Model ZW209H

Pressure Reducing and Pressure Sustaining Valve

Application

The Zurn Wilkins Model ZW209H Pressure Reducing and Pressure Sustaining Valve is designed for many applications where controlling both the inlet and outlet pressures are required. The pressure reducing pilot assembly reacts to changes in downstream pressure allowing the main valve to modulate between the closed and open position ensuring a constant downstream set pressure. The relief pilot assembly reacts to changes in upstream pressure. If the upstream pressure drops, the main valve will modulate between the closed and open position, maintaining desired upstream set pressure. However, once the upstream pressure exceeds the set point of the relief pilot, the main valve will open allowing the pressure reducing pilot to control downstream pressure. Pressure regulation is not dependent upon flow rate. In addition the Model ZW209H comes standard with blue epoxy coating internally and externally for corrosion protection, as well as isolation valves and pressure gauges for quick and easy maintenance or repair.

Standards Compliance:

- ANSI/AWWA C530
- Meets the requirements of NSF/ANSI/CAN 61*

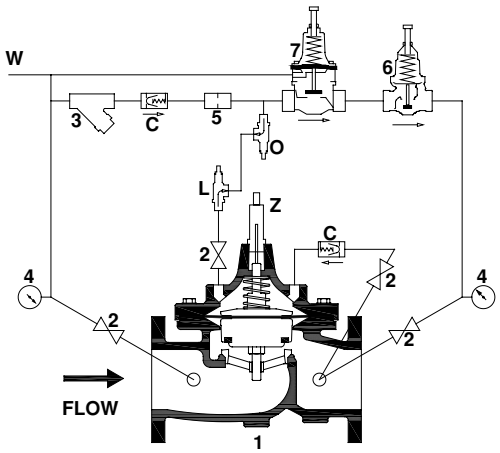
*(0.25% MAX. WEIGHTED AVERAGE LEAD CONTENT)

Materials

Main Valve Body	Ductile Iron ASTM A536
Main Valve Bonnet	Ductile Iron ASTM A536
Disc Guide	Stainless Steel
Seat	Stainless Steel
Disc	Buna-N Rubber
Diaphragm	Nylon Reinforced Buna-N
Stem	Stainless Steel
Spring	Stainless Steel

Schematic Diagram

Item	Description of Standard Features
1	Main Valve
2	850XL Isolation Valve
3	SXL "Wye" Type Strainer
4	Pressure Gauge
5	Restriction Fitting
6	PRXL Pressure Reducing Control
7	PV-RLF Pressure Relief Valve



LEAD FREE

NSF/ANSI/CAN 61

BODY CONFIGURATIONS		GLOBE STYLE BODY		ANGLE STYLE BODY
END CONNECTION	PRESSURE RATING	FULL PORT	REDUCED PORT	
Threaded	400 psi max.	1 1/4"-3"	n/a	1 1/4"-3"
Flanged	ANSI Class 150, 250 psi max.	1 1/2"-16"	3"-10"	1 1/2"-10"
	ANSI Class 300, 400 psi max.			
Grooved	300 psi max.	1 1/2"-10"	n/a	1 1/2"-10"
MINIMUM INLET PRESSURE 10 PSI				

TEMPERATURE RATING: ☐ Water 33°F to 140°F
PILOT SPRING RANGE: ☐ 15-120 psi (Pressure Reducing)
☐ 50-200 psi (Pressure Sustaining)

Note: See fourth page for additional pressure ranges

Standard Features

- ☐ Blue Epoxy Coated, FDA Approved
- ☐ Pilot Assembly
  - "Wye" Type Strainer
  - Opening Speed Control (sizes 1 1/4" - 4")
  - Isolation Valves
- ☐ Inlet and Outlet Pressure Gauges
- ☐ ANSI Class 150 Flanges
- ☐ Copper Tubing and Brass Fittings

Options

(Add suffix letters to ZW209H)

Function

- ☐ C - 40XL2 Hydraulic Check with Isolation Valve
- ☐ L - SC1 Closing Speed Control*
- ☐ O - SC1 Opening Speed Control (Standard 1 1/4" - 4")

Body

- ☐ A - Angle Style Body
- ☐ R - Reduced Port Body

Connections

- ☐ G - IPS Grooved
- ☐ TH - NPT Threaded
- ☐ Y - ANSI Class 300 Flanges

Main Valve Options

- ☐ Z - ZPI Visual Position Indicator

Pilot System

- ☐ See Table for Pressure Reducing and Pressure Sustaining Pilot Adjustment Ranges
- ☐ SP - All Stainless Steel Pilotry (replaces all brass fittings, pilot valve and copper tubing. "GL" Option included)
- ☐ SH - Stainless Steel Braided Hoses (only replaces Copper Tubing)
- ☐ RV - Pilot on Reverse Side
- ☐ GL - Liquid Filled Gauge
- ☐ SO - Limit Switch Open Trip
- ☐ SC - Limit Switch Closed Trip
- ☐ SD - Limit Switch Dual Trip

*The closing speed control (optional) on this valve should always be open at least three (3) turns off its seat.

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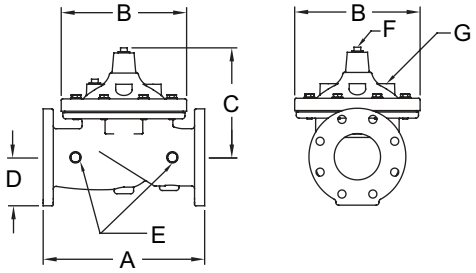
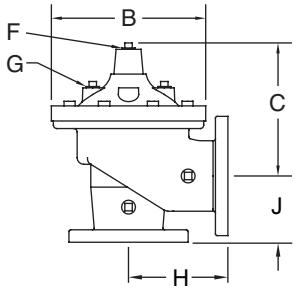
Patent zurn.com/patents

Globe and Angle Main Valve Dimensions

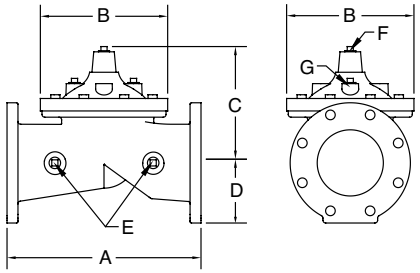
DIM	FULL PORT	VALVE SIZE INCHES (mm)											
		1 1/4 (32)	1 1/2(38)	2 (50)	2 1/2 (65)	3 (80)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)	14 (350)	16 (400)
A	Threaded	7 1/4	7 1/4	9 7/16	11	12 1/2							
	Class 150 Flange		8 1/2	9 3/8	11	12	15	20	25 3/8	29 3/4	34	39	41 3/8
	Class 300 Flange		9	10	11 5/8	13 1/4	15 5/8	21	26 7/16	31 1/8	35 1/2	40 1/2	43 1/2
	Grooved		8 1/2	9	11	12 1/2	15	20	25 3/8	29 3/4			
B	Diameter	5 5/8	5 5/8	6 3/4	8	9 3/16	11 11/16	15 3/4	20 1/8	23 11/16	27 1/2	31 3/4	34 1/2
C	Max.	5 3/4	5 3/4	6 3/16	7 3/8	8	10 3/16	12 5/16	15 9/16	17 5/8	20 3/16	22 13/16	25 7/8
D	Threaded/Grooved	1 3/8	1 3/8	1 3/4	2 1/8	2 9/16	3 7/16	5	5	5 13/16	6 3/4	8 7/8	8 13/16
	Class 150 Flange		2 1/2	3	3 1/2	3 3/4	4 1/2	5 1/2	6 3/4	8	9 1/2	10 1/2	11 3/4
	Class 300 Flange		3	3 1/4	3 3/4	4 1/8	5	6 1/4	7 1/2	8 3/4	10 1/4	11 1/2	12 3/4
E	NPT Body Tap	3/8	3/8	3/8	1/2	1/2	3/4	3/4	1	1	1	1	1
F	NPT Cvr. Plug Tap	1/2	1/2	1/2	1/2	1/2	3/4	3/4	1	1	1	1	1
G	NPT Cover Tap	3/8	3/8	3/8	1/2	1/2	3/4	3/4	1	1	1	1	1
H	Threaded	3 1/4	3 1/4	4 3/4	5 1/2	6 1/4							
	Class 150 Flange		4	4 3/4	5 1/2	6	7 1/2	10	12 11/16	14 7/8			
	Class 300 Flange		4 1/4	5	6	6 7/16	8	10 1/2	13 1/4	15 9/16			
	Grooved		4 7/16	4 3/4	5 1/2	6	7 1/2	10	12 11/16	14 7/8			
J	Threaded	1 15/16	1 15/16	3 1/4	4	4 1/2							
	Class 150 Flange		4	3 1/4	4	4	5	6	8	8 5/8			
	Class 300 Flange		4 1/4	3 1/2	4 5/16	4 7/16	5 5/16	6 1/2	8 1/2	9 5 /16			
	Grooved		3 3/16	3 1/4	4	4 1/4	5	6	8	8 5/8			
Valve Stem Internal Thread		10-32	10-32	10-32	10-32	1/4-20	1/4-20	1/4-20	3/8-16	3/8-16	3/8-16	3/8/16	3/8-16
Stem Travel (in)		7/16	7/16	3/4	7/8	1	1 3/16	1 3/4	2 3/8	2 13/16	3 7/16	3 13/16	4 5/16
Approx. Wt. (lbs)		22	26	36	55	70	130	240	440	720	820	1200	1550



Globe Style Body



Angle Style Body



Reduced Port Body

Reduced Port Main Valve Dimensions

DIM		VALVE SIZE INCHES (mm)				
		3" (80)	4" (100)	6" (150)	8" (200)	10" (250)
A	Class 150 Flange	10 1/4	14	17 3/4	21 7/16	26
	Class 300 Flange	11	14 1/2	18 11/16	22 7/16	27 7/16
B	Dia	6 3/4	9 3/16	11 11/16	15 3/4	20 1/8
C	Max	6 3/8	8 7/16	12 5/16	13 1/4	16 3/4
D	Class 150 Flange	3 3/4	4 1/2	5 1/2	6 3/4	8
	Class 300 Flange	4 1/8	5	6 1/4	7 1/2	8 3/4
E	NPT Body Tap	3/8	1/2	3/4	3/4	1
F	NPT Cvr. Plug Tap	3/8	1/2	3/4	3/4	1
G	NPT Cvr. Tap	3/8	1/2	3/4	3/4	1
Valve Stem Internal Thread		10-32	1/4-20	1/4-20	3/8-16	3/8-16
Stem Travel (in)		3/4	1	1 1/5	1 3/4	2 3/8
Approx. Wt. (Lbs)		35	80	140	275	480

Job Name _____ **Contractor** _____

Job Location _____ **Engineer** _____

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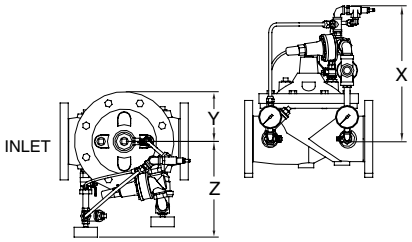
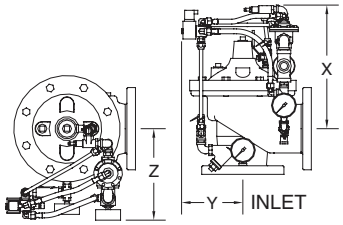
Pilot System Dimensions

PILOT SYSTEM DIMENSIONS		VALVE SIZE INCHES (mm)											
	DIM	1-1/4 (32)	1-1/2 (40)	2" (50)	2-1/2" (65)	3" (80)	4" (100)	6" (150)	8" (200)	10" (250)	12" (300)	14" (350)	16" (400)
Full Port Body	X	11 5/8	11 5/8	11 5/8	12 5/8	12 5/8	15 5/8	15 5/16	16 5/16	17 5/16	20	23	26
	Y	4	4	4	4	4 1/2	6	8	10	12	14	16	17 1/2
	Z	9 5/8	9 5/8	10	9 3/4	10 1/8	11 1/4	12 1/8	13 5/8	13 5/8	18	20	21 1/2
Reduced Port Body	X					11 5/8	12 5/8	15 5/8	15 5/16	16 5/16			
	Y					4	4 1/2	6	8	10			
	Z					10	10 1/8	11 1/4	12 1/8	13 5/8			
Angle Body	X	12	12	12	13	13	16	16	17	18			
	Y	5	5	5	5	5	6	8	10	12			
	Z	10	10	10 1/2	10 1/2	10 1/2	12	12 1/2	14	14			

Globe Pilot System Dimensions



Angle Pilot System Dimensions



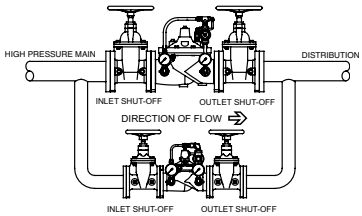
Operation

The Model ZW209H utilizes a pressure reducing and a pressure relief pilot valve which are installed on the discharge side of the control circuitry. Both pilots are direct acting, spring loaded, diaphragm actuated valves. The pressure reducing pilot is normally open. The pressure relief pilot is normally closed. The operation of the ZW209H begins with accurately sizing the valve, then fine tuning the control circuit by adjusting both pilot springs to the desired downstream and upstream set pressure. Inlet pressure is piped to the inlet port of both pilots. A sensing line runs internally from the discharge side of the pressure reducing pilot to its lower control chamber under the diaphragm. Thus, downstream pressure exceeding the preset acts to close the pilot while the adjustable spring seeks to keep it open. The result is a modulating action in the pilot that is transmitted to the bonnet of the main valve. This creates a mirror modulation of the diaphragm assembly in the main valve. Downstream pressure is maintained within narrow limits regardless of changing flow rates or varying inlet pressures. A sensing line runs externally from the inlet of the main valve to the pressure relief pilot control chamber under the diaphragm. Thus, inlet pressure exceeding the preset acts to open the pilot while the adjustable spring seeks to keep it closed. As with the pressure reducing pilot the result is a modulating action in the pilot that is transmitted to the bonnet of the main valve. Upstream pressure causes the main valve to open and will maintain the upstream pressure regardless of changing flow rates or varying outlet pressures.

Flow Characteristics

Full Port Globe and Angle Valve size	inches (mm)	1 1/4 (32)	1 1/2 (40)	2 (50)	2 1/2 (65)	3 (80)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)	14 (350)	16 (400)
Reduced Port Globe Valve Size	inches (mm)			3 (80)		4 (100)	6 (150)	8 (200)	10 (250)				
Suggested Flow (GPM)	Max. Continuous	93	125	210	300	460	800	1800	3100	4900	7000	8400	11000
	Max Intermittent	120	160	260	375	600	1000	2250	4000	6150	8700	10500	13800
	Min. Continuous	10	10	15	20	30	50	115	200	300	435	530	690
Suggested Flow (Liters/sec)	Max. Continuous	6	8	13	19	29	50	113	195	309	550	665	870
	Max. Intermittent	7.6	10	16.4	23	37	62	142	246	388	440	530	95
	Min. Continuous	.6	.6	0.9	1.3	1.9	3.2	7.2	13	19	28	33	43

Typical Installation



Suggested flow calculations are based on flow through Schedule 40 Pipe. Maximum continuous flow is approx. 20 ft./sec (6.1 meters/sec) & maximum intermittent is approx. 25 ft./sec (7.6 meters/sec) and minimum continuous flow is approx. 1.25 ft./sec (0.4 meters/sec). Many factors should be considered in sizing pressure reducing valves including inlet pressure, outlet pressure and flow rates.

Notice:

In cases where design flow falls below the minimum continuous flow rate, a low flow by-pass shall be installed.

Caution: The recommended installation orientation for ACVs is horizontal, with the valve cover up. 6" and larger valves should only be installed horizontally, with the valve cover up, due to the difficulty of properly bleeding air out of the cover and performing maintenance on valves installed in the vertical orientation.

Specifications

The Pressure Reducing and Pressure Sustaining Valve shall be a diaphragm actuated, pilot controlled valve. The main valve body shall be ductile iron ASTM A 536. The stem of the basic valve shall be guided top and bottom. The diaphragm shall not be used as a seating surface. All internal and external ferrous surfaces shall be coated with a high quality, fusion epoxy coating. The pressure reducing pilot control shall be field adjustable from 15 psi to 120 psi. The pressure relief pilot shall be field adjustable from 50 to 200 psi. The valve shall be certified to NSF/ANSI/CAN Standard 61. The Pressure Reducing and Pressure Sustaining Valve shall be a ZURN WILKINS Model ZW209H.

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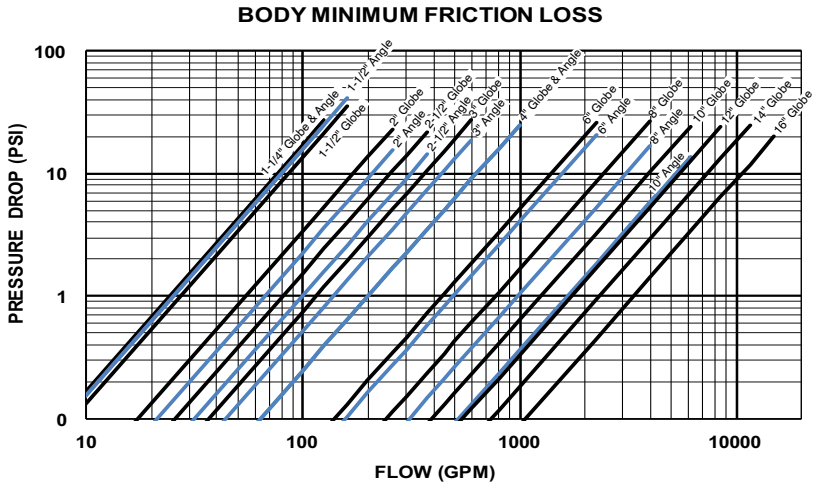
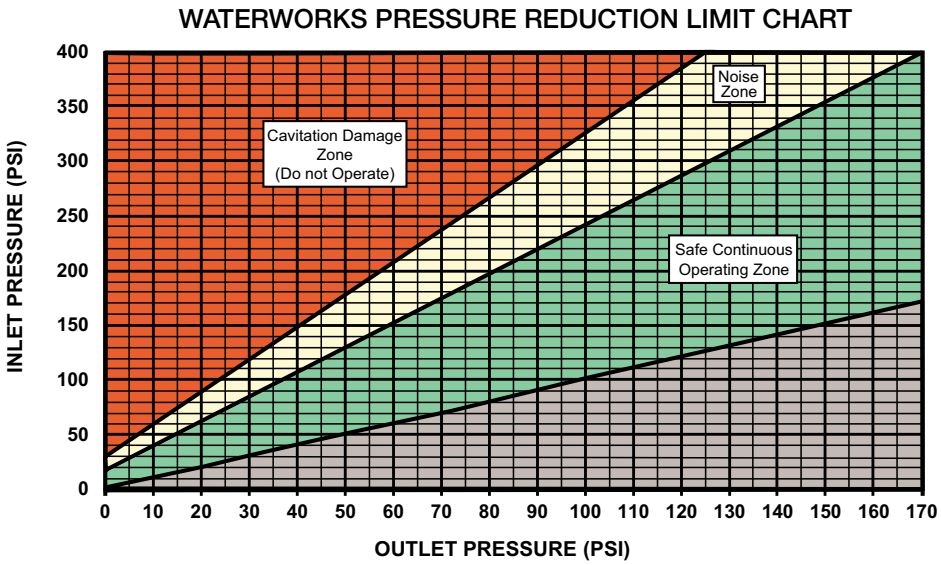
Flow Characteristics



*** Notes for Body Minimum Friction Loss Chart:**
Minimum inlet pressure is 10 psi higher than set point or the additional body friction loss intended flow, whichever is higher. (friction loss may be important at flows above 20 ft/s)
Example: A 6" valve intended to flow 2000 GPM at 120 psi has a friction loss of 20 psi at 2000 GPM. The minimum inlet pressure would be 120 + 20 = 140 psi. When inlet pressure is below set point, the outlet pressure will be the pressure at the inlet minus the friction loss.



Notes for Pressure Reduction Limit Chart: Determine if the outlet reduced flowing pressure is within the safe operating zone for your Zurn Automatic Control Valve. First, find the system inlet pressure on the left axis and draw a horizontal line from that point across the chart. Then find the outlet reduced flowing pressure on the bottom axis and draw a vertical line up to where it meets the first line. The point where the lines intersect should be in the green "Safe Continuous Operating Zone" below and to the right of the yellow "Noise Zone". If the operating point is in the area labeled "Noise Zone" or "Cavitation Damage Zone", the valve seal ring, plunger, or body may be damaged. The lifespan of the valve will be reduced. Damage from cavitation to internal components may cause high pressure downstream and/or external leaks. To move out of the cavitation or noise zone you will need to place two valves in series in order to safely reduce pressure. Use the chart to pick an intermediate pressure in the green zone that you will set the first valve in series to. The intermediate pressure you pick will then become the inlet pressure for the 2nd valve and you can verify it will be in the green zone using the chart.

Pressure Reducing and Pressure Sustaining Pilot Adjustment Ranges

Reducing ↓ \ Sustaining →		LP3 5 - 15 psi	LP2 10 - 35 psi	LP 30 - 90 psi	S 50 - 200 psi	HP 150 - 300 psi
LP	5 - 25 psi	LPLP3	LPLP2	LPLP	LPS	LPHP
S	15 - 120 psi	SLP3	SLP2	SLP	(no adder)	SHP
HP	30 - 300 psi	HPLP3	HPLP2	HPLP	HPS	HPHP

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