

# Instrument Ball Valves



## 40 Series

- On-off, switching, and crossover flow paths
- Working pressures up to 3000 psig (206 bar)
- Temperatures from 50 to 150°F (10 to 65°C)
- Low-temperature service option from -65 to 150°F (-53 to 65°C)
- 1/16 to 3/4 in. and 3 to 12 mm end connections
- Virtually no dead space

## Features

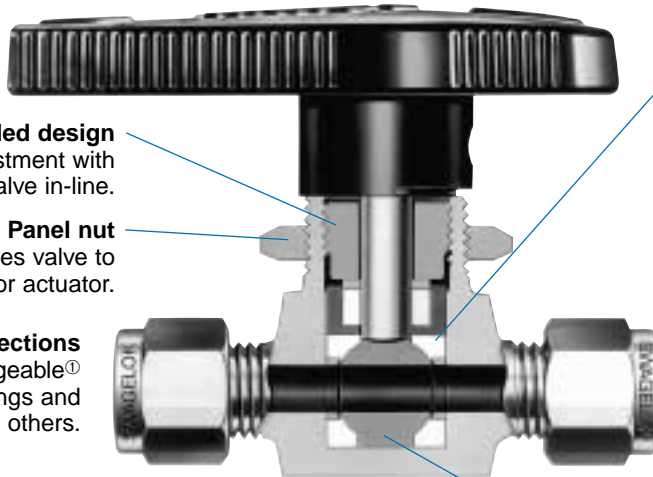
**Directional handle** indicates position of orifice.

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

**Panel nut** secures valve to panel or actuator.

**End connections** include gaugeable<sup>①</sup> Swagelok® tube fittings and a variety of others.

① Stainless steel and alloy 400 Swagelok tube fittings are gaugeable.



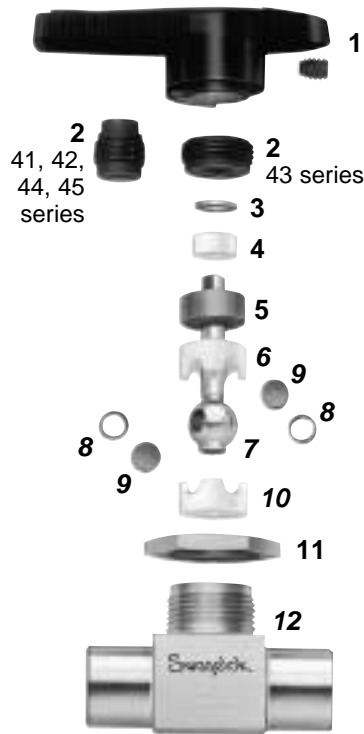
**Capsule seat packing**

- does not require system pressure to make a seal
- allows bidirectional flow
- has virtually no dead space
- is easily cleaned and purged
- is available in optional materials for system compatibility.

**One-piece body** eliminates multiple seal points.

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

## Materials of Construction



Component	Valve Body Materials		
	Stainless Steel	Brass	Alloy 400
	Material Grade/ASTM Specification		
1 Handle	Nylon with brass insert		
Set screw	S17400 SS/A564		
2 Packing bolt <sup>①</sup>	Powdered metal 300 series SS/B783 or 316 SS/A276, A479	Brass CDA 360/B16	Alloy R-405/B164
3 Upper gland	316 SS/A240	41, 42, 45 series—brass 260/B36; 43, 44 series—316 SS/A240	Alloy 400/B127
4 Bushing	PTFE/D1710		
5 Lower gland	Powdered metal 300 series SS/B783	Brass CDA 360/B16	Alloy 400/B164
6 Upper packing	PTFE/D1710		
7 Ball stem	316 SS/A276 and A479	Brass CDA 360/B16 <sup>②</sup>	Alloy R-405/B164
8 Side rings	Fluorocarbon-coated powdered metal 300 series SS/B783	Fluorocarbon-coated brass powdered metal <sup>②</sup>	Fluorocarbon-coated alloy 400 powdered metal
9 Side discs			
10 Lower packing	PTFE/D1710		
11 Panel nut	Powdered metal 300 series SS/B783	Brass CDA 360/B16	Powdered metal 300 series SS/B783
12 Body <sup>③</sup>	316 SS/A276 and A479	Brass CDA 360/B16	Alloy 400/B164
Lubricant <sup>④</sup>	41, 42, 43 series—silicone-based; 44, 45 series—silicone- and fluorinated-based		

Wetted components listed in *italics*.

① Molybdenum disulfide with hydrocarbon binder coating.

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

③ Bodies with VCO® end connections have fluorocarbon FKM O-rings.

④ For valves assembled without lubrication, see **Options**, page 8.

## Important Information about Packed Valves

- Packing adjustment may be required during the valve's service life.  
**Warning: Failure to periodically inspect and maintain valve packing may result in leakage.** Service instructions are shipped with each 40 series ball valve.
- 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.

- Packing in 40 series ball valves is factory adjusted for service at 1000 psig and 70°F. Packing *must be readjusted* for service at other than test pressure.
- Valves exposed to dynamic temperature conditions before installation may lose their initial packing load. Packing adjustment may be needed.
- 43 series ball valves require an adapter to adjust the packing bolt. Ordering number: **MS-WK-43**  
For all other 40 series ball valves, packing adjustments can be made with standard wrenches.

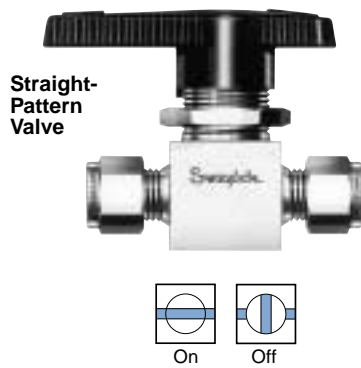
## Testing

Every 40 series ball valve is adjusted for factory testing at 1000 psig (69 bar) with nitrogen 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 cm<sup>3</sup>/min.

## Cleaning and Packaging

Every 40 series ball valve is cleaned and packaged in accordance with Swagelok standard cleaning and packaging specification (SC-10), MS-06-62.

### On-Off (2-Way) Valves



### Pressure-Temperature Ratings

① Pressure ratings for valves with Swagelok tube fitting ends may be lower. See Swagelok *Tubing Data*, MS-01-107.

Valve Series	Temperature Rating °F (°C)	Pressure Rating <sup>①</sup> psig (bar)
41, 42, 41-A, 42-A, 43-A	50 to 150 (10 to 65)	2500 (172)
43		3000 (206)
44, 45		2500 (172)
44-A, 45-A		1500 (103)

### Flow Data at 70°F (20°C)

C <sub>v</sub>	Pressure Drop to Atmosphere (Δp), psi					
	10			50		
	Air Flow, std ft <sup>3</sup> /min			Water Flow, U.S. gal/min		
0.10	1.1	3.0	5.3	0.3	0.7	1.0
0.20	2.3	6.0	11	0.6	1.4	2.0
0.50	5.6	15	27	1.6	3.5	5.0
0.60	6.8	18	32	1.9	4.2	6.0
0.90	10	27	48	2.8	6.4	9.0
1.2	14	36	64	3.8	8.5	12
1.5	17	45	80	4.7	11	15
1.6	18	48	85	5.0		16
2.4	27	72	120	7.6	17	24
2.6	29	78	140	8.2	18	26
3.0	34	90	160	9.5	21	30
6.0	68	180	320	19	42	60
6.3	71	190	330	20	45	63
6.4	72					64
12	130	360	640	38	85	120

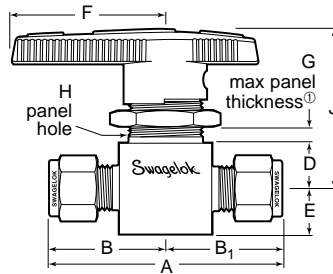
For angle-pattern valve flow data, see **Flow Data**, page 4.

### Ordering Information and Dimensions

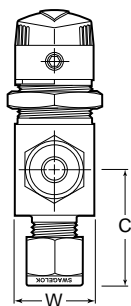
Add **SS** for 316 stainless steel, **B** for brass, or **M** for alloy 400 to the basic ordering number.

Example: **SS-43S4**

Dimensions are for reference only and are subject to change.



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



### Angle-Pattern Valves

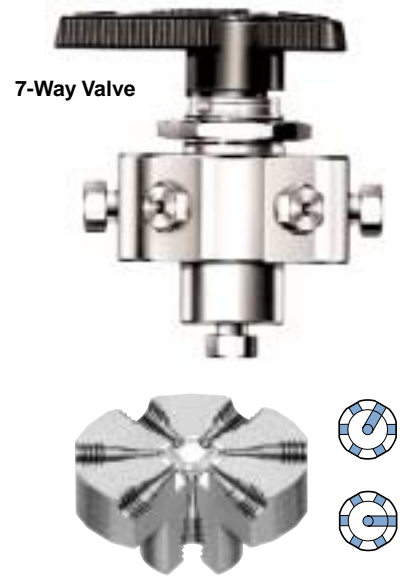
Add **-A** to the ordering number of a valve with the C dimension listed.

Example: **SS-43S4-A**

Dimensions shown with Swagelok tube fitting nuts finger-tight.

End Connections	Inlet/Outlet	Size	Basic Ordering Number	C <sub>v</sub>	Angle	Orifice		Dimensions, in. (mm)												
						in.	mm	A	B	B <sub>1</sub>	C	D	E	F	G	H	J	W		
Fractional Swagelok tube fittings	1/16	-41S1	0.1	—	0.052	1.3	1.68 (42.7)	0.84 (21.3)	—	—	—	—	—	—	—	—	—	—	—	
	1/8	-41S2	0.2	0.15	0.093	2.4	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	-42S4	0.6	0.35	0.125	3.2	2.21 (56.1)	1.10 (27.9)	1.07 (27.2)	—	—	—	—	—	—	—	—	—	—	—
		-43S4	1.4	0.90	0.187	4.8	2.36 (59.9)	1.18 (30.0)	1.17 (29.7)	0.44 (11.2)	0.38 (9.7)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.56 (39.6)	0.78 (19.8)	—	—	—	
	-43S6	1.5	0.90	2.58 (65.5)		1.29 (32.8)	1.29 (32.8)	—	—	—	—	—	—	—	—	—	—	—	—	
	3/8	-44S6	6.0	2.0	0.281	7.1	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)	—	—	—	—	
		-45S8	12	4.6	0.406	10.3	3.92 (99.6)	1.96 (49.8)	1.74 (44.2)	0.69 (17.5)	3.00 (76.2)	1 1/2 (38.1)	2.43 (61.7)	1.50 (38.1)	—	—	—	—	—	
3/4	-45S12	6.4	3.8	3.92 (99.6)		1.96 (49.8)	1.74 (44.2)	0.69 (17.5)	3.00 (76.2)	1 1/2 (38.1)	2.43 (61.7)	1.50 (38.1)	—	—	—	—	—	—		
Metric Swagelok tube fittings	3 mm	-41S3MM	0.2	0.15	0.093	2.4	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	-42S6MM	0.6	0.35	0.125	3.2	2.21 (56.1)	1.10 (27.9)	1.07 (27.2)	—	—	—	—	—	—	—	—	—	—	—
		-43S6MM	1.4	0.90	0.187	4.8	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)	1.56 (39.6)	0.78 (19.8)	—	—	—	
	8 mm	-43S8MM	1.5	0.90		2.46 (62.5)	1.23 (31.2)	1.20 (30.5)	—	—	—	—	—	—	—	—	—	—	—	
	10 mm	-44S10MM	6.0	2.0	0.281	7.1	3.07 (78.0)	1.53 (38.9)	1.43 (36.9)	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	-45S12MM	12	4.6	0.406	10.3	3.92 (99.6)	1.96 (49.8)	1.74 (44.2)	0.69 (17.5)	3.00 (76.2)	1 1/2 (38.1)	2.43 (61.7)	1.50 (38.1)	—	—	—	—	—		
Female NPT	1/8	-42F2	0.5	0.30	0.125	3.2	1.62 (41.1)	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)	—	—	—	
		-43F2	1.2	0.70	0.187	4.8	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)	1.56 (39.6)	0.78 (19.8)	—	—	—	
	1/4	-43F4	0.9	0.75		2.06 (52.3)	1.03 (26.2)	—	—	—	—	—	—	—	—	—	—	—	—	
		-44F4	3.0	1.7	0.281	7.1	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	-44F6	2.6	1.5		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)	1.50 (38.1)	—	—	—	—	—		
1/2	-45F8	6.3	3.5	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)	1.50 (38.1)	—	—	—	—			
Male NPT	1/4	-43M4	1.2	0.75	0.187	4.8	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)	1.56 (39.6)	0.78 (19.8)	—	—	—	
Male NPT/Swagelok tube fitting	1/4	-43M4-S4	1.6	0.75	0.187	4.8	2.20 (55.9)	1.00 (25.4)	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)	1.56 (39.6)	0.78 (19.8)	—	—	
Female ISO tapered	1/4	-43F4RT	0.9	—	0.187	4.8	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)	1.56 (39.6)	0.78 (19.8)	—	—	—	
	3/8	-44F6RT	2.6	—	0.281	7.1	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	-45F8RT	6.3	—	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)	1.50 (38.1)	—	—	—			
VCO fittings	1/4	-42VCO4	0.6	0.35	0.125	3.2	1.75 (44.4)	0.88 (22.4)	—	0.44 (11.2)	0.38 (9.7)	1.12 (28.4)	3/16 (4.8)	19/32 (15.1)	1.36 (34.5)	0.78 (19.8)	—	—	—	
		-43VCO4	2.4	0.90	0.187	4.8	1.88 (47.8)	0.94 (23.9)	—	0.44 (11.2)	0.38 (9.7)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.56 (39.6)	0.78 (19.8)	—	—	—	
Male VCR® fittings	1/4	-42VCR4	0.6	0.35	0.125	3.2	2.13 (54.1)	1.06 (26.9)	—	0.44 (11.2)	0.38 (9.7)	1.12 (28.4)	3/16 (4.8)	19/32 (15.1)	1.36 (34.5)	0.78 (19.8)	—	—	—	
		-43VCR4	2.4	0.90	0.187	4.8	2.13 (54.1)	1.03 (26.2)	—	0.44 (11.2)	0.38 (9.7)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.56 (39.6)	0.78 (19.8)	—	—	—	
	1/2	-44VCR8	6.0	—	0.281	7.1	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)	1.12 (28.4)	—	—	—		
		-45VCR8	12	—	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)	1.50 (38.1)	—	—	—	—		

## Switching (3-Way, 5-Way, and 7-Way) Valves



### Features

- Unique, top-loaded capsule packing allows reliable switching.
- Flow can be switched from a single inlet to multiple outlets or from multiple inlets to a common outlet.
- 3-way valve has a center-off position.
- 5- and 7-way 43 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

### Pressure-Temperature Ratings

Valve Series	Flow Pattern	Temperature Rating °F (°C)	Pressure Rating <sup>①</sup> psig (bar)
41X, 42X, 43X	3-way	50 to 150 (10 to 65)	2500 (172)
44X, 45X			1500 (103)
43Z	5-way		2500 (172)
45Z			1500 (103)
43Z6	7-way		500 (34.4)

① Pressure ratings for valves with Swagelok tube fitting ends may be lower. See Swagelok *Tube Fitting Data*, MS-01-107.

### Flow Data at 70°F (20°C)

C <sub>v</sub>	Pressure Drop to Atmosphere (Δp) psi					
	10	50	100	10	50	100
	Air Flow, std ft <sup>3</sup> /min			Water Flow, U.S. gal/min		
<b>2-Way Angle Pattern and 3-Way Valves</b>						
0.08	0.9	2.4	4.3	0.3	0.6	0.8
0.15	1.7	4.5	8.0	0.4	1.0	1.5
0.30	3.4	9.0	16	0.9	2.1	3.0
0.35	4.0	10	19	1.1	2.4	3.5
0.75	8.5	22	40	2.3	5.3	7.5
0.80	9.0	24	42	2.5	5.6	8.0
0.90	10	27	48	2.8	6.3	9.0
1.5	17	45	80	4.7	11	15
1.7	19	51	90	5.3	12	17
2.0	22	60	100	6.3	14	20
3.5	39	100	180	11	25	35
3.8	43	110	200	12	27	38
4.6	52	140	240	15	33	46
<b>5-Way Valves</b>						
0.07	0.8	2.1	3.7	0.2	0.5	0.7
3.5	39	100	180	11	25	35
<b>7-Way Valves</b>						
0.05	0.6	1.5	2.6	0.1	0.3	0.5
0.07	0.8	2.1	3.7	0.2	0.5	0.7

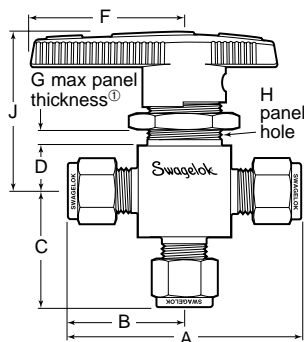
### Ordering Information and Dimensions

Add **SS** for 316 stainless steel, **B** for brass, or **M** for alloy 400 to the basic ordering number.

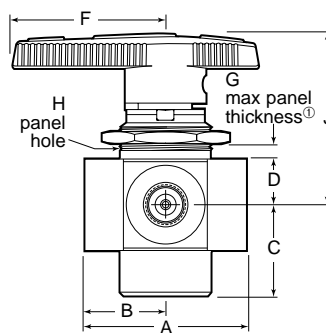
Example: **SS-43XS4**

Dimensions are for reference only and are subject to change.

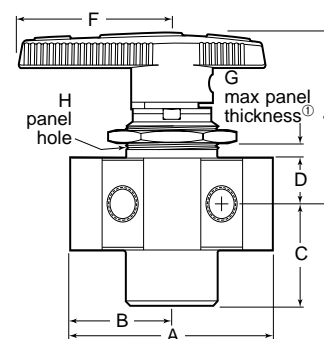
#### 3-Way Valve



#### 5-Way Valve



#### 7-Way Valve



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

End Connections		Basic Ordering Number	C <sub>v</sub>	Orifice		Dimensions, in. (mm)									
Inlet/Outlet	Size			in.	mm	A	B	C	D	F	G	H	J	W	
<b>3-Way Valves</b>															
Fractional Swagelok tube fittings	1/16	-41XS1	0.08	0.052	1.3	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 (15.0)	1.36 (34.5)	0.58 (14.7)	
	1/8	-41XS2	0.15	0.093	2.4	2.01 (51.1)	1.01 (25.7)	0.97 (24.6)							
	1/4	-42XS4	0.35	0.125	3.2	2.21 (56.1)	1.10 (27.9)	1.07 (27.2)							
		-43XS4	0.90	0.187	4.8	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)	1.56 (39.6)	0.78 (19.8)	
	3/8	-44XS6	2.0	0.281	7.1	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	-45XS8	4.6	0.406	10.3	3.48 (88.4)	1.74 (44.2)		0.69 (17.5)	3.00 (76.2)		1 1/2 (38.1)	2.43 (61.7)	1.50 (38.1)	
3/4	-45XS12	3.8													
Metric Swagelok tube fittings	3 mm	-41XS3MM	0.15	0.093	2.4	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 (15.0)	1.36 (34.5)	0.58 (14.7)	
	6 mm	-42XS6MM	0.35	0.125	3.2	2.21 (56.1)	1.10 (27.9)	1.07 (27.2)							
		-43XS6MM	0.90	0.187	4.8	2.39 (60.7)	1.20 (30.5)	1.17 (29.7)							0.44 (11.2)
	8 mm	-43XS8MM	0.80			2.46 (62.5)	1.23 (31.2)	1.20 (30.5)	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)	
	10 mm	-44XS10MM	2.0	0.281	7.1	2.89 (73.4)	1.45 (36.8)	1.43 (36.3)				0.69 (17.5)	3.00 (76.2)	1 1/2 (38.1)	2.43 (61.7)
12 mm	-45XS12MM	4.6	0.406	10.3	3.48 (88.4)	1.74 (44.2)		0.69 (17.5)	3.00 (76.2)						
Female NPT	1/8	-42XF2	0.30	0.125	3.2	1.63 (41.4)	0.81 (20.6)		0.34 (8.6)	1.13 (28.7)	1/4 (6.4)	19/32 (15.0)	1.36 (34.5)	0.58 (14.7)	
	1/4	-43XF4	0.75	0.187	4.8	2.06 (52.3)	1.03 (26.2)		0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.56 (39.6)	0.78 (19.8)	
		-44XF4	1.7	0.281	7.1	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	-44XF6	1.5			3.13 (79.5)	1.56 (39.6)		0.69 (17.5)	3.00 (76.2)		1 1/2 (38.1)	2.43 (61.7)	1.50 (38.1)	
	1/2	-45XF8	3.5	0.406	10.3	3.13 (79.5)	1.56 (39.6)		0.69 (17.5)	3.00 (76.2)					
Male NPT/ Swagelok tube fittings	1/4	-43XS4-S4-M4	0.80	0.187	4.8	2.40 (61.0)	1.20 (30.5)	1.03 (26.2)	0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.56 (39.6)	0.78 (19.8)	
Female ISO tapered	1/4	-43XF4RT	0.75	0.187	4.8	2.06 (52.3)	1.03 (26.2)		0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	25/32 (19.8)	1.56 (39.6)	0.78 (19.8)	
	3/8	-44XF6RT	1.5	0.281	7.1	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	-45XF8RT	3.5	0.406	10.3	3.13 (79.5)	1.56 (39.6)		0.69 (17.5)	3.00 (76.2)		1 1/2 (38.1)	2.43 (61.7)	1.50 (38.1)	
Male VCR fittings	1/4	-42XVCR4	0.35	0.125	3.2	2.13 (54.1)	1.06 (26.9)	1.09 (27.7)	0.44 (11.2)	1.13 (28.7)	3/16 (4.8)	19/32 (15.0)	1.36 (34.5)	0.78 (19.8)	
		-43XVCR4	0.90	0.187	4.8		1.53 (38.9)	25/32 (19.8)	1.56 (39.6)						
<b>5-Way Valves</b>															
Female Swagelok tube fittings	1/8	-43ZFS2 <sup>①</sup>	0.07	0.062	1.6	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	-43ZF2 <sup>①</sup>	0.07	0.062	1.6	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	-45ZF8-ND <sup>②</sup>	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)	—	
<b>7-Way Valves</b>															
Female Swagelok tube fittings	1/16	-43Z6FS1	0.05	0.052	1.3	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	-43Z6FS2	0.07	0.062	1.6										

Dimensions shown with Swagelok tube fitting nuts finger-tight.

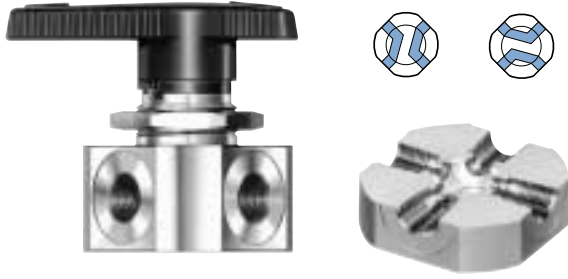
① Cross-port flow may occur during switching. If cross-port flow is unacceptable, specify a 0.049 in. ball orifice. Example: SS-43ZF2-049

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

### 4-Way Valve



### 6-Way Valve



### Features

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

### Pressure-Temperature Ratings

Valve Series	Flow Pattern	Temperature Rating °F (°C)	Working Pressure psig (bar)
43Y	4-way	50 to 150 (10 to 65)	2500 (172)
45Y			1500 (103)
43Y6	6-way		500 (34.4)

### Flow Data at 70°F (20°C)

C <sub>v</sub>	Pressure Drop to Atmosphere (Δp), psi					
	10			50		
	100			100		
Air Flow, std ft <sup>3</sup> /min			Water Flow, U.S. gal/min			
<b>4-Way Valves</b>						
0.06	0.7	1.8	3.2	0.2	0.4	0.6
0.08	0.9	2.4	4.2		0.5	0.8
1.6	18	48	85		5.0	11
<b>6-Way Valves</b>						
0.06	0.7	1.8	3.2	0.2	0.4	0.6
0.08	0.9	2.4	4.2		0.5	0.8

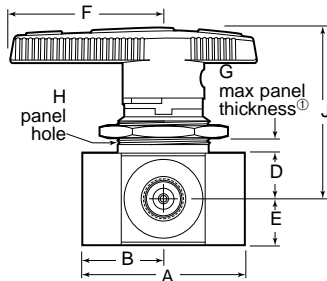
### Ordering Information and Dimensions

Dimensions are for reference only and are subject to change.

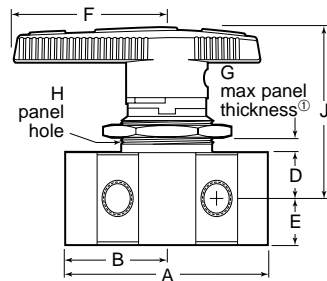
Add **SS** for 316 stainless steel, **B** for brass, or **M** for alloy 400 to the basic ordering number.

Example: **SS-43YF2**

#### 4-Way Valve



#### 6-Way Valve



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

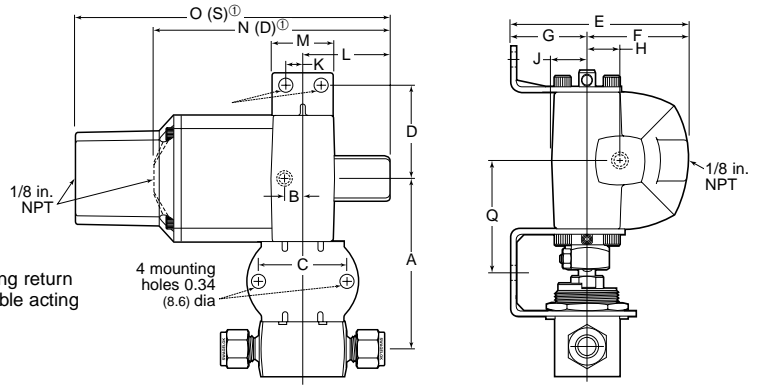
End Connection	Basic Ordering Number	C <sub>v</sub>	Orifice		Dimensions, in. (mm)								
			Type	Size	in.	mm	A	B	D	E	F	G	H
<b>4-Way Valves</b>													
Female Swagelok tube fitting	1/16	-43YFS1 ①	0.06	0.052	1.3	1.55 (39.4)	0.78 (19.8)	0.44 (11.2)	0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	29/32 (23.1)	1.68 (42.7)
	1/8	-43YFS2 ①				1.95 (49.5)	0.98 (24.9)						
Female NPT	1/8	-43YF2 ①	0.08	0.062	1.6	1.55 (39.4)	0.78 (19.8)	0.44 (11.2)	0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	29/32 (23.1)	1.69 (42.9)
	1/2	-45YF8 ②				3.13 (79.5)	1.56 (39.6)						
<b>6-Way Valves</b>													
Female Swagelok tube fitting	1/16	-43Y6FS1	0.06	0.052	1.3	1.95 (49.5)	0.97 (24.6)	0.44 (11.2)	0.44 (11.2)	1.53 (38.9)	3/16 (4.8)	29/32 (23.1)	1.68 (42.7)
	1/8	-43Y6FS2				0.08	0.062						

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**

## Pneumatic Actuators

Swagelok rack and pinion pneumatic actuators are compact, lightweight, easily mountable, and can be operated with standard shop air. For technical data, including pressure-temperature ratings and materials of construction, see the *Rack and Pinion Pneumatic Actuators for Swagelok Ball Valves* catalog, MS-06-87.



① S = spring return  
D = double acting

## Dimensions

Valve Series	Actuator Model	Dimensions, in. (mm)														
		A	B	C	D	E	F	G	H	J	K	L	M	N	O	Q
41, 41-A, 41X, 42, 42-A, 42X	-131	2.81 (71.4)			1.75 (44.5)	3.04 (77.2)	1.73 (43.9)	1.31 (33.3)	0.60 (15.2)	0.52 (13.2)	0.31 (7.9)	1.46 (37.1)	1.25 (31.8)	4.09 (104)	4.91 (125)	1.80 (45.7)
	-151	2.91 (73.9)	0.34 (8.6)	2.00 (50.8)												
43, 43-A, 43X, 43Y	-133 -153	3.72 (94.5)														2.30 (58.4)
		4.13 (104)	0.48 (12.2)	2.00 (50.8)	2.31 (58.7)	4.07 (103)	2.32 (58.9)	1.75 (44.5)	0.75 (19.1)	0.81 (20.6)	0.44 (11.2)	2.16 (54.9)	1.56 (39.6)	5.89 (150)	7.86 (200)	2.56 (65.0)
44, 44-A, 44X		4.25 (108)		2.19 (55.6)												
45, 45-A, 45X, 45Y																

## Actuator Pressure at Maximum System Pressure

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

Actuator Model	Actuator Designator	Valve Series	Actuation Modes			
			Double Acting		Spring Return	
			Single	Dual	Single	Dual
			Minimum Actuator Pressure, psig (bar)			
-131 (90°)	-31	41, 41-A, 42, 42-A	20 (1.4)	35 (2.5)	60 (4.2)	70 (4.9)
		43, 43-A, 43Y	50 (3.5)	80 (5.6)	80 (5.6)	—
-151 (180°)	-51	41X, 42X	20 (1.4)	35 (2.5)	60 (4.2)	70 (4.9)
		43X	50 (3.5)	80 (5.6)	70 (4.9)	—
-133 (90°)	-33	43, 43-A, 43Y	20 (1.4)	35 (2.5)	65 (4.5)	75 (5.2)
		44, 44-A	25 (1.8)	50 (3.5)	70 (4.9)	90 (6.3)
		45, 45-A, 45Y	60 (4.2)	100 (6.9)	90 (6.3)	—
-153 (180°)	-53	43X	20 (1.4)	35 (2.5)	65 (4.5)	70 (4.9)
		44X	25 (1.8)	50 (3.5)	70 (4.9)	80 (5.6)
		45X	60 (4.2)	100 (6.9)	85 (5.9)	—

## Other Actuator Options

### For Field Assembly or Factory Assembly

#### Electric Actuators

For information, see the *Swagelok Electric Actuators—141 and 142 Series* catalog, MS-01-35.

#### Solenoid Valves

For information, see the *Swagelok Solenoid Valves for Electropneumatically Actuated Ball Valves* catalog, MS-02-41.

#### Limit Switches

indicate actuator position by means of an electrical signal. They meet a variety of NEMA ratings such as NEMA 4 (weatherproof) and NEMA 7 (explosion proof). For more information, see the *Swagelok Limit Switches* catalog, MS-06-39.

#### Position Indicators

provide visual status of a valve.

#### ISO 5211-Compliant Actuator Mounting Bracket Kits

For information, see the *Swagelok Actuated Ball Valve Selection Guide*, MS-02-136.

## Ordering Information

### Factory-Assembled Actuators

#### Typical Ordering Number

**SS - 43S4 - 31D**

Valve Ordering Number

Actuator Designator  
Determine valve series, then select actuator model (see **Actuator Pressure** table).

Actuation Mode

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

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

Example: SS-43S4-31DDM

### Actuators for Field Assembly

#### Typical Ordering Number

**MS - 131 - DA**

Actuator Model

Determine valve series, then select actuator model (see **Actuator Pressure** table).

Actuation Mode

DA = double acting  
SR = spring return

## Mounting Bracket Kits

Valve Series	Actuator Model	Ordering Number
41, 41-A, 42, 42-A	-131	MS-MB-41 <sup>①</sup>
41X, 42X	-151	
43, 43-A	-131	MS-MB-43
43X	-151	
43, 43-A	-133	MS-MB-43-133
43X	-153	
43Y	-131	MS-MB-43Y
	-133	MS-MB-43Y-133
44, 44-A	-133	MS-MB-44 <sup>②</sup>
44X	-153	
45, 45-A	-133	MS-MB-45
45X	-153	
45Y	-133	MS-MB-45Y

① 42 series valves with VCO or VCR end connections mounted to an actuator are only available factory assembled.

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

## Options

### Handles

#### Factory-Assembled Nylon

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

Example: SS-43S4-**BL**

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



#### 316 Stainless Steel Bar

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

Example: SS-43S4-**SH**



#### Aluminum Bar

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

Example: SS-43S4-**BKB**



#### Nylon Oval (2- and 3-Way)

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

Example: SS-43S4-**K**

Nylon oval handles are available factory assembled only.

### Handle Kits

include handle and set screw.

Valve Series	Nylon Directional Handle Basic Ordering Number <sup>①</sup>	Stainless Steel Bar Handle Ordering Number	Aluminum Bar Handle Ordering Number
41, 41-A, 41X, 42, 42-A, 42X	BZ-5K-42	SS-5K-42B	A-5K-42B-BK
43, 43-A, 43X, 43Y	BZ-5K-43	SS-5K-43B	A-5K-43B-BK
43Z	BZ-5K-43Z	—	—
44, 44-A, 44X	BZ-5K-44	SS-5K-44B	A-5K-44B-BK
45, 45-A, 45X, 45Y	BZ-5K-45	SS-5K-45B	A-5K-45B-BK

<sup>①</sup> For a complete ordering number, add a handle color designator to the basic ordering number. Example: BZ-5K-42-**BK**

### Vented Valves

#### 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.

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

Example: SS-43VS4

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

Cross-port flow may occur during actuation. If cross-port flow is unacceptable, specify a ball orifice of:

- 0.040 in. for 41 and 42 series valves. Example: SS-41VS1-**040**
- 0.049 in. for 43 and 44 series valves. Example: SS-43VS4-**049**
- 0.093 in. for 45 series valves. Example: SS-45VS8-**093**

#### 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.**

### Special Cleaning and Packaging (SC-11)

To order 40 series ball valves 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, add **-SC11** to the valve ordering number.

Example: SS-43S4-**SC11**

### Valves Assembled Without Lubrication

40 series ball valves assembled without lubricant are cleaned and packaged in accordance with Swagelok *Special Cleaning and Packaging (SC-11)*, MS-06-63, and are adjusted for factory testing at 200 psig (13.7 bar). Valves have a pressure rating of 200 psig (13.7 bar). Brass valves are assembled with stainless steel rings, discs, and stem. To order, add **-1466** to the valve ordering number.

Example: SS-43S4-**1466**

### Low-Temperature Service

Live-loaded packing option extends the temperature range to -65 to 150°F (-53 to 65°C).

For more information, see the Swagelok *Live-Loaded 40 Series Ball Valves for Low-Temperature Service* catalog, MS-02-109.

### 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.

### Sour Gas Service

40 series ball valves with female pipe ends are available for sour gas service. Materials for wetted valve components are selected in accordance with NACE Standard MR0175 for sulfide stress cracking resistant materials. Stem, rings, and discs are alloy 400. To order, add **-SG** to the valve ordering number.

Example: SS-43F4-**SG**

### Directional Name Plates

Directional name plates indicate the direction of flow.

A matte surface accepts ink or labels. To order, add **-WN1** (blank nameplate) or **-WN2** (marked nameplate) to the valve ordering number.

Example: SS-43S4-**WN1**

### Optional Flow Paths

40 series ball valves are available with a variety of flow paths to accommodate many special applications.

For more information, see the Swagelok *40 Series Ball Valve Flow Path Options* catalog, MS-02-30.

### Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit [swagelok.com](http://swagelok.com) or contact your authorized Swagelok representative.