

W68/W88/W98 Series

CONTROL VALVES



Throttling or regulating valves are designed for flow and pressure control applications. Fluid flows against the tapered curve of the valve seat allowing a calculated amount of flow through as it opens and closes. The throttling valve is typically equipped with a positioner. Throttling valves are used for flow control, pressure control, filler level control, and modulated filling.

SPX FLOW, Inc. (NYSE:FLOW) is a leading manufacturer of innovative flow technologies, many of which help define the industry standard in the market segments they serve. From its headquarters in Charlotte, North Carolina, it operates a sales and support network, centers of manufacturing excellence, and advanced engineering facilities, throughout the world. Its cutting-edge flow components and process equipment portfolio includes a wide range of pumps, valves, heat exchangers, mixers, homogenizers, separators, filters, UHT, and drying technology that meet many application needs. Its expert engineering capability also makes it a premium supplier of customized solutions and complete, turn-key packages to meet the most exacting of installation demands.

Incorporating many leading brands, SPX FLOW has a long history of serving the food and beverage, power and energy, and industrial market sectors. Its designs and engineered solutions help customers drive efficiency and productivity, increase quality and reliability, and meet the latest regulatory demands. In-depth understanding of applications and processes, state-of-the-art Innovation Centers, and advanced pilot/testing technology further assist in optimizing processes and reducing timescales to reliably meet production targets.

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Control Valves

PRODUCT FEATURES AND BENEFITS

- Utilizes standard W60/W80/W90 single seat components offering machined-from-bar bodies, modular design, and low cost of ownership
- Various body configurations allow the control of reverse-acting (W68R), converging (W682), and diverging (W685) flows
- Multiple tapered seat Cv values available for valve size
- Tri Ring seat available for throttling and shut-off dual functionality
- Fully pneumatic positioner available as cost-effective positioning option
- Advanced electropneumatic positioner option provides direct 4-20mA signal and simple set-up for accurate and stable positioning without continuous leakage of supply air

PRODUCT SPECIFICATIONS

Materials

Product Wetted:

- ASTM 316L (UNS-S31603); (DIN-1.4404)

Non-Product:

- ASTM 304 (UNS-S30400); (DIN -1.4301)

Seat Material:

- Metal or Tri Ring

Elastomer:

- FKM
- EPDM

Internal Surface Finish:

- ≤ 32Ra (≤.8 m) Other finishes available upon request

Sizes:

- 1" - 6" Tube O.D. (25 mm - 152 mm)

PRESSURE RATINGS

STANDARD ADAPTER						
VALVE SIZE WITH PRESSURE AT	1.0"/1.5" (25/38 mm)	2.0" (51 mm)	2.5" (64 mm)	3.0" (76 mm)	4.0" (102 mm)	6.0** (152 mm)
70°F (20°C)	500 psi (34.5 bar)	450 psi (31 bar)	400 psi (28 bar)	350 psi (24 bar)	200 psi (14 bar)	150 psi (10 bar)
160/180°F (71/82°C)	375 psi (26 bar)	350 psi (24 bar)	300 psi (17 bar)	250 psi (17 bar)	150 psi (10 bar)	100 psi (6 bar)
250°F (121°C)	250 psi (17 bar)	250 psi (17 bar)	200 psi (14 bar)	150 psi (10 bar)	125 psi (8 bar)	75 psi (5 bar)

HIGH PRESSURE ADAPTER AND CLAMPS						
VALVE SIZE WITH PRESSURE AT	1.0"/1.5" (25/38 mm)	2.0" (51 mm)	2.5" (64 mm)	3.0" (76 mm)	4.0" (102 mm)	6.0** (152 mm)
70°F (20°C)	1220 psi (84 bar)	900 psi (62 bar)	720 psi (49 bar)	--	--	--
160/180°F (71/82°C)	1160 psi (80 bar)	855 psi (60 bar)	690 psi (47 bar)	--	--	--
250°F (121°C)	1100 psi (75 bar)	830 psi (57 bar)	660 psi (45 bar)	--	--	--

**6" (152 mm) valves available in W61 Shutoff and W65 Divert only. For oth

HOW TO SIZE A VALVE

Throttling valves control flow rate based on the differential pressure expected across the valve; therefore flow rate and differential pressure are required to size a throttling valve.

NOTE: A properly sized throttling valve may not necessarily be the same physical size as the line in which it will be installed.

To calculate Cv for the process:

$$Cv = \frac{GPM}{\sqrt{P/SG}}$$

Cv = Valve Flow Coefficient
GPM = Flow in Gallons Per Minute
SG = Specific Gravity
P = Differential Pressure (in PSI)

$$Cv = \frac{20}{\sqrt{16/1.0}}$$

Product = Water
Cv = 5
GPM = 20
SG = 1.0
P = 16
(valve inlet pressure minus outlet pressure)

Cv = 5

To choose a Throttling Valve for a process Cv of 5, find this value in the Cv Factor table below. This will determine the valve size and valve Cv factor to be used in this application. Throttling valves should operate between 20-80% stroke, with 50% being the optimum operating point.

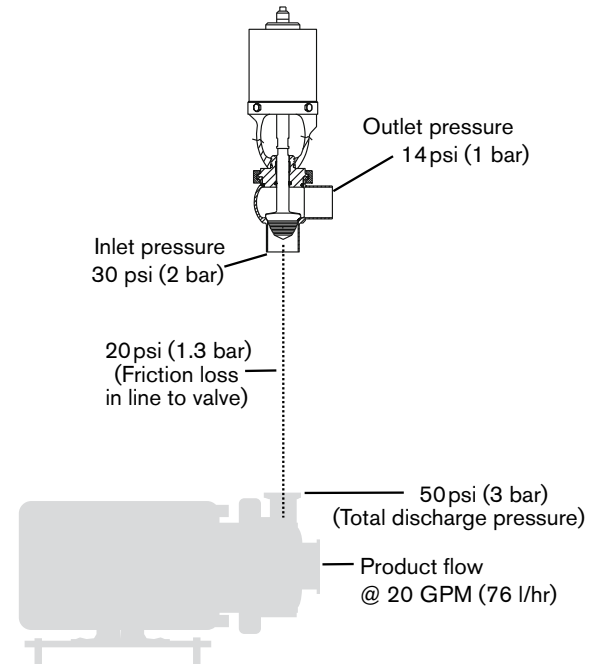
Typical product applications

Food and Beverage

Dairy
Beverage
Brewery
Clean In Place
Personal Care



Industrial Chemical



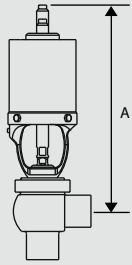
Cv FACTOR

The correct valve to use with this application is a W68, 1.5" (38 mm) size with a Cv10 plug, operating at 50% stroke.

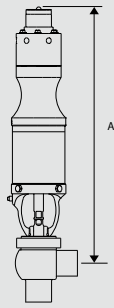
% OF VALVE STROKE	1.0"-1.5" (25 - 38')				VALVE SIZE - INCHES TUBE OD INCH (mm)										% OF VALVE STROKE
					1.5 (38)		2 (51)		2.5 (63)		3 (76)		4 (101)		
	Cv 1.75	Cv 2.5	Cv 5.0	Cv 7.5	Cv 10	Cv 35	Cv 30	Cv 70	Cv 60	Cv 120	Cv 90	Cv 150	Cv 110	Cv 210	
10	.175	.25	.50	.75	1	3.5	3	7	6	12	9	15	11	21	10
20	.35	.50	1	1.5	2	7	6	14	12	24	18	30	22	42	20
30	.53	.75	1.5	2.25	3	10.5	9	21	18	36	27	45	33	63	30
40	.70	1	2	3.0	4	14	12	28	24	48	36	60	44	84	40
50	.88	1.25	2.5	3.75	5	17.5	15	35	30	60	45	75	55	105	50
60	1.05	1.5	3	4.5	6	21	18	42	36	72	54	90	66	126	60
70	1.22	1.75	3.5	5.25	7	24.5	21	49	42	84	63	105	77	147	70
80	1.4	2	4	6.0	8	28	24	56	48	96	72	120	88	168	80
90	1.58	2.25	4.5	6.75	9	31.5	27	63	54	108	81	135	99	189	90
100	1.75	2.5	5	7.5	10	35	30	70	60	120	90	150			

¹ Not available for W682 and W685.

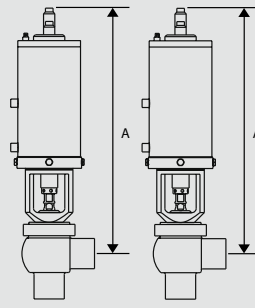
PRODUCT DIMENSIONS



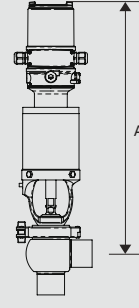
- 4AR**
4" (102 mm) Air to Raise
- 4AL**
4" (102 mm) Air to Lower
- 4AA**
4" (102 mm) Air to Air
- 5AR**
5" (127 mm) Air to Raise
- 5AL**
5" (127 mm) Air to Lower
- 5ALD**
5" (127 mm) Air to Lower, Diaphragm
- 5AA**
5" (127 mm) Air to Air
- 6AR**
6" (152 mm) Spring, Air to Raise
- 6AL**
6" (152 mm) Spring, Air to Lower
- 6AA**
6" (152 mm) Air to Air



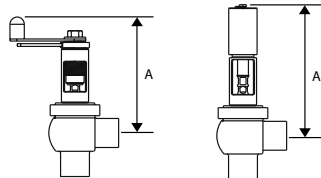
- 4ARP**
4" (102 mm) Air to Raise Positioner
- 4ALP**
4" (102 mm) Air to Lower Positioner
- 5ARP**
5" (127 mm) Air to Raise Positioner
- 5ALP**
5" (127 mm) Air to Lower Positioner
- 5ALDP**
5" (127 mm) Air to Lower, Diaphragm Positioner
- 6ARP**
6" (152 mm) Spring, Air to Raise Positioner
- 6ALP**
6" (152 mm) Spring, Air to Lower Positioner



- 3-position actuators move valve to raised, lowered and a manually adjustable mid-position.
- 4AR3**
4" (102 mm) Air to Raise 3 position
 - 4AL3**
4" (102 mm) Air to Lower 3 position



- Electropneumatic positioner option (4-20 mA), interchangeable for AR or AL, with custom trim selections.
- 4ALEP**
4" (102 mm) Air to Lower Electropneumatic Positioner
 - 5ALEP**
5" (127 mm) Air to Lower Electropneumatic Positioner
 - 6ALEP**
6" Air to Lower Electropneumatic Positioner
 - 4AREP**
4" (102 mm) Air to Raise Electropneumatic Positioner
 - 5AREP**
5" (127 mm) Air to Raise Electropneumatic Positioner
 - 6AREP**
6" (152 mm) Air to Raise Electropneumatic Positioner



H - Hand Lock M - Micrometer

STROKE LENGTH

VALVE SIZE INCH (mm)	1.0 (25)	1.5 (38)	2.0 (51)	2.5 (63)	3.0 (76)	4.0 (101)
W68/W68R	.85 (22)	.85 (22)	.85 (22)	.85 (22)	.85 (22)	.85 (22)
W682	-	.68 (17)	.68 (17)	.68 (17)	.68 (17)	.68 (17)
W685	-	.75 (19)	.75 (19)	.75 (19)	.75 (19)	.75 (19)

"A" DIMENSIONS*

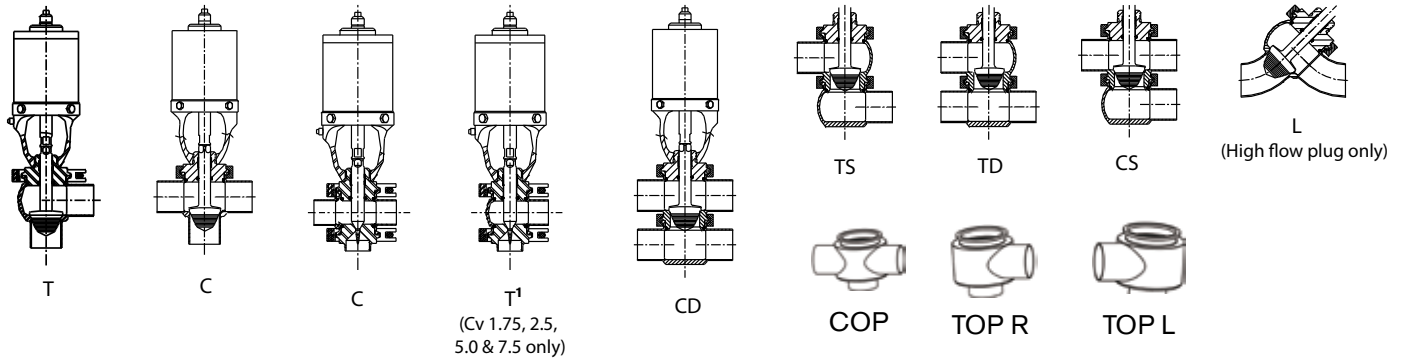
VALVE SIZE INCH (mm)	4 AR 4 AL 4 AA	5 AR 5 AL 5 AA	6 AR 6 AL 6 AA	H	M	4AL3	4AR3	4ARP 4ALP	5ARP 5ALP	6ARP 6ALP	5ALD	5ALDP	4ALEP 4AREP	5ALEP 5AREP	6ALEP 6AREP
1.0 (25)	12.58 (320)	13.89 (352)	15.65 (397)	8.65 (220)	9.7 (246)	14.68 (372)	16.07 (408)	20.01 (509)	21.32 (542)	23.08 (587)	11.99 (305)	17.73 (450)	18.13 (461)	19.44 (494)	21.20 (538)
1.5 (38)	12.58 (320)	13.89 (352)	15.65 (397)	8.65 (220)	9.7 (246)	14.68 (372)	16.07 (408)	20.01 (509)	21.32 (542)	23.08 (587)	11.99 (305)	17.73 (450)	18.13 (461)	19.44 (494)	21.20 (538)
2.0 (50)	12.83 (326)	14.14 (359)	15.90 (404)	8.90 (226)	9.9 (251)	14.93 (379)	16.32 (415)	20.26 (515)	21.57 (548)	23.33 (593)	12.24 (311)	17.98 (457)	18.38 (467)	19.69 (500)	21.45 (545)
2.5 (63)	13.08 (332)	14.39 (366)	16.15 (410)	9.15 (232)	10.2 (259)	15.1 (383)	16.57 (421)	20.51 (521)	21.82 (555)	23.58 (599)	12.49 (317)	18.23 (463)	18.63 (473)	19.94 (506)	21.70 (551)
3.0 (63)	13.33 (339)	14.64 (372)	16.40 (417)	9.40 (239)	10.4 (264)	15.3 (388)	16.82 (427)	20.76 (528)	22.07 (561)	23.83 (605)	12.74 (324)	18.48 (469)	18.88 (480)	20.19 (512)	21.95 (559)
4.0 (101)	13.81 (351)	15.12 (384)	16.88 (429)	9.88 (250)	10.9 (277)	15.8 (401)	17.30 (439)	21.24 (540)	22.55 (573)	24.31 (618)	13.22 (336)	19.00 (484)	19.40 (495)	20.70 (528)	22.50 (576)

Note: For all valves with WCB 2-piece control tops, add 3.23" (82 mm) Standard.

* "A" Dimension is in fully extended (open) position.

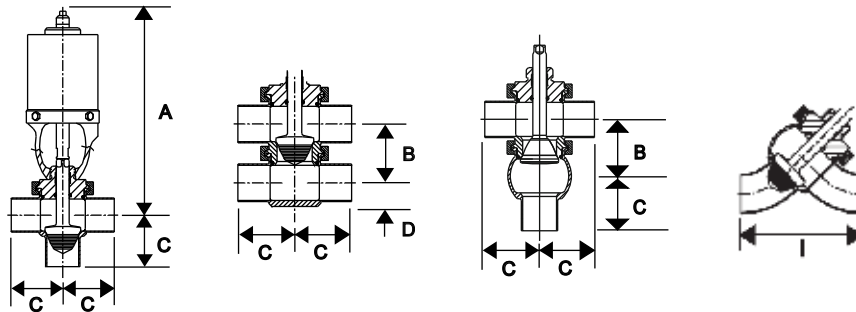
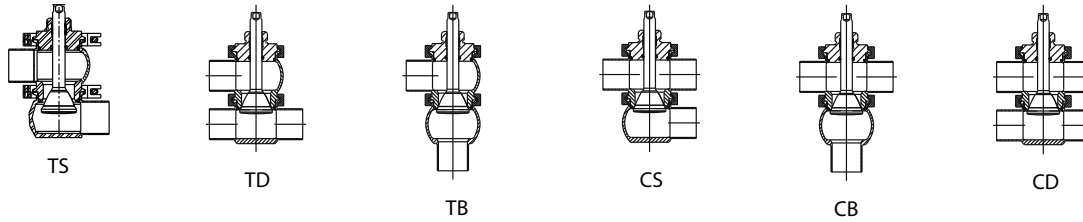
PRODUCT DIMENSIONS

W68



¹ Not Available for W682 and W685.

W68R

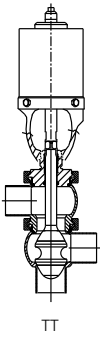


VALVE SIZE INCH (mm)	A	B	C WELD	C S-LINE	D	I WELD	I S-LINE
1.0* (25)	See page 10 for Actuator Options	2.63 (67)	2.00 (51)	3.12 (79)	.69 (18)	3.90 (120)	6.12 (155)
1.5 (38)		2.63 (67)	2.25 (57)	2.75 (70)	.94 (24)	4.76 (120)	5.73 (146)
2.0 (51)		3.13 (79.5)	3.00 (76)	3.50 (89)	1.19 (30)	6.23 (158)	7.21 (183)
2.5 (63)		3.63 (92)	3.00 (76)	3.50 (89)	1.44 (30)	7.69 (195)	8.67 (220)
3.0 (76)		4.13 (105)	3.25 (83)	3.75 (95)	1.69 (43)	9.15 (232)	10.13 (257)
4.0 (101)		5.11 (130)	3.88 (99)	4.50 (114)	2.32 (59)	11.95 (303)	13.17 (335)

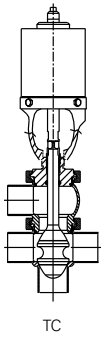
*1.0 size throttling valves are only available for Cv 1.75, 2.5, 5.0 & 7.5 in T or C body configurations.

PRODUCT DIMENSIONS

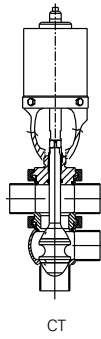
W682 CONVERGING THROTTLING



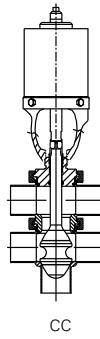
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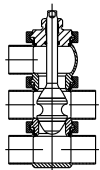
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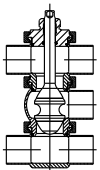
CT



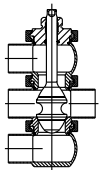
CC



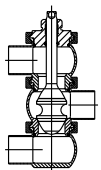
TCD



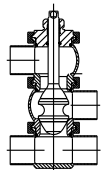
CTD



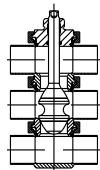
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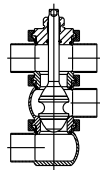
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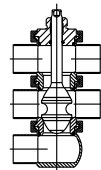
TTD



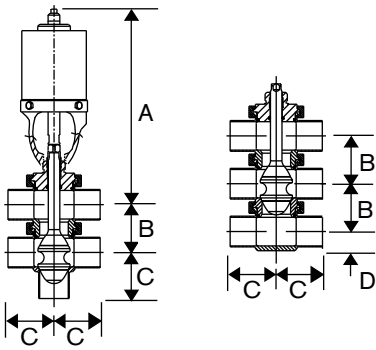
CCD



CTS



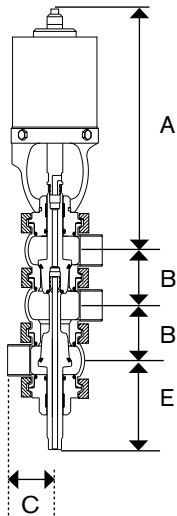
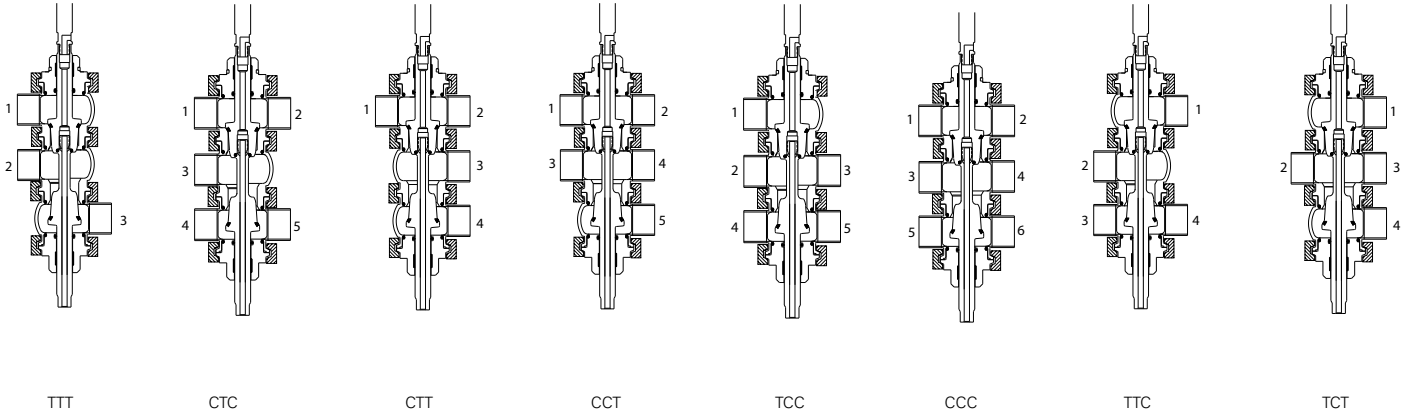
CCS



VALVE SIZE INCH (mm)	A	B	C - WELD	C - S-LINE	D
1.0 (25)	See page 10 for Actuator Options	2.63 (67)	2.00 (51)	3.12 (79)	.69 (17)
1.5 (25)		2.63 (67)	2.25 (57)	2.75 (70)	.94 (24)
2.0 (51)		3.13 (79.5)	3.00 (76)	3.50 (89)	1.19 (30)
2.5 (63)		3.63 (92)	3.00 (76)	3.50 (89)	1.44 (30)
3.0 (76)		4.13 (105)	3.25 (83)	3.75 (95)	1.69 (43)
4.0 (101)		5.11 (130)	3.88 (99)	4.50 (114)	2.32 (59)

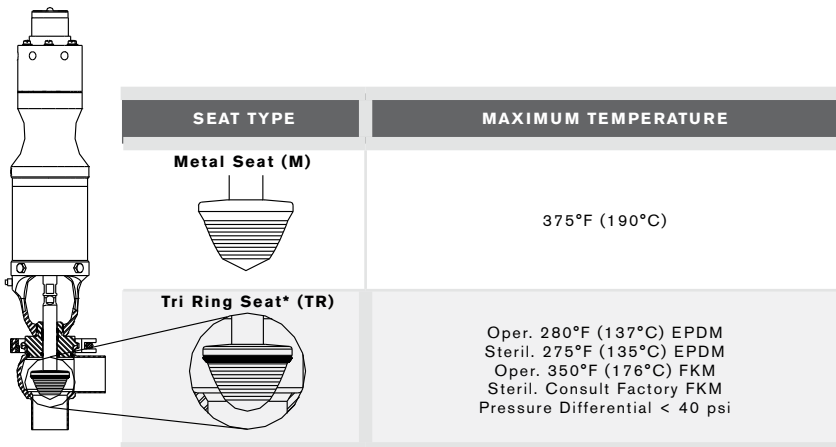
PRODUCT DIMENSIONS

W685 DIVERT THROTTLING



VALVE SIZE INCH (mm)	A	B	C WELD	C S-LINE	E
1.0 (25)	See Page 10 for actuator options	2.63 (67)	2.00 (51)	3.12 (79)	3.91 (99)
1.5 (40)		2.63 (67)	2.25 (57)	2.75 (70)	3.97 (101)
2.0 (50)		3.13 (79.5)	3.00 (76)	3.50 (89)	4.22 (107)
2.5 (65)		3.63 (92)	3.00 (76)	3.50 (89)	4.55 (116)
3.0 (80)		4.13 (105)	3.25 (83)	3.75 (95)	4.73 (120)
4.0 (100)		5.11 (130)	3.88 (99)	4.50 (114)	5.06 (129)
6.0 (152)		7.04 (179)	6.00 (152)	6.88 (175)	6.20 (157)

OPTIONS AND ACCESSORIES
SEAT OPTIONS



*Tri Ring seat not available on Cv 1.75, 2.5, 5.0 & 7.5 and 5ALD & 5ALDP actuated valves.

% OF VALVE STROKE	1.0" - 1.5" (25 - 38')				VALVE SIZE - INCHES TUBE OD INCH (mm)										% OF VALVE STROKE
					1.5 (38)		2 (51)		2.5 (63)		3 (76)		4 (101)		
	CV 1.75	CV 2.5	CV 5.0	CV 7.5	CV 10	CV 35	CV 30	CV 70	CV 60	CV 120	CV 90	CV 150	CV 110	CV 210	
10	.175	.25	.50	.75	1	3.5	3	7	6	12	9	15	11	21	10
20	.35	.50	1	1.5	2	7	6	14	12	24	18	30	22	42	20
30	.53	.75	1.5	2.25	3	10.5	9	21	18	36	27	45	33	63	30
40	.70	1	2	3.0	4	14	12	28	24	48	36	60	44	84	40
50	.88	1.25	2.5	3.75	5	17.5	15	35	30	60	45	75	55	105	50
60	1.05	1.5	3	4.5	6	21	18	42	36	72	54	90	66	126	60
70	1.22	1.75	3.5	5.25	7	24.5	21	49	42	84	63	105	77	147	70
80	1.4	2	4	6.0	8	28	24	56	48	96	72	120	88	168	80
90	1.58	2.25	4.5	6.75	9	31.5	27	63	54	108	81	135	99	189	90
100	1.75	2.5	5	7.5	10	35	30	70	60	120	90	150	110	210	100

*Not available for W682 and W685.

The Valve Flow Coefficient Cv is the standard measure of valve flow capacity.

Preliminary valve sizing may be done with the following formulas:

Formula for water and other products with a specific gravity equal to 1.0:
$$Cv = \frac{GPM}{\sqrt{P \text{ (psi)}}}$$

Formula for products where specific gravity will vary from water 1.0:
$$Cv = \frac{GPM}{\sqrt{P \text{ (psi)}/SG}}$$

If the viscosity of the flowing fluid is below 100 Saybolt Seconds Universal (SSU) or 20 Centistokes, the viscosity effect may be disregarded. Beyond these limits, viscosity correction should be made. Contact Waukesha Cherry-Burrell Application Engineering. After the Cv factor for a specific application has been calculated, select the size valve where the Cv factor is closest to 50% of stroke for the valve size selected. 50% stroke is the optimum operating point. Optimum operating range is 20%-80% stroke.

See page 3 for a valve sizing example for flow control.

Where:

GPM=Product flow rate in gallons per minute.

SG=Specific gravity of product.

P=Pressure drop across valve in psi
(Inlet pressure minus outlet pressure).

Cv=Valve Flow Coefficient.

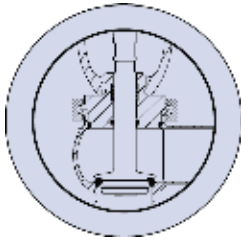
Metric Conversions:

$$Cv = 1.156 (Kv) \quad Kv = \frac{m^3/hr}{\sqrt{P \text{ (Bar)}/SG}}$$

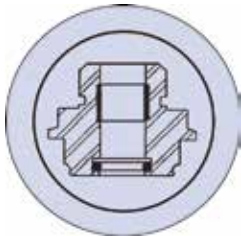
1 bar=14.5 psi 1m³/hr=4.4 GPM

ADAPTER OPTIONS

Throttling valves are also available in W88 Stem Flush or W98 Diaphragm Stem options.



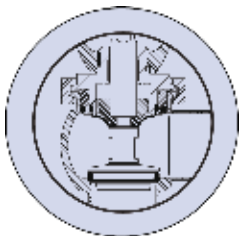
The 'standard' adapter is used on all models of short and long stroke W60 Series valves. Machined from SS 316L bar with a thick cross-section, the adapter adds strength to the valve body and provides alignment for the stem. The outer perimeter seals to the valve body with an o-ring that is located forward to the product zone to minimize crevices. The product stem passes through the adapter and is sealed to the adapter with an o-ring. TFM bearing guides the stem and takes up the mechanical loading imparted by hydraulic forces. This increases the service life of the stem seal. Adapters are made in 1" - 6" (25 mm - 152 mm) sizes.



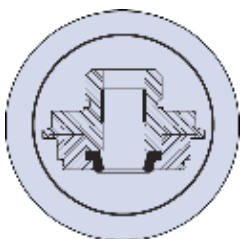
The pressure limitation of the W60 adapter is the sealing capability of the dynamic o-ring on the product stem. This variation of the W60 adapter uses a backing ring added on the atmospheric side to support the stem o-ring. This significantly boosts the pressure rating on the stem o-ring. The product stem passes through the adapter and is sealed to the adapter with an o-ring and is guided by a TFM bearing.



This adapter is used to convert a 'standard' W60 series valve to a W80. The outer perimeter seals to the valve body with an o-ring that is located forward to the product zone to minimize crevices. The product stem passes through the adapter and is sealed in the upper part and the lower part of the adapter with o-rings. The space between the o-rings is flushed with a suitable liquid or steam. TFM bearing is located in the flushed chamber. Adapters are made in 1" - 6" (25 mm - 152 mm) sizes. For vacuum-rated, extended shelf-life (ESL) applications, the W80A adapter adds steam trace to the adapter-to-valve body connection.



This adapter is used to convert a 'standard' W60 series valve to a diaphragm-stem seal valve for use with extended shelf-life (ESL) applications. The valve stem is modified to work in conjunction with the adapter. This adapter is made in sizes 1.5" (38 mm) through 4" (102 mm). All sizes use the 1.5" (38 mm) diaphragm with the difference in diameter being taken up by a spacer ring. The outer perimeter of the spacer ring is sealed to the 'standard' W60 body with an o-ring. The stem used with the W90 adapter is a two piece design. The standard seat option is FDA compliant Tef-Flow™ P, suitable to 280°F (138°C) and high pressures. Other seat options include elastomer (EPDM and FKM) Tri Ring and metal seats.



For high-risk and hard to clean product applications, the wiping stem seal fills the gap between the product zone and the traditional o-ring stem seal. The adapter is a two-piece design to allow easy inspection or replacement of the wiping stem seal. The outer perimeter seals to the valve body with an o-ring that is located forward to the product zone to minimize crevices. TFM bearing is used to guide and support the valve stem.

OPTIONS AND ACCESSORIES

ACTUATOR TYPES

Air to Spring, Piston Actuator

For use in a wide range of product pressures, including high pressure applications. Control Air Supply Pressure is 18 psi (1 bar) to 42 psi (3 bar) (See Figure 1)). Maximum air pressure is 150 psi (10 bar).

Available in Air-to-Raise (AR) or Air-to-Lower (AL).

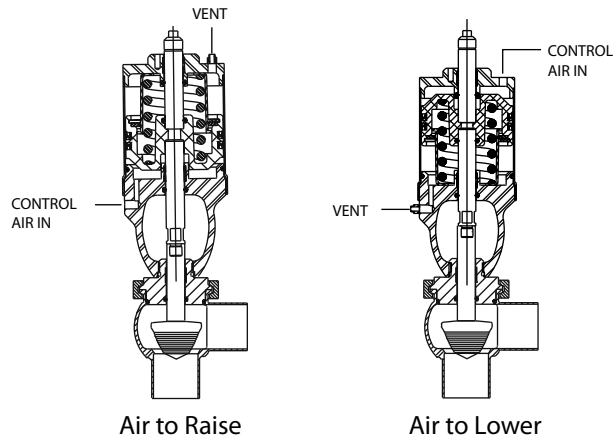
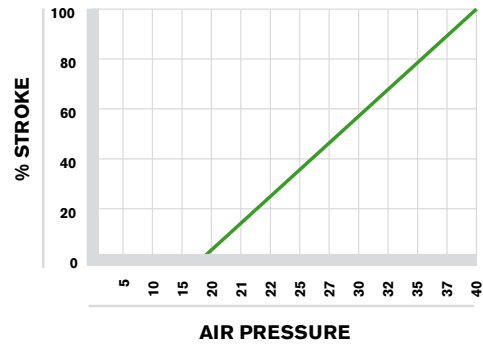


Figure 1: Air Pressure vs. % Stroke*

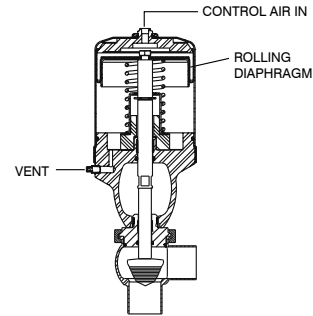


*For Air to Spring Actuators (without positioner).

Percent stroke based on 4" (102 mm) & 5" (127 mm) standard springs and 6" (152 mm) light springs.

Rolling Diaphragm Actuator

For use in low product pressure applications. Eliminates breakaway friction and increases sensitivity of the actuator to pressure change. Control Air Supply Pressure is 3 psi (.21 bar) to 15 psi (1 bar). Maximum air pressure is 45 psi (3 bar). Available in Air-to-Lower (ALD).



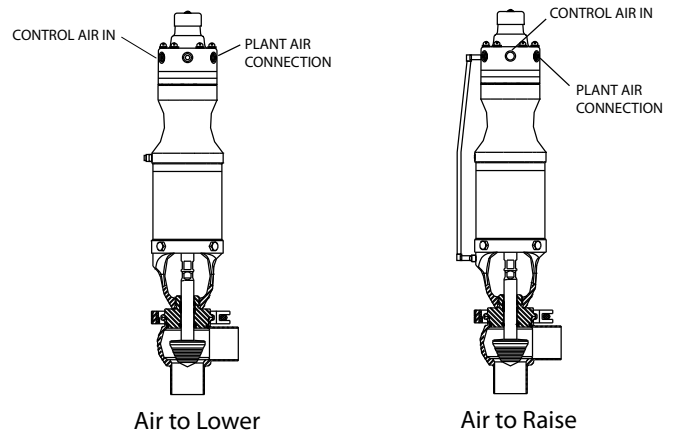
Air to Lower, diaphragm

Actuators with Positioner

Where exacting control of flow or pressure is required, positioners operate using a control signal and plant air supply. Positioners hold the stem in position relative to the signal input for repeatable performance. Two types of positioners are available: fully pneumatic (3 - 15 psi (0.2 - 1 bar) air signal) and electropneumatic (4-20 mA signal).

Air-to-spring actuators are available in both Air-to-Raise (ARP & AREP) and Air-to-Lower (ALP & ALEP), with direct (as signal input increases, supply air to actuator increases) or reverse-acting positioners. Air Supply Pressure is min 70 psi (5 bar) to max 100 psi (7 bar).

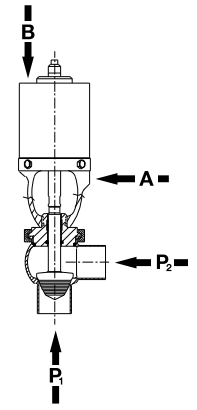
Rolling diaphragm actuators are available Air-to-Lower only (ALDP). Specify direct or reverse acting positioner on order. Maximum air pressure is 45 psi (3 bar).



**ADDITIONAL TECHNICAL DATA
W68 HOLDING PRESSURE CHARTS**

W68 AR (Air-to-Raise)

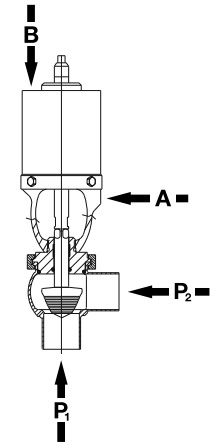
		ACTUATOR SIZE (IN)	VALVE SIZE - INCHES (mm) - PRESSURE IN psi (bar)					
			1" (25)	1.5" (38)	2" (51)	2.5" (64)	3" (76)	4" (102)
PORT P1, ACTUATOR SPRING HOLDS CLOSED AGAINST:		4AR	160 (11)	125 (8)	70 (5)	45 (3)	31 (2)	18 (1)
		5AR	251 (17)	220 (15)	124 (8)	79 (5)	55 (4)	31 (2)
		6AR	347 (24)	317 (22)	178 (12)	114 (8)	79 (5)	45 (3)
PORT P2, AIR TO PORT A, WILL OPEN AGAINST:	50 psi (3 bar)	4AR	223 (15)	270 (19)	132 (9)	80 (5)	54 (4)	29 (2)
	50 psi (3 bar)	5AR	356 (24)	398 (27)	195 (13)	118 (8)	79 (5)	43 (3)
	50 psi (3 bar)	6AR	-	-	278 (19)	168 (11)	113 (8)	61 (4)



* NOTE: 1" (5 mm) size throttling valves are only available for Cv 1.75, 2.5, 5.0 & 7.5

W68 AL (Air-to-Lower)

		ACTUATOR SIZE (IN)	VALVE SIZE - INCHES (mm) - PRESSURE IN psi (bar)					
			1" (25)	1.5" (38)	2" (51)	2.5" (64)	3" (76)	4" (102)
PORT P2, ACTUATOR SPRING OPENS STEM AGAINST:		4AL	288 (20)	335 (23)	164 (11)	99 (7)	67 (4)	36 (2)
		5AL	-	-	216 (15)	131 (9)	88 (6)	47 (3)
		6AL	-	-	260 (18)	157 (11)	106 (7)	57 (4)
		5ALD	-	61 (4)	30 (2)	18 (1)	12 (0.8)	7 (0.4)
PORT P1, AIR TO PORT B, WILL HOLD CLOSED AGAINST:	50 psi (3 bar)	4AL	111 (7)	76 (5)	43 (3)	27 (2)	19 (1)	11 (0.7)
	50 psi (3 bar)	5AL	218 (15)	187 (13)	105 (7)	67 (4)	47 (3)	27 (2)
	50 psi (3 bar)	6AL	383 (26)	353 (24)	198 (13)	127 (9)	88 (6)	50 (3)
	15 psi (1 bar)	5ALD	-	109 (7)	61 (4)	39 (2)	27 (2)	15 (1)



If pressure rating is higher than documented in tables, consult factory before exceeding.

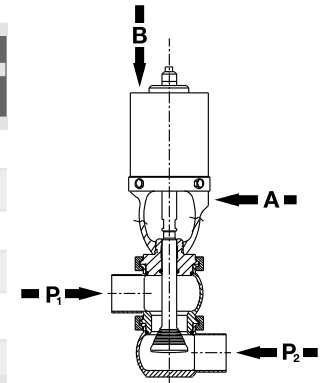
Normal air supply requirements: 50 psi for 4 and 5 inch actuator, 6 inch spring actuators.

15 psi for 5ALD actuators. *1 Bar = 14.5 psi

W68R

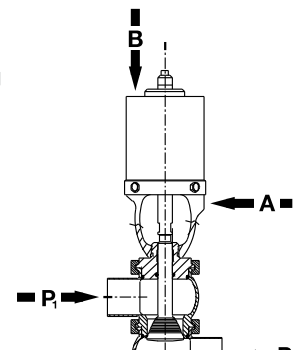
W68R AR (Air-to-Raise)

		ACTUATOR SIZE (IN)	VALVE SIZE - INCHES (mm) - PRESSURE IN psi (bar)				
			1.5" (38)	2" (51)	2.5" (64)	3" (76)	4" (102)
PORT P2, STEM RAISED, ACTUATOR SPRING WILL OPEN AGAINST:		4AR	253 (17)	142 (10)	91 (6)	63 (4)	37 (2)
		5AR	333 (23)	187 (13)	120 (8)	83 (6)	48 (3)
		6AR	426 (29)	239 (16)	153 (10)	106 (7)	61 (4)
PORT P1, AIR TO PORT A, WILL HOLD VALVE CLOSED AGAINST:	50 psi (3 bar)	4AR	99 (7)	48 (3)	29 (2)	20 (1)	10 (0.6)
	50 psi (3 bar)	5AR	247 (17)	121 (8)	73 (5)	49 (3)	26 (2)
	50 psi (3 bar)	6AR	421 (29)	206 (14)	125 (8)	84 (6)	45 (3)



W68R AL (Air-to-Lower)

		ACTUATOR SIZE (IN)	VALVE SIZE - INCHES (mm) - PRESSURE IN psi (bar)				
			1.5" (38)	2" (51)	2.5" (64)	3" (76)	4" (102)
PORT P1, ACTUATOR SPRING HOLDS CLOSED AGAINST:		4AL	164 (11)	81 (5)	49 (3)	33 (2)	17 (1)
		5AL	290 (20)	142 (10)	86 (6)	58 (4)	31 (2)
		6AL	385 (26)	189 (13)	114 (8)	77 (5)	41 (3)
		5ALD	47 (3)	23 (1)	14 (1)	9 (0.6)	5 (0.3)
PORT P2, AIR TO PORT B, WILL OPEN AGAINST:	50 psi (3 bar)	4AL	204 (14)	115 (8)	73 (5)	51 (3)	30 (2)
	50 psi (3 bar)	5AL	300 (20)	169 (11)	108 (7)	75 (5)	43 (3)
	50 psi (3 bar)	6AL	462 (32)	260 (18)	166 (11)	115 (8)	66 (4)
	15 psi (1 bar)	5ALD	120 (8)	67 (4)	43 (3)	30 (2)	17 (1)



If pressure rating is higher than documented in tables, consult factory before exceeding.

Normal air supply requirements: 50 psi for 4" and 5" actuator, 6" spring actuators.

15 psi for 5ALD actuators. *1 Bar = 14.5 psi

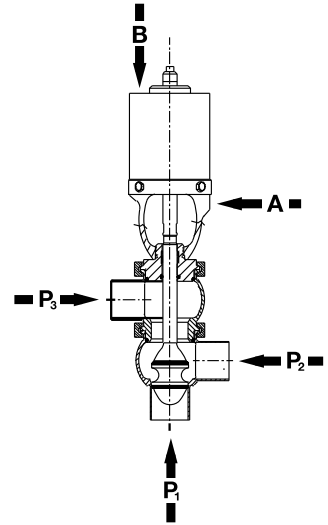
ADDITIONAL TECHNICAL DATA

HOLDING PRESSURE CHARTS

W682

W682 AR (Air-to-Raise)

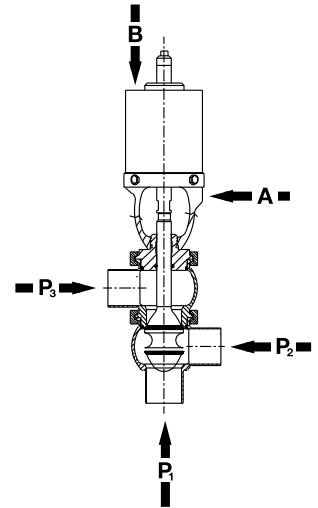
		ACTUATOR SIZE (IN)	VALVE SIZE - INCHES (mm) - PRESSURE IN psi (bar)				
			1.5" (38)	2" (51)	2.5" (64)	3" (76)	4" (102)
PORT P1, ACTUATOR SPRING HOLDS CLOSED AGAINST:		4AR	125 (8)	70 (5)	45 (3)	31 (2)	19 (1)
		5AR	220 (15)	124 (8)	79 (5)	55 (4)	32 (2)
		6AR	317 (22)	178 (12)	114 (8)	79 (5)	45 (3)
PORT P2, AIR TO ACTUATOR (WITH STEM RAISED), SPRING WILL LOWER AGAINST:		4AR	253 (17)	142 (10)	91 (6)	63 (4)	37 (2)
		5AR	333 (23)	187 (13)	120 (8)	83 (6)	48 (3)
		6AR	-	239 (16)	153 (10)	106 (7)	61 (4)
PORT P2, AIR TO PORT A, WILL RAISE STEM (OPENS) AGAINST:	50 psi (3 bar)	4AR	270 (18)	132 (9)	80 (5)	54 (4)	28 (2)
	50 psi (3 bar)	5AR	398 (27)	195 (13)	118 (8)	79 (5)	42 (3)
	50 psi (3 bar)	6AR	-	278 (19)	168 (11)	113 (8)	61 (4)
PORT P3, AIR TO PORT A (WITH STEM RAISED) WILL HOLD AGAINST:	50 psi (3 bar)	4AR	99 (7)	48 (3)	29 (2)	20 (1)	10 (0.6)
	50 psi (3 bar)	5AR	247 (17)	121 (8)	73 (5)	49 (3)	26 (2)
	50 psi (3 bar)	6LAR	421 (29)	206 (14)	125 (8)	84 (6)	45 (3)



If pressure rating is higher than documented in tables, consult factory before exceeding.
Normal air supply requirements: 50 psi for 4" and 5" actuator, 6" light spring actuators.
15 psi for 5ALD actuators. *1 bar = 14.5 psi

W682 AL (Air-to-Lower)

		ACTUATOR SIZE (IN)	VALVE SIZE - INCHES (mm) - PRESSURE IN psi (bar)				
			1.5" (38)	2" (51)	2.5" (64)	3" (76)	4" (102)
PORT P1, AIR TO PORT B, WILL HOLD AGAINST:	50 psi (3 bar)	4AL	76 (5)	43 (3)	27 (2)	19 (1)	16 (1)
	50 psi (3 bar)	5AL	187 (13)	105 (7)	67 (4)	47 (3)	27 (2)
	50 psi (3 bar)	6AL	353 (24)	198 (13)	127 (9)	88 (6)	50 (3)
	15 psi (1 bar)	5ALD	109 (7)	61 (4)	39 (2)	27 (2)	15 (1)
PORT P2, (STEM LOWERED), SPRING OPENS STEM AGAINST:		4	335 (23)	164 (11)	99 (7)	67 (4)	31 (2)
		5	441 (30)	216 (15)	131 (9)	88 (6)	47 (3)
		6AL	-	260 (18)	157 (11)	106 (7)	57 (4)
		5ALD	61 (4)	30 (2)	18 (1)	12 (1)	7 (.04)
PORT P2, AIR TO PORT B, (WITH STEM RAISED), WILL CLOSE STEM AGAINST:	50 psi (3 bar)	4	204 (14)	115 (8)	73 (5)	51 (3)	32 (2)
	50 psi (3 bar)	5	301 (21)	169 (11)	108 (7)	75 (5)	43 (3)
	50 psi (3 bar)	6LAL	-	260 (18)	166 (11)	115 (8)	66 (4)
	15 psi (1 bar)	5ALD	120 (8)	67 (4)	43 (3)	30 (2)	17 (1)
PORT P3, (STEM RAISED) ACTUATOR SPRING HOLDS AGAINST:		4	164 (11)	81 (5)	49 (3)	33 (2)	15 (1)
		5	290 (20)	142 (10)	86 (6)	58 (4)	31 (2)
		6AL	385 (26)	189 (13)	114 (8)	77 (5)	41 (3)
		5ALD	47 (3)	23 (1)	14 (1)	9 (.06)	5 (.03)



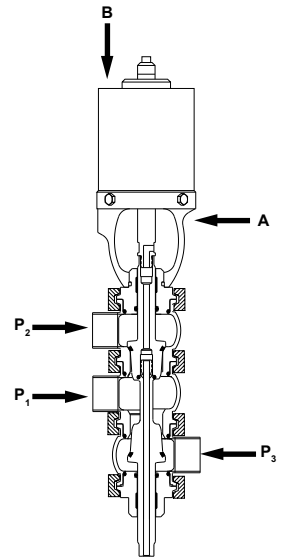
If pressure rating is higher than documented in tables, consult factory before exceeding.
Normal air supply requirements: 50 psi for 4" and 5" actuator, 6" light spring actuators.
15 psi for 5ALD actuators. *1 Bar = 14.5 psi

ADDITIONAL TECHNICAL DATA

W685 Divert Throttling Holding Pressure Charts

W685 AR/HAR (Air-to-Raise) - Standard Stroke

		ACTUATOR SIZE (IN)	VALVE SIZE - INCHES (mm) - PRESSURE IN psi (bar)						
			1" (25)	1.5" (38)	2" (51)	2.5" (64)	3" (76)	4" (102)	
PORT P1, ACTUATOR SPRING HOLDS CLOSED AGAINST:		4AR	214 (15)	162 (11)	76 (5)	50 (3)	34 (2)	19 (1)	
		4HAR	284 (19)	230 (16)	109 (7)	70 (5)	47 (3)	26 (2)	
		5AR	336 (23)	289 (20)	139 (9)	87 (6)	59 (4)	32 (2)	
		5HAR	-	495 (34)	237 (16)	150 (10)	101 (7)	56 (4)	
		6AR	-	418 (29)	200 (14)	126 (8)	85 (6)	46 (3)	
		6HAR	-	-	367 (25)	239 (16)	161 (11)	89 (6)	
PORT P3, STEM RAISED, SPRING LOWERS STEM AGAINST:		4AR	344 (24)	344 (23)	169 (11)	102 (7)	69 (5)	37 (2)	
		4HAR	418 (29)	418 (29)	205 (14)	124 (8)	83 (6)	45 (3)	
		5AR	-	433 (30)	218 (15)	132 (9)	89 (6)	49 (3)	
		5HAR	-	-	392 (27)	237 (16)	160 (11)	89 (6)	
		6AR	-	-	279 (19)	168 (11)	114 (8)	63 (4)	
		6HAR	-	-	-	404 (28)	274 (19)	152 (10)	
PORT P2, AIR TO PORT A, WILL RAISE STEM AGAINST:		50 psi (3 bar)	4AR	223 (15)	275 (19)	138 (9)	79 (5)	53 (3)	29 (2)
		75 psi (5 bar)	4HAR	371 (25)	425 (29)	212 (14)	124 (8)	83 (6)	45 (3)
		50 psi (3 bar)	5AR	356 (24)	403 (28)	200 (14)	117 (8)	79 (5)	43 (3)
		75 psi (5 bar)	5HAR	-	-	272 (19)	157 (11)	106 (7)	57 (4)
		50 psi (3 bar)	6AR	-	-	285 (19)	167 (11)	113 (8)	61 (4)
		75 psi (5 bar)	6HAR	-	-	361 (25)	200 (14)	135 (9)	73 (5)
PORT P1, AIR TO PORT A (WITH STEM RAISED) WILL HOLD AGAINST:		50 psi (3 bar)	4AR	93 (6)	113 (8)	48 (3)	29 (2)	19 (1)	10 (.06)
		75 psi (5 bar)	4HAR	238 (16)	258 (18)	119 (8)	72 (5)	48 (3)	25 (2)
		50 psi (3 bar)	5AR	241 (16)	259 (18)	120 (8)	73 (5)	48 (3)	26 (2)
		75 psi (5 bar)	5HAR	228 (16)	263 (18)	116 (8)	70 (5)	46 (3)	24 (1)
		50 psi (3 bar)	6AR	416 (28)	433 (30)	206 (14)	125 (8)	83 (6)	45 (3)
		75 psi (5 bar)	6HAR	102 (7)	167 (11)	58 (4)	35 (2)	22 (1)	10 (.06)



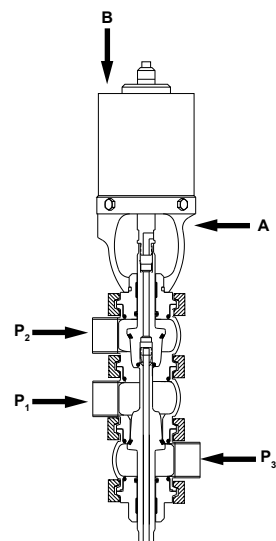
If pressure rating is higher than documented in tables, consult factory before exceeding.
Normal air supply requirements: 50 psi for 4", 5" and 6" actuators and long stroke actuators, 75 psi for 4", 5" and 6" heavy duty spring actuators. *1 bar = 14.5 psi

ADDITIONAL TECHNICAL DATA

W685 Divert Throttling Holding Pressure Charts

W685 AL/HAL (Air-to-Lower) - Standard Stroke

		ACTUATOR SIZE (IN)	VALVE SIZE - INCHES (mm) - PRESSURE IN psi (bar)					
			1" (25)	1.5" (38)	2" (51)	2.5" (64)	3" (76)	4" (102)
PORT P1, AIR TO PORT B, WILL HOLD CLOSED AGAINST:	50 psi (3 bar)	4AL	149 (10)	96 (6)	44 (3)	31 (2)	21 (1)	12 (1)
	75 psi (5 bar)	4HAL	295 (20)	241 (16)	115 (8)	73 (5)	50 (3)	27 (2)
	50 psi (3 bar)	5AL	292 (20)	245 (17)	117 (8)	74 (5)	50 (3)	28 (2)
	75 psi (5 bar)	5HAL	327 (22)	237 (16)	110 (7)	74 (5)	50 (3)	28 (2)
	50 psi (3 bar)	6AL	-	-	226 (15)	140 (9)	94 (6)	52 (3)
	75 psi (5 bar)	6HAL	-	267 (18)	120 (8)	86 (6)	59 (4)	33 (2)
PORT P1, (STEM RAISED) SPRING HOLDS CLOSED AGAINST:		4AL	158 (11)	178 (12)	80 (5)	49 (3)	32 (2)	17 (1)
		4HAL	227 (15)	248 (17)	114 (8)	69 (5)	46 (3)	24 (1)
		5AL	285 (19)	300 (20)	142 (10)	86 (6)	57 (4)	31 (2)
		5HAL	-	-	243 (17)	147 (10)	98 (7)	52 (3)
		6AL	380 (26)	397 (27)	188 (13)	114 (8)	76 (5)	41 (3)
		6HAL	-	-	322 (22)	196 (13)	129 (9)	68 (4)
PORT P3, AIR TO PORT B, WILL LOWER STEM AGAINST:	50 psi (3 bar)	4AL	278 (19)	258 (18)	134 (9)	81 (5)	55 (4)	31 (2)
	75 psi (5 bar)	4HAL	428 (29)	408 (28)	207 (14)	125 (8)	85 (6)	47 (3)
	50 psi (3 bar)	5AL	407 (28)	389 (27)	197 (13)	119 (8)	81 (5)	45 (3)
	75 psi (5 bar)	5HAL	-	-	265 (18)	160 (11)	109 (7)	61 (4)
	50 psi (3 bar)	6AL	-	-	300 (20)	182 (12)	124 (8)	68 (4)
	75 psi (5 bar)	6HAL	-	-	415 (28)	249 (17)	171 (12)	95 (6)
PORT P2, (STEM LOWERED) ACTUATOR SPRING RAISES STEM AGAINST:		4AL	288 (20)	302 (21)	170 (12)	99 (7)	66 (4)	36 (2)
		4HAL	360 (25)	414 (28)	206 (14)	120 (8)	81 (5)	44 (3)
		5AL	400 (27)	446 (31)	222 (15)	130 (9)	87 (6)	48 (3)
		5HAL	-	-	398 (27)	233 (16)	157 (11)	85 (6)
		6AL	-	-	265 (18)	157 (11)	105 (7)	57 (4)
		6HAL	-	-	-	359 (25)	241 (16)	131 (9)



If pressure rating is higher than documented in tables, consult factory before exceeding.
Normal air supply requirements: 50 psi for 4", 5" and 6" actuators and long stroke actuators, 75 psi for 4", 5" and 6" heavy duty spring actuators. *1 bar = 14.5 psi

ADDITIONAL TECHNICAL DATA

AIR ASSIST CHARTS

Air Boost for Port B (See Figure 1)

Chart shows additional product holding pressure per 1 psi or bar of air applied to port B to:

- (1) air assist spring holding force¹ (spring to close)
- (2) calculate holding power on air to air actuator
- (3) calculate additional holding power above the nominal air requirement of the actuator³
- (4) Maximum Air Assist Pressures should not exceed:
 - 70 psi on 4", 5", 6" Maintainable Actuators
- (5) Air Assist pressures should be air regulated to the lowest required amount of air

ACTUATOR SIZE	PRODUCT RATIO PER VALVE SIZE (psi)* INCH (mm)					
	1 (25)	1.5 (38)	2 (51)	2.5 (63)	3 (76)	4 (101)
4 (101)	6.5 (165)	6.5 (165)	3.7 (94)	2.4 (61)	1.6 (40)	0.9 (23)
5 (127)	10.4 (264)	10.4 (264)	5.8 (147)	3.7 (94)	2.6 (66)	1.5 (38)
6 (152)	15.0 (381)	15.0 (381)	8.4 (213)	5.4 (137)	3.7 (94)	2.1 (53)
5ALD	-	10.4	5.8 (147)	3.7 (94)	2.6 (66)	1.5 (38)

Air Boost for Port A (See Figure 2)

Chart shows additional product holding pressure per 1 psi or bar of air applied to port A to:

- (1) air assist spring holding force² (spring to close)
- (2) calculate holding power on air to air actuator
- (3) calculate additional holding power above the nominal air requirement of the actuator³
- (4) Maximum Air Assist Pressures should not exceed:
 - 70 psi on 4", 5", 6" Maintainable Actuators
- (5) Air Assist pressures should be air regulated to the lowest required amount of air pressure

ACTUATOR SIZE	PRODUCT RATIO PER VALVE SIZE (psi)* INCH (mm)					
	1 (25)	1.5 (38)	2 (51)	2.5 (63)	3 (76)	4 (101)
4 (101)	8.7 (221)	8.7 (221)	4.3 (109)	2.6 (66)	1.7 (43)	1.0 (25)
5 (127)	13.8 (350)	13.8 (350)	6.8 (173)	4.1 (104)	2.8 (71)	1.5 (38)
6 (152)	19.8 (503)	19.8 (503)	9.7 (246)	5.9 (150)	3.9 (99)	2.2 (56)

¹Refer to W68 holding pressure charts for spring only holding force.

²Refer to W682 & W68R holding pressure charts for spring only holding force.

³Air requirements: 50 psi to actuate 4", 5", & 6" Spring Actuators (refer to holding pressure charts for holding power)

15 psi to actuate 5ALD Actuators (refer to holding pressure charts for holding power). Max 45 psi to actuator.

*1 bar = 14.5 psi

Example:

W68T-3" with 5" Air to Raise (Spring to Close) actuator required to hold against 75 psi product pressure.

Holding pressure required: 75 psi

Minus Spring only holding force: -55 psi

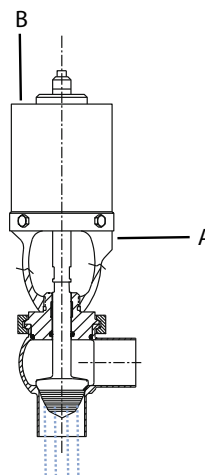
(From page 11)

Add'l holding power required: 20 psi

$$\text{Air Assist pressure required} = \frac{\text{Add'l holding power required}}{\text{Product Ratio from chart above}}$$

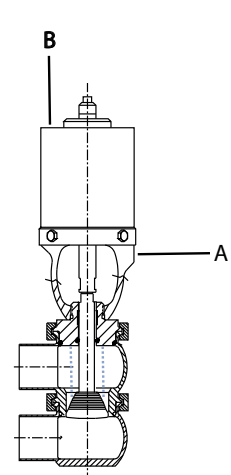
$$\text{Air Assist pressure required} = \frac{20}{2.6} = 7.79 \text{ psi Air Required to Port B}$$

Figure 1



Product pressure applied to bottom of plug

Figure 2



Product pressure applied to top of plug

W68/W88/W98 Series

CONTROL VALVES

SPXFLOW

Based in Charlotte, North Carolina, SPX FLOW, Inc. (NYSE: FLOW) is a multi-industry manufacturing leader. For more information, please visit www.spxflow.com

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