PNEUMATIC ACTUATED INDUSTRIAL VALVES

PRECISION GLOBE CONTROL VALVES

PRODUCT SPECIFICATION

SERIES **2800**

SIZES: 1/2 TO 2 INCHES

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

2800_PS_RevR_0825

2800 PRODUCT SPEC

WARREN CONTROLS

A company of the ARI-Armaturen Group

2600 EMRICK BLVD • BETHLEHEM, PA 18020 • USA •800-922-0085 • WWW.WARRENCONTROLS.COM

DEPENDABLE, RUGGED, PRECISION CONTROL VALVES AND ACCESSORIES

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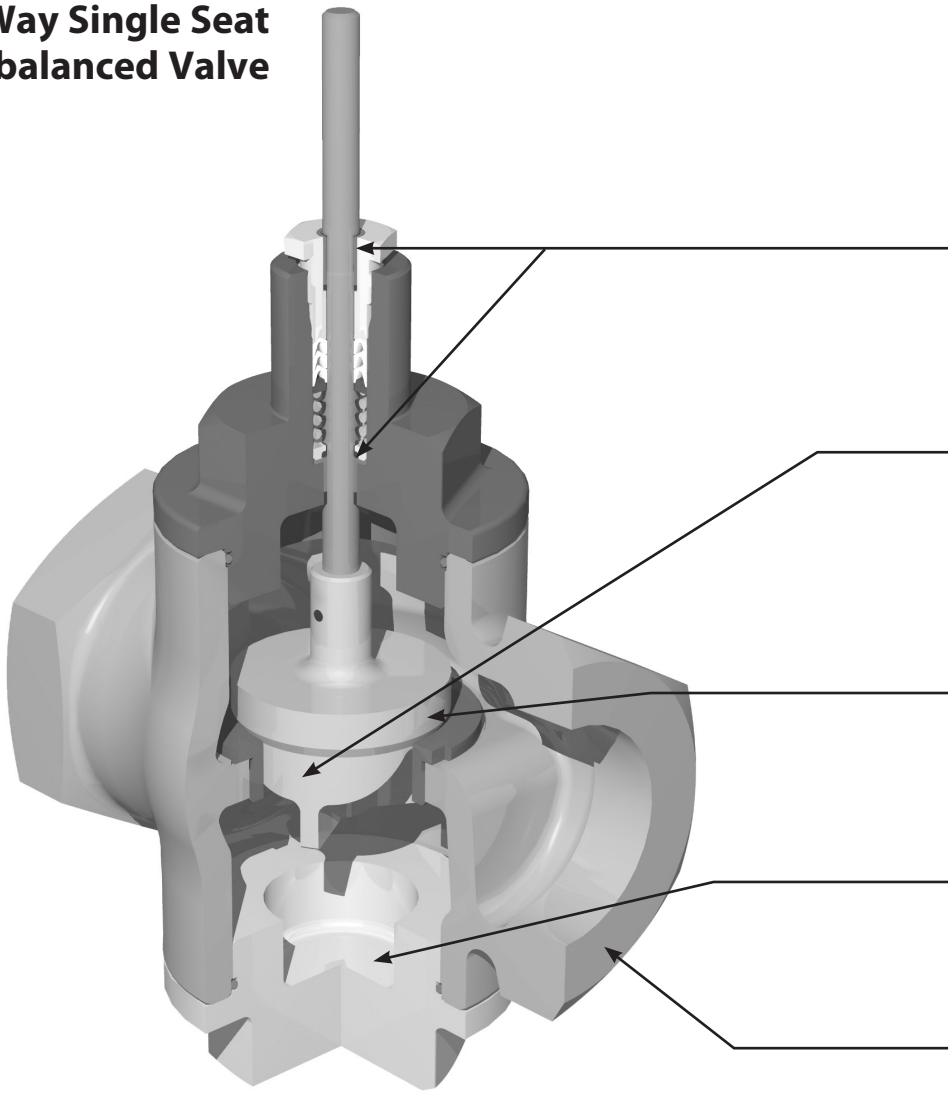
2820

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.

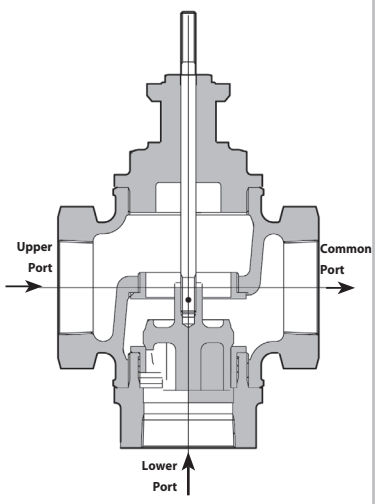
Port Guided Plug Assembly provides stability and desired equal percentage flow characteristic.

Lower Plug offers easy access for inspection and clean out.

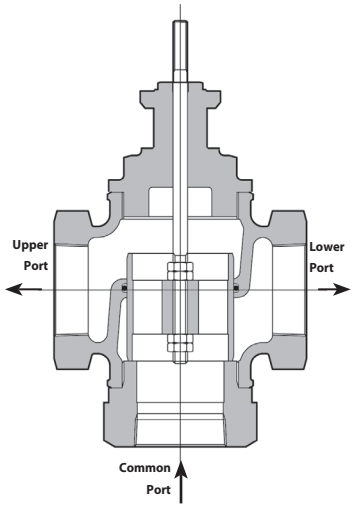
Rugged Body with a selection of port reductions.

SERIES: 2800

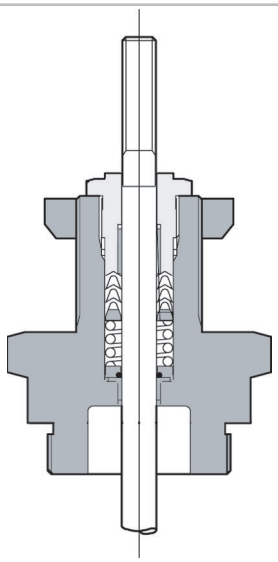
Precision Globe Control Valves



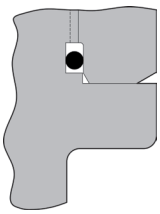
2830
Three-Way Mixing Valve



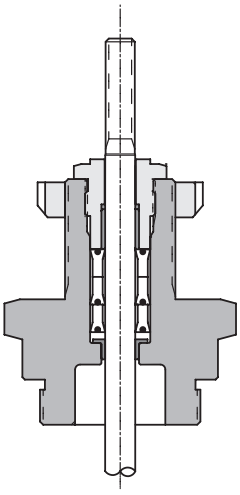
2832
Three-Way Diverting Valve



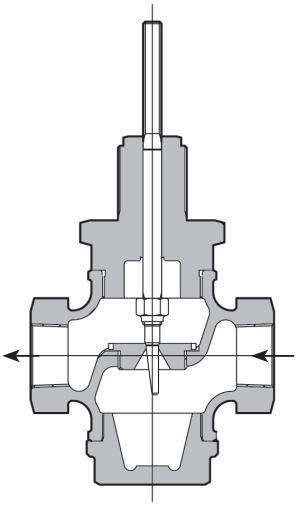
Guided Low-Friction TFE V-Ring Packing Spring Loaded



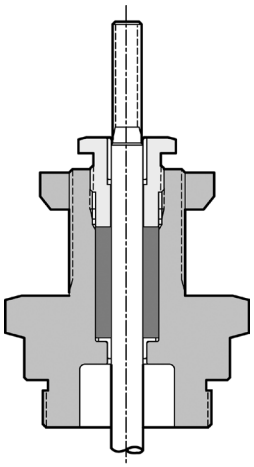
Fluoraz O-Ring Upper and Lower Body Seals in Stainless Steel Body Valves



Long-Life Multi-Stack EPDM Lip Packing



2828
Two-Way Single Seat Low Flow Unbalanced Valve



Adjustable Graphite Packing

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 500ºF. 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 2-Way Single Seat Unbalanced Valve

The most commonly applied solution with ANSI Class IV and VI leakage rates. ***See Table on page 21 for Fluid Temperature Limits***

Sizes:	1/2, 3/4, 1, 1-1/4, 1-1/2, 2 inch
Body:	ANSI B16.15 Bronze 250LB Threaded (NPT), or 316 Stainless Steel 300LB Threaded (NPT), or 316 Stainless Steel 300LB SCH 40 Buttweld (BWE) Stainless Steel body valves contain Fluoraz 797 O-Ring upper and lower body seals.*
Trim:	EQ% or Linear, 316 Stainless Steel, Alloy 6, TFE, PEEK, or 17-4 pH Hardened Stainless Steel
Leakage Rates:	ANSI Class IV (Stainless Steel and Alloy 6 Trim), ANSI Class VI (TFE and PEEK Trim)
Packing:	Long-Life Multi-Stack EPDM Lip Packing (EPDM Lip Packing is not suitable for use with oils, hydrocarbons, or acids.) Guided Low-Friction TFE V-Ring, Spring Loaded Adjustable Graphite Packing
Rangeability:	50:1

2828 2-Way Single Seat Low Flow Unbalanced Valve

Low Flow Trim with ANSI Class IV and VI leakage rates.

See Table on page 21 for Fluid Temperature Limits

Sizes:	1/2, 3/4, 1 inch
Body:	ANSI B16.15 Bronze 250LB Threaded (NPT), 316 Stainless Steel 300LB Threaded (NPT), or 316 Stainless Steel 300LB SCH 40 Buttweld (BWE) Stainless Steel body valves contain Fluoraz 797 O-Ring upper and lower body seals.*
Trim:	Modified Linear, 316 Stainless Steel, TFE, or PEEK
Leakage Rates:	ANSI Class IV (Stainless Steel Trim), ANSI Class VI (TFE and PEEK Trim)
Packing:	Long-Life Multi-Stack EPDM Lip Packing (EPDM Lip Packing is not suitable for use with oils, hydrocarbons, or acids.) Guided Low-Friction TFE V-Ring, Spring Loaded Adjustable Graphite Packing
Rangeability:	40:1 for Cv 1.00 and 0.50 20:1 for Cv 0.25

Note: Fluoraz o-ring is not compatible with the following solvents: acetates, acetone, benzene, carbon tetrachloride, ethers, Freons, ketones, lacquers, methyl ethyl ketone, and toluene - Consult Factory with service conditions for alternate o-ring selection.

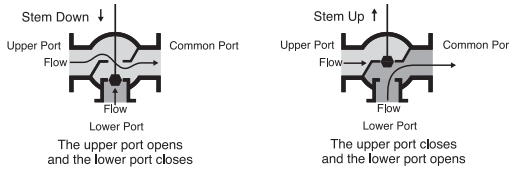
3-WAY VALVES
(Control of Liquids)

2830 3-Way Mixing Valve

This valve has two inlets and one outlet, and is the simplest solution for mixing or bypass applications with an ANSI Class IV leakage rate. 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.

See Table on page 21 for Fluid Temperature Limits

Sizes:	1/2, 3/4, 1, 1-1/4, 1-1/2, 2 inch
Body:	ANSI B16.15 Bronze 250LB Threaded (NPT), or 316 Stainless Steel 300LB Threaded (NPT), or 316 Stainless Steel 300LB SCH 40 Buttweld (BWE) Stainless Steel body valves contain Fluoraz 797 O-Ring upper and lower body seals.*
Trim:	Linear, 316 Stainless Steel
Packing:	Long-Life Multi-Stack EPDM Lip Packing (EPDM Lip Packing is not suitable for use with oils, hydrocarbons, or acids.) Guided Low-Friction TFE V-Ring, Spring Loaded Adjustable Graphite Packing
Rangeability:	50:1



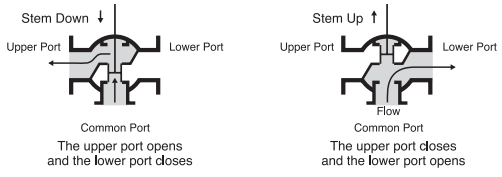
2832 3-Way Diverting/Mixing Valve

Designed as a diverting valve with one inlet and two outlets with ANSI Class III leakage rate. 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.

See Table on page 21 for Fluid Temperature Limits

(See Piping note on Page 8.)

Sizes:	1, 1-1/2, 2 inch
Body:	ANSI B16.15 Bronze 250LB Threaded (NPT), or 316 Stainless Steel 300LB Threaded (NPT), or 316 Stainless Steel 300LB SCH 40 Buttweld (BWE) Stainless Steel body valves contain Fluoraz 797 O-Ring upper and lower body seals.*
Trim:	Linear, Bronze (Bronze 250LB Threaded), or 316 Stainless Steel (316 Stainless Steel 300LB Threaded or Buttweld)
Packing:	Long-Life Multi-Stack EPDM Lip Packing (EPDM Lip Packing is not suitable for use with oils, hydrocarbons, or acids.) Guided Low-Friction TFE V-Ring, Spring Loaded Adjustable Graphite Packing
O-Ring:	EPR (Bronze 250LB Threaded), Fluoraz 797 (316 Stainless Steel 300LB Threaded or Buttweld)*
Rangeability:	50:1

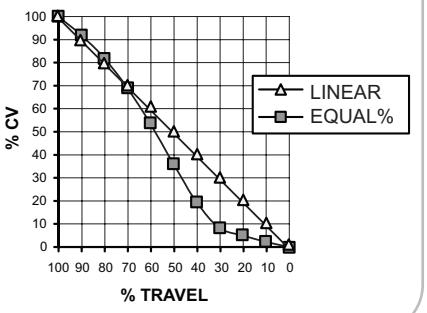


2-Way Valves (Control of Liquids, Gases, and Steam)

2820 FLOW COEFFICIENTS (Cv) 2-WAY SINGLE SEAT UNBALANCED VALVE

VALVE				%Travel									
Valve Size (IN)	Trim Style	Trim Size (IN)	Port Size	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	1.20	0.95	0.69	0.43	0.17
		0.876	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
		0.876	2SR	3.30	3.30	2.34	1.63	1.20	0.75	0.51	0.39	0.26	0.13
		0.626	3SR	1.50	1.45	0.96	0.73	0.52	0.42	0.31	0.21	0.10	0.06
	LINEAR	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
		0.876	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
	LINEAR	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
		0.876	3SR	6.00	5.79	3.88	2.70	1.97	1.22	0.96	0.70	0.43	0.17
		0.876	4SR	3.40	3.41	2.38	1.64	1.20	0.75	0.51	0.39	0.26	0.13
	LINEAR	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
		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
	LINEAR	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
		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
	LINEAR	2.126	FULL	37.0	33.3	29.6	25.9	22.2	18.5	14.8	11.1	7.40	3.70

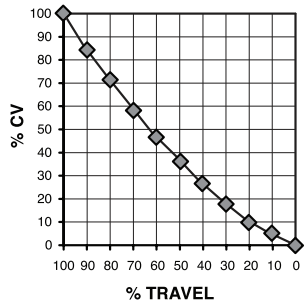
2820 TYPICAL FLOW CURVES



2828 FLOW COEFFICIENTS (Cv) 2-WAY SINGLE SEAT LOW FLOW UNBALANCED VALVE

VALVE				%Travel									
Valve Size (IN)	Trim Style	Trim Size(N)	Port Size	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
1/2	MODIFIED LINEAR	0.250	FULL	1.00	0.85	0.72	0.58	0.47	0.36	0.26	0.17	0.10	0.05
			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 LINEAR	0.250	FULL	1.00	0.85	0.72	0.58	0.47	0.36	0.26	0.17	0.10	0.05
			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 LINEAR	0.250	FULL	1.00	0.85	0.72	0.58	0.47	0.36	0.26	0.17	0.10	0.05
			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

2828 TYPICAL FLOW CURVE



Pressure ratings are PSIG
For applications below 32ºF consult factory.
For applications above 375ºF, 300 THD Stainless Steel Body is recommended.

BODY PRESSURE-TEMPERATURE RATINGS:

Temp. (F)	250 THD Bronze	300 THD& BWE SS
-20° To 100°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

AGENCY APPROVALS

CRN REGISTERED — SEE TABLE ON PAGE 20

GAS INTERNATIONAL ISO 9001:2015 REGISTERED FIRM Certificate no US2269

TRIM MATERIALS	FLOWING DIFFERENTIAL PRESSURE LIMIT
Bronze	50 PSID
316 Stainless Steel	100 PSID
TFE	15 PSID
PEEK	100 PSID
17-4 pH Hardened Steel	200 PSID
Alloy 6	300 PSID

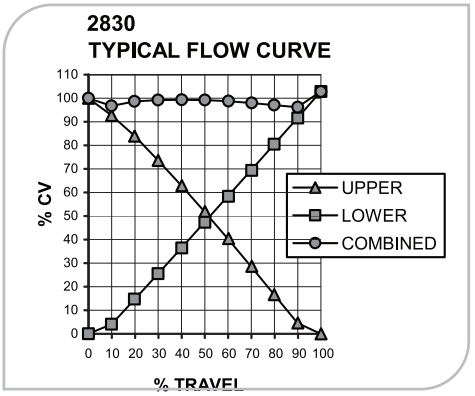
NOTE: Approaching limits for continuous use will reduce trim life. For continuous use, stay within half of rated maximum.

NOTE ON BEARINGS: PEEK Bearings should not be used for temperatures above 450ºF or flowing differential pressure above 300 PSIG.

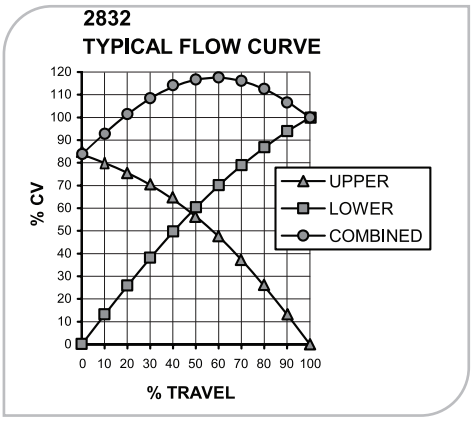
FLOW COEFFICIENTS (Cv) VERSUS TRAVEL

3-Way Valves (Control of Liquids)

VALVE	2830 FLOW COEFFICIENTS (Cv) 3-WAY MIXING VALVE							
Valve Size (IN)	Trim Style	Trim Size(N)	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) 3-WAY DIVERTING/MIXING VALVE		
Valve Size (IN)	Trim Style	Travel 100% Upper	Travel 100% Lower
1	LINEAR	12	15
1-1/2	LINEAR	22	26
2	LINEAR	40	47



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

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

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

$$GPM_1 = GPM_2 \times \frac{\text{°F water}_2 \text{ temp. rise or drop}}{\text{°F water}_1 \text{ temp. rise or drop}}$$

Heating or Cooling Water

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

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

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

Heating Liquids with Steam

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

Heating Liquids in Steam Jacketed Kettles

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

General Liquid Heating

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

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_{fg} = Latent Heat of Steam

NOTES:

1) 2820 leakage rates are ANSI Class IV (Stainless Steel Trim and Alloy 6 Trim), ANSI Class VI (TFE and PEEK Trim) 2828 leakage rates are 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.

Shut-off values are for valves with TFE or EPDM packing. For valves with Graphite packing contact factory for shut-offs.

2820 SHUT-OFF ΔP 2-WAY, SINGLE SEAT UNBALANCED

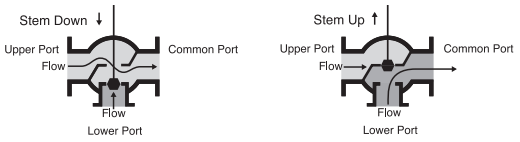
VALVE			ACTUATOR		Maximum Shut-off ΔP in PSI							
					Fail Closed Reverse Acting				Fail Open Direct Acting			
					Air Signal to Actuator				Air Signal to Actuator			
Trim Size (IN)	Valve Size (IN)	Plug Travel (IN)	Pneumatic Actuator	Spring Range	3-15 PSI	1-17 PSI	0-30 PSI	0-40 PSI	3-15 PSI	1-17 PSI	0-30 PSI	0-40 PSI
0.626	1/2 thru 1-1/4	3/4	DL49	Low	N/A	226	386	N/A Exceeds DL49 and DL84 Actuator's Maximum Air Pressure	704	720	720	N/A Exceeds DL49 and DL84 Actuator's Maximum Air Pressure
				Full	67	386	545		67	386	720	
				High	720	720	720		226	545	720	
0.876	1/2 thru 2	3/4	DL49	Low	N/A	90	171		333	496	720	
				Full	8	171	252		8	171	720	
				High	415	577	659		90	252	720	
			DL49XR	Xtra-High	N/A	N/A	720		N/A	N/A	N/A	
1.126	1 thru 2	3/4	DL49	Low	N/A	38	88		186	284	720	
				Full	N/A	88	137		N/A	88	720	
				High	235	334	383		38	137	720	
			DL49XR	Xtra-High	N/A	N/A	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 thru 2	3/4	DL49	Low	N/A	11	42		102	162	555	
				Full	N/A	42	72		N/A	42	434	
				High	132	193	223		11	72	464	
			DL49XR	Xtra-High	N/A	N/A	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	N/A	N/A	542		N/A	N/A	N/A	
1.676	1-1/4 thru 2	3/4	DL49	Low	N/A	N/A	24		68	113	401	
				Full	N/A	24	46		N/A	24	313	
				High	91	135	157		N/A	46	335	
			DL49XR	Xtra-High	N/A	N/A	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	N/A	N/A	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	N/A	N/A	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	N/A	N/A	236		N/A	N/A	N/A	

2828 SHUT-OFF ΔP 2-WAY, SINGLE SEAT LOW FLOW, UNBALANCED

VALVE			ACTUATOR		Maximum Shut-off ΔP in PSI							
					Fail Closed Reverse Acting				Fail Open Direct Acting			
					Air Signal to Actuator				Air Signal to Actuator			
Trim Size (IN)	Valve Size (IN)	Plug Travel (IN)	Pneu-matic Actuator	Spring Range	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 All Ports	1/2 thru 1	3/4	DL49	Low	N/A	720	720	N/A Exceeds Actuator Rating	720	720	720	N/A Exceeds Actuator Rating
				Full	401	720	720		401	720	720	
				High	720	720	720		720	720	720	

SHUT-OFF ΔP RATINGS

2830 Three-Way Mixing Valve



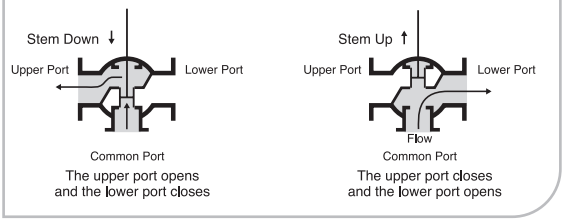
NOTES:

1) 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 2830 are direct acting. The upper port fails closed on loss of air pressure to the actuator.
2) 2830 leakage rate is ANSI Class IV.
3) Inlet pressure **cannot** exceed Body Pressure-Temperature Rating.
4) 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.
5) 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
6) See Actuators, Positioners, and Accessories section for explanation of spring ranges.

2830 SHUT-OFF ΔP 3-WAY MIXING

VALVE			ACTUATOR		Maximum Shut-off ΔP in PSI							
					Upper Port Closed Direct Acting				Lower Port Closed Direct Acting			
					Air Signal to Actuator				Air Signal to Actuator			
Trim Size (IN)	Valve Size (IN)	Plug Travel (IN)	Pneumatic Actuator	Spring Range	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 thru 1	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	
				High	545	720	720		83	401	720	
0.876	1/2 thru 1	9/16	DL49	Low	N/A	8	90		260	423	720	
				Full	N/A	90	171		N/A	98	720	
				High	252	415	496		16	179	720	
1.126	1/2 thru 1-1/2	9/16	DL49	Low	N/A	N/A	38		142	240	720	
				Full	N/A	38	88		N/A	43	683	
				High	137	235	284		N/A	92	720	
1.676	1-1/4 thru 2	3/4	DL49	Low	N/A	N/A	2		48	93	381	
				Full	N/A	2	24		N/A	4	293	
				High	46	91	113		N/A	26	315	
			DL84	Low	N/A	11	49		140	223	715	
				Full	N/A	11	49		N/A	N/A	486	
				High	163	240	278		N/A	N/A	486	
2.126	2	3/4	DL49	Low	N/A	N/A	N/A		22	50	229	
				Full	N/A	N/A	N/A		N/A	N/A	174	
				High	21	48	62		N/A	8	188	
			DL84	Low	N/A	N/A	23		81	129	436	
				Full	N/A	N/A	23		N/A	N/A	58	
				High	94	141	165		N/A	N/A	294	
			DL84XR	Xtra-High	165	212	236		N/A	N/A	294	

2832 Three-Way Diverting Valve



****PIPING NOTE***: The 2832 is **NOT** compatible with an elbow directly connected or in close proximity to the common port without the use of a flow straighter. Otherwise a minimum of 10 diameters of straight pipe are required for the common port connection.

2832 SHUT-OFF ΔP 3-WAY DIVERTING/MIXING

VALVE		ACTUATOR		Maximum Shut-off ΔP in PSI							
				Upper Port Closed Direct Acting				Lower Port Closed Direct Acting			
				Air Signal to Actuator				Air Signal to Actuator			
Valve Size (IN)	Plug Travel (IN)	Pneumatic Actuator	Spring Range	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	

1) 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.
2) 2832 leakage rate is ANSI Class II.
3) Inlet pressure **cannot** exceed Body Pressure-Temperature Rating.
4) 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.
5) 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
6) See Actuators, Positioners, and Accessories section for explanation of spring ranges.

Shut-off values are for valves with TFE or EPDM packing. For valves with Graphite packing contact factory for shut-offs.

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	2-23/32	3-13/16	4
	300THD	2-23/32	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	3-15/32	3-13/16	4
	300THD	2-23/32	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

ACTUATOR	D (in) ACTUATOR	d (in) HAND-WHEEL	H MAX (IN)		WEIGHT (LB)	
			STD*	WITH HAND-WHEEL	STD	WITH HAND-WHEEL
DL49 Direct	11	6-3/8	12-1/4	16	25	CF
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

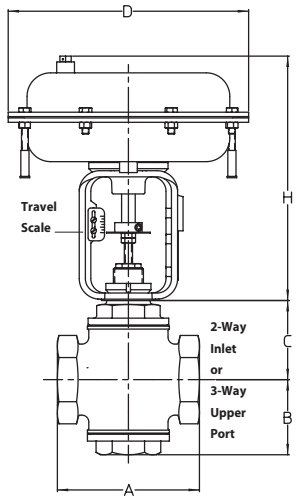
* Includes 1-3/8 inch for air fitting on direct acting diapHragm actuators

CF = Consult factory

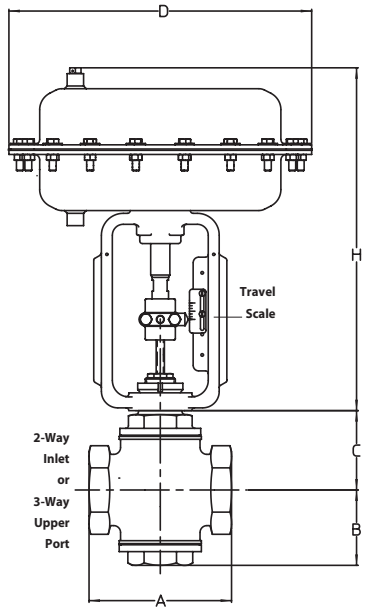
Allow 4-7/8 inch clearance above actuator for removal.

Actual shipping weights may vary.

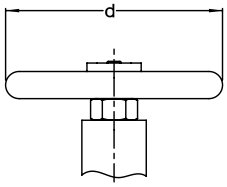
Face to face dimensions conform to Historical Warren Controls standard and are NOT ANSI/ISA compatible.



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



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



Top mounted Handwheel

Default Actuator Orientation Shown

Fluid Temperature Limit Thresholds

The engineering data within our product specification will share information about MAX fluid temperature limits as if it is an absolute for any configurable valve assembly. It is not. The MAX fluid temperatures listed, sometimes as high as 800 Deg. F depending on the valve is only an absolute one for the valve body itself. It does not take into consideration the actuation or accessories. Actuators and accessories each have their own MAX ambient temperature limits that may be anywhere from 122 °F to 250°F depending on the items for the electronics or softs goods these items contain. ***It is nearly impossible to correlate JUST fluid temperature to determine when any of these actuators or accessories will have their ambient exceeded.***

THERE ARE SEVERAL FACTORS THAT INCLUDE BUT ARE NOT LIMITED TO:

- valve size
- actuator orientation
- room ambient temperature
- distance from the valve body to the components of interest
- bonnet style/size
- conducted heat versus radiated heat
- ventilation

With all of these variables it is a challenge to come up with some guidelines.

However, we have attempted to do that in the tables that follow on page 13. Realize these are only guidelines.

Actuator Mounting VS *Insulating Blankets*

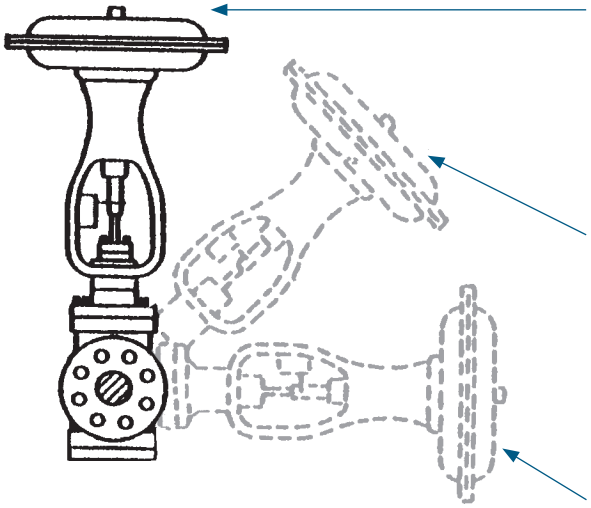
When working with higher fluid temperatures thermal insulating blankets can ***dramatically reduce surface temperatures on pipes, valves and other fixtures*** in a fluid control system such that the ambient room temperatures in these environments are dramatically reduced as well. This is often required in for valve actuators and accessories to reliably survive when fluid temperatures rise well above the safe ambient temperatures of the devices. Radiant heat and convected heat are the major sources for damage to these actuators and accessories. When a valve actuator is mounted to the side of a valve there is still radiant heat but convected heat is mostly eliminated. ***For globe control valves, having the actuator mounted vertically above the valve is best for optimum valve packing life but will then suffer the most with both radiant and convected heat to deal with.*** Alternatives to blankets and the mounting orientation listed include longer yoke actuators and extension bonnets on valves. These put distance between the heat sources and the components you are trying to protect from heat.

Choose the right blanket

ACOUSTIGUARD™ VS THERMIGUARD™

At Warren Controls our ***AcoustiGuard™ & ThermiGuard™*** blankets are nearly identical. In fact they have identical thermal properties. The ***AcoustiGuard™*** has an additional layer of high density barium sulfate vinyl reflector for sound reflection. Each blanket is specifically designed in a one or two piece design that is made to be easily removable for valve servicing. When used in conjunction with high temperature fluids, significant energy savings, lower surface & ambient temperatures and a ***safer environment for employees are just some of the benefits***.

Predicting Safe Fluid Temperatures for Actuators & Accessories



VERTICAL ABOVE PIPING

This is the recommended position for mounting as it is the best position to ensure the service life of the equipment; however this is where it will encounter the most heat and sound vibrations.

45° FROM VERTICAL ABOVE PIPING ON EITHER SIDE

You may mount in this position to try to reduce the heat in high temperature applications; however this will reduce the life of the packing.

Actuators mounted in any position other than vertical MUST be supported independent of the valve.

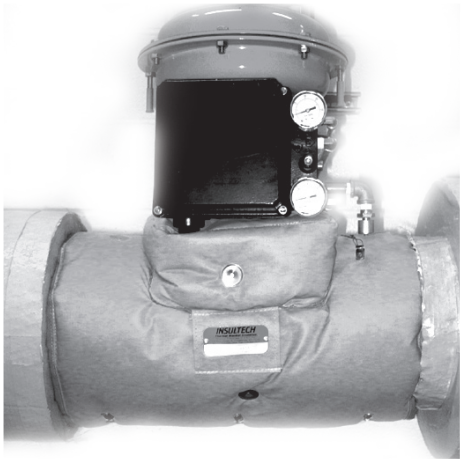
90° TO PIPING HORIZONTAL ON EITHER SIDE

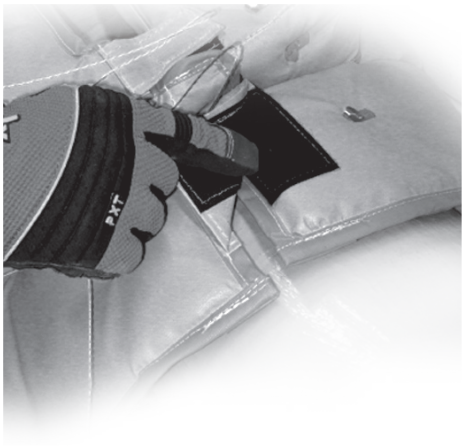
This is the worst possible position and creates great strain and limits the life of the internal components of the valve.

Actuators mounted in any position other than vertical MUST be supported independent of the valve.

The tables that follow on page 13 will identify temperature ranges, valve size ranges, actuator orientation and use of thermal blankets to determine what is required to get longevity out of your actuators and accessories.

HEAT/SOUND PRESSURE LEVELS GUIDELINES





Whether you need to lower your mechanical room temperature, avoid getting burned, reduce harmful noise or save energy our blanket wraps are your solution!

AcoustiGuard™ & ThermiGuard™ are custom fit high quality insulation blanket systems pre-engineered to either reduce harmful noise, or save energy by retaining radiant heat. Both are designed to improve the surrounding work environment. While ***AcoustiGuard™*** is designed to act as a "sound attenuation" and thermal barrier, ***ThermiGuard™*** is capable of withstanding weather conditions and chemical environments. Both are capable of withstanding maximum service temperatures of 450°F (***AcoustiGuard™ & ThermiGuard™***) or up to 800°F with the High Temperature option. Any piece will not exceed 40 pounds. ***AcoustiGuard™*** comes with 2 fastening options: Lacing Pins & Metal "D" Ring Strap with Velcro Tab. In addition to these fastening options, ***ThermiGuard™*** comes with 2 additional fastening options: Velcro Flaps & Side Release Buckles. The ***AcoustiGuard™ & ThermiGuard™*** products are designed to be flexible and easier to install, easy to remove and reinstall, allowing quick access and easy equipment serviceability.

- ***EASY TO INSTALL & REINSTALL***
- ***CAN WITHSTAND UP TO 450°F OR 800°F***
- ***MULTIPLE FASTENING OPTIONS***

Sound Pressure Levels

107 dBA Source	A-Weighted Measurements	Linear Weighted Measurements
Test Frequency (In Hz)	1 1/2" Noise Reduction (In dBA)	1 1/2" Insertion Loss (In dBA)
100	13	13
125	14	13
160	13	13
200	13	13
250	13	12
315	15	15
400	19	19
500	25	25
630	26	33
800	39	39
1000	38	39
1250	42	42
1600	43	43
2000	43	43
2500	44	44
3150	45	44
4000	44	45
5000	46	45

Fluid Temperature Limit Guidelines

2800 DL 49 DIAPHRAGM ACTUATOR

Ensures reliable, long-term performance of diaphragm, seals and any included instrumentation.

STANDARD BONNET

	Valves: 1/2" - 2"
ACTUATOR ORIENTATION	***FLUID TEMPERATURE LIMIT***
Above the Valve	350°F
35° - 45° To the Side of the Valve	450°F

**Assumes no valve and pipe insulation.*

2800 DL 84 DIAPHRAGM ACTUATOR

Ensures reliable, long-term performance of diaphragm, seals and any included instrumentation.

STANDARD BONNET

	Valves: 1/2" - 2"
ACTUATOR ORIENTATION	***FLUID TEMPERATURE LIMIT***
Above the Valve	400°F
35° - 45° To the Side of the Valve	500°F

**Assumes no valve and pipe insulation.*

These are simply rough guidelines and not absolute thresholds.

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.

ARI-STEVI-POS Models:

Electro-Pneumatic: Model AxSF

Technical Data

Stroke range (linear actuator)	10 up to 120 mm
Rotation angle range (rotary actuator)	25° up to 100°
Pneumatics	single-acting
Auxiliary energy	Supply air: 1,4 up to 7 bar (20 up to 105 psi)
Air connection	G1/4
Manometer connection	G1/8
Operation	4...20 mA: max. load voltage: 9,5 V (475 Ω)
Behavior in case of control signal failure	Valve is vented
Behavior in case of air pressure failure	Valve is vented
Max. cable cross section	Operation: 2,5 mm^2
Cable diameter for cable glands	M20x1,5: clamping range Ø8 - 13 mm
Linearity	±1.5 % F.S. [1]
Hysteresis	1.4 % F.S. [1]
Resolution	0.5 % F.S. [1]
max. permissible ambient temperature	-20 °C... +80 °C (-4 °F... +176 °F)
max. storage temperature	-25°C...+80 °C (-13 °F... +176 °F)
Body material	PA
Hood material	PC
Protection class EN 60529	IP66
Corrosion class	C3 according to EN ISO 12944-2
Pneumatic operating medium • Oil content • Solid impurities • Pressure dew point	Compressed air according to ISO 8573-1 • Class 4 • Class 4 permanent • Class 4 (min. 10 K below ambient temperature)
Ventilate actuator • Supply air pressure 2 bar (29 psi) • Supply air pressure 4 bar (58 psi) • Supply air pressure 6 bar (87 psi)	 6,36 m^3/h (28 USgpm) 11,76 m^3/h (51,8 USgpm) 15,72 m^3/h (69,2 USgpm)
Vent actuator • Signal pressure 2 bar (29 psi) • Signal pressure 4 bar (58 psi) • Signal pressure 6 bar (87 psi)	 7,68 m^3/h (33,8 USgpm) 14,76 m^3/h (65,0 USgpm) 15,72 m^3/h (69,2 USgpm)
Air consumption in controlled condition	≤ 0,024 m3/h (≤ 0,11 USqpm) (at 25 °C)
Mounting position	Any, restriction: air connections and silencers not upwards
Weight	0,7 kg

[1] F.S.: full scale (20 mA)

Accessories

NPT-air connection	1/4-18 NPT (with NPT-Adapter)
NPT-cable gland	Adapter M20x1,5 x 1/2-14 NPT Cable gland 1/2-14NPT
Analog output card	4...20 mA passive for current loop 9...32 V galvanically isolated max. conductor cross-section for connection terminal: 2,5 mm^2
Manometer	2 pieces: 0 - 10 bar / 0 - 140 psi for supply air and working pressure

VAC V200 Models:

VAC V200 Pneumatic

Models: 2FP_: Full Range Signal (3-15 PSIG)
2LP_: Low Range Signal (3-9 PSIG)
2HP_: High Range Signal (9-15 PSIG)
Options: 2SPDT Limit Switches, 4-20 mA Feedback
Ingress & Corrosion Protection: NEMA, 4X, IP66
Supply Pressure: 20 to145 PSIG Max **Not to Exceed Actuator rating**
Linearity error: <0.7% f.s.
Hysteresis: <0.4% f.s.
Repeatability: <0.3% f.s.
Weight: 3.2 lbs

VAC V200 Electro-Pneumatic

Models: 2FE_: Full Range Signal (4-20 mA)
2LE_: Low Range Signal (4-12 mA)
2HE_: High Range Signal (12-20 mA)
Options: 2SPDT Limit Switches, 4-20 mA Feedback
Ingress & Corrosion Protection: NEMA, 4X, IP66
Supply Pressure: 20 to 145 PSIG **Not to Exceed Actuator Rating**
Linearity error: <1.0% f.s.
Hysteresis: <0.6% f.s.
Repeatability: <0.5% f.s.
Weight: 3.8 lbs

VAC V200 Electro-Pneumatic Intrinsically Safe

Models: 2FI_: Full Range Signal (4-20 mA)
2LI_: Low Range Signal (4-12 mA)
2HI_: High Range Signal (12-20 mA)
Ingress & Corrosion Protection: NEMA, 4X, IP66
Supply Pressure: 20 to 145 PSIG **Not to Exceed Actuator Rating**
Linearity error: <1.0% f.s.
Hysteresis: <0.6% f.s.
Repeatability: <0.5% f.s.
Weight: 3.8 lbs

VAC V200 Electro-Pneumatic Explosion Proof

Models: 2FX_: Full Range Signal (4-20 mA)
2LX_: Low Range Signal (4-12 mA)
2HX_: High Range Signal (12-20 mA)
Ingress & Corrosion Protection: NEMA, 4X, IP66
Supply Pressure: 20 to 145 PSIG **Not to Exceed Actuator Rating**
Linearity error: <0.8% f.s.
Hysteresis: <0.5% f.s.
Repeatability: <0.4% f.s.
Weight: 5.3 lbs

VAC V200 Electro-Pneumatic Fail Freeze*

Models: 2FF_: Full Range Signal (4-20 mA)
2LF_: Low Range Signal (4-12 mA)
2HF_: 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 **Not to Exceed Actuator Rating**
Linearity error: <1.2% f.s.
Hysteresis: <0.9% f.s.
Repeatability: <0.8% f.s.
Weight: 5.4 lbs

** For positioner code 2xF_, the VAC V200 Positioner with the Fail Freeze module, check first with the factory for approval due to the space considerations on certain valve assembly combinations.*

VAC V200 All Models:

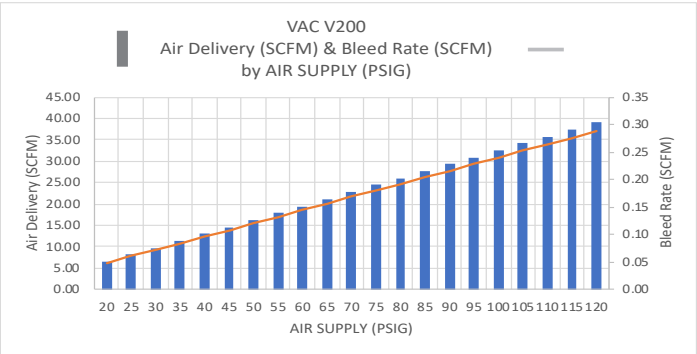
Construction: Aluminum Housing with Polyester Coating
Action: Direct or Reverse
Media: Clean Dry Oil Free Air Filtered to 5 micron
Air Connections: 1/4 NPT
Electrical Connection: 1/2 NPT
Gauges: Input 0-30 PSIG,
Output 0-60 PSIG, Supply 0-60 PSIG,
(Diaphragm Actuator), Housing Black Steel Case with Chrome Ring
Ambient Temperature: -40 to 185°F (Except Fail Freeze - 20 to 158°F)
Mounting: Yoke Mounted

Limit Switches and Feedback Options are NEMA 4X, IP66 only, and are not suitable for hazardous locations.

APPROVALS - VAC V200 POSITIONERS ONLY		
Ratings for hazardous locations:	**V200-EX** - Explosion Proof	
	ATEX - Explosion Protection 1487X, instrinsically safe EEx ia IIC T4/T5/T6	
FM and CSA: Explosions Proof	CL I, II Div 1 Grp B-G	
Intrinsically Safe: FM, CSA	CL I-II-III Div 1 Grp A-G; CL II Div 1&2 Grp E-G; CL III	
Non Incendive: FM	CL 1 Div2 Grp A-C	
Temperature Class		
Short Circut	Current-max	Ambient Temp max
T6	50 mA	140 F (60 C)
T5	60 mA	158 F (70 C)
T4	60 mA	185 F (85 C)
Intrinsically Safe		
V200-IS • ATEX: EEX ia IIcT4/T6		
FM: CL1 Div1 Grp A B C D		
CSA: EX ia CL1 Grp A B C D EX ia CL 1 Div2 Grp A B C D		

VAC V200		
AIR SUPPLY (PSIG)	**Bleed Rate (SCFM)**	**Air Delivery (SCFM)**
20	0.05	6.50
25	0.06	8.13
30	0.07	9.75
35	0.08	11.38
40	0.10	13.00
45	0.11	14.63
50	0.12	16.25
55	0.13	17.88
60	0.14	19.50
65	0.16	21.13
70	0.17	22.75
75	0.18	24.38
80	0.19	26.00
85	0.20	27.63
90	0.22	29.25
95	0.23	30.88
100	0.24	32.50
105	0.25	34.13
110	0.26	35.75
115	0.28	37.38
120	0.29	39.00

Bleed: 0.0024 scfm per psig
Delivery: 0.325 scfm per psig



SIEMENS 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

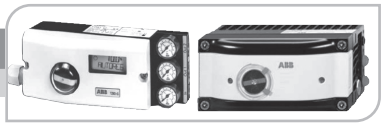
Models: 76E_: Full Range Signal (4-20 mA)
Options: Limit Switches, 4-20 mA Feedback (Reduced feedback span for valves with less than 1 inch travel — Call factory for details.)

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.

760 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

VAC D400 Models:



4-20mA

Models: T0Z0: Full Range Signal (2-Wire, 4-20 mA),
Explosion Protection: None
Calibration: Single-Button Auto-adjust Commissioning or Customized Auto-adjust
Operator Panel: 4 Push-Buttons and Two-Line LCD
Position Indicator: Mechanical
Options: None

4-20mA w/HART

Models: THN_: Full Range Signal (2-Wire, 4-20 mA), HART Protocol 5.1
Explosion Protection: Intrinsically Safe & Non-Incendive
Calibration: Single-Button Auto-adjust Commissioning or Customized Auto-adjust
Operator Panel: 4 Push-Buttons and Two-Line LCD
Position Indicator: Mechanical
Options: 4-20 mA Feedback Module, Digital Position Feedback Module, Proximity Switches NC

Models: THX_: Full Range Signal (2-Wire, 4-20 mA), HART Protocol 5.1
Explosion Protection: Explosion Proof
Calibration: Single-Button Auto-adjust Commissioning or Customized Auto-adjust
Operator Panel: 4 Push-Buttons and Two-Line LCD
Position Indicator: Mechanical
Options: 4-20 mA Feedback Module, Digital Position Feedback Module, 24VDC/AC Micro-switches, Proximity Switches NC.

APPROVALS & RATINGS: D400 Intrinsically Safe & Non-Incendive Models

FM
Intrinsically Safe: Class I, II, III, Div. 1, Grp. A-B-C-D-E-F-G
T6, T5, T4, Ta = 40 °C, 55 °C, 85 °C
901265 Entity, FISCO
Non-Incendive: Class I, Div. 2, Grp. A-B-C-D
T6, T5, T4, Ta = 40 °C, 55 °C, 85 °C
Suitable: Class II, III, Div. 2, Grp. E-F-G
T6, T5, T4, Ta = 40 °C, 55 °C, 85 °C

CSA
Intrinsically Safe: Class I, Div. 1 Grp. A-B-C-D
Class II, Div. 1 Grp. E-F-G
Class III, Div. 1

APPROVALS & RATINGS: D400 Explosion-Proof Models

FM
Explosion Proof: Class I; Div 1; Grp. C-D
T5, max. 82 °C
Dust Ignition-Proof: Class II, III, Div 1 Grp. E-F-G
T5; max. 82 °C

CSA
Explosion Proof: Class I; Div 1; Grp. C-D
Class II; Div 1; Grp. E-F-G
Class III
Temperature range: -40 … 85 °C
T5, max. 85 °C ; T6, max. 70 °C

D400 All Models:

Construction:	Aluminum Case with Electrostatic Dipping Varnish with Epoxy Resin Stove Hardened.
Ingress & Corrosion Protection:	IP65 / NEMA 4X
Action:	Direct or Reverse
Supply Pressure:	20 to 90PSIG **Not to Exceed Actuator Rating**
Media:	Clean Dry Oil Free Air acc.to DIN / ISO 8573-1 Pollution and Oil Content According to Class 3 (Purity: Max. Particle Size: 5 µm, Max. Particle Density: 5 mg/^{3}; Oil Content: Max. Concentration: 1mg / m^3; Pressure Dew Point: 10, K Below Operating Temperature
Output Flow Capacity:	2.3 SCFM at 20 PSIG, 6.0 SCFM at 90 PSIG
Air Consumption:	<0.015 SCFM (Independent of Supply Pressure)
Air Connections:	1/4-18 NPT
Electrical Connections:	1/2-14 NPT
Gauges:	Supply, Output
Ambient Temperature:	-40 to 185°F
Mounting:	Yoke Mounted

Available as Specials:

(Contact Factory for Details and Available Models)
Fail Freeze Function
Safety Integrity Level SIL2
ATEX, GOST, IECEx Approvals
Shutdown Module

OPTIONS:

F) 4-20 mA Feedback Module
Range 4-20mA (Configurable)Two-Wire circuitry, Power Supply 24VDC
NOTE: For 4-20mA w/HART Models ONLY

K) Digital Position Feedback Module
Two Switches For Digital Position Feedback (Position Adjustable Within The Range Of 0 … 100%, Ranges Cannot Overlap)
NOTE: For 4-20mA w/HART Models ONLY

L) 24VDC/AC Micro-switches
Two Micro-switches For Independent Position Signaling. Switching Points Adjustable Between 0 … 100%
NOTE: For Explosion Proof Models ONLY

P) Proximity Switches NC
Two Proximity Switches For Independent Position Signaling. Switching Points Adjustable Between 0 … 100%
Switch Type SJ2-SN (NC)

ACCEPTABLE OPTION COMBINATIONS				
w/	F*	K*	L‡	P
F*		Yes	Yes	Yes
K*	Yes		Yes	Yes
L‡	Yes	Yes		No
P	Yes	Yes	No	

* For 4-20mA w/HART Models Only

‡ For Explosion Proof Models ONLY

POSITION INDICATION SWITCHES

Proximity Mark 1

Models:

PX11: 2 SPDT Switches; Ambient Temperature: -58 to 176°F Continuous (Rated to 350°F for 600 hours)

PX12: 2 SPDT Switches w/ 2K Potentiometer; Ambient Temperature: -40 to 176°F; Power Rating: 1.5 Watt Maximum

PX13: PX13: 2 SPDT Switches w/ 4-20 mA Feedback w/2K OHM Pot; Ambient Temperature: -40 to 176°F; Power Requirement: 5 to 30 Vdc
Current Consumption: 50 mA

PX14: 4 SPDT Switches; Ambient Temperature: -58 to 176°F Continuous (Rated to 350°F for 600 hours)

PX15: 6 SPDT Switches; Ambient Temperature: -58 to 176°F Continuous; (Rated to 350°F for 600 hours)

All Models:

Locations:	NEMA 1, 2, 3, 3R, 3S, 4, 4X, 6, 7, 9, 12, 13
Approvals: & Ratings:	
UL:	Class I, Div. 1 & 2, Groups B, C, D; Class II, Div. 1 & 2, Groups E, F, & G
CSA:	Class I, Div. 1 & 2, Groups A, B, C, D; Class II, Div. 1 & 2, Groups E, F, & G
Construction:	Aluminum Housing, Hard Anodized
Electrical Connection:	Screw Terminal
Conduit Connection:	3/4 NPT
Mounting:	Yoke Mounted

I/P's

Type 500X

Locations:	NEMA 4X (IP65)
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 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, 5 micron (D400 Positioners Require 5 micron Filter). 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 (All), 24Vdc (8320G184)
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…[1]	Loss of Power Valve Fails…[2]	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

[1] Valves with Fail Freeze Positioners Fail in Last Position on Loss of Signal.
[2] PROFIBUS PA or Foundation Fieldbus ONLY

POSITIONER FEEDBACK

Valve Type	Actuator Action	Feedback Signal[3]	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

[3] 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 Lower Port Closed	Closed Open	Open Closed

PROXIMITY MARK 1 POSITION INDICATION SWITCHES FEEDBACK

Valve Type	Actuator Action	Feedback Signal		Feedback Signal
		Potentiometer[4]	mA	Increases as
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

[4] 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

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	Lower Port Open/ Upper Port Closed	Lower Port Open/ Upper Port Closed	Lower Port Open/ Upper Port Closed

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.

AIR FILTER REGULATORS

Actuator	Output Pressure
DL49, 84 & 84XR	30 PSIG

1. SELECTIONS

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

28□ - □□ □□□ □ □ □ □ □ □ □

VALVE BODY

Model	Valve Type	Size	Body Material	End Connection	Trim Style	Trim Material	Trim Cv	Packing Type
N Type 20,30 & 32	**20** 2-Way, Single Seat	**050** 1/2 inch	**B** Bronze	**S** Screwed	**E** Equal %	**S** 316 SS*	**F** Full Port	**T** Teflon
L Type 28	**28** 2-Way, Lo-Flow	**075** 3/4 inch	**F** CF8M	**B** Buttweld End	**L** Linear	**B** Bronze	**1** 1st Port Reduction	**G** Graphite
	30 3-Way Mixing	**100** 1 inch			**M** Mod Lin	**6** Alloy 6	**2** 2nd Port Reduction	**V** Vacuum Service
	32 3-Way Diverting	**125** 1-1/4 inch			*Types 30/32, Linear Only. Type 28, Mod Lin Only*	**H** 17-4 PH	**3** 3rd Port Reduction	**L** EPDM Lip
		150 1-1/2 inch				**T** Teflon	**4** 4th Port Reduction	*Stainless Steel, Type 20 Bodies come standard with PEEK bearings. Used for Temp. up to 500F.*
		200 2 inch				**P** PEEK	*NOTE: Port reductions only available to Type 20/28/30. Check factory for availability.*	
						*NOTE: *Type 28, 316SS trim uses a harder Nitronic 60 seat.*		

CRN REGISTERED

CRN (Canadian Registration Number)

Valve	Body Mat'l	Size (inch) 1/2	3/4	1	1-1/4	1-1/2	2
2820	BRZ	Y	Y	Y	Y	Y	Y
	SS	P	P	P	P	P	P
2828	BRZ	Y	Y	Y	-	-	-
	SS	P	P	P	-	-	-
2830	BRZ	Y	Y	Y	Y	Y	Y
	SS	P	P	P	P	P	P
2832	BRZ	-	-	Y	-	Y	Y
	SS	-	-	P	-	P	P

Y = Yes, currently registered - CRN # CSA - OC18997
P = Registration pending, Starting Process

FLUID TEMPERATURE LIMITS					
Valve Type	**Body Material & Code**	**Trim Material & Code**	**Packing Type & Code**	**T MAX**	**T MIN**
20 2-Way Single Seat	Bronze **B**	316 **S**, Alloy 6 **6**, 17-4 PH **H**, PEEK **P**	EPDM **L**	400ºF	-20ºF
	Bronze **B**	316 **S**, Alloy 6 **6**, 17-4 PH **H**, PEEK **P**	Teflon **T**, Vacuum Service **V**	400ºF	60ºF
	Bronze **B**	316 **S**, Alloy 6 **6**, 17-4 PH **H**, PEEK **P**	Graphite **G**	400ºF	-20ºF
	Bronze **B**	Teflon **T**	EPDM **L**	250ºF	-20ºF
	Bronze **B**	Teflon **T**	Teflon **T**, Vacuum Service **V**	250ºF	60ºF
	Bronze **B**	Teflon **T**	Graphite **G**	250ºF	-20ºF
	CF8M **F**	316 **S**, Alloy 6 **6**, 17-4 PH **H**	EPDM **L**	450ºF	-20ºF
	CF8M **F**	316 **S**, Alloy 6 **6**, 17-4 PH **H**	Teflon **T**, Vacuum Service **V**	450ºF	60ºF
	CF8M **F**	316 **S**, Alloy 6 **6**, 17-4 PH **H**	Graphite **G**	450ºF	-20ºF
	CF8M **F**	Teflon **T**	EPDM **L**	250ºF	-20ºF
	CF8M **F**	Teflon **T**	Teflon **T**, Vacuum Service **V**	250ºF	60ºF
	CF8M **F**	Teflon **T**	Graphite **G**	250ºF	-20ºF
	CF8M **F**	PEEK **P**	EPDM **L**	450ºF	-20ºF
	CF8M **F**	PEEK **P**	Teflon **T**, Vacuum Service **V**	450ºF	60ºF
	CF8M **F**	PEEK **P**	Graphite **G**	450ºF	-20ºF
28 2-Way Low Flow	Bronze **B**	316 **S**, PEEK **P**	EPDM **L**	400ºF	-20ºF
	Bronze **B**	316 **S**, PEEK **P**	Teflon **T**, Vacuum Service **V**	400ºF	60ºF
	Bronze **B**	316 **S**, PEEK **P**	Graphite **G**	400ºF	-20ºF
	Bronze **B**	Teflon **T**	EPDM **L**	250ºF	-20ºF
	Bronze **B**	Teflon **T**	Teflon **T**, Vacuum Service **V**	250ºF	60ºF
	Bronze **B**	Teflon **T**	Graphite **G**	250ºF	-20ºF
	CF8M **F**	316 **S**	EPDM **L**	450ºF	-20ºF
	CF8M **F**	316 **S**	Teflon **T**, Vacuum Service **V**	450ºF	60ºF
	CF8M **F**	316 **S**	Graphite **G**	450ºF	-20ºF
	CF8M **F**	Teflon **T**	EPDM **L**	250ºF	-20ºF
	CF8M **F**	Teflon **T**	Teflon **T**, Vacuum Service **V**	250ºF	60ºF
	CF8M **F**	Teflon **T**	Graphite **G**	250ºF	-20ºF
	CF8M **F**	PEEK **P**	EPDM **L**	450ºF	-20ºF
	CF8M **F**	PEEK **P**	Teflon **T**, Vacuum Service **V**	450ºF	60ºF
	CF8M **F**	PEEK **P**	Graphite **G**	450ºF	-20ºF
30 3-Way Mixing	Bronze **B**	316 **S**	EPDM **L**	400ºF	-20ºF
	Bronze **B**	316 **S**	Teflon **T**, Vacuum Service **V**	400ºF	60ºF
	Bronze **B**	316 **S**	Graphite **G**	400ºF	-20ºF
	CF8M **F**	316 **S**	EPDM **L**	450ºF	-20ºF
	CF8M **F**	316 **S**	Teflon **T**, Vacuum Service **V**	450ºF	60ºF
	CF8M **F**	316 **S**	Graphite **G**	450ºF	-20ºF
32 3-Way Diverting	Bronze **B**	Bronze **B**	Teflon **T**, Vacuum Service **V**	300ºF	60ºF
	Bronze **B**	Bronze **B**	Graphite **G**, EPDM **L**	300ºF	-20ºF
	CF8M **F**	316 **S**	EPDM **L**	450ºF	23ºF
	CF8M **F**	316 **S**	Teflon **T**, Vacuum Service **V**	450ºF	60ºF
	CF8M **F**	316 **S**	Graphite **G**	450ºF	23ºF

NOTE: -20ºF T MIN temperature limit is for indoor applications with low humidity where ice will not form on the valve stem.

VALVE TYPE/TRIM MATERIAL COMBINATIONS:

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

Actuator Series

- **00** None
- **DIAPHRAGMS:**
- **49** DL49 (49 Sq. In.)
- **4X** DL49XR
- **84** DL84 (84 Sq. In.)
- **8X** DL84XR (84 Ext. Ring.)

Action

- **0** None
- **R** Reverse Stem Fail Down
- **D** Direct Stem Fail Up

Spring Range

- **0** None
- **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

Hand-wheel

- **0** None
- **R** Reverse
- **D** Direct

Note: Must match action.

BKIT
PKIT
7KIT
WCI parts only positioner mounting kits.

ACCESSORIES

Positioners, I/P's & Limit Switches

- **0000** None

POSITIONERS:

- **AxSF** ARI STEVI POS Digital Electro-Pneumatic w 4-20mA Feedback
- **2xP_** VAC V200 Pneumatic
- **2xE_** VAC V200 ElectroPneumatic
- **2xI_** VAC V200 ElectroPneu. Intrn. Safe
- **2xX_** VAC V200 ElectroPneu. Exp. Proof
- **2xF_** VAC V200 ElectroPneu. Fail Freeze
- **76P_** Siemens 760 Pneumatic
- **76E_** Siemens 760 Electro-Pneumatic
- **TOZO** VAC D400 4-20mA *
- **THN_** VAC D400 4-20mA w/HART Intrn. Safe & Non-Incend *
- **THX_** VAC D400 4-20mA w/HART Exp. Proof *

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

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
- **MAP7** Type 550X I/P, 0-60 PSI-for 15 or 5X Only
- **MAP9** Type 950X I/P, 3-15 EXP

x digit spec.

- **F** Full Range Signal, 3-15 PSI or 4-20mA (Factory Default)
- **L** Low of Split Range, 3-9 PSI or 4-12mA
- **H** High of Split Range, 9-15 PSI or -20mA

V200/760 4th digit spec.

- **0** No Additions
- **L** w/Mech. Lmt Swtch's
- **F** w/4-20 Feedback
- **B** w/Swtch's & Feedbck

NOTE : L,F,B not available for 2xI , 2xX.

D400 4th digit spec.

Individual Options

- **0** No Additions
- **F** w/4-20 Feedback Module (4-20mA w/HART Models ONLY)
- **K** w/Digital Position Feedback Module (4-20mA w/HART Models ONLY)
- **L** w/ 24VDC/AC Micro-Switch's (Exp. Proof Models ONLY)
- **P** w/Proximity Switch's NC

Option Combinations (For 4-20mA w/HART Models ONLY)

- **A** = **F** & **K**
- **B** = **F** & **L** (Exp. Proof Mod. ONLY)
- **C** = **F** & **P**
- **E** = **K** & **L** (Exp. Proof Mod. ONLY)
- **G** = **K** & **P**
- **J** = **F** & **K** & **L** (Exp. Proof Mod. ONLY)
- **M** = **F** & **K** & **P**

See Actuators, Positioners, & Accessories • Section of Product Specification for details.

Air Filter Regulators

- **0** None
- **A** Type 300, 0-30 PSI
- **B** Type 300, 0-60 PSI
- **D** Type 350SS 0-100 PSI

ASCO Solenoids

- **0** None

120 Vac Coils:

- **A** 8320G184 3-Way Brass
- **B** 8320G202 3-Way SS
- **L** EF8320G184 3-Way EXP Br.
- **M** EF8320G202 3-Way EXP SS

24 Vdc Coils:

- **Y** EF8320G184 Explosion Proof 3-Way Brass
- **Z** 8320G184 3-Way Brass
- **4** EF8320G202 24VDC Coil 3-Way EXP SS

24 Vac Coils:

- **3** 8320G184 24 VAC Coil 3-Way Brass

Special Options

- **0** None
- **S** Special Opts or Set-Up
- **T** SS Tubing
- **G** SS Tagging
- **B** SS Tubing and Tagging

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.

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**
49 49 Sq. In. (DL49)	for 28N Bodies
4X (DL49XR)	for 28N Bodies
84 84 Sq. In. (DL84)	for 28N Bodies
8X (DL84XR)	for 28N Bodies

* Available with Split Ranges, Select "**S**" in Special Options.

‡ For positioner code 2xF_, the VAC V200 Positioner with the Fail Freeze module, check first with the factory for approval due to space considerations on certain valve assembly combinations.

Warren Controls does not assume responsibility for the selection, use, or maintenance of any product. Responsibility for proper selection, use, and maintenance of any Warren Controls product remains solely with the purchaser and end-user.

2800 PRODUCT SPECIFICATION

1800 SERIES

Heavy Globe Control Valves

styles:

- 2-way balanced
- 2-way unbalanced
- 3-way mixing
- 3-way diverting

sizes 1/2 to 12 in.
class 250 & 300
ends 125 FF, 150, 250, 300 RF flg
body Cast Iron, WCB,CF8M, Bronze (ASTM B61)
trim 316 SST, Alloy 6
Cv up to 1649
temp. -20° to 800°F
body limit to 740 psi
leakage rates class III, IV, IV+
rangeability 50:1

- Heavy Duty
- Severe Service
- High Pressure Differentials
- Corrosive Materials, Liquids, Gases & Steam
- Modulating or On/Off Control

2800 SERIES

Precision Globe Control Valves

styles:

- 2-way unbalanced
- 2-way low flow
- 3-way mixing
- 3-way diverting

sizes 1/2 to 2 in.
class 250 & 300
ends Buttweld, NPT
body Bronze, CF8M
trim Bronze, 316 SST17-4pH, Alloy 6, TFE, PEEK
Cv up to 40
temp. -20° to 500°F
body limit to 720 psi
leakage rates class III, IV, VI
rangeability 50:1

- Economical
- Precision Control
- Suited for Gases, Steam, or Liquids that are not Viscous or Solids Bearing

2900 SERIES

High Capacity General Purpose Globe Control Valves

styles:

- 2-way balanced
- 2-way unbalanced
- 3-way mixing
- 3-way diverting

sizes 2-1/2 to 10 in.
class 125 & 250
ends 125 FF, 250 RF flg
body Cast Iron
trim Bronze, 300 SS, 17-4pH, Alloy 6
Cv up to 960
temp. -20° to 400°F
body limit to 400 psi
leakage rates class II, III, IV
rangeability 50:1

- High Capacity
- General Purpose
- Moderate Pressure Drops
- Compatible Liquids and Gas, Steam & Water
- Modulating or On/Off Control

3800 SERIES

E-Ball Rotary Control Valves

styles:

- 2-way rotary
  - flow to open
  - flow to close

sizes 1 to 8 in.
class 300
ends 150,300 RF flg
body WCB, CF8M, Custom Alloys
trim 316 SST, Alloy 6, Ceramic, TFE, PEEK
Cv up to 1420
temp. -20° to 800°F
body limit to 740 psi
leakage rates class IV, IV+, VI
rangeability 100:1

- Eccentric, Segmented Ball
- Well Suited for Erosive Service
- Various Trim Options Include Ceramic for Slurries or Gritty Materials & Teflon® for Class VI Shutoff

5800 SERIES

Compact Globe Control Valves

styles:

- 2-way unbalanced cage retained seat
- 2-way low flow unbalanced cage retained seat
- 2-way cage balanced cage retained seat

sizes 1/2 to 4 in.
class 300
ends 150,300 RF flg, Socketweld, NPT
body WCB, CF8M, Bronze (ASTM B61)
trim 316 SST, 400 SST, Alloy 6, TFE, PEEK
Cv up to 170
temp. -20° to 800°F
body limit to 740 psi
leakage rates class IV, IV+, VI
rangeability 50:1

- Highly Efficient, Compact Design
- High Pressure Drops
- Typically Suited for High Force Piston Actuators for Steam, Chemicals & Dirty Fluids