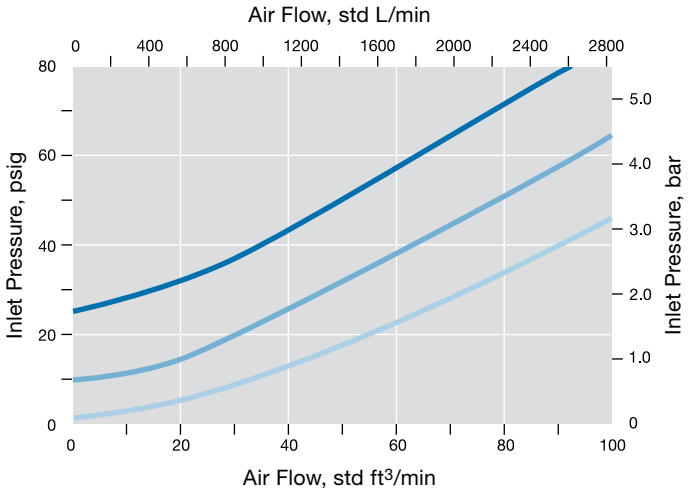
CH4 Series



CH8 Series

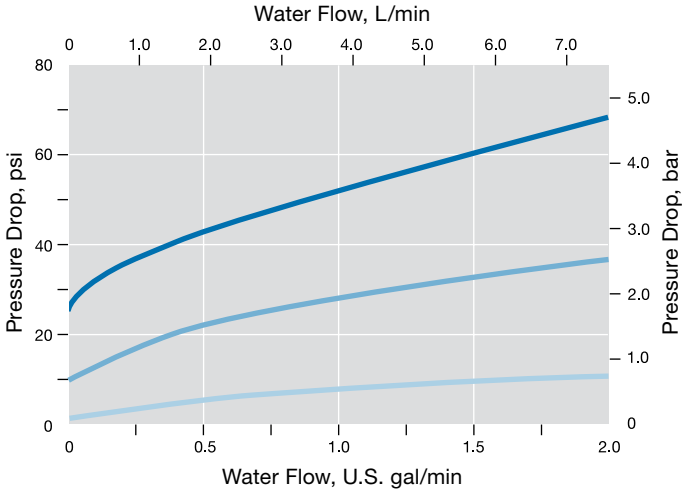


CH16 Series

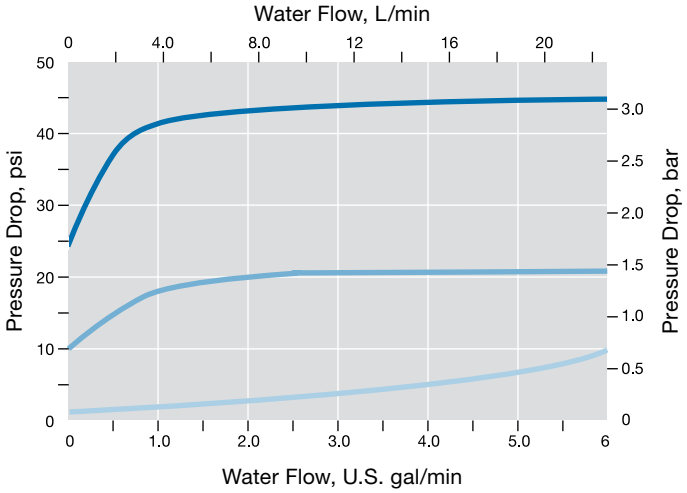


Water

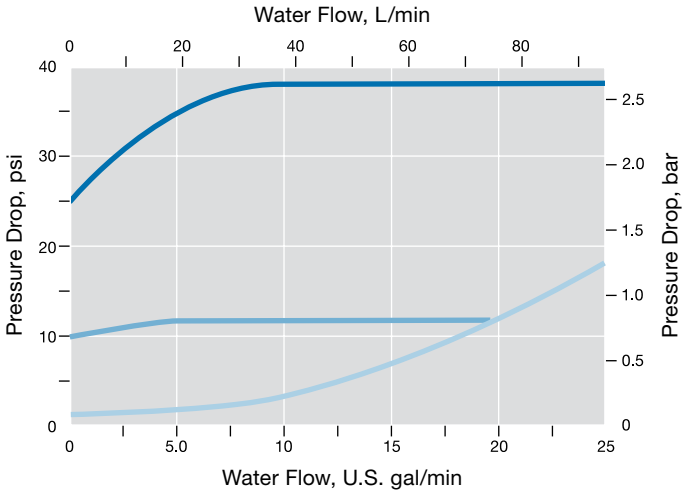
CH4 Series



CH8 Series



CH16 Series



Flow Data at 70°F (20°C)

The flow curves shown here were generated in optimal laboratory conditions. Flow results in individual applications may vary due to specific system parameters.

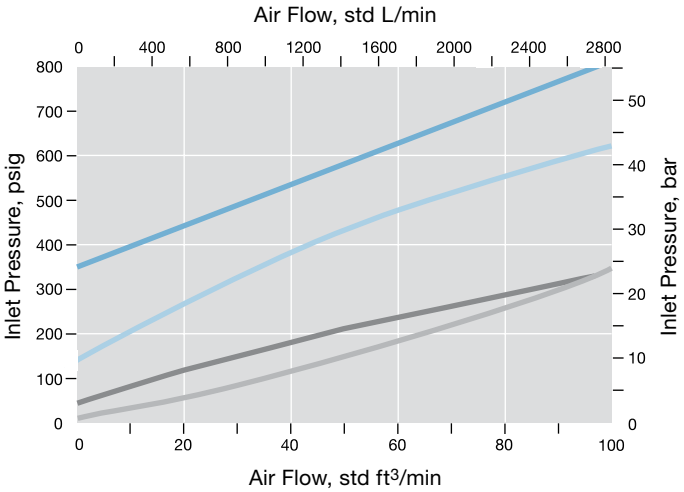
CA and CPA Series

Nominal Cracking Pressures

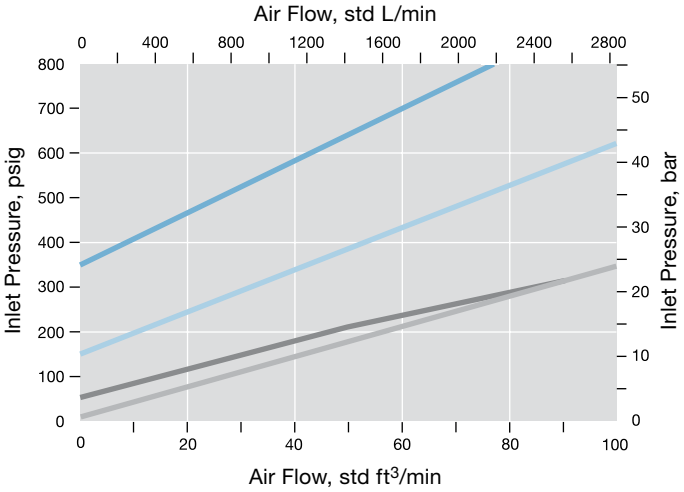
3 psi (0.21 bar) 50 psi (3.5 bar) 150 psi (10.4 bar) 350 psi (24.2) bar

Air

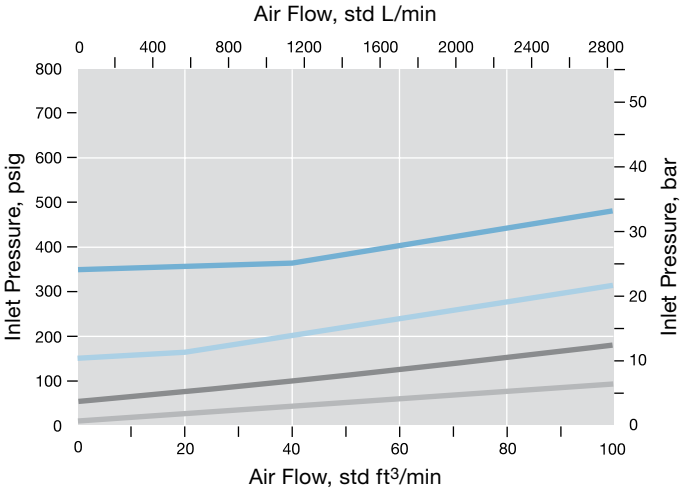
CA Series



4CPA Series

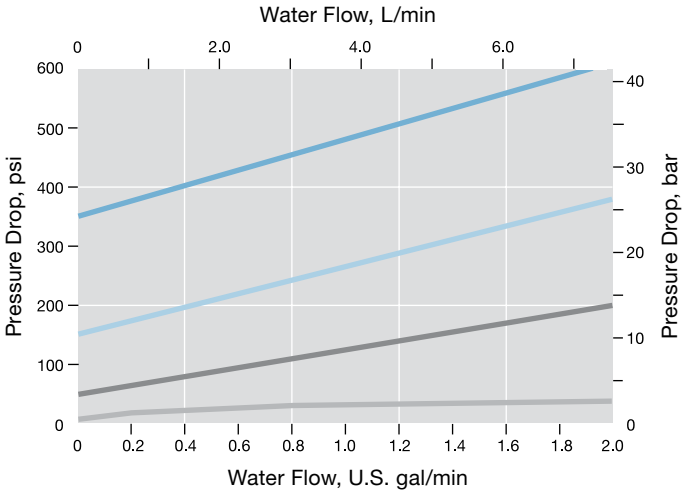


8CPA Series

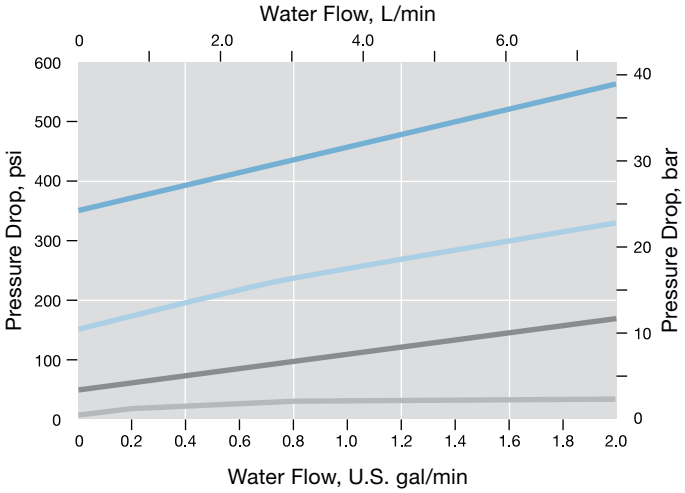


Water

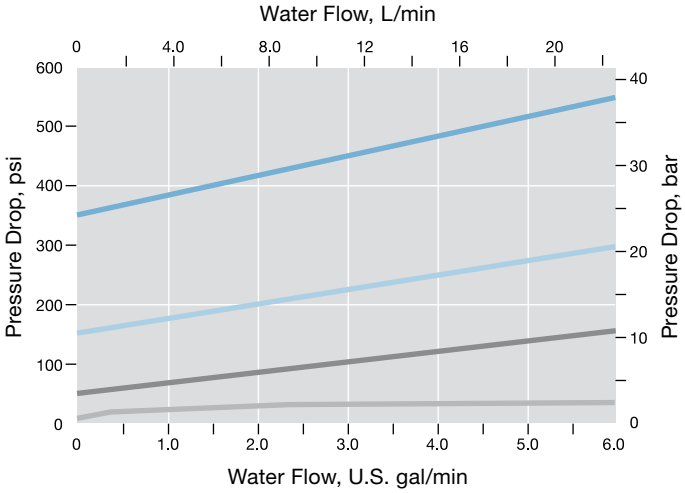
CA Series



4CPA Series



8CPA Series



Flow Data at 70°F (20°C)

The flow curves shown here were generated in optimal laboratory conditions. Flow results in individual applications may vary due to specific system parameters.

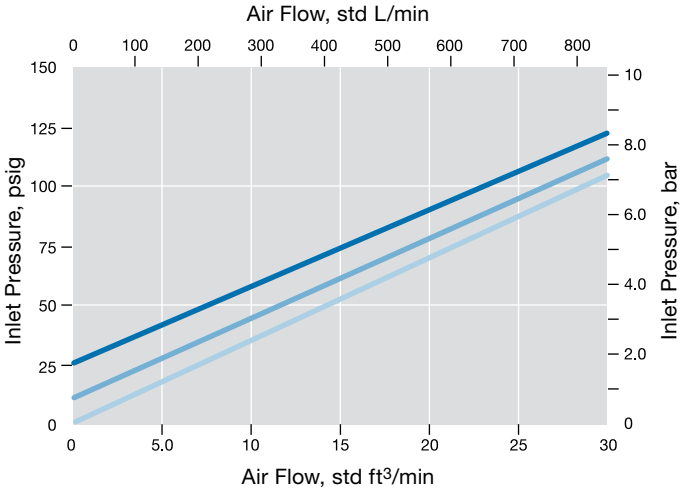
CP Series

Nominal Cracking Pressures

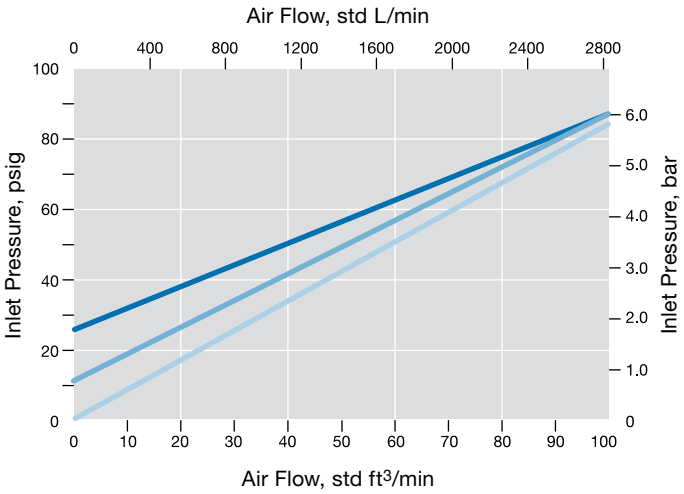
1 psi (0.07 bar) 10 psi (0.69 bar) 25 psi (1.8 bar)

Air

4CP Series

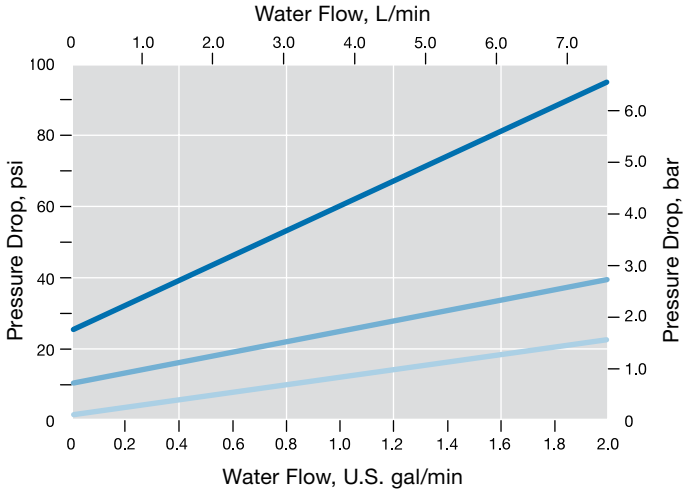


8CP Series

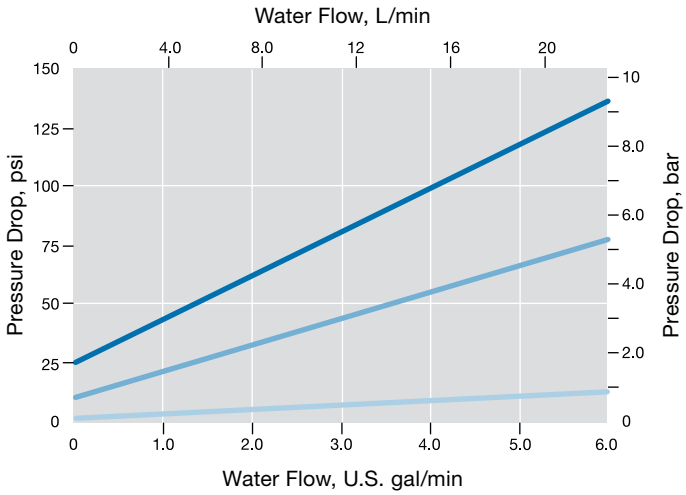


Water

4CP Series



8CP Series



Testing

Every C, CA, CH, CP, and CPA series check valve is factory tested for crack and reseal performance with a liquid leak detector.

Check valves with fixed cracking pressures, C, CP, and CH series, are cycled six times prior to testing. Every valve is tested to ensure it seals within 5 seconds at the appropriate reseal pressure.

Check valves with adjustable cracking pressures, CA and CPA series, are tested at two pressure points. Every valve is tested at a low-pressure setting and at a high-pressure setting. All valves must seal within 5 seconds at the appropriate reseal pressure.

Cleaning and Packaging

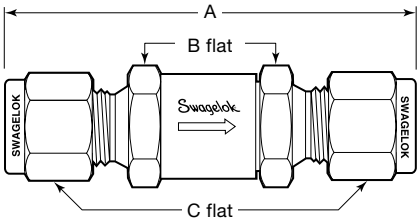
Every C, CA, and CH series check valve with VCR® or VCO® end connections is processed in accordance with Swagelok *Special Cleaning and Packaging (SC-11)* (MS-06-63), to ensure compliance with product cleanliness requirements as stated in ASTM G93 Level C.

All other C, CA, and CH series check valves, as well as every CP and CPA series check valve, are cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* (MS-06-62).

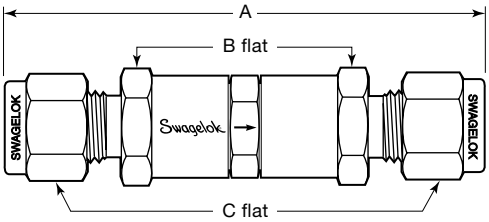
Dimensions

Dimensions, shown with Swagelok tube fitting nuts finger-tight, are for reference only and are subject to change.

C Series



CA Series



End Connections		Basic Ordering Number	Series	Dimensions, in. (mm)		
Inlet/Outlet	Size			A	B	C
Fixed Cracking Pressure, C Series						
Fractional Swagelok tube fittings	1/8 in.	SS-2C-	2C	2.14 (54.3)	5/8	7/16
	1/4 in.	SS-4C-	4C	2.35 (59.7)		9/16
	3/8 in.	SS-6C-	6C	3.17 (80.5)	7/8	11/16
	1/2 in.	SS-8C-	8C	3.42 (86.9)		7/8
	3/4 in.	SS-12C-	12C	4.32 (110)	1 1/4	1 1/8
	1 in.	SS-16C-	16C	4.74 (120)	1 3/8	1 1/2
Metric Swagelok tube fittings	6 mm	SS-6C-MM-	4C	2.36 (59.9)	5/8	(14)
	10 mm	SS-10C-MM-	8C	3.32 (84.3)	7/8	(19)
	12 mm	SS-12C-MM-		3.42 (86.9)		(22)
Female NPT	1/8 in.	SS-2C4-	2C	1.89 (48.0)	5/8	—
	1/4 in.	SS-4C4-	4C	2.15 (54.6)	3/4	
	3/8 in.	SS-6C4-	6C	2.98 (75.7)	7/8	
	1/2 in.	SS-8C4-	8C	3.58 (90.9)	1 1/16	
	3/4 in.	SS-12C4-	12C	4.08 (104)	1 1/4	
	1 in.	SS-16C4-	16C	4.84 (123)	1 5/8	
Male NPT	1/8 in.	SS-2C2-	2C	1.71 (43.4)	5/8	
	1/4 in.	SS-4C2-	4C	2.09 (53.1)		
	3/8 in.	SS-6C2-	6C	2.78 (70.6)	7/8	
	1/2 in.	SS-8C2-	8C	3.16 (80.3)		
	3/4 in.	SS-12C2-	12C	4.08 (104)	1 1/4	
	1 in.	SS-16C2-	16C	4.52 (115)	1 5/8	
Male NPT/ Swagelok tube fitting	1/4 in.	SS-4C1-	4C	2.22 (56.4)	5/8	9/16
Male VCR fittings	1/4 in.	SS-4C-VCR-	4C	2.21 (56.1)	5/8	—
	1/2 in.	SS-8C-VCR-	8C	3.56 (90.4)	15/16	
	3/4 in.	SS-12C-VCR-	12C	4.64 (118)	1 5/8	
	1 in.	SS-16C-VCR-	16C	4.76 (121)		
Adjustable Cracking Pressure, CA Series						
Swagelok tube fittings	1/4 in.	SS-4CA-	CA	3.23 (82.0)	5/8	9/16
	6 mm	SS-6CA-MM-				(14)
	8 mm	SS-8CA-MM-		3.32 (84.3)		(16)
Male NPT/ Swagelok tube fitting	1/4 in.	SS-4CA1-		3.12 (79.2)		9/16
Male VCR fittings	1/4 in.	SS-4CA-VCR-		3.09 (78.5)		—

Ordering Information

Basic ordering numbers specify stainless steel material. To order brass, replace **SS** with **B** in the basic ordering number.

Example: **B**-2C-

C Series

To order, add a cracking pressure designator to the basic ordering number.

Cracking Pressure psi (bar)	Designator
1/3 (0.03)	1/3
1 (0.07)	1
10 (0.69)	10
25 (1.8)	25

Example: SS-2C-**1/3**

CA Series

To order, add a cracking pressure range designator to the basic ordering number.

Cracking Pressure psi (bar)	Designator
3 to 50 (0.21 to 3.5)	3
50 to 150 (3.5 to 10.4)	50
150 to 350 (10.4 to 24.2)	150
350 to 600 (24.2 to 41.4)	350

Example: SS-4CA-**3**

⚠ **Check valves are designed for directional flow control only. Swagelok check valves should never be used as code safety relief devices.**

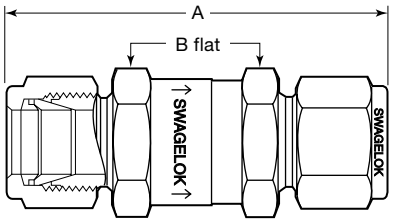
Dimensions

Dimensions, shown with Swagelok tube fitting nuts finger-tight, are for reference only and are subject to change.

End Connections		Pressure Rating at 100°F (37°C) psig (bar)	Basic Ordering Number	Series	Dimensions in. (mm)	
Type	Size				A	B
Fractional Swagelok tube fitting	1/8 in.	6000 (413)	SS-CHS2-	CH4	2.27 (57.7)	11/16
	1/4 in.		SS-CHS4-		2.43 (61.7)	
	3/8 in.		SS-CHS6-	CH8	2.75 (69.9)	1
	1/2 in.		SS-CHS8-		2.96 (75.2)	
	3/4 in.	5000 (344)	SS-CHS12-	CH16	3.52 (89.4)	1 5/8
	1 in.	4700 (323)	SS-CHS16-		3.88 (98.6)	
Metric Swagelok tube fitting	6 mm	6000 (413)	SS-CHS6MM-	CH4	2.43 (61.7)	11/16
	8 mm		SS-CHS8MM-	CH8	2.70 (68.6)	1
	10 mm		SS-CHS10MM-		2.80 (71.1)	
	12 mm		SS-CHS12MM-		2.96 (75.2)	
	22 mm	4900 (337)	SS-CHS22MM-	CH16	3.48 (88.4)	1 5/8
	25 mm	4600 (316)	SS-CHS25MM-		3.88 (98.6)	
Female NPT	1/4 in.	6000 (413)	SS-CHF4-	CH4	2.13 (54.1)	11/16
	3/8 in.	5300 (365)	SS-CHF6-	CH8	2.55 (64.8)	1
	1/2 in.	4900 (337)	SS-CHF8-		3.03 (77.0)	1 1/16
	3/4 in.	4600 (316)	SS-CHF12-	CH16	3.23 (82.0)	1 5/8
	1 in.	4400 (303)	SS-CHF16-		3.83 (97.3)	
Male NPT	1/8 in.	6000 (413)	SS-CHM2-	CH4	1.79 (45.5)	11/16
	1/4 in.		SS-CHM4-		2.17 (55.1)	
	3/8 in.		SS-CHM6-	CH8	2.36 (59.9)	1
	1/2 in.		SS-CHM8-		2.73 (69.3)	
	3/4 in.	5000 (344)	SS-CHM12-	CH16	3.29 (83.6)	1 5/8
	1 in.		SS-CHM16-		3.67 (93.2)	
Female ISO①	1/4 in.	6000 (413)	SS-CHF4RT-	CH4	2.28 (57.9)	11/16
	1/2 in.	5100 (351)	SS-CHF8RT-	CH8	3.29 (83.6)	1 1/16
	3/4 in.	4800 (330)	SS-CHF12RT-	CH16	3.55 (90.2)	1 5/8
	1 in.	4400 (303)	SS-CHF16RT-		3.83 (97.3)	
Male ISO①	1/4 in.	6000 (413)	SS-CHM4RT-	CH4	2.17 (55.1)	11/16
	1/2 in.		SS-CHM8RT-	CH8	2.73 (69.3)	1
	3/4 in.	5000 (344)	SS-CHM12RT-	CH16	3.29 (83.6)	1 5/8
	1 in.		SS-CHM16RT-		3.67 (93.2)	
Female SAE/MS	1/2 in.	4600 (316)	SS-CHF8ST-	CH8	2.74 (69.6)	1
Male SAE/MS	1/2 in.	4600 (316)	SS-CHM8ST-		2.48 (63.0)	
Male VCO fitting	1/4 in.	6000 (413)	SS-CHVCO4-	CH4	1.98 (50.3)	11/16
	1/2 in.		SS-CHVCO8-	CH8	2.35 (59.7)	1
	3/4 in.	5000 (344)	SS-CHVCO12-	CH16	2.90 (73.7)	1 5/8
	1 in.		SS-CHVCO16-			
Male VCR fitting	1/4 in.	6000 (413)	SS-CHVCR4-	CH4	2.28 (57.9)	11/16
	1/2 in.	4300 (296)	SS-CHVCR8-	CH8	2.73 (69.3)	1
	3/4 in.	3700 (254)	SS-CHVCR12-	CH16	3.78 (96.0)	1 5/8

① See specifications ISO 7/1, BS EN 10226-1, DIN 2999, JIS B0203.

CH Series



Ordering Information

To order, add a cracking pressure designator to the basic ordering number.

Cracking Pressure psi (bar)	Designator
1/3 (0.03)	1/3
1 (0.07)	1
5 (0.35)	5
10 (0.69)	10
25 (1.8)	25

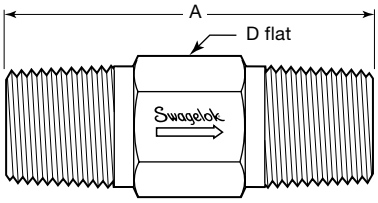
Example: SS-CHS2-**1/3**

⚠ **Check valves are designed for directional flow control only. Swagelok check valves should never be used as code safety relief devices.**

Dimensions

Dimensions, shown with Swagelok tube fitting nuts finger-tight, are for reference only and are subject to change.

CP and CPA Series



End Connections		Basic Ordering Number	Series	Dimensions, in. (mm)	
Inlet/Outlet	Size			A	D
Fixed Cracking Pressure, CP Series					
Female NPT	1/4 in.	SS-4CP4-	4CP	2.41 (61.2)	3/4
	1/2 in.	SS-8CP4-	8CP	3.71 (94.2)	1 1/16
Male NPT	1/4 in.	SS-4CP2-	4CP	1.62 (41.1)	9/16
	1/2 in.	SS-8CP2-	8CP	2.28 (57.9)	7/8
Female/male NPT	1/4 in.	SS-4CP6-	4CP	2.29 (58.2)	3/4
Male/female NPT	1/4 in.	SS-4CP5-		1.75 (44.4)	3/4
	1/2 in.	SS-8CP5-	8CP	2.83 (71.9)	1 1/16
Female ISO①	1/4 in.	SS-4CP4-RT-	4CP	2.54 (64.5)	3/4
Male ISO①	1/4 in.	SS-4CP2-RT-		1.62 (41.1)	9/16
Adjustable Cracking Pressure, CPA Series					
Female NPT	1/4 in.	SS-4CPA4-	4CPA	2.98 (75.7)	3/4
Male NPT	1/4 in.	SS-4CPA2-		1.62 (41.1)	9/16
	1/2 in.	SS-8CPA2-	8CPA	2.56 (65.0)	7/8
Male ISO①	1/4 in.	SS-4CPA2-RT-	4CPA	1.62 (41.1)	9/16
	1/2 in.	SS-8CPA2-RT-	8CPA	2.56 (65.0)	7/8

① See specifications ISO 7/1, BS EN 10226-1, DIN 2999, and JIS B0203.

Ordering Information

Basic ordering numbers specify stainless steel material. To order brass, replace **SS** with **B** in the basic ordering number.

Example: **B**-4CP4-

CP Series

To order, add a cracking pressure designator to the basic ordering number.

Cracking Pressure psi (bar)	Designator
1/3 (0.03)	1/3
1 (0.07)	1
10 (0.69)	10
25 (1.8)	25

Example: B-4CP4-**1/3**

CPA Series

To order, add a cracking pressure range designator to the basic ordering number.

Cracking Pressure psi (bar)	Designator
3 to 50 (0.21 to 3.5)	3
50 to 150 (3.5 to 10.4)	50
150 to 350 (10.4 to 24.2)	150
350 to 600 (24.2 to 41.4)	350

Example: SS-4CPA4-**3**

⚠ **Check valves are designed for directional flow control only. Swagelok check valves should never be used as code safety relief devices.**

Options and Accessories

Seal Materials (All Series)

Fluorocarbon FKM O-rings are standard in 316 stainless steel valves; Buna N O-rings are standard in brass valves. Other elastomer seals (poppet bonding material and O-ring) are available. To order, insert the seal material designator into the valve ordering number.

Seal Material	Designator	Temperature Rating °F (°C)
Buna N	-BU	–10 to 250 (–23 to 121)
Ethylene propylene	-EP	–50 to 300 (–45 to 148)
Fluorocarbon FKM	-VI	–10 to 375 (–23 to 190)①
Neoprene	-NE	–40 to 250 (–40 to 121)

① –10 to 400°F (–23 to 204°C) for CH series.

Example: B-2C-**VI**-1/3

Additional seal materials are available. Contact your authorized Swagelok representative for details.

Special Alloys (All Series)

Springs of alloy 400 or alloy C-276 are available in some sizes. Valve bodies of alloy 400, carbon steel, aluminum, or other alloys are available in some sizes. Contact your authorized Swagelok representative for more information.

PTFE-Coated Springs (C, CA, CP, and CPA Series)

Springs with PTFE coating are available in some sizes. Contact your authorized Swagelok representative for more information.

Inlet Gaskets (2C, 4C, 6C, and 8C Series)

PTFE-coated 316 stainless steel inlet gaskets are available for 2C, 4C, 6C, and 8C series valves to reduce the possibility of dislodging the O-ring in systems where pressure surges, shock, or pulses occur. Gaskets are standard for select valves; see the table below for details.

Cracking Pressure psig (bar)	Inlet Gasket		
	2C, 4C Series	6C, 8C Series	12C, 16C Series
< 50 (3.5)	Optional	Optional	Standard
> 50 (3.5)	Optional	Standard	Standard

To order an inlet gasket, if it is not standard, insert **-FG** into the valve ordering number.

Example: SS-4C-**FG**-1

Deflector Caps (4C, 8C, CP, and CPA Series)

A polyethylene deflector cap is available for 4C, 8C, CP, and CPA series valves with male NPT end connections. The deflector cap deflects flow from direct contact with personnel and prevents atmospheric contaminants from entering the valve. The deflector cap screws easily onto the male NPT outlet end of the valve. Maximum rating is 300 psig at 100°F (20.6 bar at 37°C).

To order, insert **-DG** for a green cap or **-DR** for a red cap into the ordering number.

Example: SS-4CPA2-**DR**-3

Sour Gas Valves (CH Series)

CH series valves are available for sour gas service. Materials are selected in accordance with NACE MR0175/ISO 15156.

Technical Data

Pressure Rating at 70°F (20°C)
5000 psig (344 bar)

Temperature Rating
–50 to 300°F (–45 to 148°C)

Nominal Cracking Pressures
1/3, 1, and 5 psi (0.03, 0.07, and 0.35 bar)

End Connections
1/4, 3/8, and 1/2 in. Swagelok tube fittings

Materials of Construction
Body, poppet—alloy 400/B164
Seals—ethylene propylene
Backup ring—PTFE
Spring—alloy X-750/AMS 5699
All other materials and lubricant same as standard product.
See **Materials of Construction,** page 5.

Ordering Information

To order, replace **SS** with **M** and insert **-SG** into the ordering number.

Example: **M**-CHS4-**SG**-1/3

Valves With ECE R110-Type Approval (CH Series)

Stainless steel CH series check valves with Buna C seals are available with ECE R110-type approval for use in alternative fuel service.

- Temperature rating: –40 to 185°F (–40 to 85°C)
- Pressure rating within the range: 3770 psig (260 bar)

To order, add **-11670** to a standard valve ordering number.

Example: SS-CHS8-1/3-**11670**

Special Cleaning and Packaging (SC-11)

Every C, CA, and CH series check valve with VCR or VCO end connections is processed in accordance with Swagelok *Special Cleaning and Packaging (SC-11)* (MS-06-63), to ensure compliance with product cleanliness requirements stated in ASTM G93 Level C.

To order special cleaning and packaging for C, CA, and CH series check valves with other end connections, add **-SC11** to the ordering number.

Example: SS-2C-1/3-**SC11**

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).

Maintenance Kits

C, CP, CA, and CPA Series Seal Kits

Kits contain O-ring and instructions. Select a kit ordering number. To order PTFE seal kits, replace the material designator with **T** and *omit* the durometer number.

Example: **T**-4C-K4

Valve Series	Uniform O-Ring Size	Kit Ordering Number
Fixed Cracking Pressures: 1/3, 1, 10, and 25 psi (0.03, 0.07, 0.69, and 1.8 bar)		
2C, 4C	009	NEO70-4C-K4
		VI70-4C-K4
		BU80-4C-K4
		EP80-4C-K4
4CP	009	NEO60-4C-K4
		VI60-4C-K4
		BU60-4C-K4
		EP60-4C-K4
6C, 8C	111	NEO70-8C-K4
		VI70-8C-K4
		BU70-8C-K4
		EP70-8C-K4
8CP	110	NEO70-8CP-K4
		VI70-8CP-K4
		BU70-8CP-K4
		EP70-8CP-K4
12C, 16C	114	NEO70-14C-K4
		VI70-14C-K4
		BU70-14C-K4
		EP70-14C-K4
Adjustable Cracking Pressures: 3 to 150 psi (0.21 to 10.4 bar)		
CA, 4CPA	009	NEO70-4C-K4
		VI70-4C-K4
		BU70-4C-K4
		EP70-4C-K4
8CPA	110	NEO70-8CP-K4
		VI70-8CP-K4
		BU70-8CP-K4
		EP70-8CP-K4
Adjustable Cracking Pressures: 150 to 600 psi (10.4 to 41.4 bar)		
CA, 4CPA	009	NEO90-4C-K4
		VI90-4C-K4
		BU90-4C-K4
		EP90-4C-K4
8CPA	110	NEO90-8CP-K4
		VI90-8CP-K4
		BU90-8CP-K4
		EP90-8CP-K4

CH Series Seal Kits

Kits contain bonded poppet, body seal O-ring, PTFE backup ring, and instructions. Select a basic kit ordering number and add a seal material designator.

Example: SS-3K-CH4-**VI**

Valve Series	Valve Body Material	Basic Kit Ordering Number
CH4	316 SS	SS-3K-CH4-
	Alloy 400	M-3K-CH4-
CH8	316 SS	SS-3K-CH8-
	Alloy 400	M-3K-CH8-
CH16	316 SS	SS-3K-CH16-

Seal Material	Designator
Buna N	BN
Ethylene propylene	EP
Fluorocarbon FKM	VI
Neoprene	NE

CA and C Series Metal Gasket Kits

Kits contain PTFE-coated gasket(s) and instructions. Select a basic kit ordering number and add a gasket material designator.

Example: **SS**-8C-K6

Valve Series	Basic Kit Ordering Number
2C, 4C (1 gasket)①	-4C-K6
6C, 8C (1 gasket)①	-8C-K6
12C, 16C (1 gasket)	-14C-K6
CA (1 inlet gasket, 1 outlet gasket)	-4CA-K6

① Gasket is available for 2C, 4C, 6C, and 8C series valves for use in systems where pressure surges, shock, or pulses occur and is required in 6C and 8C series valves with 50 psi (3.5 bar) or higher spring cracking pressure.

Gasket Material	Designator
316 SS	SS
Alloy 400①	M
Aluminum②	A

① Not available for 6C, 8C, and CA series valves.

② Not available for 2C, 4C, 6C, 8C, and CA series valves.

Maintenance Kits

C, CP, CA, and CPA Series Spring Kits

Kits contain spring, two cracking pressure labels, and instructions. Select a basic kit ordering number and add a spring material designator.

Example: **302**-4C-K2-1/3

To order a kit with a PTFE-coated spring, add **T** to the kit ordering number.

Example: 302-4C-K2-1/3**T**

Valve Series	Cracking Pressure psi (bar)	Basic Kit Ordering Number
2C, 4C 4CP	1/3 (0.03)	-4C-K2-1/3
	1 (0.07)	-4C-K2-1
	10 (0.69)	-4C-K2-10
	25 (1.8)	-4C-K2-25
6C, 8C, 8CP	1/3 (0.03)	-8C-K2-1/3
	1 (0.07)	-8C-K2-1
	10 (0.69)	-8C-K2-10
	25 (1.8)	-8C-K2-25
12C, 16C	1/3 (0.03)	-14C-K2-1/3
	1 (0.07)	-14C-K2-1
	10 (0.69)	-14C-K2-10
	25 (1.8)	-14C-K2-25

Valve Series	Cracking Pressure psi (bar)	Basic Kit Ordering Number
CA, 4CPA	3 to 50 (0.21 to 3.5)	-4CA-K2-3
	50 to 150 (3.5 to 10.4)	-4CA-K2-50
	150 to 350 (10.4 to 24.2)	-4CA-K2-150
	350 to 600 (24.2 to 41.4)	-4CA-K2-350
8CPA	3 to 50 (0.21 to 3.5)	-8CA-K2-3
	50 to 150 (3.5 to 10.4)	-8CA-K2-50
	150 to 350 (10.4 to 24.2)	-8CA-K2-150
	350 to 600 (24.2 to 41.4)	-8CA-K2-350

Spring Material	Designator
302 SS	302
Alloy 400①	M

① Not available for CA or CPA series valves.

CH Series Spring Kits

Kits contain spring, two cracking pressure labels, and instructions. Select a basic kit ordering number and add a cracking pressure designator.

Example: 302-13K-CH4-**1/3**

Valve Series	Valve Body Material	Basic Kit Ordering Number
CH4	316 SS	302-13K-CH4-
	Alloy 400	M-13K-CH4-
CH8	316 SS	302-13K-CH8-
	Alloy 400	M-13K-CH8-
CH16	316 SS	302-13K-CH16-

Cracking Pressure psi (bar)	Designator
1/3 (0.03)	1/3
1 (0.07)	1
5 (0.35)	5
10 (0.69)	10
25 (1.8)	25

4C, 8C, CP, and CPA Series Deflector Cap Kits

Each kit contains one polyethylene deflector cap in red or green.

Male NPT	Kit Ordering Number	
	Red	Green
1/4 in.	P-4CP4-K12-RD	P-4CP4-K12-GR
1/2 in.	P-8CP4-K12-RD	P-8CP4-K12-GR

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

About this document

Thank you for downloading this electronic catalog, which is part of General Product catalog Swagelok published in print. This type of electronic catalog is updated as new information arises or revisions, which may be more current than the printed version.

Swagelok Company is a major developer and provider of fluid system solutions, including products, integration solutions and services for industry research, instrumentation, pharmaceutical, oil and gas, power, petrochemical, alternative fuels, and semiconductor. Our manufacturing facilities, research, service and distribution facilities support a global network of more than 200 authorized sales and service centers in 57 countries.

Visit www.swagelok.com to locate your Swagelok representative and obtain any information on features, technical information and product references, or to learn about the variety of services available only through authorized sales centers and service Swagelok.

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.

Warranty Information

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

Bleed Valves and Purge Valves

Bleed Valves

- Working pressures up to 10 000 psig (689 bar)
- Temperatures up to 850°F (454°C)
- 316 stainless steel, carbon steel, alloy 400, or alloy C-276 materials

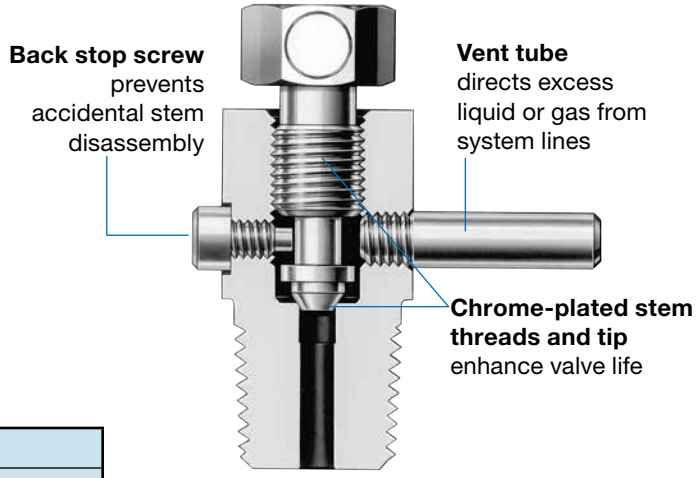
Purge Valves

- Working pressures up to 4000 psig (275 bar)
- Temperatures up to 600°F (315°C)
- 316 stainless steel, brass, or carbon steel materials

Bleed Valves

Swagelok bleed valves can be used on instrumentation devices such as multivalve manifolds or gauge valves to vent signal line pressure to atmosphere before removal of an instrument or to assist in calibration of control devices.

- Compact for convenient installation
- Male NPT and SAE end connections
- Orifice of 0.125 in. (3.2 mm); flow coefficient (C_v) of 0.25



Materials of Construction

Component	Valve Body Materials			
	316 SS	Steel	Alloy 400	Alloy C-276
	Material Grade/ASTM Specification			
Stem	*Chrome-plated 316 SS/A276*		*Alloy 400/ B164*	*Alloy C-276/ B574*
*Body*①	*316 SS/A479*	*1018②/A108*		
Back stop screw	*316 SS*		*Alloy 400*	
Vent tube	*316 SS/A269*		*Alloy 400/B165*	
Lubricant	*Nickel antiseize, hydrocarbon carrier*			

Wetted components listed in *italics*.

① Male SAE body has fluorocarbon FKM O-ring.

② Carbon steel bodies are plated with cadmium yellow dichromate for corrosion resistance.

Pressure-Temperature Ratings①

Material	316 SS	Steel	Alloy 400	Alloy C-276
Temperature, °F (°C)	**Working Pressure,** psig (bar)			
–65 (–53) to 100 (37)	10 000 (689)	10 000 (689)	10 000 (689)	10 000 (689)
200 (93)	9 290 (640)	9 110 (627)	8 800 (606)	9 120 (628)
300 (148)	8 390 (578)	8 860 (610)	8 240 (567)	8 425 (580)
400 (204)	7 705 (530)	8 555 (589)	7 960 (548)	7 800 (537)
450 (232)	7 435 (512)	8 315 (572)	7 940 (547)	7 545 (519)
500 (260)	7 165 (493)	—	7 920 (545)	7 290 (502)
600 (315)	6 770 (466)	—	—	6 850 (471)
650 (343)	6 660 (458)	—	—	6 665 (459)
700 (371)	6 480 (446)	—	—	6 520 (449)
750 (398)	6 335 (436)	—	—	6 375 (439)
800 (426)	6 230 (429)	—	—	6 265 (431)
850 (454)	6 085 (419)	—	—	6 155 (424)

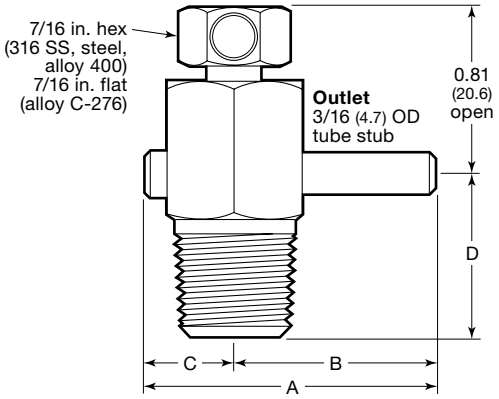
① Ratings based on all metal seals. Ratings limited to:

- –20°F (–28°C) min with steel.
- 450°F (232°C) max with SAE end connections using fluorocarbon FKM O-rings.
- 4568 psig (314 bar) max with SAE end connections.

Bleed Valves

Dimensions

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



Inlet End Connection		Ordering Number	Dimensions, in. (mm)			
Type	Size		A	B	C	D
Male NPT	1/8 in.	SS-BVM2	1.34 (34.0)	0.94 (23.9)	0.41 (10.4)	0.75 (19.1)
	1/4 in.	SS-BVM4				
	3/8 in.	SS-BVM6	1.47 (37.3)	1.03 (26.2)	0.44 (11.2)	0.88 (22.4)
	1/2 in.	SS-BVM8				
Male SAE①	1/4 in., 7/16-20	SS-BVST4	1.34 (34.0)	0.94 (23.9)	0.41 (10.4)	0.69 (17.5)
	1/2 in., 3/4-16	SS-BVST8	1.47 (37.3)	1.03 (26.2)	0.44 (11.2)	0.63 (16.0)
Male ISO②	1/4 in.	SS-BVM4RT	1.34 (34.0)	0.94 (23.9)	0.41 (10.4)	0.75 (19.1)
	1/2 in.	SS-BVM8RT	1.50 (38.1)	1.06 (26.9)	0.44 (11.2)	0.92 (23.4)

① Adapts to SAE straight thread boss and SAE J1926/1 boss.

② See specifications ISO7/1, BS EN 10226-1, DIN-2999, JIS B0203.

Ordering Information

Select an ordering number.

To order other valve body materials, replace **SS** in the ordering number with **S** for carbon steel, **M** for alloy 400, or **HC** for alloy C-276.

Example: **S**-BVM2

Low Fugitive Emissions

The American Petroleum Institute's API 624 tests for fugitive emissions to atmosphere for rising stem valves. The tests are conducted at a third party lab and certify that at no point in the test did the valve leak in excess of 100 ppm of methane. Certificates stating that the valve is certified for Low Emissions service are available. For more information, contact your authorized Swagelok sales and service representative.

Testing

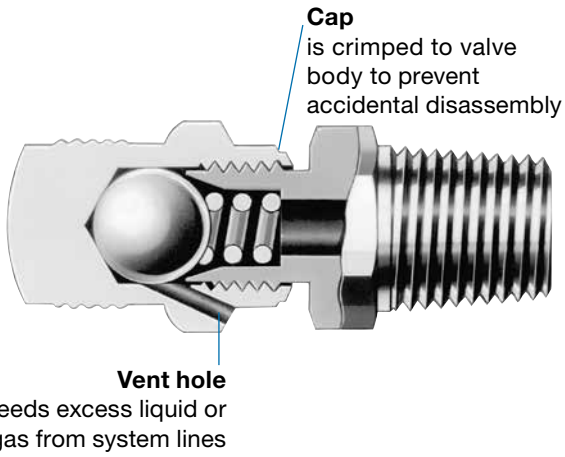
Every Swagelok bleed valve is factory tested with nitrogen at 1000 psig (69 bar). Seats have a maximum allowable leak rate of 0.1 std cm^3/min. Shell testing is performed to a requirement of no detectable leakage with a liquid leak detector.

⚠ **When installing a Swagelok bleed valve, position the vent tube to direct system fluid away from operating personnel. Always open bleed valves slowly. These valves contain no packing, so some fluid weepage will occur when the valves are opened. Operating personnel must protect themselves from exposure to system fluids.**

Purge Valves

Swagelok purge valves are manual bleed, vent, or drain valves. The knurled cap is permanently assembled to the valve body for safety. One-quarter turn with a wrench from finger-tight obtains leak-tight closure on first makeup. Snugging with a wrench ensures closure to the rated pressure with subsequent makeups.

- Compact for convenient installation
- NPT, SAE, Swagelok tube fitting, and tube adapter end connections



Materials of Construction

Component	Valve Body Materials		
	316 SS	Brass	Steel
	Material Grade/ASTM Specification		
Cap	*316 SS/A479*	*Brass 360/B16*	*Cadmium-plated 12L14/A108*
*Body*①			*Zinc-plated 12L14/A108*
*Poppet, ball*②	*316 SS/A276*		
Spring	*302 SS/A313*		
Lubricant	*Molybdenum disulfide-based paste*		

Wetted components listed in *italics*.

① Male SAE body has fluorocarbon FKM O-ring.

② 316 SS valves contain a poppet; brass and carbon steel valves contain a ball.

Pressure-Temperature Ratings①

ASME Class	1660	N/A	
Material Group	2.2	N/A	
Material Name	316 SS	Brass	Steel
Temperature, °F (°C)	Working Pressure, psig (bar)		
–65 (–53) to 100 (37)	4000 (275)	3000 (206)	3000 (206)
150 (65)	3720 (256)	2800 (192)	3000 (206)
200 (93)	3440 (237)	2600 (179)	3000 (206)
300 (148)	3105 (213)	2210 (152)	3000 (206)
350 (176)	2975 (204)	1480 (101)	2985 (205)
400 (204)	2850 (196)	740 (50.9)	—
450 (232)	2750 (189)	—	—
500 (260)	2650 (182)	—	—
600 (315)	2500 (172)	—	—

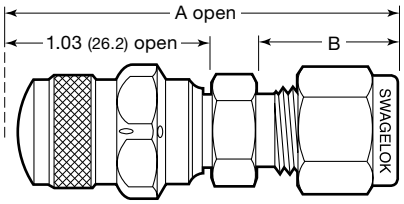
① Ratings limited to:

- –20°F (–28°C) min with steel.
- 450°F (232°C) max with SAE end connections using fluorocarbon FKM O-rings.

⚠ **When installing a Swagelok purge valve, position the vent hole to direct system fluid away from operating personnel. The vent hole rotates with the cap, changing the direction of discharge as the cap is turned. Always open purge valves slowly. These valves contain no packing, so some fluid weepage will occur when the valves are opened. Operating personnel must protect themselves from exposure to system fluids.**

Dimensions

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



Inlet End Connection		Ordering Number	Dimensions, in. (mm)	
Type	Size		A	B
Female NPT	1/8 in.	SS-4PF2	1.56 (39.6)	0.53 (13.5)
	1/4 in.	SS-4P-4F	1.75 (44.4)	0.72 (18.3)
	3/8 in.	SS-4PF6	1.81 (46.0)	0.78 (19.8)
	1/2 in.	SS-4PF8	1.98 (50.3)	0.97 (24.6)
Male NPT	1/8 in.	SS-4P-2M	1.62 (41.1)	0.38 (9.7)
	1/4 in.	SS-4P-4M	1.81 (46.0)	0.56 (14.2)
	3/8 in.	SS-4P-6M	1.84 (46.7)	
	1/2 in.	SS-4PM8	2.09 (53.1)	0.75 (19.1)
Male SAE①	1/4 in., 7/16-20	SS-4PST4	1.69 (42.9)	0.38 (9.7)
	1/2 in., 3/4-16	SS-4PST8	1.81 (46.0)	0.44 (11.2)
Male ISO②	1/8 in.	SS-4PM2RT	1.62 (41.1)	0.38 (9.7)
Swagelok tube fitting	1/8 in.	SS-4P-2	1.84 (46.7)	0.59 (15.0)
	1/4 in.	SS-4P-4	1.94 (49.3)	0.69 (17.5)
	3/8 in.	SS-4PS6	2.03 (51.6)	0.75 (19.1)
	1/2 in.	SS-4PS8	2.19 (55.6)	0.88 (22.4)
	6 mm	SS-4PS6MM	1.94 (49.3)	0.69 (17.5)
	8 mm	SS-4PS8MM	2.00 (50.8)	0.72 (18.3)
Tube adapter	1/4 in.	SS-4P-4T	1.87 (47.5)	0.63 (16.0)
	3/8 in.	SS-4P-6T	1.94 (49.3)	0.69 (17.5)
	1/2 in.	SS-4PT8	2.15 (54.6)	0.91 (23.1)

Dimensions shown with Swagelok nuts finger-tight, where applicable.

① Adapts to SAE straight thread boss and SAE J1926/1 boss.

② See specifications ISO7/1, BS EN 10226-1, DIN-2999, JIS B0203.

Ordering Information

Select an ordering number.

To order other valve body materials, replace **SS** in the ordering number with **B** for brass or **S** for carbon steel.

Example: **B**-4P-2F

Cleaning and Packaging

Every Swagelok bleed valve and purge valve is cleaned and packaged in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62.

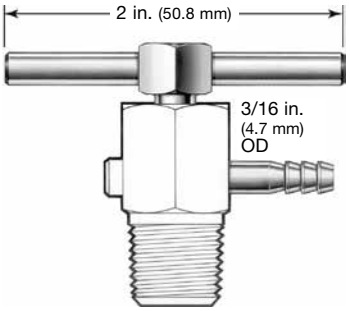
Options

Bleed Valve

Handle

To order a Swagelok bleed valve with 316 SS/ASTM A276 or A479 bar handle, add **-SH** to the ordering number.

Example: SS-BVM4**-SH**



Barbed Vent Tube

The barbed vent tube enables use of soft plastic or rubber tubing at the valve outlet. Tube material is 316 SS/ASTM A269. To order, add **-C3** to the ordering number.

Example: SS-BVM2**-C3**

Purge Valve

PTFE Ball

The Swagelok purge valve with PTFE ball provides leak-tight shutoff with finger pressure and features a removable cap for easy ball replacement.

Pressure Rating: 200 psig at 100°F (13.7 bar at 37°C)

Temperature Rating: 350°F (176°C).

To order a Swagelok purge valve with PTFE ball, add **-TFE** to the ordering number.

Example: SS-4P-2F**-TFE**

Additional Valve Materials

Alloy 625, alloy 825, and Aloy 2507 super duplex stainless steel materials are available for bleed valves. Refer to *Bleed Valves, Special Alloy Materials—BV Series* catalog, MS-02-356.

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

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

Swagelok

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 Lifetime 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.

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

Bleed Valves—Special Alloy Materials

BV Series

Swagelok bleed valves can be used on instrumentation devices such as multivalve manifolds or gauge valves to vent signal line pressure to atmosphere before removal of an instrument or to assist in calibration of control devices.

Features

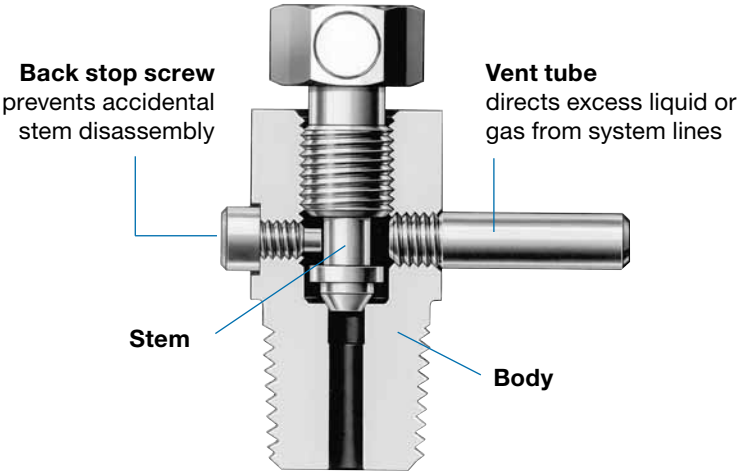
- Alloy 625, alloy 825, or Alloy 2507 super duplex stainless steel materials
- Working pressures up to 10 000 psig (689 bar)
- Temperatures up to 850°F (454°C)
- Compact for convenient installation
- Male NPT end connections
- Orifice of 0.125 in. (3.2 mm); flow coefficient (C_v) of 0.25

⚠ **When installing a Swagelok bleed valve, position the vent tube to direct system fluid away from operating personnel. Always open bleed valves slowly. These valves contain no packing, so some fluid weepage will occur when the valves are opened. Operating personnel must protect themselves from exposure to system fluids.**

Materials of Construction

Component	Valve Body Materials		
	Alloy 625	Alloy 825	Alloy 2507
	Material Grade/ASTM Specification		
Stem	*Alloy 625/ B446*	*Alloy 825/ B425*	*Alloy 2507/ A479*
Body			
Back stop screw			
Vent tube	*Alloy 625/ B444 or B704*		
Lubricant	*Nickel antiseize, hydrocarbon carrier*		

Wetted components listed in *italics*.



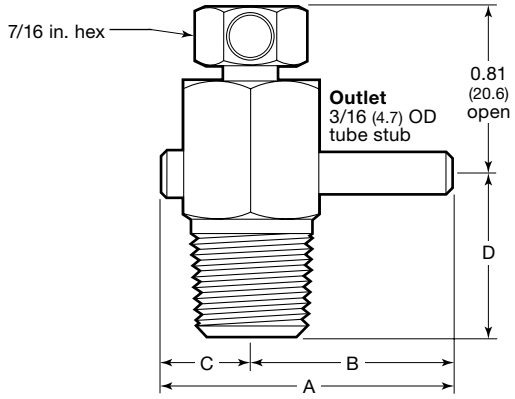
Pressure-Temperature Ratings

Material	Alloy 625	Alloy 825	Alloy 2507
Temperature, °F (°C)	**Working Pressure,** psig (bar)		
–65 (–53) to 100 (37)	10 000 (689)	10 000 (689)	10 000 (689)②
200 (93)	10 000 (689)	9 185 (632)	9 970 (686)
300 (148)	10 000 (689)	8 710 (600)	9 425 (649)
400 (204)	9 795 (674)	8 325 (573)	9 095 (626)
450 (232)	9 695 (667)	8 135 (560)	9 015 (621)①
500 (260)	9 590 (660)	7 940 (547)	—
600 (315)	9 445 (650)	7 640 (526)	—
650 (343)	9 360 (644)	7 510 (517)	—
700 (371)	9 270 (638)	7 425 (511)	—
750 (398)	9 185 (632)	7 380 (508)	—
800 (426)	9 095 (626)	7 295 (502)	—
850 (454)	9 010 (620)	7 295 (502)	—

① Alloy 2507 has a maximum pressure temperature rating of 8965 psig (618 bar) at 482°F (250°C).
② Alloy 2507 has a minimum use low temperature rating of -50°F (-46°C)

Dimensions

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



Inlet End Connection		Basic Ordering Number	Dimensions, in. (mm)			
Type	Size		A	B	C	D
Male NPT	1/4 in.	-BVM4	1.34 (34.0)	0.94 (23.9)	0.41 (10.4)	0.75 (19.1)
	3/8 in.	-BVM6	1.47 (37.3)	1.03 (26.2)	0.44 (11.2)	0.88 (22.4)
	1/2 in.	-BVM8				

Ordering Information

Select a basic ordering number. Add a material designator from the table below to the basic ordering number.

Example: **625**-BVM4

Material	Designator
Alloy 625	625
Alloy 825	825
Alloy 2507	2507

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

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Testing

Every Swagelok bleed valve is factory tested with nitrogen at 1000 psig (69 bar). Seats have a maximum allowable leak rate of 0.1 std cm^3/min. Shell testing is performed to a requirement of no detectable leakage with a liquid leak detector.

Cleaning and Packaging

Every Swagelok bleed valve is cleaned and packaged in accordance with Swagelok *Standard Cleaning and Packaging (SC-10),* MS-06-62.

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