Model ZW209BPEX

Pressure Reducing Valve with Low Flow By-Pass

Application

The Zurn Wilkins Model ZW209BPEX Pilot Operated Pressure Reducing Valve with Low Flow By-pass is designed for many applications where the reduction of high inlet pressures to safe and stable outlet pressure is required. The pilot assembly reacts to changes in downstream pressure allowing the main valve to modulate between the open and closed position ensuring a constant downstream set pressure. Once the downstream pressure reaches the pilot setting, the main valve will seal shut. When the main valve closes, the low flow bypass is set to a slightly higher pressure which allows it to handle very low flows up to 10 GPM when there is off peak demand. (An additional bypass may be needed to handle flows between the bypass and main valve minimum flow.) In addition the Model ZW209BPEX comes standard with epoxy coating internally and externally for corrosion protection.

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

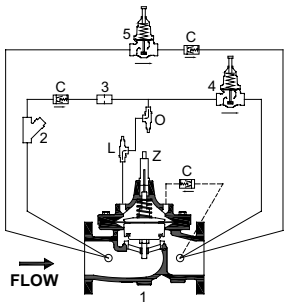
*The closing speed control (optional) on this valve should always be open at least three (3) turns off its seat.

Standard Features

- ☐ Blue Epoxy Coated, FDA Approved
- ☐ Pilot Assembly
  - •"Wye" Type Strainer
  - • Opening Speed Control (sizes 1 1/4" - 4")
- ☐ ANSI Class 150 Flanges
- ☐ Copper Tubing and Brass Fittings
- ☐ Low-Flow By-Pass Valves: 1/2" PRXL (sizes 1 1/4" - 3)
  3/4" NR3XL (size 4")

Schematic Diagram

Item	Description of Standard Features
1	Main Valve
2	SXL "Wye" Type Strainer
3	Restriction Fitting
4	PRXL Pressure Reducing Control
5	PRXL or NR3XL Pressure Reducing Control By-Pass



LEAD FREE

ALS

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"-4"	3"-6"	1 1/2"-4"
	ANSI Class 300, 400 psi max.			
Grooved	300 psi max.	1 1/2"-4"	n/a	1 1/2"-4"
MINIMUM INLET PRESSURE 10 PSI				

Sizes

GLOBE STYLE BODY SEE CONNECTIONS BELOW

Options (Add suffix letters to ZW209BPEX)

Function

- ☐ C - 40XL 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 1-1/4"-10", DN32-DN250
- ☐ R - Reduced Port Body Flanged 3"- 10", DN80-DN250

Connections

Threaded ends 1 1/4" - 3", DN32-DN80: 400 psi, 2760 kpa, 27.6 bar max

- ☐ TH - NPT Threaded
- ☐ BS - Threaded British Pipe Parallel BSPP/G size ISO
- ☐ BT - Threaded British Pipe Parallel BSPT/Rc size ISO

Flanged 1 1/2" - 10", DN40-DN250: 250 psi, 1725 kpa 17.3 bar max (blank) ANSI Class 150

- ☐ BSD - BS10/AS2129 Table D Flanges
- ☐ BSE - BS10/AS2129 Table E Flanges
- ☐ PN6 - ISO Class PN6 Flanges
- ☐ PN10 - ISO Class PN10 Flanges
- ☐ PN16 - ISO Class PN16 Flanges

Flanged 1 1/2" - 10", DN40-DN250: 400 psi, 2760 kpa, 27.6 bar max

- ☐ BSF - BS10/AS2129 Table F Flanges
- ☐ BSH - BS10/AS2129 Table H Flanges
- ☐ PN25 - ISO Class PN25 Flanges
- ☐ Y - ANSI Class 300 Flanges

Grooved 1 1/2" - 10", DN40-DN250: 300 psi, 2070 kpa, 20.7 bar max

- ☐ G - (48.3, 60.3, 73.0, 88.9, 114.3, 168.3, 219.1, 373.0 mm pipe OD)
- ☐ BG - Grooved 2-1/2" or 6" (76.1, 165.1mm pipe OD)

Main Valve Options

- ☐ V Viton Rubber Internals, Rated 180°F (only available with "HP" option)
- ☐ Z ZPI Visual Position Indicator

Pilot System

- ☐ HP 20-200 psi High Pressure Range PV-PRD Pilot

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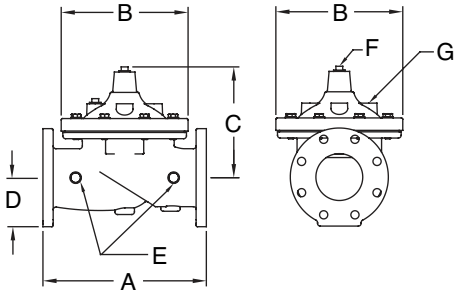
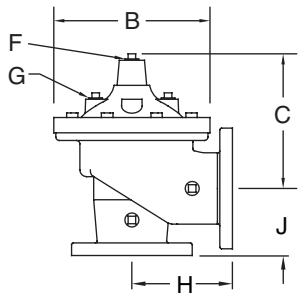
Globe and Angle Main Valve Dimensions

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)
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
	Class 300 Flange		9	10	11 5/8	13 1/4	15 5/8
	Grooved		8 1/2	9	11	12 1/2	15
B	Diameter	5 5/8	5 5/8	6 3/4	8	9 3/16	11 11/16
C	Max.	5 3/4	5 3/4	6 3/16	7 3/8	8	10 3/16
D	Threaded/Grooved	1 3/8	1 3/8	1 3/4	2 1/8	2 9/16	3 7/16
	Class 150 Flange		2 1/2	3	3 1/2	3 3/4	4 1/2
	Class 300 Flange		3	3 1/4	3 3/4	4 1/8	5
E	NPT Body Tap	3/8	3/8	3/8	1/2	1/2	3/4
F	NPT Cvr. Plug Tap	1/2	1/2	1/2	1/2	1/2	3/4
G	NPT Cover Tap	3/8	3/8	3/8	1/2	1/2	3/4
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
	Class 300 Flange		4 1/4	5	6	6 7/16	8
	Grooved		4 7/16	4 3/4	5 1/2	6	7 1/2
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
	Class 300 Flange		4 1/4	3 1/2	4 5/16	4 7/16	5 5 /16
	Grooved		3 3/16	3 1/4	4	4 1/4	5
Valve Stem Internal Thread		10-32	10-32	10-32	10-32	1/4-20	1/4-20
Stem Travel (in)		7/16	7/16	3/4	7/8	1	1 3/16
Approx. Wt. (lbs)		22	26	36	55	70	130



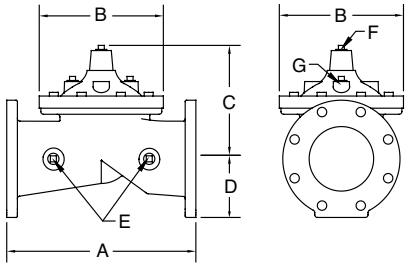
Globe Style Body



Angle Style Body

Reduced Port Main Valve Dimensions

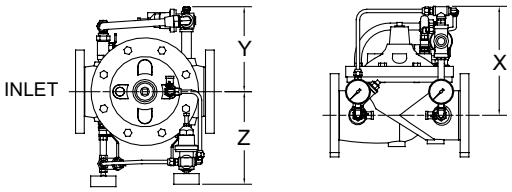
DIM		VALVE SIZE INCHES (mm)		
		3" (80)	4" (100)	6" (150)
A	Class 150 Flange	10 1/4	14	17 3/4
	Class 300 Flange	11	14 1/2	18 11/16
B	Dia	6 3/4	9 3/16	11 11/16
C	Max	6 3/8	8 7/16	12 5/16
D	Class 150 Flange	3 3/4	4 1/2	5 1/2
	Class 300 Flange	4 1/8	5	6 1/4
E	NPT Body Tap	3/8	1/2	3/4
F	NPT Cvr. Plug Tap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



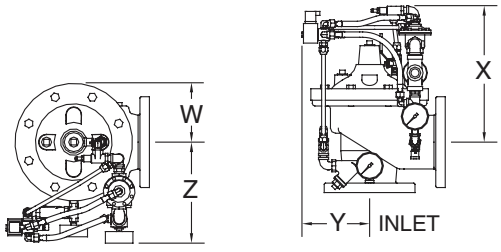
Reduced Port Body

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)
Full Port Body	X	Max. (inches)	9 1/4	9 1/4	9 1/2	9 1/2	9 3/4	12	
	Y	Max. (inches)	9	9	7 1/2	7	7 1/2	9 1/2	
	Z	Max. (inches)	9 1/4	9 1/4	9 1/2	9 1/4	9 3/4	10 1/2	
Reduced Port Body	X	Max. (inches)					9 1/2	9 3/4	12
	Y	Max. (inches)					7 1/2	7 1/2	6
	Z	Max. (inches)					9 1/2	10	10
Angle Body	W	Max. (inches)	9	9	7 1/2	7	7 1/2	9 1/2	
	X	Max. (inches)	9 1/4	9 1/4	9 1/2	9 1/2	9 3/4	12	
	Y	Max. (inches)	5	5	5	5	5	6	
	Z	Max. (inches)	9 1/4	9 1/4	9 1/2	9 1/4	10	10 1/2	



Pilot System Dimensions



Angle Pilot System Dimensions

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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)
Reduced Port Globe Valve Size	inches (mm)			3" (80)		4 (100)	6 (150)
Main Valve Flow (GPM)	Max. Continuous	93	125	210	300	460	800
	Max. Intermittent	120	160	260	375	600	1000
	Min. Continuous.	10	10	15	20	30	50
*By-Pass Flow (GPM)	Min/Max	1-10	1-10	1-10	1-10	1-10	1-20
Main Valve Flow (L/s)	Max. Continuous.	6	8	13	19	29	50
	Max. Intermittent	7.6	10	16.4	23	37	62
	Min Continuous	.06	.06	.9	1.3	1.9	3.2
By-Pass Flow (L/s)	Min/Max	.06-.63	.06-.63	.06-.63	.06-.63	.06-.63	.06-1.26
*Suggested Extra By-Pass	Valve sizes	-	-	1" Model 500XL	1-1/4" Model 500XL	1-1/2" Model 500XL	2" Model 500XL

*Adding an extra by-pass bridges the gap between the flow range of by-pass and main valve.

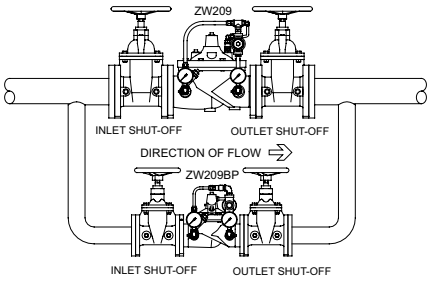
Valve Size	inches (mm)	6" (150)	8" (200)	10" (250)	12" (300)	14" (350)	16" (400)
Low Flow Bypass Required		112-ZW209BP	2-ZW209BP	212-ZW209BP	3-ZW209BP	4-ZW209BP	4-ZW209BP

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.

The ZW209BP is not a substitute for a low flow by-pass in all cases. The valve is commonly used in buildings where 1-15 GPM low flows are common in off peak usage. Many factors should be considered in sizing a pressure reducing valve: inlet pressure, outlet pressure, and flow rates. The sizing of additional low flow by-pass valves are based on a minimum of a 50 psi differential between the inlet and set outlet pressure. To develop a smooth seamless flow response, it may be necessary to add an additional low flow by-pass valve to the ZW209BP installation to compensate for a range of anticipated flows below the minimum continuous flow rate. To control the opening point of the additional by-pass valves, set the valve you want to open first 5 psi higher in static downstream set pressure.

Typical Installation



Operation
The Model ZW209BPEX utilizes a pressure reducing pilot valve that installs on the discharge side of the control circuitry. The pilot is a direct acting, normally open, spring loaded, diaphragm actuated valve. The operation of the ZW209BPEX begins with accurately sizing the valve, then fine tuning the control circuit by adjusting the pilot spring to the desired downstream pressure. It is hydraulically operated and controlled by a PRXL pilot control, which senses pressure at the main valve outlet. An increase in outlet pressure closes the control. This causes the main valve cover pressure to vary, modulating the main valve and thereby maintaining constant outlet pressure. The Model PRXL low flow pressure reducing by-pass is preset to a higher pressure than the pilot control. The PRXL responds to pressure changes from the main valve outlet. When the pilot control closes, the Model PRXL by-pass valve remains open allowing water to flow through. The by-pass closes when the flow decreases and the downstream pressure reaches its set point.

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.

NOTICE:
Contact the Zurn Wilkins factory for additional by-pass recommendations based on your unique flow applications.

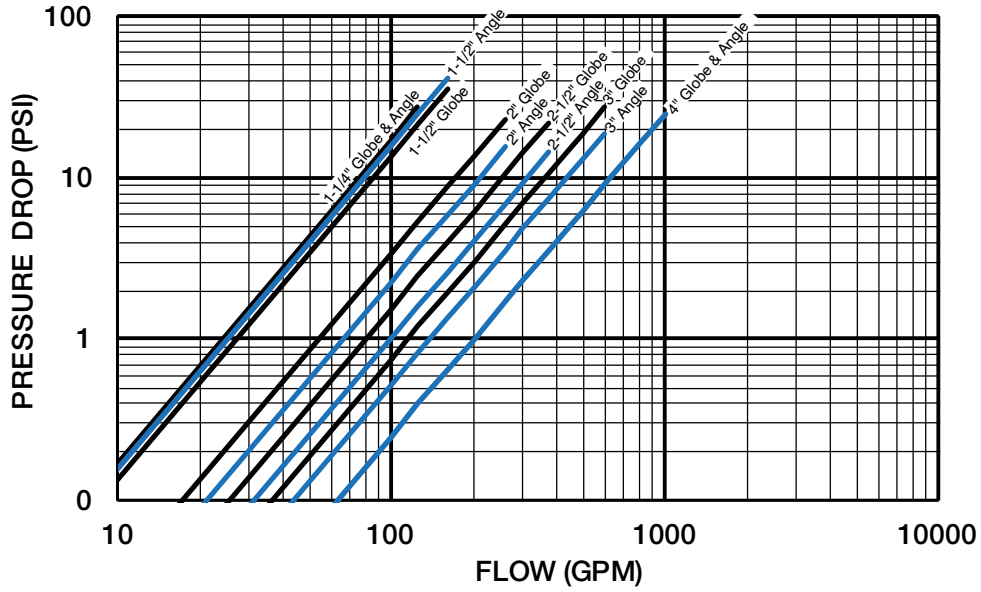
Specifications
The Pressure Reducing Valve shall be a diaphragm actuated, pilot controlled valve. The main valve body shall be ductile iron ASTM A 536. The stem of the basic valve shall be guided top and bottom. The diaphragm shall not be used as a seating surface. All internal and external ferrous surfaces shall be coated with a high quality, fusion epoxy coating. The pilot control shall be field adjustable from 15 psi to 120 psi. The valve shall be certified to NSF/ANSI/CAN Standard 61. The Pressure Reducing Valve with by-pass shall be a ZURN WILKINS Model ZW209BPEX.

Job Name _____ **Contractor** _____

Job Location _____ **Engineer** _____

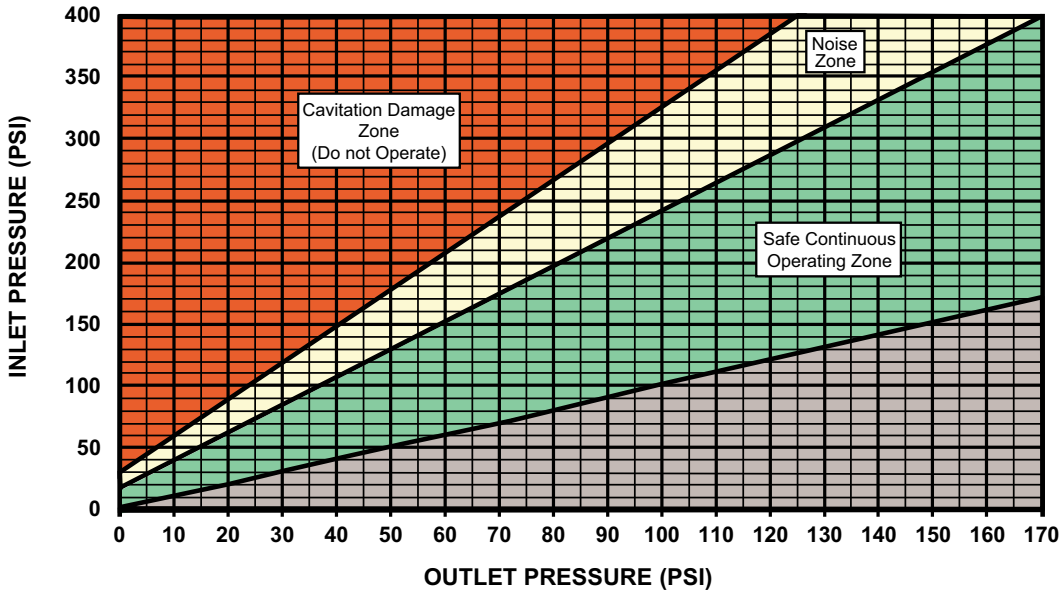
Flow Characteristics

BODY MINIMUM FRICTION LOSS



*** 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.

WATERWORKS PRESSURE REDUCTION LIMIT CHART



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.