

# PRODUCT SPECIFICATION

April 2006

## **PNEUMATIC ACTUATED INDUSTRIAL VALVES**

**SERIES: 2800 SIZES 1/2 to 2 INCHES**

**Precision Globe Control Valves**



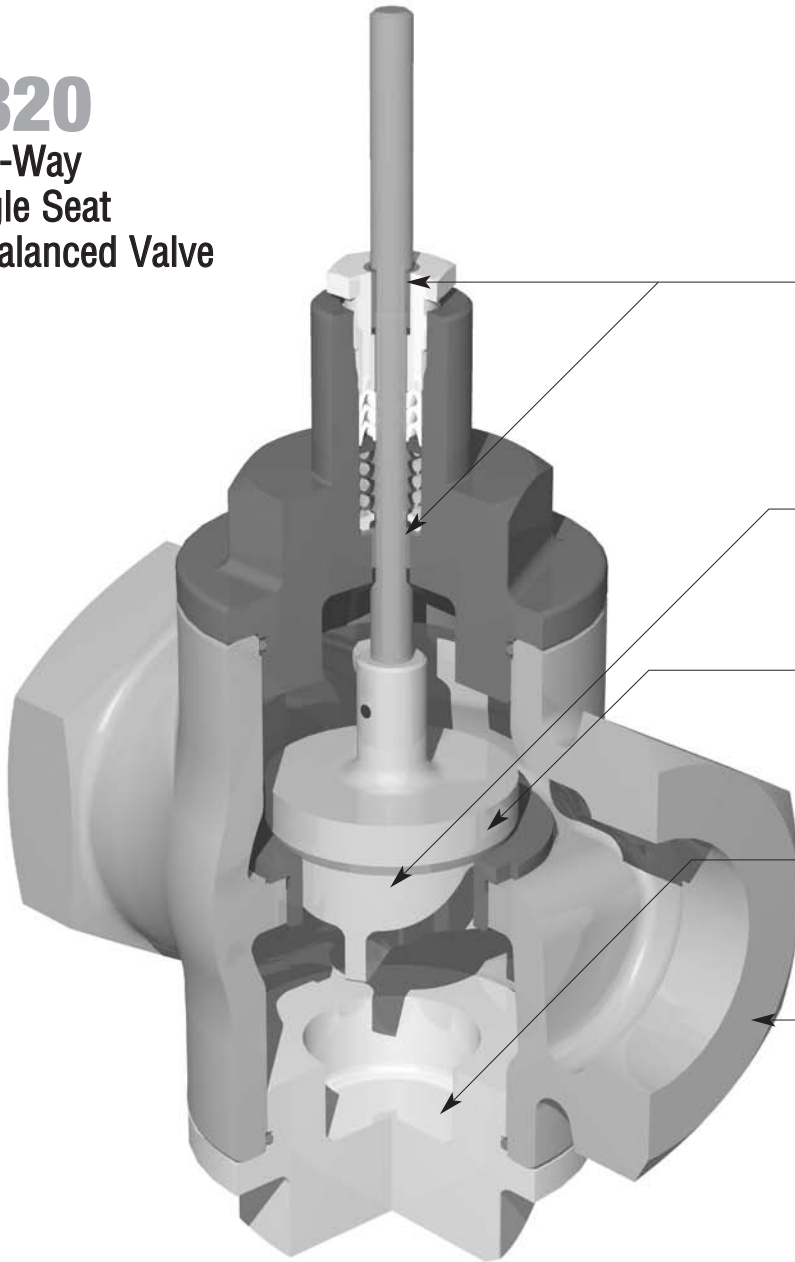
**WARREN CONTROLS**

Two-Way and Three-Way, Linear,  
Bronze or Stainless Steel Body Valves  
for Process and Utility Applications

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## 2820 Two-Way Single Seat Unbalanced Valve



### Flexible Design Options

provide optimum performance and extended reliability in a cost effective, application specific package.

### Dual Point PEEK Bearing Stem Guiding

provides both stability and low friction, yielding reduced hysteresis and optimum control.

### Trim

available in 316SS, 17-4 pH, Alloy 6, PEEK, and PTFE.

### Port Guided Plug Assembly

provides stability and desired equal percentage flow characteristic.

### Lower Plug

offers easy access for inspection and clean out.

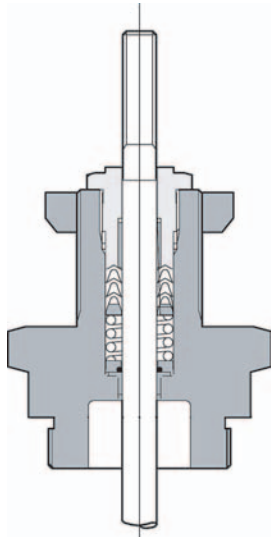
### Rugged Body

with a selection of port reductions.

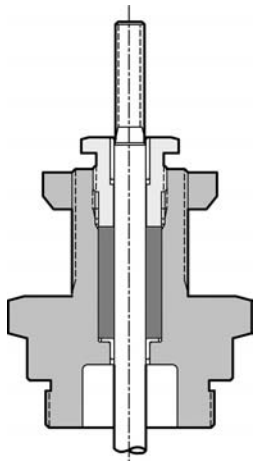


# SERIES: 2800

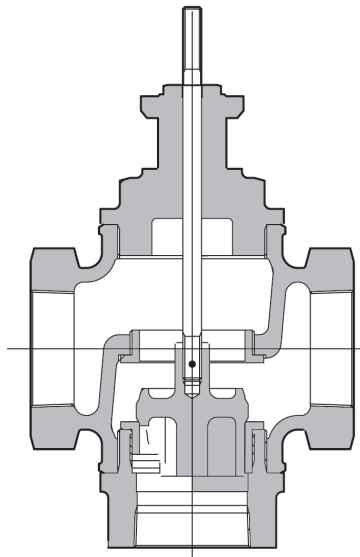
*Precision Globe Control Valves*



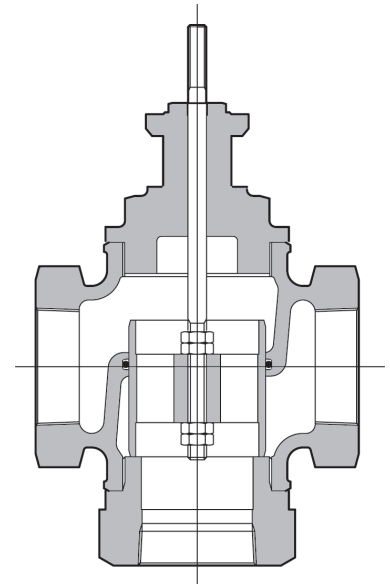
**Guided Low-Friction TFE V-Ring Packing Spring Loaded**



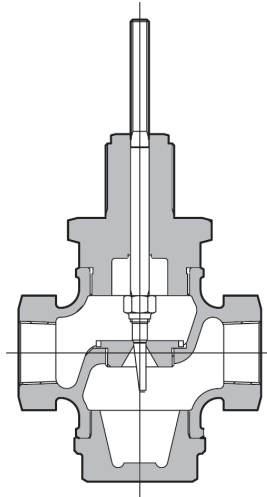
**Adjustable Graphite Packing**



**2830**  
**Three-Way Mixing Valve**  
**Bronze Body**



**2832**  
**Three-Way**  
**Diverting/Mixing Valve**  
**Bronze Body**



**2828**  
**Two-Way Single Seat**  
**Low Flow Unbalanced**  
**Valve**



**Fluoraz O-Ring**  
**Upper and Lower**  
**Body Seals in**  
**Stainless Steel**  
**Body Valves**

### **Description**

Warren Controls Series 2800 Precision Globe Control Valves feature rugged bronze or stainless steel bodies with a variety of trim materials and port sizes. The equal percentage and linear plugs in the 2-way valves and linear plugs in the 3-way valves provide excellent modulating control of a wide variety of fluids for pressure, temperature, level, and flow applications from -20 to 500°F. The Series 2800 is ideally suited where value and long life are important objectives for applications including but not limited to the Chemical, Food & Beverage, General Service, Refining, District Energy, and Pharmaceutical Industries.

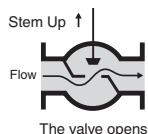
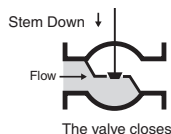
# Body Style Versus Application

## 2-Way Valves (Control of Liquids, Gases, and Steam)

### 2820 Two-Way Single Seat Unbalanced Valve

The most commonly applied solution with ANSI Class IV and VI shut-off.

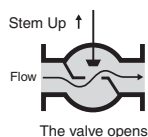
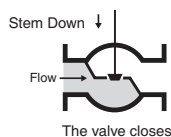
<b>Sizes:</b>	1/2, 3/4, 1, 1-1/4, 1-1/2, 2 inch
<b>Body:</b>	ANSI B16.15 Bronze 250LB Threaded (NPT), or 316 Stainless Steel 300LB Threaded (NPT), or 316 Stainless Steel 300LB Butt weld (BWE)
<b>Trim:</b>	EQ% or Linear, 316 Stainless Steel, Alloy 6, TFE, PEEK, or 17-4 PH Hardened Stainless Steel
<b>Shut-off:</b>	ANSI Class IV (Stainless Steel and Alloy 6 Trim), ANSI Class VI (TFE and PEEK Trim)
<b>Packing:</b>	Guided Low-Friction TFE V-Ring, Spring Loaded (+32 to 450°F), Adjustable Graphite Packing (+32 to 500°F)
<b>Temperature:</b>	+32 to 400°F (Bronze 250LB Threaded Body) +32 to 450°F (316 Stainless Steel 300LB Threaded or Butt weld Body w/ TFE or PEEK Trim) +32 to 500°F (316 Stainless Steel 300LB Threaded or Butt weld Body w/ Stainless Steel or Alloy 6 Trim)
<b>Rangeability:</b>	50:1



### 2828 Two-Way Single Seat Low Flow Unbalanced Valve

Low Flow Trim with ANSI Class IV and VI shut-off.

<b>Sizes:</b>	1/2, 3/4, 1 inch
<b>Body:</b>	ANSI B16.15 Bronze 250LB Threaded (NPT), 316 Stainless Steel 300LB Threaded (NPT), or 316 Stainless Steel 300LB Butt weld (BWE)
<b>Trim:</b>	Modified Linear, 316 Stainless Steel, TFE, or PEEK
<b>Shut-off:</b>	ANSI Class IV (Stainless Steel Trim), ANSI Class VI (TFE and PEEK Trim)
<b>Packing:</b>	Guided Low-Friction TFE V-Ring, Spring Loaded (+32 to 450°F), Adjustable Graphite Packing (+32 to 500°F)
<b>Temperature:</b>	+32 to 400°F (Bronze 250LB Threaded Body) +32 to 450°F (316 Stainless Steel 300LB Threaded or Butt weld Body w/ TFE or PEEK Trim) +32 to 500°F (316 Stainless Steel 300LB Threaded Body or Butt weld Body w/ Stainless Steel Trim)
<b>Rangeability:</b>	50:1

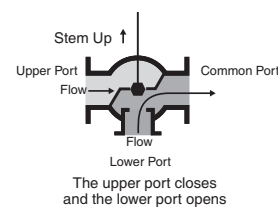
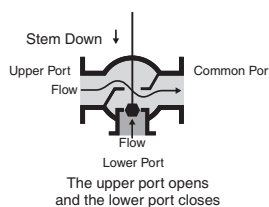


## 3-Way Valves (Control of Liquids)

### 2830 Three-Way Mixing Valve

This valve has two inlets and one outlet, and is the simplest solution for mixing or bypass applications with ANSI Class IV shut-off. In normal applications the inlet pressures are near equal and control is possible from 5% to 95% of travel with inlet pressures up to 100 PSI.

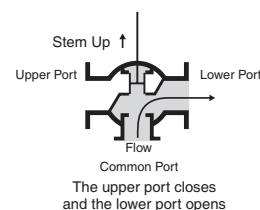
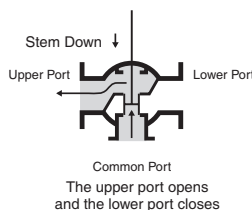
<b>Sizes:</b>	1/2, 3/4, 1, 1-1/4, 1-1/2, 2 inch
<b>Body:</b>	ANSI B16.15 Bronze 250LB Threaded (NPT), or 316 Stainless Steel 300LB Threaded (NPT), or 316 Stainless Steel 300LB Butt weld (BWE)
<b>Trim:</b>	Linear, 316 Stainless Steel
<b>Packing:</b>	Guided Low-Friction TFE V-Ring, Spring Loaded (+32 to 450°F), Adjustable Graphite Packing (+32 to 500°F)
<b>Temperature:</b>	+32 to 400°F (Bronze 250LB Threaded) +32 to 500°F (316 Stainless Steel 300LB Threaded or Butt weld)
<b>Rangeability:</b>	50:1



### 2832 Three-Way Diverting/Mixing Valve

Designed as a diverting valve with one inlet and two outlets with ANSI Class III shut-off. However, flow can be reversed for mixing if this port configuration is desirable. The difference between the upper port and lower port pressure must not exceed 50 PSID.

<b>Sizes:</b>	1, 1-1/2, 2 inch
<b>Body:</b>	ANSI B16.15 Bronze 250LB Threaded (NPT), or 316 Stainless Steel 300LB Threaded (NPT), or 316 Stainless Steel 300LB Butt weld (BWE)
<b>Trim:</b>	Linear, Bronze (Bronze 250LB Threaded), or 316 Stainless Steel (316 Stainless Steel 300LB Threaded or Butt weld)
<b>Packing:</b>	Guided Low-Friction TFE V-Ring, Spring Loaded (+32 to 450°F), Adjustable Graphite Packing (+32 to 500°F)
<b>O-Ring:</b>	EPR (Bronze 250LB Threaded), Fluoraz 797 (316 Stainless Steel 300LB Threaded or Butt weld)
<b>Temperature:</b>	+32 to 300°F (Bronze 250LB Threaded) +32 to 500°F (316 Stainless Steel 300LB Threaded or Butt weld)
<b>Rangeability:</b>	50:1

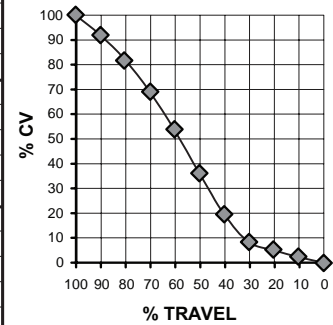


# Flow Coefficients (Cv) Versus Travel

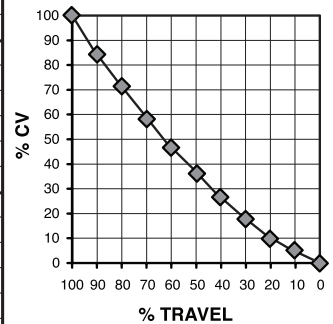
2-Way Valves (Control of Liquids, Gases, and Steam)

Valve		2820 Flow Coefficients (Cv) Two-Way Single Seat Unbalanced Valve													
Valve Size(IN)	Trim Style	Trim Size(IN)	Port Size	%Travel											
				100%	90%	80%	70%	60%	50%	40%	30%	20%	10%		
1/2	EQ%	0.876	FULL	4.90	4.78	3.53	2.57	1.92	1.92	0.95	0.69	0.43	0.17		
		0.626	1SR	3.20	3.16	2.29	1.61	1.19	0.75	0.51	0.39	0.26	0.13		
		0.626	2SR	1.50	1.44	0.96	0.72	0.52	0.42	0.31	0.21	0.10	0.06		
	LINEAR	0.876	FULL	6.00	5.40	4.80	4.20	3.60	3.00	2.40	1.80	1.20	0.60		
		3/4	EQ%	0.876	FULL	7.20	7.09	5.53	3.51	2.53	1.73	1.24	0.88	0.52	0.27
				0.876	1SR	5.50	5.31	3.73	2.64	1.95	1.21	0.96	0.70	0.43	0.17
0.626	2SR			3.30	3.30	2.34	1.63	1.20	0.75	0.51	0.39	0.26	0.13		
LINEAR	0.626	3SR	1.50	1.45	0.96	0.73	0.52	0.42	0.31	0.21	0.10	0.06			
	0.876	FULL	7.20	6.48	5.76	5.04	4.32	3.60	2.88	2.16	1.44	0.72			
	1	EQ%	1.126	FULL	10.0	9.70	6.52	4.40	2.82	2.04	1.36	0.81	0.55	0.30	
0.876			1SR	8.60	8.38	6.09	3.64	2.58	1.74	1.25	0.89	0.52	0.27		
0.876			2SR	6.00	5.79	3.88	2.70	1.97	1.22	0.96	0.70	0.43	0.17		
LINEAR		0.626	3SR	3.40	3.41	2.38	1.64	1.20	0.75	0.51	0.39	0.26	0.13		
		0.626	4SR	1.50	1.46	0.97	0.73	0.53	0.42	0.31	0.21	0.10	0.06		
		1.126	FULL	10.0	9.00	8.00	7.00	6.00	5.00	4.00	3.00	2.00	1.00		
1-1/4	EQ%	1.438	FULL	16.0	15.5	10.4	7.04	4.51	3.26	2.18	1.30	0.88	0.48		
		1.126	1SR	10.0	9.70	6.52	4.40	2.82	2.04	1.36	0.81	0.55	0.30		
		0.876	2SR	8.60	8.38	6.09	3.64	2.58	1.74	1.25	0.89	0.52	0.27		
	LINEAR	0.876	3SR	6.00	5.79	3.88	2.70	1.97	1.22	0.96	0.70	0.43	0.17		
		0.626	4SR	3.40	3.41	2.38	1.64	1.20	0.75	0.51	0.39	0.26	0.13		
		1.676	FULL	17.2	15.5	13.8	12.0	10.3	8.60	6.88	5.16	3.44	1.72		
1-1/2	EQ%	1.676	FULL	24.0	22.5	19.7	15.1	10.3	7.30	4.90	3.20	1.90	0.90		
		1.438	1SR	16.0	15.5	10.4	7.04	4.51	3.26	2.18	1.30	0.88	0.48		
		1.126	2SR	10.0	9.70	6.52	4.40	2.82	2.04	1.36	0.81	0.55	0.30		
	LINEAR	0.876	3SR	8.60	8.38	6.09	3.64	2.58	1.74	1.25	0.89	0.52	0.27		
		0.876	4SR	6.00	5.79	3.88	2.70	1.97	1.22	0.96	0.70	0.43	0.17		
		1.676	FULL	18.0	16.2	14.4	12.6	10.8	9.00	7.20	5.40	3.60	1.80		
2	EQ%	2.126	FULL	40.0	37.1	33.1	27.3	19.8	13.2	8.50	5.30	2.80	1.10		
		1.676	1SR	24.0	22.5	19.7	15.1	10.3	7.30	4.90	3.20	1.90	0.90		
		1.438	2SR	16.0	15.5	10.4	7.04	4.51	3.26	2.18	1.30	0.88	0.48		
	LINEAR	1.126	3SR	10.0	9.70	6.52	4.40	2.82	2.04	1.36	0.81	0.55	0.30		
		0.876	4SR	8.60	8.38	6.09	3.64	2.58	1.74	1.25	0.89	0.52	0.27		
		2.126	FULL	37.0	33.3	29.6	25.9	22.2	18.5	14.8	11.1	7.40	3.70		

**2820 TYPICAL FLOW CURVE**



**2828 TYPICAL FLOW CURVE**



Valve		2828 Flow Coefficients (Cv) Two-Way Single Seat Flow Unbalanced Valve											
Valve Size(IN)	Trim Style	Trim Size(IN)	Port Size	%Travel									
				100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
1/2	MODIFIED	0.250	FULL	1.00	0.85	0.72	0.58	0.47	0.36	0.26	0.17	0.10	0.05
	LINEAR		1SR	0.50	0.43	0.36	0.29	0.23	0.18	0.13	0.09	0.05	0.03
			2SR	0.25	0.21	0.18	0.15	0.12	0.09	0.07	0.04	0.03	0.01
3/4	MODIFIED	0.250	FULL	1.00	0.85	0.72	0.58	0.47	0.36	0.26	0.17	0.10	0.05
	LINEAR		1SR	0.50	0.43	0.36	0.29	0.23	0.18	0.13	0.09	0.05	0.03
			2SR	0.25	0.21	0.18	0.15	0.12	0.09	0.07	0.04	0.03	0.01
1	MODIFIED	0.250	FULL	1.00	0.85	0.72	0.58	0.47	0.36	0.26	0.17	0.10	0.05
	LINEAR		1SR	0.50	0.43	0.36	0.29	0.23	0.18	0.13	0.09	0.05	0.03
			2SR	0.25	0.21	0.18	0.15	0.12	0.09	0.07	0.04	0.03	0.01

Pressure ratings are PSIG  
 For applications below 32° consult factory.  
 For applications above 325°, 300 THD  
 Stainless Steel Body is recommended.

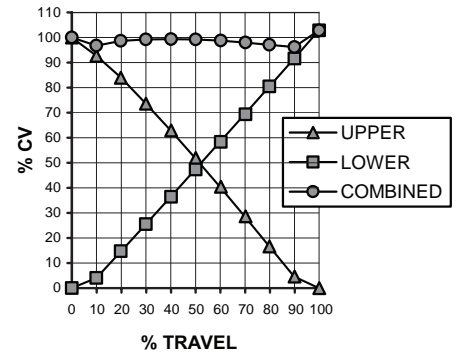
Body Pressure-Temperature Ratings:		
Temperature (F)	250 THD Bronze	300 THD & BWE SS
+32° To 150°F	400	720
150°	400	670
175°	392	645
200°	385	620
225°	375	605
250°	365	590
275°	350	575
300°	335	560
325°	317	548
350°	300	537
375°	275	526
400°	250	515
450°	-	497
500°	-	480

Trim Materials	Flowing Differential Pressure Limit
Bronze	50 PSID
316 Stainless Steel	100 PSID
TFE	100 PSID
PEEK	100 PSID
17-4 pH	
Hardened Steel	200 PSID
Alloy 6	300 PSID

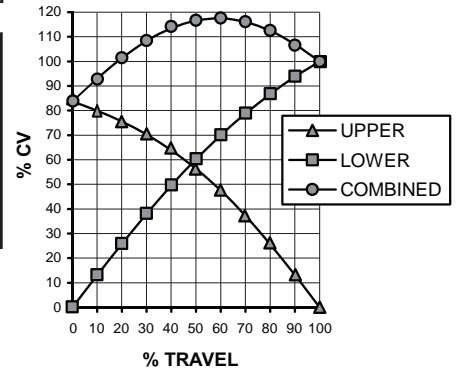
Valve		2830 Flow Coefficients (Cv) Three-Way Mixing Valve									
Valve Size(IN)	Trim Style	Trim Size(IN)	Port Size	Travel 100%	Valve Size(IN)	Trim Style	Trim Size(IN)	Port Size	Travel 100%		
1/2	LINEAR	1.126	FULL	6.30	1-1/4	LINEAR	1.676	FULL	18.5		
		0.876	1SR	4.00			1.126	1SR	10.0		
		0.626	2SR	2.00			1-1/2	LINEAR	1.676	FULL	20.0
		0.626	3SR	1.00					1.126	1SR	10.0
3/4	LINEAR	1.126	FULL	8.20	2	LINEAR	2.126	FULL	40.0		
		0.876	1SR	4.00			1.676	1SR	20.0		
		0.626	2SR	2.00							
		0.626	3SR	1.00							
1	LINEAR	1.126	FULL	10.0							
		0.876	1SR	4.00							
		0.626	2SR	2.00							
		0.626	3SR	1.00							

Valve		2832 Flow Coefficients (Cv) Three-Way Diverting/Mixing Valve			
Valve Size(IN)	Trim Style	Travel 100%		Lower	
		Upper			
1	LINEAR	12		15	
1-1/2	LINEAR	22		26	
2	LINEAR	40		47	

**2830**  
TYPICAL FLOW CURVE



**2832**  
TYPICAL FLOW CURVE



## Sizing Reference

### Load Sizing Calculations

#### Steam Table

Steam Pressure PSIG	Temp. °F	Temp. °C	Sensible Heat BTU/Lb.	Latent Heat BTU/Lb.	Total Heat BTU/Lb.
0	212	100	180	971	1151
10	239	115	207	952	1159
25	266	130	236	934	1170
50	297	147	267	912	1179
75	320	160	290	896	1186
100	338	170	309	881	1190
125	353	178	325	868	1193
150	365	185	339	858	1197
200	387	197	362	838	1200
250	406	208	381	821	1202
300	422	217	399	805	1204
400	448	231	438	778	1216
500	470	243	453	752	1205
600	489	254	475	729	1204

#### Rectangular Tank Capacity in Gallons

$$\text{Gallons} = \frac{\text{Height} \times \text{Width} \times \text{Length (inches)}}{230}$$

or

$$\text{Gallons} = H \times W \times L \text{ (Ft.)} \times 7.5$$

#### Circular Tank Storage Capacity in Gallons

$$\text{Storage} = 6D^2 \times L \text{ (Gallons)}$$

Where:

D = Tank Diameter in Feet  
L = Length in Feet

#### Heating Water with Steam

Quick Method

$$\text{Lbs./Hr.} = \frac{\text{GPM}}{2} \times \Delta T$$

Accurate Method

$$\text{Lbs./Hr.} = \frac{\text{GPM} \times 500 \times \Delta T}{h_{fg}}$$

#### Heating or Cooling Water with Water

$$\text{GPM}_1 = \text{GPM}_2 \times \frac{\text{°F water}_2 \text{ temp. rise or drop}}{\text{°F water}_1 \text{ temp. rise or drop}}$$

#### Heating or Cooling Water

$$\text{GPM} = \frac{\text{BTU / Hr.}}{(\text{°F water temp. rise or drop}) \times 500}$$

#### Heating Oil with Steam

$$\text{Lbs./Hr.} = \frac{\text{GPM}}{4} \times (\text{°F oil temp. rise})$$

#### Conversion Factors

1 Lb. Steam / Hr. = 1000 BTU / Hr.  
1 Cubic Meter = 264 U.S. Gallons  
1 Cubic Foot Water = 62.4 Lbs.  
1 PSI = 2.04 Inches of Mercury  
1 PSI = 2.3 Feet of Water  
1 PSI = 27.7 Inches of Water  
1 U.S. Gallon Water = 231 Cubic Inches  
1 U.S. Gallon Water = 8.33 Lbs.

#### Heating Air with Water

$$\text{GPM} = 2.16 \times \frac{\text{CFM} \times (\text{°F air temp. rise})}{1000 \times (\text{°F water temp. drop})}$$

#### Heating Liquids with Steam

$$\text{Lbs./Hr.} = \frac{\text{GPM} \times 60 \times C_p \times W}{h_{fg}} \times \Delta T$$

#### Heating Liquids in Steam Jacketed Kettles

$$\text{Lbs./Hr.} = \frac{\text{GPM} \times C_p \times S \times 8.33}{h_{fg} \times t} \times \Delta T$$

#### General Liquid Heating

$$\text{Lbs./Hr.} = \frac{W \times C_p}{h_{fg} \times t} \times \Delta T$$

#### Heating Air with Steam

$$\text{Lbs./Hr.} = \frac{\text{CFM}}{900} \times \Delta T$$

#### Glossary of Terms

t = Time in Hours  
Cp = Specific Heat of Liquid  
S = Specific Gravity of Fluid  
W = Weight in Lbs.  
ΔT = Temperature Rise or Fall in °F  
h<sub>fg</sub> = Latent Heat of Steam

**NOTES:**

- 1) 2820 Seat closure ANSI Class IV (Stainless Steel Trim and Alloy 6 Trim), ANSI Class VI (TFE and PEEK Trim)  
2828 Seat closure ANSI Class IV (Stainless Steel Trim), ANSI Class VI (TFE and PEEK Trim).
- 2) Inlet pressure **cannot** exceed Body Pressure-Temperature Rating.
- 3) The 3-15 and 1-17 columns of the table apply to valves with control signals coming directly from I/P transducers with matching ranges. The 0-30 and 0-40 columns apply to valves with a positioner or an I/P transducer of suitable range.
- 4) N/A indicates that the air signal is not capable of providing any shut-off or it exceeds the actuator's maximum air pressure.  
  
Maximum air pressure  
DL49 & 49XR...30 PSIG  
DL84 & 84XR...30 PSIG
- 5) See Actuators, Positioners, and Accessories section for explanation of spring ranges.

Valve			Actuator		Shut-Off ΔP				2820				
					Two-Way, Single Seat Unbalanced								
Trim Size (IN)	Valve Size (IN)	Plug Travel (IN)	Pneumatic Actuator	Spring Range	Maximum Shut-off ΔP in PSI								
					Fail Closed Reverse Acting				Fail Open Direct Acting				
					Air Signal to Actuator				Air Signal to Actuator				
					3-15 PSI	1-17 PSI	0-30 PSI	0-40 PSI	3-15 PSI	1-17 PSI	0-30 PSI	0-40 PSI	
0.626	1/2	3/4	DL49	Low	N/A	226	386			704	720	720	N/A Exceeds DL49 and DL84 Actuator's Maximum Air Pressure
	thru			Full	67	386	545			67	386	720	
	1-1/4			High	720	720	720			226	545	720	
0.876	1/2	3/4	DL49	Low	N/A	90	171			333	496	720	
	thru			Full	8	171	252			8	171	720	
	2			High	415	577	659			90	252	720	
			DL49XR	Xtra-High	720	720	720			N/A	N/A	N/A	
1.126	1	3/4	DL49	Low	N/A	38	88			186	284	720	
	thru			Full	N/A	88	137			N/A	88	720	
	2			High	235	334	383			38	137	720	
			DL49XR	Xtra-High	432	530	580			N/A	N/A	N/A	
			DL84	Low	N/A	60	144			397	566	720	
				Full	N/A	60	144			N/A	60	720	
				High	397	566	650			N/A	60	720	
1.438	1-1/4	3/4	DL49	Low	N/A	11	42			102	162	555	
	thru			Full	N/A	42	72			N/A	42	434	
	2			High	132	193	223			11	72	464	
			DL49XR	Xtra-High	253	313	343			N/A	N/A	N/A	
			DL84	Low	N/A	24	76			231	335	720	
				Full	N/A	24	76			N/A	24	697	
				High	231	335	386			N/A	24	697	
			DL84XR	Xtra-High	386	490	542			N/A	N/A	N/A	
1.676	1-1/4	3/4	DL49	Low	N/A	N/A	24			68	113	401	
	thru			Full	N/A	24	46			N/A	24	313	
	2			High	91	135	157			N/A	46	335	
			DL49XR	Xtra-High	179	224	246			N/A	N/A	N/A	
			DL84	Low	N/A	11	49			163	240	720	
				Full	N/A	11	49			N/A	11	506	
				High	163	240	278			N/A	11	506	
			DL84XR	Xtra-High	278	354	392			N/A	N/A	N/A	
2.126	2	3/4	DL49	Low	N/A	N/A	7			34	62	242	
				Full	N/A	7	21			N/A	7	186	
				High	48	76	90			N/A	21	200	
			DL49XR	Xtra-High	104	131	145			N/A	N/A	N/A	
			DL84	Low	N/A	N/A	23			94	141	449	
				Full	N/A	N/A	23			N/A	N/A	307	
				High	94	141	165			N/A	N/A	307	
			DL84XR	Xtra-High	165	212	236			N/A	N/A	N/A	

Valve			Actuator		Shut-Off ΔP				2828				
					Two-Way, Single Seat, Low Flow, Unbalanced								
Trim Size (IN)	Valve Size (IN)	Plug Travel (IN)	Pneumatic Actuator	Spring Range	Maximum Shut-off ΔP in PSI								
					Fail Closed Reverse Acting				Fail Open Direct Acting				
					Air Signal to Actuator				Air Signal to Actuator				
					3-15 PSI	1-17 PSI	0-30 PSI	0-40 PSI	3-15 PSI	1-17 PSI	0-30 PSI	0-40 PSI	
0.250	1/2	3/4	DL49	Low	N/A	720	720			720	720	720	N/A Exceeds Actuator Rating
All Ports	thru			Full	401	720	720			401	720	720	
	1			High	720	720	720			720	720	720	

# Shut-Off $\Delta P$ Ratings

## NOTES:

- 2830 Mixing Valves have two inlets and one outlet. Published shut-off values are with respect to worst case conditions with zero downstream pressure on the outlet port and zero upstream pressure on the opposing inlet port. Pneumatic Actuators used with the 2930 are direct acting. The upper port fails closed on loss of air pressure to the actuator.
- 2830 Seat closure ANSI Class IV.
- Inlet pressure **cannot** exceed Body Pressure-Temperature Rating.
- The 3-15 and 1-17 columns of the table apply to valves with control signals coming directly from I/P transducers with matching ranges. The 0-30 and 0-40 columns apply to valves with a positioner or an I/P transducer of suitable range.
- N/A indicates that the air signal is not capable of providing any shut-off or it exceeds the actuator's maximum air pressure.

Maximum air pressure  
DL49...30PSIG  
DL84 & 84XR...30PSIG

Valve			Actuator		Shut-Off $\Delta P$ Three-Way Mixing								2830			
Trim Size (IN)	Valve Size (IN)	Plug Travel (IN)	Pneumatic Actuator	Spring Range	Maximum Shut-off $\Delta P$ in PSI				Lower Port Closed Direct Acting							
					Upper Port Closed Direct Acting				Air Signal to Actuator					Air Signal to Actuator		
					3-15 PSI	1-17 PSI	0-30 PSI	0-40 PSI	3-15 PSI	1-17 PSI	0-30 PSI	0-40 PSI	3-15 PSI	1-17 PSI	0-30 PSI	0-40 PSI
0.626	1/2	9/16	DL49	Low	N/A	67	226	N/A Exceeds DL49 and DL84 Actuator's Maximum Air Pressure	560	720	720	N/A Exceeds DL49 and DL84 Actuator's Maximum Air Pressure				
				Full	N/A	226	386		N/A	242	720					
1	thru	1	DL49	High	545	720	720		83	401	720					
				Low	N/A	8	90		260	423	720					
0.876	1/2	9/16	DL49	Full	N/A	90	171		N/A	98	720					
				High	252	415	496		16	179	720					
1.126	1/2	9/16	DL49	Low	N/A	N/A	38		142	240	720					
				Full	N/A	38	88		N/A	43	683					
2	thru	2	DL49	High	137	235	284		N/A	92	720					
				Low	N/A	N/A	2		48	93	381					
1.676	1-1/4	3/4	DL49	Full	N/A	2	24		N/A	4	293					
				High	46	91	113		N/A	26	315					
2	thru	2	DL84	Low	N/A	11	49		140	223	715					
				Full	N/A	11	49		N/A	N/A	486					
2.126	2	3/4	DL84	High	163	240	278	N/A	N/A	486						
				Low	N/A	N/A	N/A	22	50	229						
2	thru	2	DL49	Full	N/A	N/A	N/A	N/A	N/A	174						
				High	21	48	62	N/A	8	188						
2	thru	2	DL84	Low	N/A	N/A	23	81	129	436						
				Full	N/A	N/A	23	N/A	N/A	58						
2	thru	2	DL84XR	High	94	141	165	N/A	N/A	294						
				Low	165	212	236	N/A	N/A	294						

- See Actuators, Positioners, and Accessories section for explanation of spring ranges.

- Published shut-off values are for diverting applications. The values are worst case and based on the pressure difference between the inlet and the outlet that is closed. Consult the factory if the required shut-off exceeds the published value and the pressure at the inlet and both outlets is known. For proper operation in diverting applications, the pressure difference between both outlets must not exceed 50 PSI. Consult the factory for shut-off values for 2832 mixing applications. Pneumatic Actuators used with the 2832 are direct acting. The upper port fails closed on loss of air pressure to the actuator.
- 2832 Seat closure ANSI Class III.
- Inlet pressure **cannot** exceed Body Pressure-Temperature Rating.

Valve			Actuator		Shut-Off $\Delta P$ Three-Way Diverting/Mixing								2832		
Valve Size (IN)	Plug Travel (IN)	Pneumatic Actuator	Spring Range	Maximum Shut-off $\Delta P$ in PSI				Lower Port Closed Direct Acting							
				Upper Port Closed Direct Acting				Air Signal to Actuator				Air Signal to Actuator			
				3-15 PSI	1-17 PSI	0-30 PSI	0-40 PSI	3-15 PSI	1-17 PSI	0-30 PSI	0-40 PSI	3-15 PSI	1-17 PSI	0-30 PSI	0-40 PSI
1	3/4	DL49	High	110	113	115	N/A Exceeds Actuator Rating	N/A	N/A	115	N/A Exceeds Actuator Rating				
			DL84	High	113	115		118	N/A	N/A		120			
1-1/2	3/4	DL49	High	N/A	110	113		N/A	N/A	113					
			DL84	High	110	113		115	N/A	N/A		118			
2	3/4	DL49	High	N/A	N/A	110		N/A	N/A	111					
			DL84	High	108	110		113	N/A	N/A		115			

- The 3-15 and 1-17 columns of the table apply to valves with control signals coming directly from I/P transducers with matching ranges. The 0-30 and 0-40 columns apply to valves with a positioner or an I/P transducer of suitable range.
- N/A indicates that the air signal is not capable of providing any shut-off or it exceeds the actuator's maximum air pressure.  
Maximum air pressure  
DL49...30 PSIG  
DL84...30 PSIG

- See Actuators, Positioners, and Accessories section for explanation of spring ranges.



# Dimensions & Weights

Dimension (IN) 2820		Valve Size (IN)		
		1/2, 3/4, 1	1-1/4 & 1-1/2	2
A	250THD	4-7/8	5-3/4	6-1/2
	300THD	5	6-1/8	6-1/2
	300BWE	15-3/8	16-7/8	17
B	250THD	2-3/4	3-1/4	3-5/8
	300THD & BWE	3	3-1/2	3-7/8
C	250THD	2-7/8	3-1/2	3-3/4
	300THD & BWE	2-7/8	3-1/2	3-3/4
Weight (LB)	250THD	8-1/2	14-1/2	18-1/2
	300THD	8	15-1/2	19
	300BWE	9-1/2	18	22-1/2

Dimension (IN) 2830		Valve Size (IN)		
		1/2, 3/4, 1	1-1/4 & 1-1/2	2
A	250THD	4-7/8	5-3/4	6-1/2
	300THD	5	6-1/8	6-1/2
	300BWE	15-3/8	16-7/8	17
B	250THD	2-3/4	3-13/16	4
	300THD	2-3/4	3-3/8	3-3/4
	300 BWE	8	8-3/4	9
C	250THD	2-7/8	3-1/2	3-3/4
	300THD & BWE	2-7/8	3-1/2	3-3/4
Weight (LB)	250THD	9	15-1/2	20
	300THD	8	15	18-1/2
	300BWE	10-1/2	19	23-1/2

Dimension (IN) 2828		Valve Size (IN)		
		1/2, 3/4, 1		
A	250THD	4-7/8		
	300THD	5		
	300BWE	15-3/8		
B	250THD	2-3/4		
	300THD & BWE	3		
C	250THD	2-7/8		
	300THD & BWE	2-7/8		
Weight (LB)	250THD	8-1/2		
	300THD	8		
	300BWE	9-1/2		

Dimension (IN) 2832		Valve Size (IN)		
		1	1-1/2	2
A	250THD	4-7/8	5-3/4	6-1/2
	300THD	5	6-1/8	6-1/2
	300BWE	15-3/8	16-7/8	17
B	250THD	3-1/2	3-13/16	4
	300THD	2-3/4	3-3/8	3-3/4
	300 BWE	8	8-3/4	9
C	250THD	2-7/8	3-1/2	3-3/4
	300THD & BWE	2-7/8	3-1/2	3-3/4
Weight (LB)	250THD	9	16-1/2	21
	300THD	8	16	19-1/2
	300BWE	10-1/2	20	24-1/2

\* Includes 1-3/8 inch for air fitting on direct acting diaphragm actuators

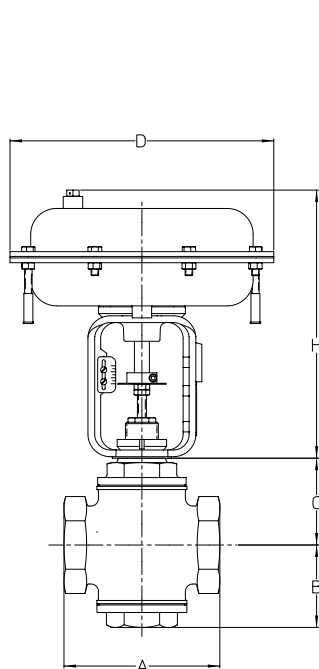
CF = Consult factory

Allow 4-7/8 inch clearance above actuator for removal.

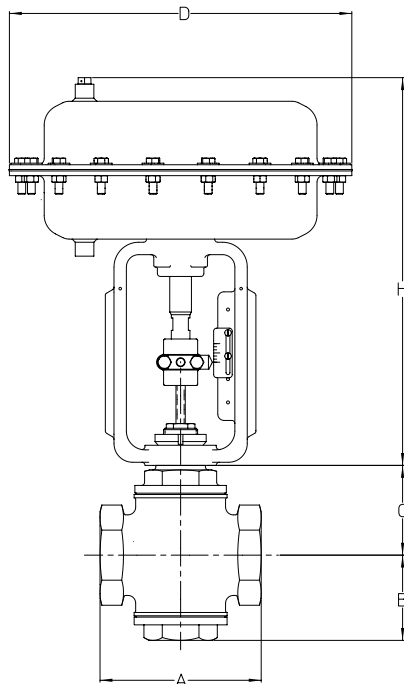
Face to face dimensions conform to Historical Warren Controls standard and are **NOT** ANSI/ISA compatible.

Actual shipping weights may vary.

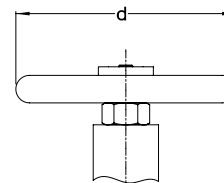
Actuator	D (in) ACTUATOR	d (in) HANDWHEEL	H MAX (IN)		WEIGHT (LB)	
			STD *	WITH HANDWHEEL	STD	WITH HANDWHEEL
			DL49 Direct	11	6-3/8	12-1/4
DL49 49XR Reverse	11	6-3/8	11-1/4	13-3/4	25	CF
DL84 Direct	13-7/8	8-1/8	16-3/4	24-1/8	48-1/2	CF
DL84 84XR Reverse	13-7/8	8-1/8	15-3/4	24	48-1/2	CF



2-Way or 3-Way  
w/ DL49 or 49XR



2-Way or 3-Way  
w/ DL84 or 84XR



Top mounted  
Handwheel

# Actuators, Positioners, & Accessories

## Actuators

Actuator		Spring Range (PSI)			
Size	Action	Low	Full	High	Xtra-High
DL49	Direct	3-9	4-13	8-12	N/A
DL49	Reverse	4-10	5-14	10-14	N/A
DL84	Direct	3-9	3-15	9-15	N/A
DL84	Reverse	3-9	3-15	9-15	N/A
DL84XR	Direct	N/A	N/A	N/A	See Note
DL49XR & DL84XR	Reverse	N/A	N/A	N/A	See Note

Note: The spring range of XR (eXtended Range) actuators varies with travel.  
These actuators require positioners or I/P's for modulating control

Effective Area: DL49 & 49XR (49 Sq In), DL84 & 84XR (84 Sq In)  
 Springs: Multiple  
 Max Air Supply: 30PSIG  
 Air Connections: 1/4 NPT  
 Diaphragm: Buna-N Fabric Reinforced  
 Diaphragm Chambers: Steel  
 Yoke: Ductile Iron  
 Stem: 300 Series Stainless Steel  
 Finish: DL49 & 49XR Epoxy-Coated  
 DL84, 84XR Acrylic Enamel  
 Ambient Temperature: DL49, 49XR -20 to 160°F  
 DL84, 84XR -40 to 180°F  
 Mounting: Vertical Above or Below Valve  
 Handwheel: Available on DL49, 49XR, 84, & 84XR

## Positioners

### Split Ranging with Positioners

Positioners are sometimes used to “Split-Range” two control valves in a parallel configuration within a piping scheme. This technique is used to obtain higher rangeability than could otherwise be achieved with a single control valve. Typically one smaller valve supplying 15% to 35% of total flow is mated with a larger valve supplying 65% to 85% of total flow.

The best-matched pair will each be providing similar rangeability for each respective flow contribution to the manifold. Calculated as maximum flow /minimum controllable flow, the smaller valve should not be attempting to control flow below 5% of stroke. Estimate Cv from Cv tables vs. stroke to calculate this.

The chosen positioners would then have a Low Range signal for the smaller valve and a High Range Signal for the larger valve. With this, a single control signal can be sequentially applied to each valve. At mid-signal range, the little valve is completely open while the larger valve is just starting to open. Controllability for wide process set point ranges is dramatically improved.

## BLX Models:



### BLX Pneumatic

Models: BFP\_: Full Range Signal (3-15 PSIG)  
 BLP\_: Low Range Signal (3-9 PSIG)  
 BHP\_: High Range Signal (9-15 PSIG)  
 Options 2SPDT Limit Switches, 4-20 mA Feedback  
 Ingress & Corrosion Protection: NEMA 4X, IP66  
 Supply Pressure: Pneumatic 145 PSIG Max **Not to exceed actuator rating**  
 Air Consumption: 0.19 SCFM at 30 PSIG

### BLX Electro-Pneumatic

Models: BFE\_: Full Range Signal (4-20 mA)  
 BLE\_: Low Range Signal (4-12 mA)  
 BHE\_: High Range Signal (12-20 mA)  
 Options 2SPDT Limit Switches, 4-20 mA Feedback  
 Ingress & Corrosion Protection: NEMA 4X, IP66  
 Supply Pressure: 21.8 to 145 PSIG **Not to exceed actuator rating**  
 Air Consumption: 0.21 SCFM at 30 PSIG

### BLX Electro-Pneumatic Intrinsically Safe

Models: BFI\_: Full Range Signal (4-20 mA)  
 BLI\_: Low Range Signal (4-12 mA)  
 BHI\_: High Range Signal (12-20 mA)  
 Ingress & Corrosion Protection: NEMA 4X, IP66  
 Approvals & Ratings:  
FM Intrinsically Safe: Class I II III, Div 1, Groups A,B,C,D,E,F,G.  
CSA Intrinsically Safe: Class I, Div 1, Groups A, B, C, D.  
 Class II, Div 1, Groups E, F, G.  
 Class III.  
 Class I, Div 2, Groups A, B, C, D.  
 Class II, Div 2, Groups E, F, G.  
 Supply Pressure: 30 to 145 PSIG **Not to exceed actuator rating**  
 Air Consumption: 0.21 SCFM at 30 PSIG

### BLX Electro-Pneumatic Explosion Proof

Models: BFX\_: Full Range Signal (4-20 mA)  
 BLX\_: Low Range Signal (4-12 mA)  
 BHX\_: High Range Signal (12-20 mA)  
 Ingress & Corrosion Protection: NEMA 4X, IP66  
 Approvals & Ratings:  
FM Intrinsically Safe: Class I II III, Div 1, Groups A,B,C,D,E,F,G.  
 Non-Incendive: Class I, Div 2, Groups A,B,C.  
 Explosion Proof: Class I, Div 1, Groups B,C,D.  
 Class I II III, Div 1, Groups E,F,G.  
CSA Intrinsically Safe: Class I, Div 1, Groups A,B,C,D.  
 Class II, Div 1, Groups E,F,G.  
 Class III.  
 Class I, Div 2, Groups A,B,C,D.  
 Class II, Div 2, Groups E,F,G.  
 Explosion Proof: Class I, Div 1, Groups B,C,D.  
 Class II, Div 1, Groups E,F,G.  
 Supply Pressure: 30 to 145 PSIG **Not to exceed actuator rating**  
 Air Consumption: 0.21 SCFM at 30 PSIG

### BLX Electro-Pneumatic Fail Freeze

Models: BFF\_: Full Range Signal (4-20 mA)  
 BLF\_: Low Range Signal (4-12 mA)  
 BHF\_: High Range Signal (12-20 mA)  
 Options 2SPDT Limit Switches, 4-20 mA Feedback  
 Ingress & Corrosion Protection: NEMA 4X, IP66  
 Supply Pressure: 20 to 100 PSIG Max **Not to exceed actuator rating**  
 Air Consumption: 0.21 SCFM at 30 PSIG

## Positioners (Continued)

### All Models:

Construction: Aluminum Housing with Polyester Powder Coat  
 Action: Direct or Reverse  
 Media: Clean Dry Oil Free Air Filtered to 5 micron  
 Air Connections: 1/4 NPT  
 Flow Capacity: 9.8 SCFM at 30 PSIG  
 Electrical Connection: 1/2 NPT  
 Gauges: Input 0-30 PSIG, Output 0-60 PSIG, Supply 0-60 PSIG,  
 Housing Black Steel Case with Chrome Ring  
 Ambient Temperature: -40 to 185°F (Except Fail Freeze -4 to 158°F)  
 Mounting: Yoke Mounted  
 Limit Switches and Feedback Options are NEMA 4X, IP66 only, and are not suitable for hazardous locations.

### Moore 760 Models:



#### 760P Pneumatic

Models: 76P\_: Full Range Signal (3-15 PSIG)  
 Options Limit Switches, 4-20 mA Feedback (*Reduced feedback span for valves with less than 1 inch travel – Call factory for details*)

#### 760E Electro-Pneumatic

Models: 76E\_: Full Range Signal (4-20 mA)  
 Options Limit Switches, 4-20 mA Feedback (*Reduced feedback span for valves with less than 1 inch travel – Call factory for details*)  
 Approvals & Ratings:

**FM** Intrinsically Safe: Class I, Div 1, Groups A,B,C,D.  
 Class II, Div 1, Groups E,F,G.  
 Class III, Div 1.

Non-Incendive: Class I, Div 2, Groups A,B,C,D.  
 Suitable for: Class II, Div 2, Groups F,G.  
 Class III, Div 2.

**CSA** Intrinsically Safe: Class I, Div 1, Groups A,B,C,D.  
 Class II, Div 1, Groups E,F,G.  
 Class III, Div 1.  
 Suitable for: Class I, Div 2, Groups A,B,C,D.  
 Class II, Div 2, Groups E,F,G.  
 Class III, Div 2.

### All Models:

Construction: Aluminum Housing with Epoxy/Polyester Powder Coat  
 Ingress & Corrosion Protection: NEMA 4, 4X, IP65  
 Action: Direct or Reverse  
 Supply Pressure: 150 PSIG Max **Not to exceed actuator rating**  
 Media: Clean Dry Oil Free Air Filtered to 3 micron  
 Flow Capacity: 9.0 SCFM  
 Air Consumption: 0.5 SCFM Typical  
 Air Connections: 1/4 NPT  
 Electrical Connection: 3/4 NPT  
 Gauges: Input 0-30 PSIG, Output 0-60 PSIG,  
 Housing Black Steel Case with Chrome Ring  
 Ambient Temperature: 760P -40 to 180°F, 760E -40 to 167°F  
 Mounting: Yoke Mounted

### Siemens SIPART PS2 Models:



#### Electro-Pneumatic

Models: P24\_: Full Range Signal (4-20 mA)  
 Calibration: Automatic or Manual Commissioning, 3 Input Keys and Two-Line CD  
 Options: Limit Switches (2 Binary Signal Outputs from Solid State Switching; No Dry Contacts), 4-20 mA Feedback

#### 2,3,4 Wire HART

Models: P2H\_: Full Range Signal (2-Wire, 4-20 mA; 3 or 4-Wire, 0/4-20 mA)  
 Calibration: Automatic or Manual Commissioning, 3 Input Keys and Two-Line CD, & HART  
 Options: Limit Switches (2 Binary Signal Outputs from Solid State Switching; No Dry Contacts), 4-20 mA Feedback

#### PROFIBUS PA

Models: P2P\_: Signal PROFIBUS PA Protocol Specification IEC 61158-2; Bus Supplied Device  
 Calibration: Automatic or Manual Commissioning, 3 Input Keys and Two-Line CD, & PROFIBUS PA  
 Options: Limit Switches (2 Binary Signal Outputs from Solid State Switching; No Dry Contacts)

#### FOUNDATION FIELDBUS

Models: P2F\_: Signal Foundation Fieldbus Protocol Specification IEC 61158-2; Bus Supplied Device  
 Calibration: Automatic or Manual Commissioning, 3 Input Keys and Two-Line CD, & Foundation Fieldbus  
 Options: Limit Switches (2 Binary Signal Outputs from Solid State Switching; No Dry Contacts)

### All Models:

Construction: Glass-Fiber-Reinforced Macrolon Housing  
 Ingress & Corrosion Protection: IP65 to EN 60 529 / NEMA 4X  
 Approvals & Ratings:  
**FM**: Intrinsically Safe: Class 1, Div 1, Gr. A,B,C,D, T4, T5 and T6, and Class 1 Zone 1, AEx ib, Group IIC  
 Non-Incendive: Class 1, Div 2, Gr. A,B,C,D, T4, T5 and T6, and Class 1 Zone 2, Group IIC  
 Explosion Proof: Class 1, Div 1, Gr. A,B,C,D, T6, and Class 1 Zone 1, Group IIC (Available as a Special, Requires Flameproof Enclosure)  
**CSA**: Intrinsically Safe: Class 1, Div 1, Gr. A,B,C,D, T4, T5 and T6, Class 1, Zone 1, AEx ib, Group IIC  
 Non-Incendive: Class 1, Div 2, Gr. A,B,C,D, T4, T5 and T6, and Class 1 Zone 2, Group IIC  
 CENELEC replaced by ATEX  
**ATEX**: Intrinsically Safe: Equipment Group II, Category 2, Atmosphere G, EEx ia/ib, IIC, T6  
 Explosion Protection: Equipment Group II, Category 3, Atmosphere G, EEx nAL [L], IIC, T6  
 Explosion Proof: Equipment Group II, Category 2, Atmosphere G, EEx d, IIC, T4, T5 and T6 (Available as a Special, Requires Flameproof Enclosure)  
 Action: Direct or Reverse  
 Supply Pressure: 20.3 to 101.5 PSIG Not to exceed actuator rating  
 Media: Clean Dry Oil Free Air Filtered to 1 micron. Pressure Dew Point -40 F Below Lowest Ambient Temperature.  
 Output Flow Capacity: 4.83 SCFM at 29 PSIG  
 Air Consumption: 0.00035 SCFM  
 Air Connections: 1/4 NPT  
 Electrical Connection: 1/2 NPT  
 Gauges: Supply 0-160 PSIG,  
 Output 0-160 PSIG  
 Housing Black Steel Case with Chrome Ring  
 Ambient Temperature: -22 to 176°F  
 Mounting: Yoke Mounted

# Actuators, Positioners, & Accessories

## Position Indication Switches

### Proximity Mark 1



Models: 2 SPDT Switches  
4 SPDT Switches  
6 SPDT Switches  
2 SPDT Switches w/ 2K Potentiometer  
2 SPDT Switches w/ 4-20 mA Feedback

Construction: Aluminum Housing, Hard Anodized

Locations: NEMA 1, 2, 3, 3R, 3S

Ambient Temperature: -40 to 180°F

Electrical Connection: 3/4 NPT, Terminal Strip

Mounting: Yoke Mounted

## I/P's

### Type 500X



Locations: NEMA 3

Construction: Zinc Alloy Base with Aluminum Bonnet, Epoxy Painted

Ranges: 3-9, 9-15, 3-15, 1-17, or 6-30 PSI

Supply Pressure: Minimum 3 PSIG Above Maximum Output  
Maximum 100 PSIG **Not to Exceed Actuator Rating**

Flow Capacity: 4.5 SCFM at 25 PSIG

Air Consumption: 0.05 SCFM Midrange Typical

Ambient Temperature: -20 to 140°F

### Type 550X



Locations: NEMA 4X (IP65)

Construction: Chromate-treated Aluminum with Epoxy Paint

Ranges: 0-30 PSI

Supply Pressure: Minimum 5 PSIG Above Maximum Output  
Maximum 100 PSIG **Not to Exceed Actuator Rating**

Flow Capacity: 12 SCFM at 100 PSIG

Air Consumption: 6.0 SCFH Midrange Typical

Ambient Temperature: -20 to 150°F

### Type 950X



Locations: NEMA 4X (IP65), Explosion proof

Construction: Chromate-treated Aluminum with Epoxy Paint

Ranges: 3-15 PSI

Supply Pressure: Minimum 5 PSIG Above Maximum Output

## I/P's (Continued)

### All Models:

Input: 4-20 mA  
Field Reversible

Air Connections: 1/4 NPT

Electrical Connection: 1/2 NPT, Pigtail Leads

Media: Clean Dry Oil Free Air Filtered to 40 micron

Mounting: Yoke Mounted

## Air Filter Regulators



Models: Type 300, Type 350SS

Output Ranges: Type 300, 0-30, 0-60 PSIG  
Type 350SS, 0-100 PSIG

Supply Pressure: Type 300, 250 PSIG Maximum  
Type 350SS, 290 PSIG Maximum

Construction: Type 300, Die-Cast Aluminum with Irridite and Baked Epoxy Paint  
Type 350SS, 316 Stainless Steel

Gauge: Type 300, Output, Housing Steel Painted  
Type 350SS, Output, Housing Stainless Steel

Air Connections: 1/4 NPT

Filter: Type 300, 40 micron. Type 350SS, 25 micron

Mounting: Chamber Mounted

## Solenoids



Models: 8320G184, EF8320G184,  
8320G202, EF8320G202

Construction: (EF)8320G184, 3-Way Brass  
(EF)8320G202, 3-Way Stainless Steel

Locations: 83206G184 & 8320G202, Watertight,  
Types 1, 2, 3, 3S, 4 & 4X  
EF8320G184 & EF8320G202, Explosion proof  
and Watertight, Types 3, 3S, 4, 4X 6, 6P, 7 & 9

Supply: 120VAC

Ambient Temperature: +32 to 125°F

Air Connections: 1/4 NPT

Electrical Connection: 1/2 NPT, Pigtail Leads

Approvals: CSA, UL, CE

Mounting: Chamber Mounted

## Air Tubing

Standard: Copper

Optional: Stainless Steel

## Positioners

Valve Type	Actuator Action	Input Signal					Failure Modes		
		Pneumatic	Electro-Pneumatic	PROFIBUS PA	Foundation Fieldbus	Increasing Signal	Loss of Signal Valve Fails... <sup>1</sup>	Loss of Power Valve Fails... <sup>2</sup>	Loss of Air Supply Valve Fails...
2820 & 28	Direct	3-15 PSI	4-20 mA	PROFIBUS Protocol	Fieldbus Protocol	Closes Valve	Open	Open	Open
	Reverse	3-15 PSI	4-20 mA	PROFIBUS Protocol	Fieldbus Protocol	Opens Valve	Closed	Closed	Closed
2830 & 32	Direct	3-15 PSI	4-20 mA	PROFIBUS Protocol	Fieldbus Protocol	Closes Lower Port/ Opens Upper Port	Upper Port Closed/ Lower Port Open	Upper Port Closed/ Lower Port Open	Upper Port Closed/ Lower Port Open

<sup>1</sup> Valves with Fail Freeze Positioners Fail in Last Position on Loss of Signal.

<sup>2</sup> PROFIBUS PA or Foundation Fieldbus ONLY

## Positioner Feedback

Valve Type	Actuator Action	Feedback Signal <sup>1</sup>	Signal Increases as
2820 & 28	Direct	4-20 mA	Valve Closes
	Reverse	4-20 mA	Valve Opens
2830 & 32	Direct	4-20 mA	Lower Port Closes/ Upper Port Opens

<sup>1</sup> Reduced feedback span for valves with 760 and less than 1 inch travel

## Positioner Limit Switches

Valve Type	Position	Settings	
		Switch 1	Switch 2
2820 & 28	Valve Closed	Closed	Open
	Valve Open	Open	Closed
2830 & 32	Upper Port Closed	Closed	Open
	Lower Port Closed	Open	Closed

## I/P's

Valve Type	Actuator Action	Input Signal	Increasing Signal	Failure Modes	
				Loss of Signal Valve Fails...	Loss of Air Supply Valve Fails...
2820 & 28	Direct	As Required For Shut-off	Closes Valve	Open	Open
	Reverse	As Required For Shut-off	Opens Valve	Closed	Closed
2830 & 32	Direct	As Required For Shut-off	Closes Lower Port/ Opens Upper Port	Upper Port Closed/ Lower Port Open	Upper Port Closed/ Lower Port Open

## SOLENOIDS (without Positioners or I/P's)

Valve Type	Actuator Action	Solenoid Energized	Failure Modes		
			Loss of Signal Valve Fails...	Loss of Air Supply Valve Fails...	Solenoid De-energized Valve Fails...
2820 & 28	Direct	Closes Valve	Open	Open	Open
	Reverse	Opens Valve	Closed	Closed	Closed
2830 & 32	Direct	Closes Lower Port/ Opens Upper Port	Upper Port Closed/ Lower Port Open	Upper Port Closed/ Lower Port Open	Upper Port Closed/ Lower Port Open

If the Solenoid is used with a Positioner or an I/P, refer to the Positioner or I/P listings for factory default settings and failure modes with the solenoid not failed.

## Proximity MARK 1 Position Indication Switches Feedback

Valve Type	Actuator Action	Feedback Signal		Feedback Signal Increases as
		Potentiometer <sup>4</sup>	mA	
2820 & 28	Direct	0-350 ohm	4-20 mA	Valve Closes
	Reverse	0-350 ohm	4-20 mA	Valve Opens
2830 & 32	Direct	0-350 ohm	4-20 mA	Lower Port Closes/ Upper Port Opens

<sup>4</sup> Span varies from approx 155 to 350 ohm depending on actuator and travel.

## Limit Switches

Valve Type	Position	Settings	
		Switch 1, 3, 5	Switch 2, 4, 6
2820 & 28	Valve Closed	Closed	Open
	Valve Open	Open	Closed
2830 & 32	Upper Port Closed	Closed	Open
	Lower Port Closed	Open	Closed

## Air Filter Regulators

Actuator	Output Pressure
DL49, 84 & 84XR	30 PSIG

# Configurations

## 1. SELECTIONS Please make a selection from each table of OPTIONS below to make a complete model number string.

# 28N

### 2. OPTIONS

#### VALVE BODY

Model	Valve Type	Size	Body Material	End Connection	Trim Style	Trim Material	Trim Cv	Packing Type
<b>20</b>	2-Way Single Seat	<b>050</b> 1/2 inch	<b>B</b> Bronze	<b>S</b> Screwed	<b>E</b> Equal %	<b>S</b> 316SS *	<b>F</b> Full Port	<b>T</b> Teflon
		<b>075</b> 3/4 inch	<b>F</b> CF8M	<b>B</b> Buttweld End	<b>L</b> Linear	<b>B</b> Bronze	<b>1</b> 1st Port Reduction	<b>G</b> Graphite
<b>28</b>	2-Way Lo-Flow	<b>100</b> 1 inch			<b>M</b> Mod Lin	<b>6</b> Alloy 6	<b>2</b> 2nd Port Reduction	<b>V</b> Vacuum Service
<b>30</b>	3-Way Mixing	<b>125</b> 1-1/4 inch			Types 30/32, Linear Only	<b>H</b> 17-4 PH	<b>3</b> 3rd Port Reduction	<i>Stainless Steel,</i>
<b>32</b>	3-Way Diverting	<b>150</b> 1-1/2 inch			Types 28 Mod Lin Only	<b>T</b> Teflon	<b>4</b> 4th Port Reduction	<i>Type 20 Bodies come standard w/PEEK bearings. Used for Temp. up to 500°F.</i>
		<b>200</b> 2 inch				<b>P</b> PEEK	NOTE: Port reductions only available on Type 20/28/30. Check factory for availability.	

#### VALVE TYPE/TRIM MATERIAL COMBINATIONS:

SIZE	TRIM MATERIAL					
	<b>S</b> 316 SS	<b>B</b> Bronze	<b>6</b> Alloy 6	<b>H</b> 17-4 PH	<b>T</b> Teflon	<b>P</b> PEEK
<b>050</b> 1/2 inch	20, 28, 30	N/A	20	20	20, 28	20, 28
<b>075</b> 3/4 inch	20, 28, 30	N/A	20	20	20, 28	20, 28
<b>100</b> 1 inch	20, 28, 30, 32SS	32 BRZ	20	20	20, 28	20, 28
<b>125</b> 1-1/4 inch	20, 30	N/A	20	20	20	20
<b>150</b> 1-1/2 inch	20, 30, 32SS	32 BRZ	20	20	20	20
<b>200</b> 2 inch	20, 30, 32SS	32 BRZ	20	20	20	20

#### VALVE TYPE/ACTUATOR COMPATIBILITY:

VALVE STYLE	VALVE SIZES	ACTUATORS
Type 20	1/2" - 2"	DL49
Type 20	1" - 2"	DL84
Type 20	1-1/4" - 2"	DL84XR
Type 28	1/2" - 1"	DL49
Type 30	1/2" - 2"	DL49
Type 30	1-1/4" - 2"	DL84
Type 30	2"	DL84XR
Type 32	1/2" - 2"	DL49 & DL84

See Shut-Off ΔP Ratings for details.

ACTUATOR				ACCESSORIES				
Actuator Series	Action	Spring Range	Handwheel	Positioners, I/P's & Limit Switches	Air Filter Regulators	ASCO Solenoids	Special Options	

**00** None  
DIAPHRAGMS:

**49** DL49 (49 Sq.In.)

**4X** DL49XR

**84** DL84 (84 Sq.In.)

**8X** DL84XR (84 Ext. Rng.)

NOTE:  
4X & 8X Only in Xtra-High Spring Range.  
4X & 8X Reverse Acting for 2-Way Valves.  
8X Directed Acting for 3-Way Valves.

**O** None  
**R** Reverse  
**L** Low  
4-10 PSI 49R;  
3-9 PSI 49D,  
84R/D

**F** Full  
5-14 PSI 49R;  
4-13 PSI 49D;  
3-15 PSI 84R/D

**H** High  
9-15 PSI 84;115  
10-14 PSI 49R  
8-12 PSI 49D

**X** Xtra-High  
DL49XR,  
DL84XR

**O** None  
**R** Reverse  
**D** Direct

NOTE:  
Must match action.

**0000** None

POSITIONERS:

**BxP** BLX Pneumatic

**BxE** BLX ElectroPneumatic

**BxI** BLX ElectroPneu. Intrn. Safe

**BxX** BLX ElectroPneu. Exp. Proof

**BxF** BLX ElectroPneu. Fail Freeze

**76P** Moore760 Pneumatic

**76E** Moore760 Electro-Pneumatic

**P24** Siemens PS2 Electro-Pneumatic

**P2H** Siemens PS2 2,3,4 Wire HART

**P2P** Siemens PS2 PROFIBUS PA

**P2F** Siemens PS2 FOUND.FIELDBUS

PROXIMITY SWITCHES:

**PX11** Mark 1 Series - 2 ea. SPDT

**PX12** Mark 1 Series - 2 ea. SPDT w/2k Pot.

**PX13** Mark 1 Series - 2 ea. SPDT w/4-20 Feedback

**PX14** Mark 1 Series - 4 ea. SPDT

**PX15** Mark 1 Series - 6 ea. SPDT

**x digit spec.**

**F** Full Range Signal, 3-15 PSI or 4-20mA

**L** Low of Split Range, 3-9 PSI or 4-12mA

**H** High of Split Range, 9-15 PSI or 12-20mA

**4th digit spec.**

**O** No Additions

**L** w/Mech. Lmt Switch's

**F** w/4-20 Feedback

**B** w/Switch's & Feedbk

NOTE:  
L,FB not available for BxI, BxX.

**O** None

**A** Type 300, 0-30 PSI

**B** Type 300, 0-60 PSI

**D** Type 350SS, 0-100 PSI

**O** None

**A** 8320G184 3-Way Brass

**B** 8320G202 3-Way SS

**L** EF8320G184 3-Way EXP Br.

**M** EF8320G202 3-Way EXP SS 120 VAC Coils

**O** None

**S** Special Options or Set-up

**T** SS Tubing

**G** SS Tagging

**B** SS Tubing and Tagging

FAILURE MODES:

MODE	VALVE TYPE	ACTUATOR ACTION
Closed	20/28	Reverse
Open	20/28	Direct
Upper Closed*	30/32	Direct
Upper Open	30/32	Reverse

\*Standard

ACTUATOR/BODY COMPATIBILITY:

DIAPHRAGMS	BODY
<b>49</b> 49 Sq.In. (DL49)	For 28N Bodies
<b>4X</b> (DL49XR)	For 28N Bodies
<b>84</b> 84 Sq.In. (DL84)	For 28N Bodies
<b>8X</b> (DL84XR)	For 28N Bodies

I/P's Use with Diaphragm Only

**MAP1** Type 500X I/P, 3-9 PSI

**MAP2** Type 500X I/P, 9-15 PSI

**MAP3** Type 500X I/P, 3-15 PSI

**MAP4** Type 500X I/P, 1-17 PSI

**MAP5** Type 500X I/P, 6-30 PSI

**MAP6** Type 550X I/P, 0-30 PSI

**MAP9** Type 950X I/P, 3-15 EXP

Note: Standard pneumatic tubing is copper. SS tubing "T" is optional.  
SS tagging "G" (Two lines, 24 characters/line) is optional.  
SS tubing and tagging together "B" is optional.

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# ACTUATED INDUSTRIAL VALVES

1800 SERIES	2800 SERIES	2900 SERIES	3800 SERIES	5800 SERIES
Heavy Globe Control Valves	Precision Globe Control Valves	High Capacity General Purpose Globe Control Valves	E-Ball Rotary Control Valves	Compact Globe Control Valves
<b>styles:</b> <ul style="list-style-type: none"> <li>• 2-way balanced</li> <li>• 2-way unbalanced</li> <li>• 3-way mixing</li> <li>• 3-way diverting</li> </ul>	<b>styles:</b> <ul style="list-style-type: none"> <li>• 2-way unbalanced</li> <li>• 2-way low flow</li> <li>• 3-way mixing</li> <li>• 3-way diverting</li> </ul>	<b>styles:</b> <ul style="list-style-type: none"> <li>• 2-way balanced</li> <li>• 2-way unbalanced</li> <li>• 3-way mixing</li> <li>• 3-way diverting</li> </ul>	<b>styles:</b> <ul style="list-style-type: none"> <li>• 2-way rotary               <ul style="list-style-type: none"> <li>- flow to open</li> <li>- flow to close</li> </ul> </li> </ul>	<b>styles:</b> <ul style="list-style-type: none"> <li>• 2-way unbalanced cage retained seat</li> <li>• 2-way cage balanced cage retained seat</li> </ul>
<b>sizes</b> 2-1/2 to 12 in. <b>class</b> 250 & 300 <b>ends</b> 125 FF,150, 250,300 RF flg <b>body</b> Cast Iron, CF8M, WCB, Bronze (ASTM B61) <b>trim</b> 316 SST, Alloy 6 <b>Cv</b> up to 1649 <b>temp.</b> -20° to 800°F <b>body limit</b> to 740 psi <b>shutoff</b> class III, IV <b>rangeability</b> 50:1 <ul style="list-style-type: none"> <li>• Heavy Duty</li> <li>• Severe Service</li> <li>• High Pressure Differentials</li> <li>• Corrosive Materials, Liquids, Gases &amp; Steam</li> <li>• Modulating or On/Off Control</li> </ul>	<b>sizes</b> 1/2 to 2 in. <b>class</b> 250 & 300 <b>ends</b> Butt weld, NPT <b>body</b> Bronze, CF8M <b>trim</b> 316SST, Alloy 6, Bronze, TFE, PEEK, 17-4pH <b>Cv</b> up to 40 <b>temp.</b> -20° to 500°F <b>body limit</b> to 720 psi <b>shutoff</b> class III, IV, VI <b>rangeability</b> 50:1 <ul style="list-style-type: none"> <li>• Economical</li> <li>• Precision Control</li> <li>• Suited for Gases, Steam, or Liquids that are Not Viscous or Solids Bearing</li> </ul>	<b>sizes</b> 2-1/2 to 10 in. <b>class</b> 125 & 250 <b>ends</b> 125 FF, 250 RF flg <b>body</b> Cast Iron <b>trim</b> Bronze, 300SS, 17-4pH, Alloy 6 <b>Cv</b> up to 960 <b>temp.</b> -20° to 400°F <b>body limit</b> to 400 psi <b>shutoff</b> class II, III, IV <b>rangeability</b> 50:1 <ul style="list-style-type: none"> <li>• High Capacity</li> <li>• General Purpose</li> <li>• Moderate Pressure Drops</li> <li>• Compatible Liquids and Gas, Steam &amp; Water</li> <li>• Modulating or On/Off Control</li> </ul>	<b>sizes</b> 1 to 8 in. <b>class</b> 300 <b>ends</b> 150,300 RF flg <b>body</b> WCB, CF8M, Custom Alloys <b>trim</b> 316 SST, Alloy 6, Ceramic, TFE, PEEK <b>Cv</b> up to 1420 <b>temp.</b> -20° to 800°F <b>body limit</b> to 740 psi <b>shutoff</b> class IV,IV+,VI <b>rangeability</b> 100:1 <ul style="list-style-type: none"> <li>• Eccentric, Segmented Ball</li> <li>• Well Suited for Erosive Service</li> <li>• Various Trim Options Include Ceramic for Slurries or Gritty Materials &amp; Teflon® for Class VI Shutoff</li> </ul>	<b>sizes</b> 1 to 4 in. <b>class</b> 300 <b>ends</b> 150,300 RF flg Socket weld, NPT <b>body</b> WCB, CF8M, Bronze (ASTM B61) <b>trim</b> 316 SST, 400 SST Alloy 6, TFE, PEEK <b>Cv</b> up to 170 <b>temp.</b> -20° to 800°F <b>body limit</b> to 740 psi <b>shutoff</b> class IV, VI <b>rangeability</b> 50:1 <ul style="list-style-type: none"> <li>• Highly Efficient, Compact Design</li> <li>• High Pressure Drops</li> <li>• Typically Suited for High Force Piston Actuators for Steam, Chemicals &amp; Dirty Fluids</li> </ul>

## WARREN CONTROLS

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