PNUEMATIC AND ELECTRIC ACTUATED INDUSTRIAL VALVES

E-BALL ROTARY CONTROL VALVES

PRODUCT SPECIFICATION

SERIES **3800**

SIZES: 1 TO 8 INCHES

High performance, reduced wear, eccentric plug rotary control valves. Available with superior erosion resistant TTZ ceramic trim. Bodies availablecustom cast in a vast array of specialized alloys to meet your requirements: Hastelloy, Zirconium, Titanium, Alloy 20, CD4MCu….

3800_PS_RevH_0513

3800 PRODUCT SPEC

WARREN CONTROLS

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

DEPENDABLE, RUGGED, PRECISION CONTROL VALVES AND ACCESSORIES

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AGENCY APPROVALS

QAS INTERNATIONAL
ISO 9001:2008
REGISTERED FIRM
Certificate no. US2269

SERIES: 3800

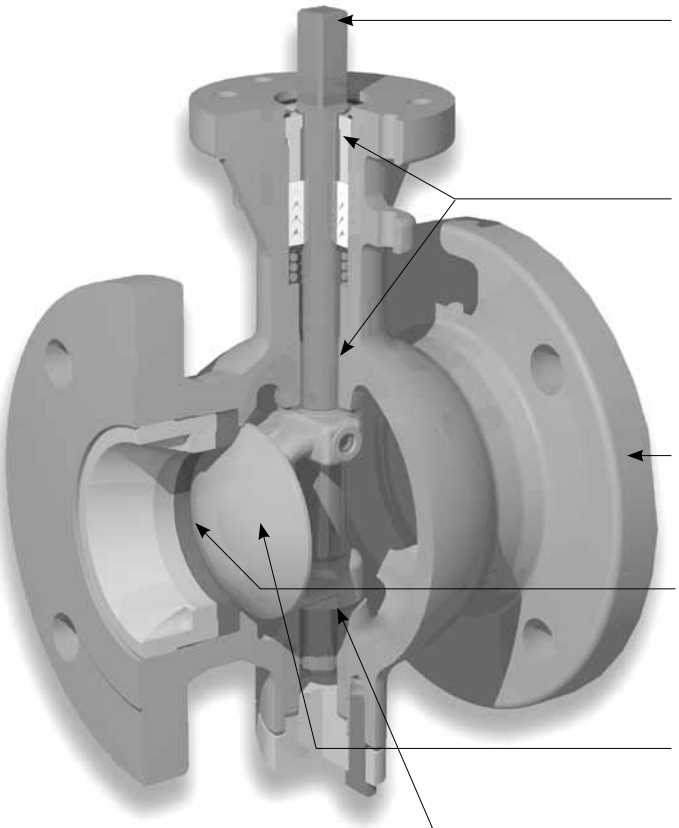
Description
The 3800 Series Rotary Globe Control Valve incorporates the time-tested and proven Segmented Ball—Eccentric Geometry design (E-Ball), combining exceptionally tight control and rangeability (100:1), with superior trim wear characteristics inherent with the eccentric design.

Available as completely automated valve assemblies with the highest quality actuators and accessories or as bare stem product ready for your automation needs, the 3800 Series comes in a wide variety of standard options for body/trim materials and construction builds, from Class IV to Class VI shut off.

The ever-popular TTZ Ceramic Trim is an off-the-shelf choice for erosive or corrosive fluids and a vast array of custom alloys can be selected for custom construction, engineered to your specific application needs.

The 3800 can flow in the forward direction, flow-to-open; or reverse direction, flow-to-close. The 3800 is available in a thru-shaft or split-shaft configuration. These features allow for maximum flexibility in matching benefits to your application.

E-Ball Rotary Valve



Parallel Square ISO-5211 Actuator Interface offers broadest range of application to 3rd party actuator preferences.

Standard Triple Point PEEK Shaft Bearings provide added stability and low friction, resulting in lowest hysteresis and precision control.

Rugged Body with a selection of port reductions.

Standard Trim Choices of 316SS, Alloy 6, TTZ Ceramic, PTFE or PEEK seated 316SS.

Classic Eccentric Plug Design cams away from seating surface avoiding plug and seat wear common with "wiping" concentric designs.

Standard Triple Point PEEK Shaft Bearings

RUGGEDNESS & HIGH PERFORMANCE

Features	Advantages
Eccentric E-ball plug	Provides exceptional modulating control with 100:1 rangeability.
One-piece straight thru body	Compact package with streamlined flow passage yields high Cv's handling greater flow capacities.
Body materials	Standard body materials are WCB steel and CF8M stainless steel. Bodies available custom cast in other specialized alloys: Hastelloy B & C, Zirconium, Titanium, Alloy 20, CD4MCu…
Trim components	Durable rugged plug and seat construction shuts off tightly without deforming plug arms or employing thin ball seals.
Trim materials	TTZ ceramic and Alloy 6 trim promote long dependable service life in applications controlling erosive and hard to handle fluids. 316 stainless steel trim, PEEK & TFE soft seat trim available for non-erosive service.
Forward or reverse flow direction	Choice of forward flow (flow-to-open) or reverse flow (flow-to-close) directions maximizes flexibility in meeting application requirements.
Reduced ports	1, 2, & 3 sizes reduced trim available. Provides flexibility in matching valve size to flow requirements.
ISO 5211 parallel square shaft	ISO standard interface. Allows for broad range of actuators.
Thru- or split-shaft	Choice of one-piece thru-shaft or two-piece split-shaft maximizes flexibility in meeting application requirements.
Shaft, drive pin, plug connection	Eliminates backlash. Assures minimum dead band and hysteresis.
Oversized bearings and shafts	Ideal for high pressure drops.
Extension bonnet	Allows for wide range of temperature applications

INCREASED SERVICEABILITY & REDUCED MAINTENANCE

Features	Advantages
Integral valve body flanges	Promote secure valve installations and piping integrity. Easy installation. Eliminate exposed line flange bolting. Shorten alignment and installation time. Many different classes of pipe flanges.
Eccentric plug rotation	Minimizes contact with seat ring until plug is fully seated reducing friction and wear.
Segmented ball design	In control range reduces risk of cavitation as compared to a full bore ball valve.
90 degree shaft rotation	Removes valve plug from flow stream reducing plug wear.
Rotary shaft with TFE v-ring or graphite packing	Reduces packing wear. Minimizes potential for packing leaks.

ESTABLISHED FEATURES & QUALITY

Features	Advantages
Rotary Control Valve	Rotary design is rugged and compact providing higher Cv's than linear globe designs. Matched with rotary actuators to produce heavy duty automatic throttling control valve which dependably controls both clean and dirty fluids in many process industries.
Electric actuators	Powerful, low profile, high torque actuators with reversible 4-20mA or 2-10Vdc input and feedback. Features integral hand wheel for manual override and large highly visible valve position indicator.
Pneumatic rack & pinion actuators	Powerful, low profile, high torque actuators with large, highly visible, valve position indicator. Supply pressures to 120 psig. Declutchable gear operator available for manual override. Combine actuators with pneumatic accessories to allow for wide variety of control actions.
Wide variety of accessories	Pneumatic and electro-pneumatic positioners for intrinsically safe, explosion proof, or fail freeze operation. Digital positioners and communications, intelligent keypad, Hart, and foundation fieldbus inputs available. 3-way and 4-way solenoids also available.

3800 ATTRIBUTE SELECTION CRITERIA

TRIM MATERIAL:

316 STAINLESS STEEL
316 stainless steel is our most common and lowest cost trim material choice. 316 stainless steel trim is suitable for flowing differential pressures up to 300 PSIG, is capable of tight Class IV shut-off, is corrosion resistant to many fluids, but is less erosion resistant than other trim materials.

TTZ CERAMIC
TTZ Ceramic is our most durable trim material choice. TTZ Ceramic trim is suitable for flowing differential pressures up to 550 PSIG, is capable of tighter Class IV+ shut-off, is corrosion resistant to many fluids, and is more erosion resistant than other trim materials.

TFE SOFT SEAT
TFE is our most common choice for a resilient trim material. TFE soft seat trim is suitable for flowing differential pressures up to 100 PSIG and temperatures to 340F, is capable of our tightest Class VI shut-off, is corrosion resistant to many fluids, but is much less erosion resistant than other trim materials.

PEEK SOFT SEAT
PEEK is our most durable choice for a resilient trim material. PEEK soft seat trim is suitable for flowing differential pressures up to 200 PSIG and temperatures to 450F, is capable of our tightest Class VI shut-off, is corrosion resistant to many fluids, but is less erosion resistant than other trim materials.

ALLOY 6
Alloy 6 is an extremely durable choice for trim material. Alloy 6 trim is suitable for flowing differential pressures up to 450 PSIG, is capable of tight Class IV shut-off. While somewhat corrosion resistant, Alloy 6 is particularly well suited to wear longer in a cavitation prone environment.

SHAFT DESIGN:

THROUGH VS SPLIT
The through shaft design has one piece and passes continuously through the center of the valve. The through shaft is our most common and lowest cost shaft design choice. The split shaft design has two pieces and does not pass continuously through the center of the valve. Seen through the end of the valve, the split shaft provides a flow path with little obstruction. An advantage of this design is a valve with a higher Cv or flow capacity compared to the same valve with a through shaft. Disadvantages are, since the split shaft and plug is a matched set, it is harder and more costly to manufacture or repair. A split shaft is generally only chosen when the higher Cv it offers is absolutely required or there is very thick, sticky or dense slurry.

DIRECT VS INDIRECT
This feature describes the part of the shaft that extends above the valve and connects to the actuator. The direct design has a short shaft and the actuator mounts directly to the valve. The indirect design has a long shaft and the actuator mounts on a bracket indirectly to the valve. While the direct design is more compact and lower in cost than the indirect design, there are applications where an indirect shaft is desired. The indirect design is commonly selected for higher temperature applications where it is necessary to have space between the actuator and valve. Also, if the process fluid is corrosive, CL2 for example, users may want to inspect the packing for leaks. The indirect design provides access to the packing for inspection and adjustment, while the direct design does not.

SHAFT MATERIAL:

17-4 HARD VS INCONEL
17-4 Hard is our most common and lowest cost shaft material choice. Of the two standard choices we offer it is the strongest and can handle the highest torques. It has mild corrosion resistance and due to its hardness performs well on erosive service. Inconel is more commonly chosen for corrosive service applications but is a more expensive nickel alloy and is somewhat softer than 17-4 offering a bit lower actuator torque capability.

BEARING & SEALS TYPE:

PEEK VS ALLOY 6
PEEK is our most common and lowest cost bearing material choice. PEEK bearings are good to 450F and for flowing differential pressures up to 300 PSIG. Alloy 6 is more durable than PEEK and is available as a bearing material for more severe service. Alloy 6 bearings are good to 800F.

FLUORAZ SEALS
Fluoraz seals protect the valve's bearings and shaft from entrained particles in the fluid. If no seals are present, fluid pressure may force foreign particles between the bearings and shaft where damage can occur to the guiding surfaces. Fluoraz seals are good to 500F and are compatible with a significant number of process fluids.

PACKING TYPE:

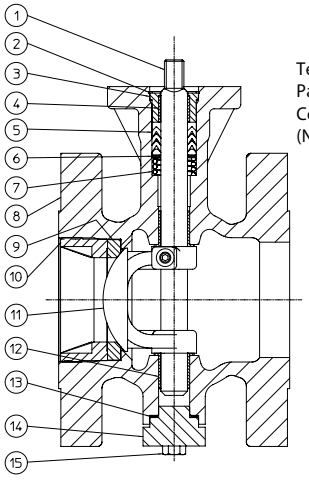
TEFLON V-RING VS GRAPHITE
Teflon v-ring packing is our most common and lowest cost packing material choice. Available self-adjusting or adjustable, teflon v-ring packing is used with PEEK bearings and good to 450F. Graphite packing is available for more severe service. Adjustable, graphite packing used with PEEK bearings is good to 450F, and used with Alloy 6 bearings is good to 800F. Adjustable teflon v-ring or graphite packing requires an indirect shaft.

FLOW DIRECTION:

FLOW-TO-OPEN VS FLOW-TO-CLOSE
When flow enters the valve through the end containing the seat ring the flow direction is flow-to-open. Flow through the valve in this direction tends to move the plug away from the seat ring and opens the valve. When flow enters the valve through the end opposite the seat ring the flow direction is flow-to-close. Flow through the valve in this direction tends to move the plug toward the seat ring and closes the valve. The flow-to-open direction is commonly chosen for its smoother transition from valve closed to open with large pressure differentials and large valves. This flow direction also allows for larger pressure drops prior to the onset of cavitation. The flow-to-close direction provides greater erosion resistance and higher Cv's although flow to open Cv's can be maximized with a split-shaft. Valves with TTZ Ceramic trim in the flow-to-close direction are capable Class IV+ shut-off.

Materials of Construction

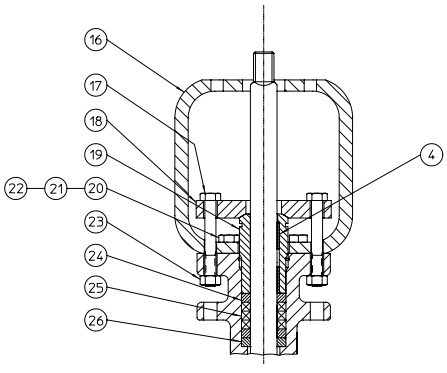
Direct Shaft



Teflon V-Ring
Packing
Code T
(Non-adjustable)

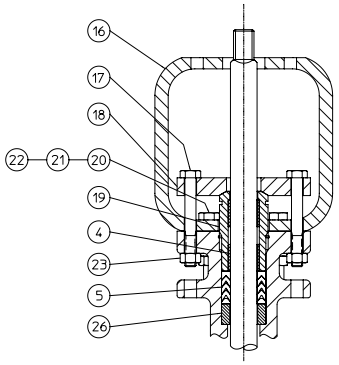
Full Cross-Section

Indirect Shaft



Graphite
Packing
Code G
(Adjustable)

Graphite
Packing
Code J
(A3djustable)



Teflon V-Ring
Packing
Code A
(A3djustable)

BODY MATERIALS

Item	Part Nomenclature	Materials
	Code: W WCB Body	
8	Valve Body	Steel A216 WCB
13	Gasket	Nonasbestos
14	Bottom Cover	Steel A216 WCB
15	Hex Head Capscrew	Alloy Steel GR B7
30	O-ring	Fluoraz 797
31	Bottom Plug	STEEL
	Code: F CF8M Body	
8	Valve Body	SST A351 CF8M
13	Gasket	Nonasbestos
14	Bottom Cover	SST A351 CF8M
15	Hex Head Capscrew	SST GR B8M Class 2
30	O-ring	Fluoraz 797

TRIM MATERIALS

Item	Part Nomenclature	Materials
	Code: S316 Stainless Steel Trim	
9	Fixed Adjustable Seat Ring	316 SST
10	Seat Retainer	316 SST
11	Plug	316 SST
27	Set Screw	316 SST
29	Socket Head Capscrew	316 SST
	Code: Z TTZ Ceramic Trim	
9	Fixed Adjustable Seat Ring	TTZ Zirconia Ceramic
10	Seat Retainer	316 SST
27	Set Screw	316 SST
29	Socket Head Capscrew	316 SST
32	Blank Plug	316 SST
33	Plug Face	TTZ Zirconia Ceramic
34	Retaining Screw	Inconel 625
	Code: T TFE Soft Seats	
10	Seat Retainer	316 SST
11	Plug	316 SST
27	Set Screw	316 SST
29	Socket Head Capscrew	316 SST
35	Soft Seat Retainer	316 SST
36	Soft Seat	Fluorosint 207
	Code: P PEEK Soft Seats	
10	Seat Retainer	316 SST
11	Plug	316 SST
27	Set Screw	316 SST
29	Socket Head Capscrew	316 SST
35	Soft Seat Retainer	316 SST
36	Soft Seat	PEEK
	Code: 6 Alloy 6 Trim	
9	Fixed Adjustable Seat Ring	Alloy 6B or 316 SST/ Alloy 6B Inlay
10	Seat Retainer	316 SST
27	Set Screw	316 SST
29	Socket Head Capscrew	316 SST
32	Blank Plug	316 SST
33	Plug Face	Alloy 6B
34	Retaining Screw	Inconel 625

SHAFT DESIGN

Item	Part Nomenclature	Materials
	Code: D or E Indirect Shaft	
16	Actuator Adapter	Steel
20	Hex Head Bolt	Alloy Steel GR B7
21	Regular Lockwasher	Steel
22	Hex Nut	Alloy Steel GR 2
	Code: E or F Split Shaft	
37	Upper Shaft	As Specified
38	Groove Pin	SST
39	Lower Shaft	As Specified

SHAFT MATERIALS

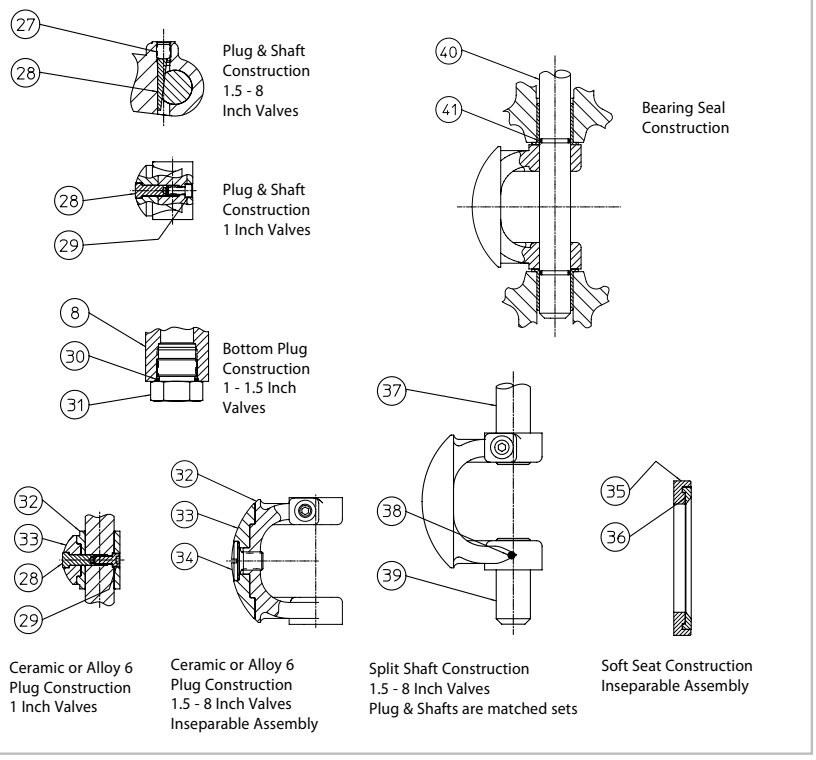
Item	Part Nomenclature	Materials
	Code: S 17-4 Hard Shaft	
1	Valve Shaft	17-4 PH SST
28	Drive Pin	17-4 PH SST
	Code: I Inconel Shaft	
1	Valve Shaft	Inconel 718
28	Drive Pin	Inconel 718

BEARINGS AND SEALS

Item	Part Nomenclature	Materials
	Code: S PEEK Bearings	
12	Bearing	PEEK
	Code: T PEEK Bearings w/Fluoraz 797 Seals	
12	Bearing	PEEK
40	Shaft for Bearing Seals	As Specified
41	O-ring	Fluoraz 797
	Code: 6 Alloy 6B Bearings	
12	Bearing	Alloy 6B
	Code: Y Alloy 6B Bearings w/Fluoraz 797 Seals	
12	Bearing	Alloy 6B
40	Shaft for Bearing Seals	As Specified
41	O-ring	Fluoraz 797

PACKING MATERIALS

Item	Part Nomenclature	Materials
	Code: T Teflon V-Ring Packing	
2	Retaining Ring	316 SST
3	Packing Retainer	316 SST
4	Packing Bearing	PEEK
5	V-Ring Packing Set	PTFE
6	Packing Spacer	316 SST
7	Packing Spring	316 SST
	Code: G Graphite Packing (Requires Indirect Shaft)	
17	Hex Head Capscrew	SST
18	Packing Flange	316 SST
19	Adjustable Packing Retainer	Alloy 6B
23	Hex Nut	316 SST
24	Yarn Packing	Graphite
25	Ring Packing	Graphite
26	Packing Spacer	Alloy 6B
	Code: J Graphite Packing (Requires Indirect Shaft)	
4	Packing Bearing	PEEK
17	Hex Head Capscrew	SST
18	Packing Flange	316 SST
19	Adjustable Packing Retainer	316 SST
23	Hex Nut	316 SST
24	Yarn Packing	GRAPHITE
25	Ring Packing	GRAPHITE
26	Packing Spacer	316 SST
	Code: A Teflon V-Ring Packing (Requires Indirect Shaft)	
4	Packing Bearing	PEEK
5	V-ring Packing Set	PTFE
17	Hex Head Capscrew	SST
18	Packing Flange	316 SST
19	Adjustable Packing Retainer	316 SST
23	Hex Nut	316 SST
26	Packing Spacer	316 SST



PERFORMANCE CHARACTERISTICS

Body Pressure-Temperature Ratings

Body Pressure — Temperature Rating conform to ANSI based on body/flange rating and body material. As the fluid temperature increases, the maximum allowable internal pressure decreases. Verify maximum pressures and temperatures prior to selecting body material and body/flange rating.

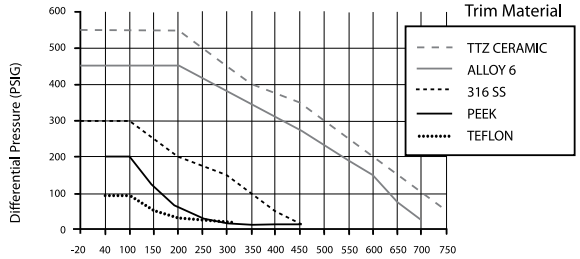
BODY PRESSURE-TEMPERATURE RATINGS:				
Temperature (F)	**150 FLG WCB**	**300 FLG WCB**	**150 FLG CF8M**	**300 FLG CF8M**
+32° To 100°	285	740	275	720
150°	272	710	255	670
175°	266	695	245	645
200°	260	680	235	620
225°	252	673	230	605
250°	245	667	225	590
275°	237	661	220	575
300°	230	655	215	560
325°	222	650	210	548
350°	215	645	205	535
375°	207	640	200	526

BODY PRESSURE-TEMPERATURE RATINGS:				
Temperature (F)	**150 FLG WCB**	**300 FLG WCB**	**150 FLG CF8M**	**300 FLG CF8M**
400°	200	635	195	515
450°	185	620	182	497
500°	170	605	170	480
550°	155	587	155	465
600°	140	570	140	450
650°	125	550	125	440
700°	110	530	110	435
750°	95	505	95	425
800°	80	410	80	420

Pressure ratings are PSIG
For applications below 32° consult factory.

Flowing Differential Pressure

MAXIMUM FLOWING DIFFERENTIAL PRESSURE LIMITS



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.

Shut-off Classes

SHUT-OFF (ALLOWABLE SEAT LEAKAGE) CLASSES				
Leakage Class	**Maximum Seat Leakage**	**Test Fluid**	**Test Pressure**	**Relative Seat Tightness**
Class II	0.5% of rated CV	Water	45 to 60 PSI	1
Class III	0.1% of rated CV	Water	45 to 60 PSI	5
Class IV	0.01% of rated CV	Water	45 to 60 PSI	50
Class IV+	0.0015 ml/min/inch of trim size/ΔP(PSI)	Water	Max Operating ΔP	150,000
Class V	0.0005 ml/min/inch of trim size/ΔP(PSI)	Water	Max Operating ΔP	300,000
Class VI	Class VI about 0.9 ml/min*	Air	50 PSI	600,000

3800 with Metal Seats in any flow direction or TTZ Ceramic Seats Flow-To-Open
ANSI Class IV

3800 with TTZ Ceramic Seats Flow-To-Close
Class IV+
Class IV+ is a proprietary designation of Warren Controls and is not an ANSI/FCI classification.

3800 with PEEK or TFE Soft Seats
ANSI Class VI

*Leakage rate varies by nominal port diameter, refer to the Standard ANSI/FCI 70.2.

Internal Configurations vs Max Temp

Trim Material	**Shaft Design**	**Bearing & Seals**	**Packing**	**Max Temp [1]**
S 316 Stainless Steel	**C** Thru Direct	**S** PEEK	**T** Teflon V-ring	450°F
Z TTZ Ceramic	**D** Thru Indirect	**T** PEEK w/ Fluoraz 797 Seal		
T TFE Soft Seats	**E** Split Direct			
P PEEK Soft Seats	**F** Split Indirect			
6 Alloy 6				
S 316 Stainless Steel	**D** Thru Indirect	**S** PEEK	**J** Graphite	450°F
Z TTZ Ceramic	**F** Split Indirect	**T** PEEK w/ Fluoraz 797 Seal	**A** Teflon V-ring	
T TFE Soft Seats				
P PEEK Soft Seats				
6 Alloy 6				
S 316 Stainless Steel	**D** Thru Indirect	**Y** Alloy 6B w/ Fluoraz 797 Seal	**G** Graphite	500°F
Z TTZ Ceramic	**F** Split Indirect			
6 Alloy 6				
S 316 Stainless Steel	**D** Thru Indirect	**6** Alloy 6B	**G** Graphite	800°F
Z TTZ Ceramic	**F** Split Indirect			
6 Alloy 6				

[1]For Maximum Temperatures see also Valve Body Pressure-Temperature Ratings and Actuator Temperature Ratings

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

Gallons = H x W x L (Ft.) x 7.5

Circular Tank Storage Capacity in Gallons

Storage = $6D^2$ x L (Gallons)

Where:
D = Tank Diameter in Feet
L = Length in Feet

LOAD SIZING CALCULATIONS

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

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 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

$$GPM_1 = GPM_2 \times \frac{°F\ water_2\ temp.\ rise\ or\ drop}{°F\ water_1\ temp.\ rise\ or\ drop}$$

Heating or Cooling Water

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

Heating Oil with Steam

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

Heating Air with Water

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

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

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

FLOW COEFFICIENTS (CV) VERSUS TRAVEL — FLOW TO OPEN

Flow-To-Open:
Most general service applications will benefit from the flow to open direction. Smoother transitions from close to open and greater ability to accommodate larger pressure drops prior to the onset of cavitation are prime benefits as compared to flow to close operation.

	VALVE			3800 FLOW COEFFICIENTS (CV) FLOW TO OPEN									
	Valve Size (IN)	Port Size	% Stroke Size	10	20	30	40	50	60	70	80	90	100
Thru Shaft	1	Reduced	Full	0.90	1.70	3.00	4.50	6.20	8.00	10.0	12.4	14.7	17.3
			1SR	0.60	1.20	2.00	3.00	4.20	5.40	6.70	8.20	9.80	11.5
			2SR	0.40	0.80	1.30	2.00	2.80	3.60	4.50	5.50	6.50	7.70
			3SR	0.30	0.50	0.90	1.30	1.80	2.40	3.00	3.70	4.40	5.10
Thru Shaft	1.5	Reduced	Full	3.00	6.00	10.0	15.0	20.0	26.0	32.0	40.0	48.0	56.0
			1SR	1.90	3.70	6.50	9.70	13.0	17.0	22.0	27.0	32.0	37.0
			2SR	1.20	2.50	4.30	6.50	9.00	12.0	14.0	18.0	21.0	25.0
			3SR	0.80	1.70	2.90	4.30	6.00	7.70	9.60	12.0	14.0	17.0
Split Shaft	1.5	Reduced	Full	5.00	11.0	19.0	29.0	40.0	51.0	64.0	79.0	94.0	110
			1SR	3.70	7.30	13.0	19.0	26.0	34.0	43.0	52.0	62.0	73.0
			2SR	2.40	4.90	8.50	13.0	18.0	23.0	28.0	35.0	42.0	49.0
			3SR	1.60	3.30	5.60	8.50	12.0	15.0	19.0	23.0	28.0	33.0
Thru Shaft	2	Reduced	Full	4.00	8.00	15.0	22.0	30.0	39.0	49.0	60.0	71.0	84.0
			1SR	2.80	5.60	9.70	15.0	20.0	26.0	32.0	40.0	48.0	56.0
			2SR	1.90	3.70	6.50	9.70	13.0	17.0	22.0	27.0	32.0	37.0
			3SR	1.20	2.50	4.30	6.50	9.00	12.0	14.0	18.0	21.0	25.0
Split Shaft	2	Reduced	Full	7.00	14.0	24.0	35.0	49.0	63.0	79.0	97.0	116	136
			1SR	4.50	9.10	16.0	24.0	33.0	42.0	53.0	65.0	77.0	91.0
			2SR	3.00	6.00	10.5	16.0	22.0	28.0	35.0	43.0	51.0	60.0
			3SR	2.00	4.00	7.00	10.5	15.0	19.0	23.0	29.0	34.0	40.0
Thru Shaft	3	Reduced	Full	9.00	18.0	31.0	47.0	65.0	84.0	104	129	153	180
			1SR	6.00	12.0	21.0	31.0	43.0	56.0	70.0	86.0	102	120
			2SR	4.00	8.00	14.0	21.0	29.0	37.0	46.0	57.0	68.0	80.0
			3SR	2.70	5.30	9.20	14.0	19.0	25.0	31.0	38.0	45.0	53.0
Split Shaft	3	Reduced	Full	13.0	27.0	47.0	70.0	97.0	126	157	193	230	270
			1SR	9.00	18.0	31.0	47.0	65.0	84.0	104	129	153	180
			2SR	6.00	12.0	21.0	31.0	43.0	56.0	70.0	86.0	102	120
			3SR	4.00	8.00	13.8	21.0	29.0	37.0	46.0	57.0	68.0	80.0
Thru Shaft	4	Reduced	Full	17.0	35.0	61.0	91.0	126	163	203	250	298	350
			1SR	11.7	23.0	40.0	61.0	84.0	108	135	167	198	233
			2SR	7.80	16.0	27.0	40.0	56.0	72.0	90.0	111	132	156
			3SR	5.20	10.0	18.0	27.0	37.0	48.0	60.0	74.0	88.0	104
Split Shaft	4	Reduced	Full	26.0	51.0	89.0	133	185	239	298	367	436	513
			1SR	17.1	34.0	59.0	89.0	123	159	198	245	291	342
			2SR	11.4	23.0	39.0	59.0	82.0	106	132	163	194	228
			3SR	7.60	15.0	26.0	40.0	55.0	71.0	88.0	109	129	152
Thru Shaft	6	Reduced	Full	40.0	80.0	138	208	288	372	464	572	680	800
			1SR	27.0	53.0	92.0	139	192	248	309	381	453	533
			2SR	17.8	36.0	62.0	92.0	128	165	206	254	302	356
			3SR	11.9	24.0	41.0	62.0	85.0	110	137	169	201	237
Split Shaft	6	Reduced	Full	58.0	116	200	301	416	538	670	827	983	1156
			1SR	39.0	77.0	133	200	277	358	447	551	655	771
			2SR	26.0	51.0	89.0	134	185	239	298	367	437	514
			3SR	17.1	34.0	59.0	89.0	123	159	199	245	291	343
TS	8		Full	65.0	130	225	338	468	604	754	929	1105	1300
SS	8		Full	86.0	173	299	450	623	804	1003	1237	1471	1730

FLOW COEFFICIENTS (CV) VERSUS TRAVEL — FLOW TO CLOSE

	VALVE			3800 FLOW COEFFICIENTS (CV) FLOW TO CLOSE									
	Valve Size (IN)	Port Size	% Stroke Size	10	20	30	40	50	60	70	80	90	100
Thru Shaft	1	Reduced	Full	0.90	1.90	3.20	4.90	6.70	8.70	10.8	13.4	15.9	18.7
			1SR	0.60	1.20	2.20	3.20	4.50	5.80	7.20	8.90	10.6	12.5
			2SR	0.40	0.80	1.40	2.20	3.00	3.90	4.80	5.90	7.10	8.30
			3SR	0.30	0.60	1.00	1.40	2.00	2.60	3.20	4.00	4.70	5.50
Thru Shaft	1.5	Reduced	Full	3.00	6.00	11.0	16.0	22.0	29.0	36.0	44.0	53.0	62.0
			1SR	2.10	4.10	7.20	10.7	15.0	19.0	24.0	30.0	35.0	41.0
			2SR	1.40	2.80	4.80	7.20	9.90	13.0	16.0	20.0	23.0	28.0
			3SR	0.90	1.80	3.20	4.80	6.60	8.50	10.7	13.0	16.0	18.0
Split Shaft	1.5	Reduced	Full	6.00	12.0	21.0	32.0	44.0	57.0	71.0	87.0	104	122
			1SR	4.10	8.10	14.0	21.0	29.0	38.0	47.0	58.0	69.0	81.0
			2SR	2.70	5.40	9.40	14.0	20.0	25.0	31.0	39.0	46.0	54.0
			3SR	1.80	3.60	6.30	9.40	13.0	17.0	21.0	26.0	31.0	36.0
Thru Shaft	2	Reduced	Full	5.00	9.00	16.0	24.0	33.0	43.0	53.0	66.0	78.0	92.0
			1SR	3.10	6.10	10.6	16.0	22.0	29.0	36.0	44.0	52.0	61.0
			2SR	2.00	4.10	7.10	10.6	15.0	19.0	24.0	29.0	35.0	41.0
			3SR	1.40	2.70	4.70	7.10	9.80	13.0	16.0	19.0	23.0	27.0
Split Shaft	2	Reduced	Full	7.00	15.0	26.0	39.0	54.0	69.0	86.0	107	127	149
			1SR	5.00	9.90	17.0	26.0	36.0	46.0	58.0	71.0	84.0	99.0
			2SR	3.30	6.60	11.5	17.0	24.0	31.0	38.0	47.0	56.0	66.0
			3SR	2.20	4.40	7.60	11.5	16.0	21.0	26.0	32.0	38.0	44.0
Thru Shaft	3	Reduced	Full	10.0	20.0	34.0	51.0	71.0	92.0	114	141	167	197
			1SR	6.60	13.0	23.0	34.0	47.0	61.0	76.0	94.0	112	131
			2SR	4.40	8.80	15.0	23.0	32.0	41.0	51.0	63.0	74.0	88.0
			3SR	2.90	5.80	10.0	15.0	21.0	27.0	34.0	42.0	50.0	58.0
Split Shaft	3	Reduced	Full	15.0	29.0	51.0	77.0	106	137	171	211	251	295
			1SR	9.80	20.0	34.0	51.0	71.0	91.0	114	141	167	197
			2SR	6.60	13.1	23.0	34.0	47.0	61.0	76.0	94.0	111	131
			3SR	4.40	8.70	15.0	23.0	31.0	41.0	51.0	62.0	74.0	87.0
Thru Shaft	4	Reduced	Full	19.0	38.0	66.0	100	138	179	223	275	326	384
			1SR	12.8	26.0	44.0	67.0	92.0	119	148	183	218	256
			2SR	8.50	17.0	30.0	44.0	61.0	79.0	99.0	122	145	171
			3SR	5.70	11.0	20.0	30.0	41.0	53.0	66.0	81.0	97.0	114
Split Shaft	4	Reduced	Full	28.0	56.0	97.0	146	203	262	327	403	479	563
			1SR	18.8	38.0	65.0	98.0	135	175	218	268	319	375
			2SR	12.5	25.0	43.0	65.0	90.0	116	145	179	213	250
			3SR	8.30	17.0	29.0	43.0	60.0	78.0	97.0	119	142	167
Thru Shaft	6	Reduced	Full	44.0	87.0	151	227	315	407	507	626	744	875
			1SR	29.0	58.0	101	152	210	271	338	417	496	583
			2SR	19.4	39.0	67.0	101	140	181	226	278	331	389
			3SR	13.0	26.0	45.0	67.0	93.0	121	150	185	220	259
Split Shaft	6	Reduced	Full	63.0	126	219	329	455	588	734	904	1075	1265
			1SR	42.0	84.0	146	219	304	392	489	603	717	843
			2SR	28.0	56.0	97.0	146	202	261	326	402	478	562
			3SR	18.7	37.0	65.0	97.0	135	174	217	268	319	375
TS	8		Full	71.0	142	246	369	511	660	824	1015	1207	1420
SS	8		Full	94.0	189	327	491	680	879	1096	1351	1607	1890

Flow-To-Close:
Flow to close operation is generally reserved for erosive service applications. While tighter shut off can be an additional benefit, this is not quantified for levels of tightness above Class IV or Class VI. Further, the tradeoff can be lack of a smooth transition from close to open when pressure differentials are significant especially on larger sizes.

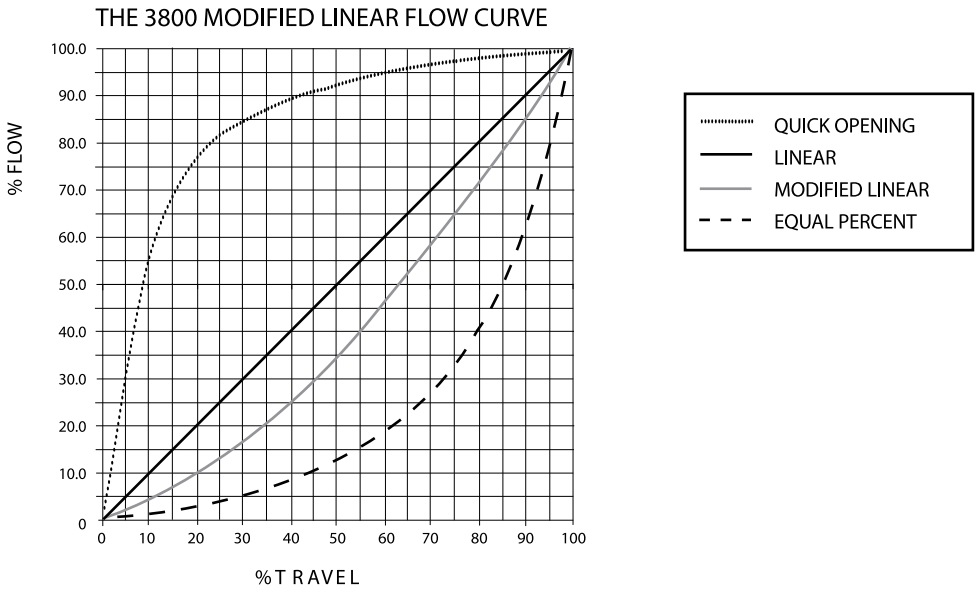
ADDITIONAL COEFFICIENTS

VALVE		FLOW-TO-OPEN									
Coefficients	**Valve Size (IN)**	**10%**	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**	**90%**	**100%**
FL	1 - 2 All Ports	0.89	0.89	0.88	0.88	0.87	0.87	0.86	0.86	0.85	0.85
FL2		0.79	0.79	0.77	0.77	0.76	0.76	0.74	0.74	0.72	0.72
Kc		0.60	0.61	0.61	0.62	0.62	0.63	0.64	0.63	0.62	0.59
XT		0.48	0.50	0.51	0.54	0.57	0.61	0.63	0.62	0.60	0.59
FL	3 - 4 All Ports	0.87	0.85	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76
FL2		0.76	0.72	0.69	0.67	0.66	0.64	0.62	0.61	0.59	0.58
Kc		0.60	0.61	0.61	0.62	0.62	0.63	0.61	0.60	0.58	0.57
XT		0.48	0.53	0.57	0.54	0.52	0.51	0.49	0.48	0.46	0.45
FL	6 - 8 All Ports	0.94	0.92	0.90	0.87	0.84	0.81	0.78	0.75	0.72	0.69
FL2		0.88	0.85	0.81	0.76	0.71	0.66	0.61	0.56	0.52	0.48
Kc		0.60	0.61	0.61	0.62	0.62	0.63	0.60	0.55	0.51	0.47
XT		0.60	0.57	0.54	0.51	0.48	0.45	0.45	0.43	0.42	0.41

VALVE		FLOW-TO-CLOSE									
Coefficients	**Valve Size (IN)**	**10%**	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**	**90%**	**100%**
FL	1 - 2 All Ports	0.96	0.87	0.77	0.74	0.68	0.62	0.62	0.62	0.62	0.62
FL2		0.92	0.76	0.59	0.55	0.46	0.38	0.38	0.38	0.38	0.38
Kc		0.88	0.72	0.55	0.52	0.44	0.35	0.35	0.35	0.35	0.35
XT		0.52	0.54	0.56	0.49	0.42	0.36	0.36	0.36	0.35	0.35
FL	3 - 4 All Ports	0.83	0.82	0.81	0.75	0.65	0.58	0.58	0.58	0.58	0.58
FL2		0.69	0.67	0.66	0.56	0.42	0.34	0.34	0.34	0.34	0.34
Kc		0.61	0.57	0.53	0.52	0.40	0.32	0.32	0.32	0.32	0.32
XT		0.52	0.54	0.56	0.49	0.42	0.36	0.36	0.36	0.35	0.35
FL	6 - 8 All Ports	0.92	0.90	0.88	0.81	0.74	0.66	0.63	0.60	0.59	0.58
FL2		0.85	0.81	0.77	0.66	0.55	0.44	0.40	0.36	0.35	0.34
Kc		0.77	0.73	0.69	0.62	0.53	0.41	0.39	0.34	0.33	0.33
XT		0.64	0.55	0.49	0.45	0.42	0.39	0.37	0.35	0.33	0.31

Flow Curve

The 3800 design inherently has a modified linear flow curve suitable for a wide range of precision control applications.



3800 Actuator Torque Requirements - Flow to OPEN

VALVE	MAX TORQUE		RATED TORQUES (LBS - IN) HOLDING TORQUE IN LB - IN TO MAINTAIN CLASS IV SHUT OFF																
Valve Size (IN)	17-4 Shaft	Inconel Shaft	Control Valve Inlet Pressure (PSI)																
			Seat Surface: Hard						Bearing Material: PEEK								Packing Material: PTFE		
			10	20	30	40	50	60	75	100	125	150	175	200	250	300	400	500	600
1	480	424	44	46	49	52	55	57	61	68	75	82	89	95	109	123	150	177	204
1-1/2	1080	950	78	85	92	99	106	113	124	142	159	177	195	212	248	283	353	424	495
2	1080	950	100	111	123	134	146	157	174	203	232	261	289	318	376	433	548	664	779
3	1800	1590	203	235	268	301	334	366	415	497	579	661	742	824	988	1151	1478	1805	2132
4	3160	2860	369	448	526	605	683	762	879	1075	1271	1467	1664	1860	2252	2644	3428	4213	4997
6	7020	6190	759	974	1188	1403	1618	1833	2155	2692	3229	3766	4303	4840	5914	6987	9135	11283	13431
8	8460	7460	1229	1646	2063	2479	2896	3313	3938	4981	6023	7065	8107	9149	11234	13318	17486	21655	
			Seat Surface: Hard						Bearing Material: Alloy 6								Packing Material: PTFE		
			10	20	30	40	50	60	75	100	125	150	175	200	250	300	400	500	600
1	480	424	49	52	55	59	62	65	70	78	85	93	101	109	125	141	172	204	235
1-1/2	1080	950	87	95	103	111	119	127	138	158	178	198	218	238	277	317	396	476	555
2	1080	950	111	124	137	150	163	176	195	228	260	293	325	357	422	487	617	747	876
3	1800	1590	223	260	296	333	369	405	460	551	642	733	824	915	1097	1278	1642	2006	2370
4	3160	2860	407	493	580	666	753	839	969	1186	1402	1618	1835	2051	2484	2917	3782	4648	5513
6	7020	6190	846	1086	1327	1567	1808	2048	2409	3011	3612	4213	4815	5416	6619	7822	10227	12633	15039
8	8460	7460	1346	1805	2263	2721	3180	3638	4326	5471	6617	7763	8909	10055	12347	14638	19222	23805	
			Seat Surface: Hard						Bearing Material: Alloy 6								Packing Material: Graphite		
			10	20	30	40	50	60	75	100	125	150	175	200	250	300	400	500	600
1	480	424	129	132	136	139	142	145	150	158	166	174	182	190	206	222	254	287	319
1-1/2	1080	950	167	175	183	191	199	207	219	239	259	279	299	319	359	399	479	559	638
2	1080	950	191	204	217	230	243	256	276	308	341	373	406	439	504	569	699	830	960
3	1800	1590	374	410	447	483	520	556	611	702	793	885	976	1067	1250	1432	1797	2162	2527
4	3160	2860	617	704	791	877	964	1051	1181	1399	1616	1833	2050	2267	2701	3136	4004	4873	5741
6	7020	6190	1302	1544	1785	2027	2269	2511	2873	3478	4082	4686	5291	5895	7104	8313	10730	13148	15566
8	8460	7460	1803	2262	2722	3181	3641	4100	4790	5938	7087	8236	9385	10534	12832	15129	19725	24320	

VALVE	MAX TORQUE		RATED TORQUES (LBS - IN) HOLDING TORQUE IN LB - IN TO MAINTAIN CLASS IV SHUT OFF																
Valve Size (IN)	17-4 Shaft	Inconel Shaft	Control Valve Inlet Pressure (PSI)																
			Seat Surface: Soft						Bearing Material: PEEK								Packing Material: PTFE		
			10	20	30	40	50	60	75	100	125	150	175	200	250	300	400	500	600
1	480	424	38	41	43	45	48	50	53	59	65	71	76	82	94	105	128	152	175
1-1/2	1080	950	67	73	79	85	91	96	105	120	135	150	164	179	209	238	297	357	416
2	1080	950	80	89	98	107	116	125	139	161	184	206	229	251	297	342	432	522	612
3	1800	1590	158	183	208	233	258	283	321	383	446	508	571	634	759	884	1134	1385	1635
4	3160	2860	281	339	398	456	515	573	661	807	953	1100	1246	1392	1685	1977	2562	3147	3732
6	7020	6190	570	729	887	1045	1204	1362	1599	1995	2391	2787	3182	3578	4370	5161	6744	8327	9910
8	8460	7460	902	1204	1506	1808	2110	2411	2864	3619	4374	5129	5883	6638	8148	9657	12676	75696	

Rules for Use:

1) Select torque requirement table based on flow direction, seat surface, bearing material, and packing material of valve.

2) Read across row for valve size to columns for MAX torque. Read maximum shaft torque in column for shaft material of valve.

3) Read across row for valve sizeto column for control valve inlet pressure that is equal to orgreater than inlet pressure to valve. Read rated torque value in that column. For rated torque values in *italics* consult factory for an engineering-application review, and for possible consideration of stronger custom shaft and plug materials, as these choices exceed the MAX torque for standard shafts.

4) Proceed to actuator selection tables.

3800 Actuator Torque Requirements - Flow to CLOSE

VALVE	MAX TORQUE		RATED TORQUES (LBS - IN) THE GREATER OF HOLDING TORQUE OR RE-OPENING TORQUE IN LB - IN TO MAINTAIN CLASS IV SHUT OFF (CLASS IV+ WITH TTZ CERAMIC SEAT), WHILE ALLOWING RE-OPENING																
Valve Size (IN)	17-4 Shaft	Inconel Shaft	Control Valve Inlet Pressure (PSI)																
			Seat Surface: Hard						Bearing Material: PEEK								Packing Material: PTFE		
			10	20	30	40	50	60	75	100	125	150	175	200	250	300	400	500	600
1	480	424	12	13	15	16	18	19	22	26	30	34	38	42	50	57	73	89	105
1-1/2	1080	950	14	18	22	25	29	33	39	49	58	68	78	87	107	126	165	204	242
2	1080	950	18	26	34	42	50	58	70	90	110	130	150	170	210	250	330	410	489
3	1800	1590	39	63	87	111	135	159	195	255	316	376	436	496	616	736	977	1217	1457
4	3160	2860	82	143	205	267	328	390	482	637	791	945	1099	1253	1562	1870	2486	3103	3720
6	7020	6190	220	395	569	744	919	1094	1356	1793	2230	2667	3104	3541	4415	5289	7037	8786	10534
8	8460	7460	398	750	1103	1455	1808	2160	2689	3571	4452	5334	6215	7096	8859	10622	14148	17674	
			Seat Surface: Hard						Bearing Material: Alloy 6								Packing Material: PTFE		
			10	20	30	40	50	60	75	100	125	150	175	200	250	300	400	500	600
1	480	424	12	13	15	17	19	20	23	27	31	36	40	44	53	61	78	96	113
1-1/2	1080	950	14	18	22	27	31	35	41	51	62	72	82	93	113	134	175	217	258
2	1080	950	18	27	35	43	52	60	73	93	114	135	156	177	219	260	344	427	510
3	1800	1590	40	65	90	116	141	166	204	267	329	392	455	518	644	770	1021	1273	1524
4	3160	2860	84	148	212	276	341	405	501	661	821	982	1142	1302	1623	1943	2584	3225	3866
6	7020	6190	228	410	593	775	958	1140	1414	1870	2327	2783	3239	3696	4609	5521	7347	9172	10997
8	8460	7460	410	775	1140	1505	1870	2235	2783	3695	4608	5520	6433	7345	9170	10995	14645	18296	
			Seat Surface: Hard						Bearing Material: Alloy 6								Packing Material: Graphite		
			10	20	30	40	50	60	75	100	125	150	175	200	250	300	400	500	600
1	480	424	92	94	95	97	99	101	103	108	112	117	121	125	134	143	161	179	196
1-1/2	1080	950	94	98	103	107	111	115	121	132	142	153	163	174	195	216	258	300	341
2	1080	950	98	107	115	124	132	141	154	175	196	217	239	260	302	345	430	515	599
3	1800	1590	190	216	241	266	291	317	355	418	481	544	607	670	797	923	1176	1429	1681
4	3160	2860	294	359	423	488	552	616	713	874	1035	1196	1357	1518	1840	2162	2806	3450	4094
6	7020	6190	684	867	1051	1235	1419	1602	1878	2337	2797	3256	3715	4175	5094	6012	7850	9687	11524
8	8460	7460	866	1232	1599	1965	2331	2697	3247	4162	5078	5993	6909	7824	9655	11486	15148	18811	

VALVE	MAX TORQUE		RATED TORQUES (LBS - IN) THE GREATER OF HOLDING TORQUE OR RE-OPENING TORQUE IN LB - IN TO MAINTAIN CLASS VI SHUT OFF, WHILE ALLOWING RE-OPENING																
Valve Size (IN)	17-4 Shaft	Inconel Shaft	Control Valve Inlet Pressure (PSI)																
			Seat Surface: Soft						Bearing Material: PEEK								Packing Material: PTFE		
			10	20	30	40	50	60	75	100	125	150	175	200	250	300	400	500	600
1	480	424	11	12	13	15	16	17	19	22	24	27	30	33	39	45	56	68	79
1-1/2	1080	950	13	15	18	21	23	26	30	37	44	50	57	64	77	90	117	144	171
2	1080	950	15	21	26	32	37	43	51	64	78	91	105	119	146	173	227	282	336
3	1800	1590	31	47	64	80	96	112	137	177	218	258	299	339	420	501	663	825	987
4	3160	2860	61	103	144	185	227	268	330	433	537	640	743	847	1053	1260	1673	2087	2500
6	7020	6190	162	279	396	513	630	747	923	1215	1508	1801	2093	2386	2971	3556	4727	5897	7067
8	8460	7460	281	516	752	987	1223	1458	1812	2401	2989	3578	4167	4756	5934	7112	9467	11823	

Rules for Use:

1) Select torque requirement table based on flow direction, seat surface, bearing material, and packing material of valve.

2) Read across row for valve size to columns for MAX torque. Read maximum shaft torque in column for shaft material of valve.

3) Read across row for valve size to column for control valve inlet pressure that is equal to or greater than inlet pressure to valve. Read rated torque value in that column. For rated torque values in *italics* consult factory for an engineering-application review, and for possible consideration of stronger custom shaft and plug materials, as these choices exceed the MAX torque for standard shafts.

4) Proceed to actuator selection tables.

ACTUATOR 3800 RACK & PINION PNEUMATIC ACTUATOR TORQUE

Valve Size (IN)	Model	Double Acting Torque (IN-LBS) PSI - Actuator 40	60	80	100	120	Spring# Per Side	The following torque values are in IN - LBS and represent full stroke for the Spring Return Units: All Spring St.	All Spring End	40 Spring End	40 Spring St.	60 AIR End	60 AIR St.	80 AIR End	80 AIR St.	100 AIR End	100 AIR St.	120 AIR End	120 AIR St.
1 - 3	RP73	367	551	734	918	1101	2	199	127	163	235	344	417	525	598	706	779	887	960
		-	-	-	-	-	3	299	190	63	172	244	353	426	534	607	715	788	896
		-	-	-	-	-	4	398	253	-	108	145	290	326	471	507	652	688	833
		-	-	-	-	-	5	498	317	-	45	45	226	226	407	407	588	588	769
		-	-	-	-	-	6	597	380	-	-	-	162	12	343	307	524	488	706
	RP103	516	774	1032	1290	1548	2	267	189	241	318	495	572	749	826	1002	1080	1256	1334
		-	-	-	-	-	3	400	284	107	223	361	477	615	731	869	985	1123	1239
		-	-	-	-	-	4	533	379	-	128	227	382	481	636	735	890	989	1144
		-	-	-	-	-	5	667	473	-	33	93	287	347	541	601	795	855	1049
		-	-	-	-	-	6	800	568	-	-	-	192	213	446	467	700	721	954
1 - 8	RP148	740	1109	1479	1849	2219	2	407	260	321	468	685	832	1049	1196	1413	1560	1777	1924
		-	-	-	-	-	3	611	391	117	337	481	701	845	1065	1209	1429	1573	1793
		-	-	-	-	-	4	814	521	-	207	277	571	641	935	1005	1299	1369	1663
		-	-	-	-	-	5	1018	651	-	76	73	440	437	804	801	1168	1165	1532
		-	-	-	-	-	6	1221	781	-	-	-	309	232	673	596	1037	960	1401
	RP222	1109	1664	2218	2773	3327	2	550	400	489	645	1018	1174	1548	1704	2077	2233	2607	2763
		-	-	-	-	-	3	826	600	188	426	718	956	1247	1485	1777	2015	2307	2544
		-	-	-	-	-	4	1101	800	-	200	407	729	936	1259	1466	1789	1995	2318
		-	-	-	-	-	5	1376	1000	-	-	84	495	614	1025	1144	1554	1673	2084
		-	-	-	-	-	6	1651	1200	-	-	-	253	281	783	810	1312	1304	1842
	RP295	1479	2219	2958	3698	4437	2	814	516	641	939	1369	1667	2097	2395	2825	3123	3552	3850
		-	-	-	-	-	3	1222	775	234	681	962	1409	1689	2137	2417	2864	3145	3592
		-	-	-	-	-	4	1629	1033	-	423	554	1150	1282	1878	2010	2606	2738	3334
		-	-	-	-	-	5	2036	1291	-	164	147	892	874	1620	1602	2348	2330	3075
		-	-	-	-	-	6	2443	1549	-	-	-	634	467	1361	1195	2089	1922	2817
4 - 8	RP470	2071	3106	4142	5177	6213	2	1133	681	938	1390	1974	2425	3009	3461	4045	4496	5080	5532
		-	-	-	-	-	3	1699	1022	371	1049	1407	2084	2443	3120	3478	4155	4514	5191
		-	-	-	-	-	4	2266	1363	-	708	840	1743	1876	2779	2911	3841	3947	4850
		-	-	-	-	-	5	2832	1704	-	367	273	1402	1309	2438	2344	3473	3380	4509
		-	-	-	-	-	6	3398	2044	-	26	-	1061	742	2097	1777	3132	2813	4168
	RP586	2933	4399	5865	7331	8798	2	1542	1052	1344	1834	2787	3277	4320	4720	5673	6163	7117	7606
		-	-	-	-	-	3	2312	1578	573	1308	2016	2751	3459	4194	4902	5637	6345	7080
		-	-	-	-	-	4	3083	2104	-	781	1245	2224	2688	3667	4131	5111	5574	6554
		-	-	-	-	-	5	3854	2630	-	255	473	1698	1916	3141	3359	4584	4802	6027
		-	-	-	-	-	6	4625	3156	-	-	-	1171	1145	2614	2588	4058	4031	5501
6 - 8	RP900	4550	6825	9100	11375	13650	2	2251	1619	2227	2859	4466	5098	6705	7337	8944	9576	11183	11815
		-	-	-	-	-	3	3376	2428	1101	2049	3340	4288	5579	6527	7818	8766	10057	11005
		-	-	-	-	-	4	4501	3238	-	1239	2214	3478	4453	5717	6692	7956	8931	10195
		-	-	-	-	-	5	5627	4047	-	429	1088	2668	3327	4907	5566	7146	7805	9385
		-	-	-	-	-	6	6752	4856	-	-	-	1858	2200	4097	4439	6336	6678	8575
	RP1213	6066	9099	12132	15165	18198	2	3000	2159	2969	3811	5954	6796	8939	9781	11924	12766	14910	15751
		-	-	-	-	-	3	4501	3238	1468	2731	4453	5716	7438	8701	10424	11686	13409	11005
		-	-	-	-	-	4	6001	4317	-	1651	2952	4636	5937	7621	8922	10606	11907	10195
		-	-	-	-	-	5	7501	5397	-	571	1451	3556	4436	6541	7421	9526	10406	9385
		-	-	-	-	-	6	9001	6476	-	-	-	2475	2934	5460	5919	8446	8904	8575

RULES FOR USE: First obtain rated torque value and maximum shaft torque value from Torque Requirement Tables.

Double-Acting, Flow-to-Open or Flow-to-Close

(Double Acting Flow to Close Not Recommended)

1) Read across air supply columns to find double acting torque value equal to or greater than rated torque required.
2) Check that the double acting torque value is less than or equal to maximum shaft torque.
3) Check that actuator model is compatible with valve size. Repeat as necessary to determine actuator model and air supply required.

Single-Acting Spring Fail Open, Flow-to-Open or Flow-to-Close:

1) Read down and across air supply columns to find air-end torque value equal to or greater than rated torque required.
2) Check that air-end torque value is less than or equal to maximum shaft torque.
3) Corresponding spring-start torque value must be equal to or greater than 1.5x (times) the air-end torque.
4) Check that actuator model is compatible with valve size. Repeat as necessary to determine actuator model, springs per side, and air supply required.

Single-Acting Spring Fail Closed, Flow-to-Open or Flow-to-Close:

1) Read down spring column to find spring-end torque value equal to or greater than rated torque required.
2) Check that spring-end torque value is less than or equal to maximum shaft torque.
3) Read across to spring# per side column. Actuator will use this number of springs per side. See table below for air supply required based on spring# per side.
4) Check that actuator model is compatible with valve size. Repeat as necessary to determine actuator model, springs per side and air supply required.

Spring# Per Side	Air Supply (PSIG)
2	40
3	60
4	80
5	100
6	120

ACTUATOR TORQUES

ELECTRIC ACTUATOR TORQUE CHART (IN-LBS) FOR VALVES WITH 17-4 SHAFT								
Valve Size	**17-4 Shaft Torque**	**Valve Interface**	**2nd Torque Reduction Code (2TR)**	**1st Torque Reduction Code (1TR)**	**Full Torque**	**Actuator Mounting Flange Pattern**	**Actuator Size**	**Order Code**
	Limit		480			F07	P2	EA3
1	480	F07	480	640	800	F07	P2	EA3
			801	990		F07	P3	EB3
1 1/2 & 2	1080	F07	480	640	800	F07	P2	EA3
3	1800	F07	801	990	1335	F07	P3	EB3
			480	640	800	F07	P2	EA3
4	3160	F07, F10	801	990	1335	F07	P3	EB3
			2100	2400	N/A	F10	P4	EO4
			2640			F10	P5	EO5
			2100	2400	3500	F10	P4	EO4
6	7020	F10	2640	3520	4400	F10	P5	EO5
			3480	4640	5800	F10	P6	EO6
			2100	2400	3500	F10	P4	EO4
8	8460	F10, F12	2640	3520	4400	F10	P5	EO5
			3480	4640	5800	F10	P6	EO6
			5340	7000		F12	P7	EO7

ELECTRIC ACTUATOR TORQUE CHART (IN-LBS) FOR VALVES WITH INCONEL SHAFT								
Valve Size	**Inconel Shaft Torque**	**Valve Interface**	**2nd Torque Reduction Code (2TR)**	**1st Torque Reduction Code (1TR)**	**Full Torque**	**Actuator Mounting Flange Pattern**	**Actuator Size**	**Order Code**
	Limit		CF	CF	CF	F07	CF	CF
1	424	F07	480	640	800	F07	P2	EA3
			801			F07	P3	EB3
1 1/2 & 2	950	F07	480	640	800	F07	P2	EA3
3	1590	F07	801	990	1335	F07	P3	EB3
			480	640	800	F07	P2	EA3
4	2860	F07, F10	801	990	1335	F07	P3	EB3
			2100	2400		F10	P4	EO4
			2640			F10	P5	EO5
			2100	2400	3500	F10	P4	EO4
6	6190	F10	2640	3520	4400	F10	P5	EO5
			3480	4640	5800	F10	P6	EO6
			2100	2400	3500	F10	P4	EO4
8	7460	F10, F12	2640	3520	4400	F10	P5	EO5
	8460		3480	4640	5800	F10	P6	EO6
			5340	7000		F12	P7	EO7

CF = Consult factory for an engineering application review and for possible consideration of stonger custom shaft and plug materials as these choices exceed the torque limit for the shaft.

Rules for use:

First obtain rated torque value from Torque Requirement Tables.

1) Go to correct Electric Actuator Torque Table for Shaft Material in valve.

2) For your valve size read across rows under actuator torque columns to find torque value equal to or greater than rated torque required.

3) Read across row containing torque value selected to find Actuator Size and Order Code.

If torque value selected is in 2ND Torque Reduction Column add 2TR to end of order code.

If torque value selected is in 1ST Torque Reduction Column add 1TR to end of order code.

Tabulated electric actuator torque values are those available at time of printing. Some values may change. Consult factory to confirm electric actuator selection.

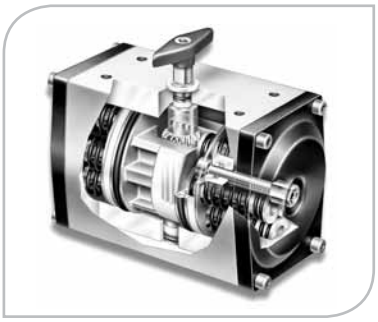
Pneumatic Rack and Pinion

SIZE	AIR CONSUMPTION CU. IN/CYCLE
RP73	52.5
RP103	67.1
RP148	112.9
RP222	152.6
RP295	218.5
RP470	335.6
RP486	416.2
RP900	762.8
RP1213	872.6

ACTUATOR INTERFACE		
Size	Flange Type	Star Drive
P73	F05/F07	17 mm
RP103	F05/F07	17 mm
RP148	F07/F10	22 mm
RP222	F07/F10	22 mm
RP295	F07/F10	22 mm
RP470	F10/F12	27 mm
RP586	F10/F12	27 mm
RP900	F12/F16	36 mm
RP1213	F12/F14	36 mm

Body: Extruded Aluminum, Hard Anodized, with One Part Dry Powder Epoxy Polyester Paint
End Caps: Die Cast Aluminum, with One Part Dry Powder Epoxy Polyester Paint
Fasteners: 304 Stainless Steel
Racks: Dual, Die Cast Aluminum, Racks with Integral Pistons
Pinion: One Piece Electroless Plated Steel Pinion
Pinion Bearings: Upper and Lower, Delrin 500 Encapsulated
Piston Guides: Delrin 500
Seals: Buna-N
Travel Stops: 304 Stainless Steel Dual Adjustable
Springs Cartridges: Fully Encapsulated Epoxy Coated Steel, Delrin/Brass
Action: Double Acting or Spring Return
Accessory Mounting: Namur
Ambient Temperature: -10 to 195ºF (Standard Seals)
Options: High Temperature Seals (-10 to 275OF)
Low Temperature Seals (-40 to 195OF)
(Specify using Special Options or Set-Up Code S)
Accessories: Declutchable Gear Operators

Pneumatic Rack and Pinion Actuators require a positioner for modulating control.



RP Actuator Mounting	Actuator Orientation	Max Allowable Fluid Temp in Valve
Direct Shaft	Directly Above Valve	350F
	Not Directly Above Valve	450F
Indirect Shaft	Directly Above Valve	450F
	Not Directly Above Valve	800F

Electric Quarter Turn

Sizes: P2, P3, P4, P5, P6, P7
Input: 4-20mA closed at 4mA (Factory Default), 0-10vdc, 1-5vdc, 2-10vdc, 0-20mA (Selectable, Programmable, and Reversible)
Supply: 120 Vac +/- 10%, 1 Phase (other supply voltages available on special order- check with factory)
Feedback: 4-20mA closed at 4mA (Factory Default), 0-10vdc, 1-5vdc, 2-10vdc, 0-20mA (Selectable, Programmable, and Reversible)
Stroke (Seconds): See table
Built-in thermal protection: AC Split Phase Capacitor 275OF Thermal F Class
Housing: Aluminum Alloy, Powder Coated

Position Indicator: Beacon on Actuator Cover
Manual Override: Handwheel
Mechanical Connections: ISO5211
Electrical Entry: (2) 3/4" NPT
Additional Standard Features: Internal Low Power Heater, (2) Auxillary Limit Switches (Form C)
Ambient Temperature: -22oF to +150oF
Enclosure: NEMA 4, 4X
Approvals: CSA 22.2 Pending, CE

ACTUATORS (CONTINUED)

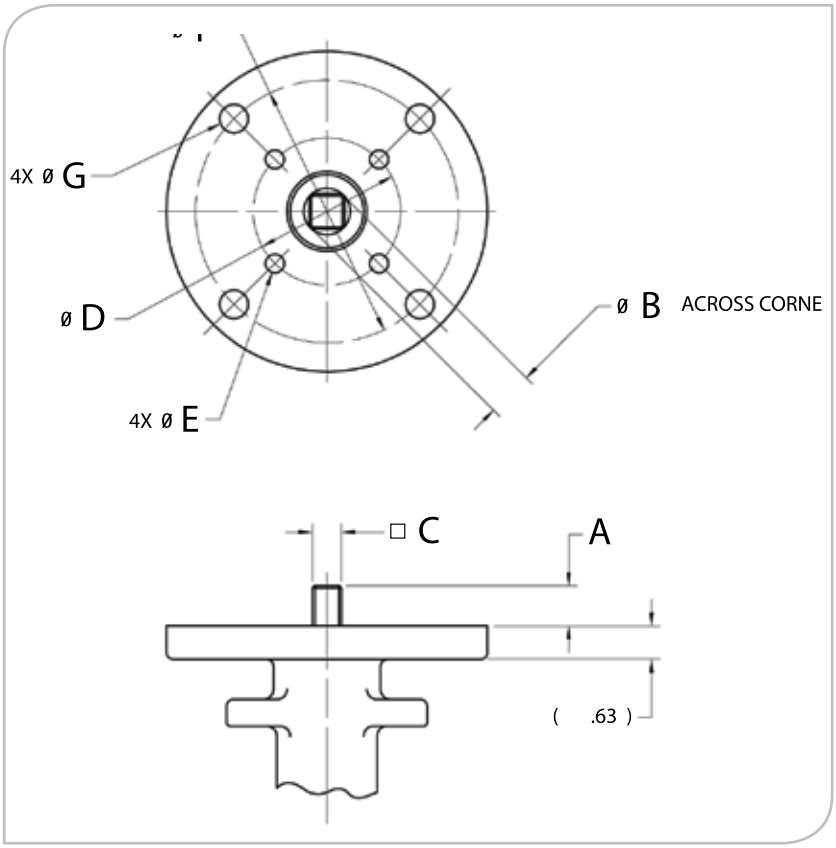
ACTUATOR SIZE	ORDER CODE	FULL TORQUE	1ST TORQUE REDUCT.	2ND TORQUE REDUCT.	CURRENT MAX INRUSH	CURRENT RUNNING	STROKE (SEC.)	ACTUATOR MOUNTING FLANGE PATTERN	STAR DRIVE	FITS VALVE SIZES	VALVE INTERFACES
P2	EA3	800	640	480	3.0 A	1.0 A	15	F07	22mm	1″-4″	385, 386, 387
P3	EB3	1335	990	801	3.0 A	1.0 A	22	F07	22mm	1″-4″	385, 386, 387
P4	E04	3500	2400	2100	3.1 A	1.3 A	16	F10	35mm	4″-8″	387, 388
P5	E05	4400	3520	2640	3.0 A	1.5 A	22	F10	35mm	4″-8″	387, 388
P6	E06	5800	4640	3480	3.0 A	1.8 A	28	F10	35mm	6″-8″	387, 388
P7	E07	8900	7000	5340	12.0 A	3.2 A	46	F12	36mm	6″-8″	389

For actuator selection use Torque Requirement Tables and Electric Actuator Torque Tables

P SERIES ACTUATOR MOUNTING	ACTUATOR ORIENTATION	MAX ALLOWABLE FLUID TEMP IN VALVE
Direct Shaft	Directly Above Valve	200F
	Not Directly Above Valve	350F
Indirect Shaft	Directly Above Valve	450F
	Not Directly Above Valve	650F

Actuator Interface

INTERFACES		
Model	**ISO 5211-2001 Designation**	**Actuator Interface**
385 1″ - 2″ Bodies	EN ISO 5211-F07-N-L-11	F07 flange w/ parallel square drive
386 3″ Bodies	EN ISO 5211-F07-N-L-14	F07 flange w/ parallel square drive
387 4″ Bodies	EN ISO 5211-F07/F10-N-L-17	F07 & F10 flange w/ parallel square drive
388 6″or 8″ Bodies	EN ISO 5211-F10-N-L-22	F10 flange w/ parallel square drive
389 6″or 8″ Bodies	EN ISO 5211-F12-N-L-22	F12 flange w/ parallel square drive



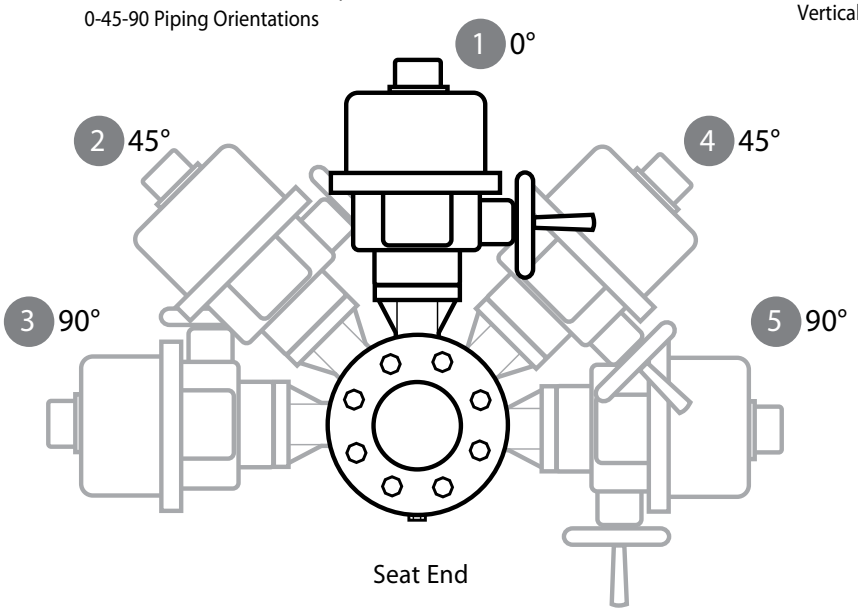
INTERFACE DIMENSIONS							
Valve Size (IN)	**A**	**B**	**C**	**D**	**E**	**F***	**G***
1	.75	.551 .547	.4318 .4291	2.756	.352 .341	--	--
1-1/2	.75	.551 .547	.4318 .4291	2.756	.352 .341	--	--
2	.75	.551 .547	.4318 .4291	2.756	.352 .341	--	--
3	.75	.708 .704	.5499 .5472	2.756	.352 .341	--	--
4	.75	.866 .861	.6680 .6653	2.756	.352 .341	4.016 .419	.430
6	.94	1.102 1.097	.8646 .8613	4.016	.430 .419	4.921 .528	.540
8	.94	1.102 1.097	.8646 .8613	4.016	.430 .419	4.921 .528	.540

* F10 flange 4″ valve size 387 Models.
F12 flange 6″ & 8″ valve sizes 389 Models.

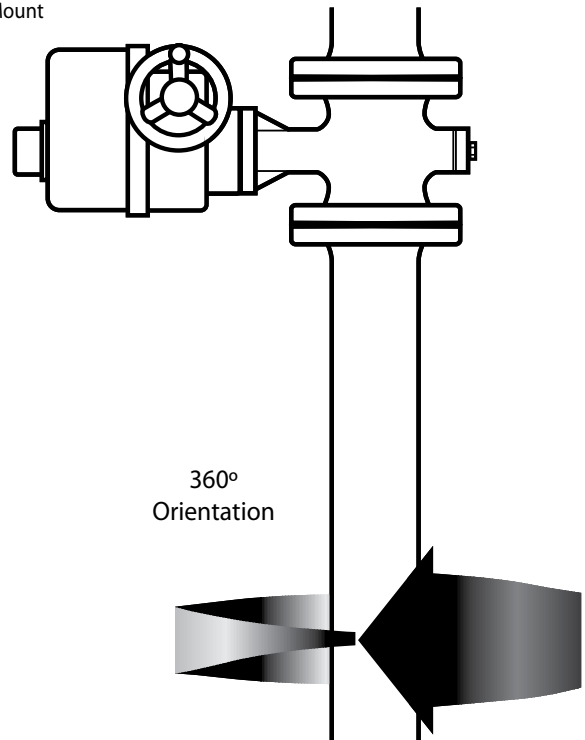
A wide array of acceptable piping orientations allow for maximum flexibility of piping design layout.

Positions 1, 2, and 3 are preferred. Positons 4 and 5 are **NOT** preferred (plug opens into any material that may have settled in bottom of valve.)

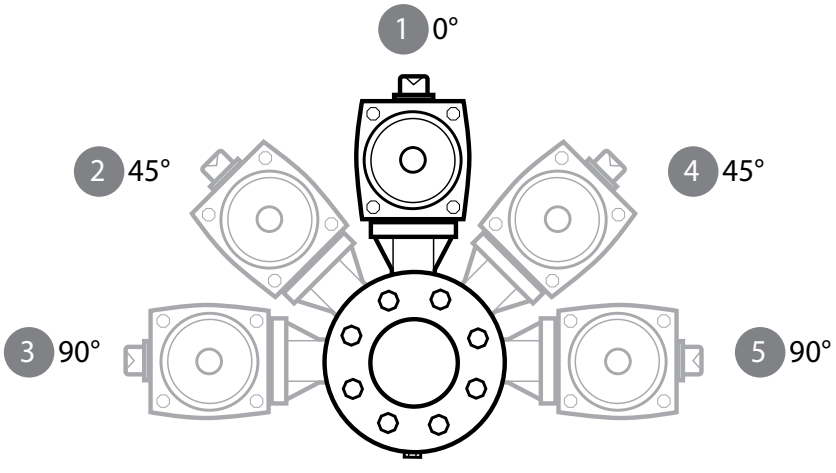
Electric Actuator Horizontal Pipe
0-45-90 Piping Orientations



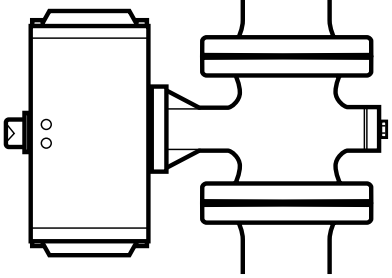
Electric Actuator
Vertical Pipe Mount



Pneumatic Actuator Horizontal Pipe
0-45-90 Piping Orientations



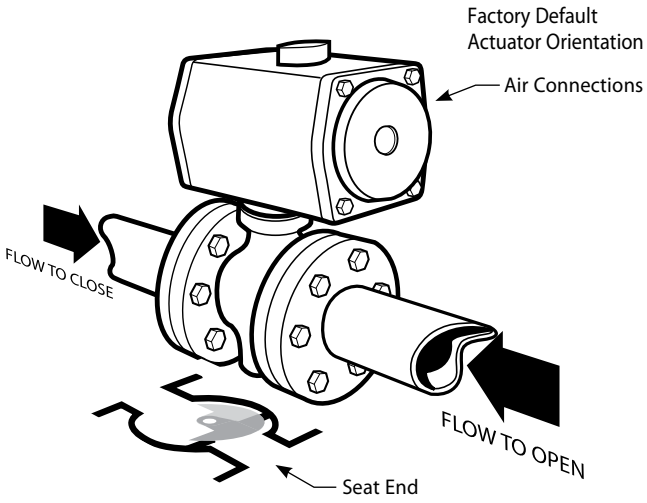
Pneumatic Actuator
Vertical Pipe Mount

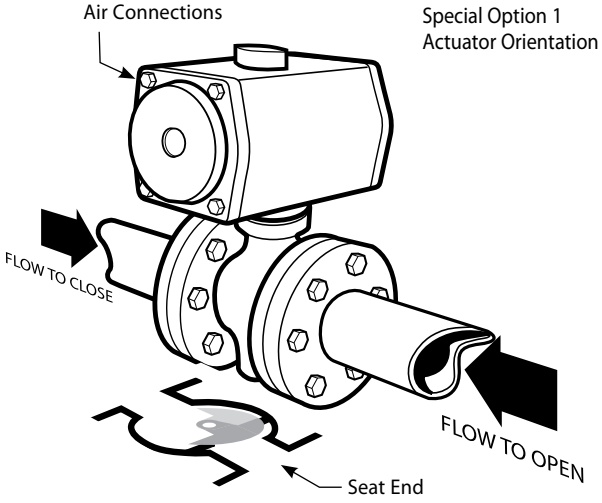


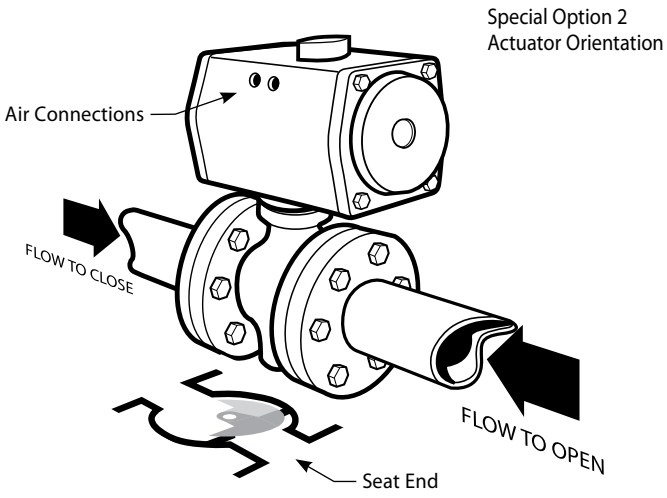
High temperature applications require indirect actuator mount and actuator orientation that is not directly above the valve.

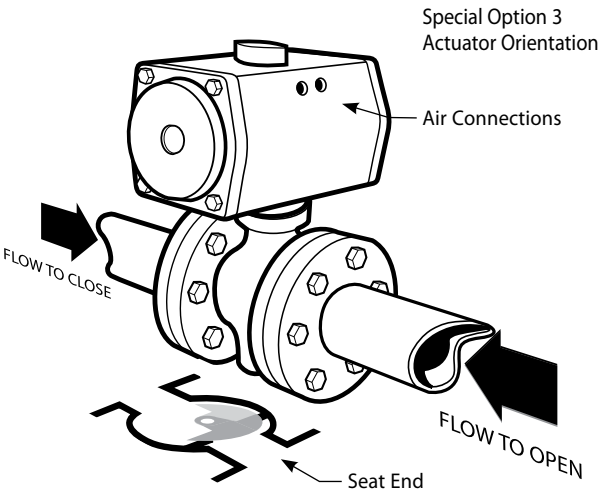
ACTUATOR ORIENTATION & FLOW DIRECTION

Pneumatic Rack & Pinion Actuator

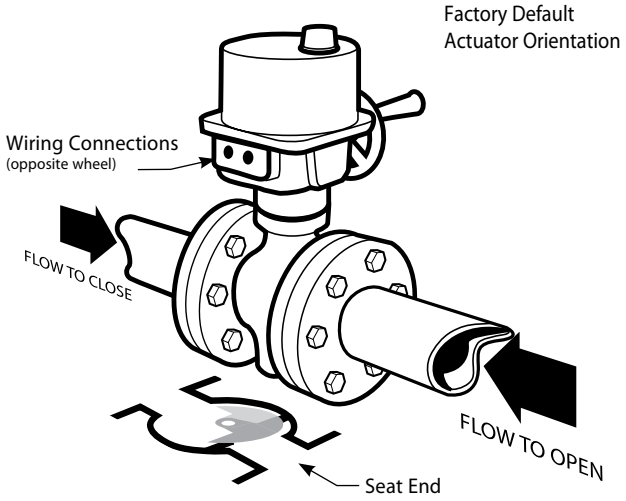




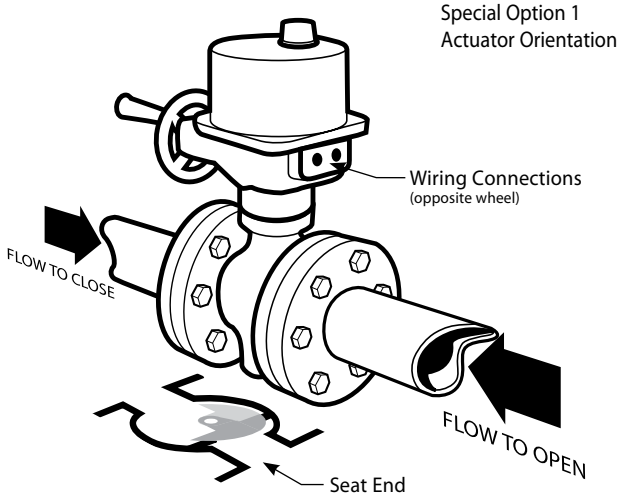




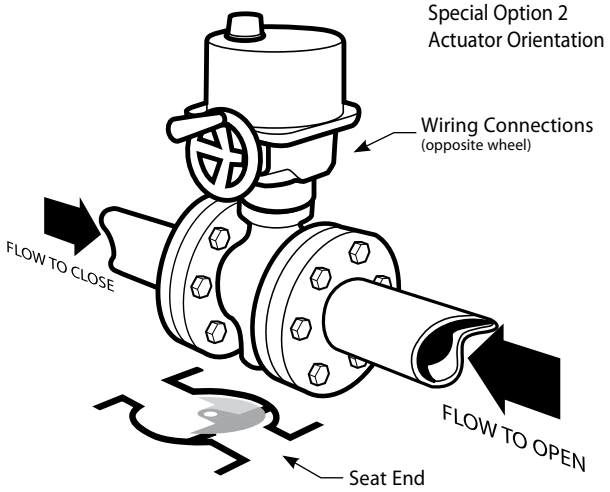
Factory Default
Actuator Orientation



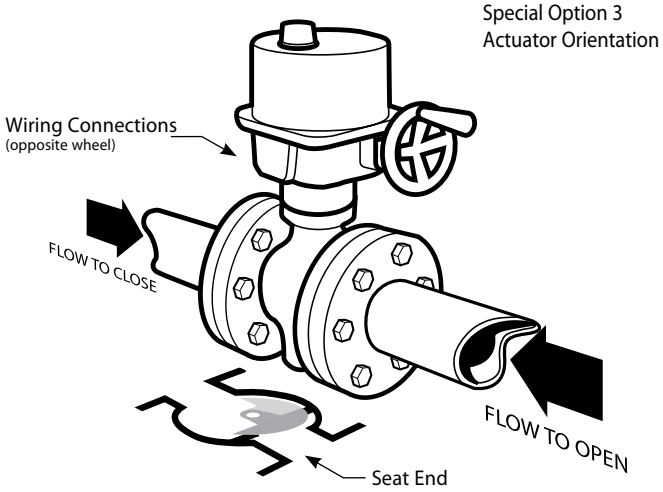
Special Option 1
Actuator Orientation



Special Option 2
Actuator Orientation



Special Option 3
Actuator Orientation



Flow Direction

Flow-To-Open: Most general service applications will benefit from the flow to open direction. Smoother transitions from close to open and greater ability to accommodate larger pressure drops prior to the onset of cavitation are prime benefits as compared to flow to close operation. However, flow-to-open has a slightly smaller Cv as compared to the equivalent flow-to-close valve. If Cv with flow-to-open is borderline, you may want to consider a split-shaft configuration to increase Cv rather than flow-to-close for some applications.

Flow-To-Close: Flow-to-close operation is generally reserved for erosive service applications. While tighter shut off can be an additional benefit, this is not quantified by ANSI for levels of tightness above Class IV or Class VI. Further, the tradeoff can be lack of a smooth transition from close to open when pressure differentials are significant especially on larger sizes. Caution should be observed.

When using TTZ Ceramic trim in the flow-to-close direction, the 3800 can achieve levels of seat tightness that approach ANSI Class V. Warren Controls has designated this elevated level of seat tightness with the proprietary classification Class IV+. For greater detail on relative seat tightness see "Allowable Seat Leakage" on page 5.

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 strok e. 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 applied to both valves. At mid-signal range, the little valve is completely open while the larger valve is just starting to open. Controlability for wide process set point ranges is dramatically improved.

BLX Models:

BLX Pneumatic

Models:	BFP_: Full Range Signal (3-15 P!
	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:	0.37 SCFM at 60 PSIG
	0.61 SCFM at 100 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:	0.41 SCFM at 60 PSIG
	0.69 SCFM at 100 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.

BLX Models Continued:

Supply Pressure:	30 to 145 PSIG **Not to exceed actuator rating**
Air Consumption:	0.41 SCFM at 60 PSIG
	0.69 SCFM at 100 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-Incentive:	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:	0.41 SCFM at 60 PSIG
	0.69 SCFM at 100 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:	0.41 SCFM at 60 PSIG
	0.69 SCFM at 100 PSIG

All Models:

Construction:	Aluminum Housing with Polyester Powder Coat
Action:	Single or Double Acting, Direct or Reverse
Media:	Clean Dry Oil Free Air Filtered to 5 micron
Air Connections:	1/4 NPT
Flow Capacity:	19.5 SCFM at 60 PSIG
	32.5 SCFM at 100 PSIG
Electrical Connection:	1/2 NPT
Gauges:	Input 0-30 PSIG,
	Output 0-100 PSIG, Supply 0-100 PSIG,
	Housing Black Steel Case with Chrome Ring
Ambient Temperature:	-40 to 185°F (Except Fail Freeze —4 to 158°F)
Mounting:	Actuator Mounted

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

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 I, Div 1, Gr. A,B,C,D, T4,T5 and T6, and Class 1 Zone 1, AEx ib, Group IIC.
Non-Incentive:	Class I, Div 2, Gr. A,B,C,D, T4,T5 and T6, and Class 1 Zone 2, Group IIC.
Explosion Proof:	Class I, 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 I, Div 1, Gr. A,B,C,D, T4,T5 and T6, Class 1, Zone 1, AEx ib,Group IIC.
Non-Incentive:	Class I, Div 2, Gr. A,B,C,D, T4,T5 and T6, 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:	11.30 SCFM at 87 PSIG
Air Consumption:	0.00035 SCFM
Air Connections:	1/4 NPT
Electrical Connection:	1/2 NPT
Gauges:	Supply 0-100 PSIG
Output:	0-100 PSIG
Housing:	Black Steel Case with Chrome Ring
Ambient Temperature:	-22 to 176°F
Mounting:	Actuator Mounted

AIR FILTER REGULATORS

Models:	Type 300, Type 350SS
Output Ranges:	Type 300, 0-60, or 0-120 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:	Remote Mounted

SOLENOIDS

3 way

4-way

3-Way solenoids are commonly used to evacuate pneumatic single-acting spring return actuators and block the supply. 4-way solenoids are commonly used to help drive pneumatic double-acting on-off actuators. Several combinations are available, when choosing a solenoid please provide diagram or set-up

Models:	8320G704, EF8320G704, 8320G714, EF8320G714, 8342G501, EF8342G501, 8342G502, EF8342G502 8342G511, EF8342G511, 8342G512, EF8342G512
Construction:	(EF)8320G704, 3-Way Brass, Single Solenoid (EF)8320G714, 3-Way Stainless Steel, Single Solenoid (EF)8342G501, 4-Way Brass, Single Solenoid (EF)8342G511, 4-Way Stainless Steel, Single Solenoid (EF)8342G502, 4-Way Brass, Dual Solenoid (EF)8342G512, 4-Way Stainless Steel, Dual Solenoid

SOLENOIDS Continued:

Locations:	8320G704, 8320G714, 8342G501, 8342G502, 8342G511, & 8342G512 Watertight Types 1, 2, 3, 3S, 4, and 4X EF8320G704, EF8320G714, EF8342G501, EF8342G502, EF8342G501 & EF8342G502 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:	Direct Mounted

MANUAL (WORM) GEAR OPERATORS

Models:	G30 Fits 1 Thru 4 Inch Valves, G50 Fits 6 Inch Valves G51 Fits 8 Inch Valves
Body:	Cast Iron
Cover:	Cast Iron
Gear Cover:	Cast Iron
Handwheel:	Ductile Iron (DG30 & 50), Steel (DG51)
Handwheel Shaft:	1045Steel
Housings:	Epoxy Coated
External Lube Fitting:	Standard
Limit Stops:	Standard
Position Indicator:	Standard
Sealed Weathertight Housing:	Standard

Factory Default Mounting Position: Handwheel parallel to pipe away from Seat End

DECLUTCHABLE (WORM) GEAR OPERATORS

For Use With RP Pneumatic Rack & Pinion Actuators

Models:	DG6 Fits 1 Thru 3 Inch Valves, DG8 Fits 4 Inch Valves, DG11 Fits 6 & 8 Inch Valves
Cover:	Cast Iron
Body:	Cast Iron
Gear Cover:	Cast Iron
Handwheel:	Cast Iron
Handwheel Shaft:	Plated Carbon Steel
Dual Position Limit Stops:	Standard
External Lube Fitting:	Standard
Position Lock Assy:.	Standard

Factory Default Mounting Position: Handwheel on side opposite actuator air connections.

SPECIAL OPTIONS AND SET-UPS

Air Tubing:	Copper Standard, Stainless Steel Optional
Tagging:	Stainless Steel Tagging Optional (Two lines, 24 characters/ line)
Actuator Orientation:	Optional positions 1, 2, or 3

For additional special option and set-up requirements consult factory.

With Electric Actuators

Dimension (IN)		Valve Size (IN)						
		1	1-1/2	2	3	4	6	8
A	150FLG	4	4-1/2	4-7/8	6-1/2	7-5/8	9	9-9/16
	300FLG	4	4-1/2	4-7/8	6-1/2	7-5/8	9	9-9/16
B		2-7/8	3-1/4	3-5/8	4-1/2	5-3/8	6-5/8	7-3/4
C (Standard Direct Actuator Mounting)	P2	16-1/8	16-3/8	16-1/2	17-1/2	18-1/2	N/A	N/A
	P3	N/A	16-3/8	16-1/2	17-1/2	18-1/2	N/A	N/A
	P4	N/A	N/A	N/A	N/A	19-5/8	21-1/8	22-5/8
	P5	N/A	N/A	N/A	N/A	19-5/8	21-1/8	22-5/8
	P6	N/A	N/A	N/A	N/A	N/A	21-1/8	22-5/8
	P7	N/A	N/A	N/A	N/A	N/A	N/A	26-5/8
C (With Hi-Temp Indirect Actuator Mounting)	P2	21	21-1/4	21-3/8	22-3/8	23-3/8	N/A	N/A
	P3	N/A	21-1/4	21-3/8	22-3/8	23-3/8	N/A	N/A
	P4	N/A	N/A	N/A	N/A	26-1/2	28	29-1/2
	P5	N/A	N/A	N/A	N/A	26-1/2	28	29-1/2
	P6	N/A	N/A	N/A	N/A	N/A	28	29-1/2
	P7	N/A	N/A	N/A	N/A	N/A	N/A	33-1/2
D	P2	20-3/4	20-3/4	20-3/4	20-3/4	20-3/4	N/A	N/A
	P3	N/A	20-3/4	20-3/4	20-3/4	20-3/4	N/A	N/A
	P4	N/A	N/A	N/A	N/A	36-5/8	36-5/8	36-5/8
	P5	N/A	N/A	N/A	N/A	36-5/8	36-5/8	36-5/8
	P6	N/A	N/A	N/A	N/A	N/A	36-5/8	36-5/8
	P7	N/A	N/A	N/A	N/A	N/A	N/A	30-5/8

Valve Size (IN)	Weight (LB)			
	Standard		With Hi-Temp Actuator MTG	
	150 FLG	300 FLG	150 FLG	300 FLG
1	20	22	29	31
1-1/2	23	30	32	39
2	20	25	29	34
3	35	50	44	59
4	55	80	76	101
6	100	140	121	161
8	145	200	166	221

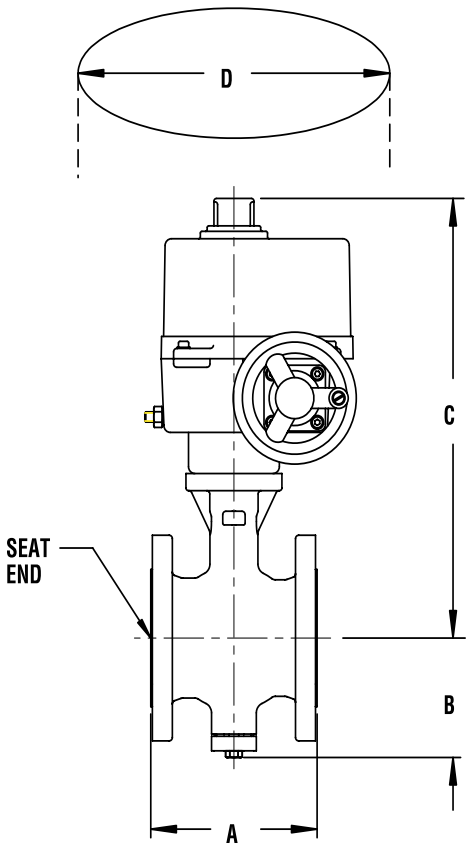
Actual shipping weights may vary.

Actuator	Weight (LB)
P2	25
P3	25
P4	49
P5	49
P6	49
P7	80

N/A = Not Available
Face to face dimensions conform to ANSI/ISA S75.04
Actuator removal clearance
Above P2 & P3 allow 9"
Above P4, P5, & P6 allow 10"
Above P7 allow 11"

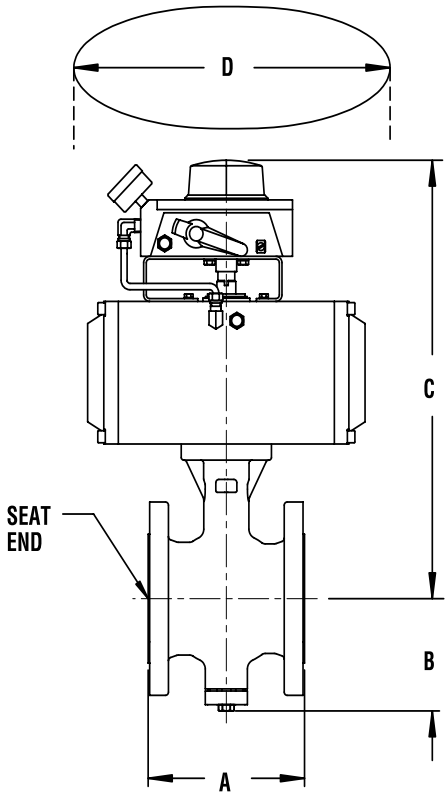
Consult factory for drawings, weights,
and dimensions of configurations not shown.

DIMENSIONS & WEIGHTS

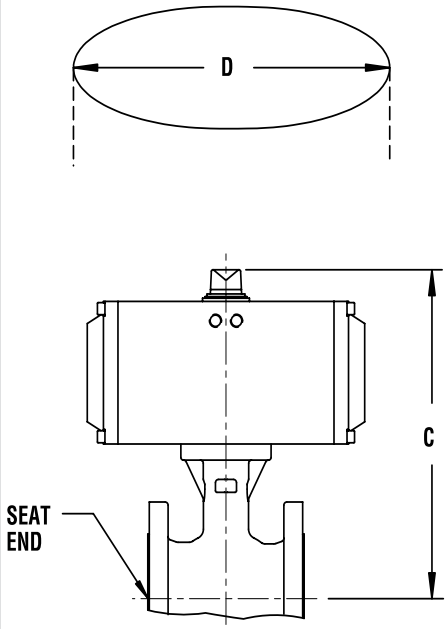


Electric Actuated

With BLX Positioner



Without Positioner



Pneumatic Rack & Pinion Actuated

Actuator	Weight (LB)
RP73	6
RP103	8
RP148	11
RP222	15
RP295	19
RP470	31
RP586	35
RP900	62
RP1213	69

BLX Positioner	Weight (LB)
Pneumatic	5-1/2
Electro Pneumatic	6
Intrinsically Safe	7
Explosion Proof	7
Fail Freeze	8

N/A = Not Available

Face to face dimensions conform to ANSI/ISA S75.04

Actuator removal clearance
Allow 3" above pneumatic rack & pinion actuators for removal.

Consult factory for drawings, weights, and dimensions of configurations not shown.

With Pneumatic Rack & Pinion Actuators

DIMENSION (IN)		VALVE SIZE (IN) 1	1-1/2	2	3	4	6	8
A	150FLG	4	4-1/2	4-7/8	6-1/2	7-5/8	9	9-9/16
	300FLG	4	4-1/2	4-7/8	6-1/2	7-5/8	9	9-9/16
B		2-7/8	3-1/4	3-5/8	4-1/2	5-3/8	6-5/8	7-3/4
Without Positioner								
C	RP73	10	10-1/4	10-3/8	11-3/8	N/A	N/A	N/A
(Standard Direct Actuator Mounting)	RP103	11-1/4	11-1/2	11-5/8	12-5/8	N/A	N/A	N/A
	RP148	11-3/8	11-5/8	11-3/4	12-3/4	13-3/4	15-1/4	16-3/4
	RP222	11-5/8	11-7/8	12	13	14	15-1/2	17
	RP295	12-3/8	12-5/8	12-3/4	13-3/4	14-3/4	16-1/4	17-3/4
	RP470	N/A	N/A	N/A	N/A	16-1/4	17-3/4	19-1/4
	RP586	N/A	N/A	N/A	N/A	16-7/8	18-3/8	19-7/8
	RP900	N/A	N/A	N/A	N/A	N/A	20-3/8	21-7/8
	RP1213	N/A	N/A	N/A	N/A	N/A	20-3/8	21-7/8
C	RP73	14-7/8	15-1/8	15-1/4	16-1/4	N/A	N/A	N/A
(With Hi-Temp Indirect Actuator Mounting	RP103	16-1/8	16-3/8	16-1/2	17-1/2	N/A	N/A	N/A
	RP148	16-1/4	16-1/2	16-5/8	17-5/8	20-5/8	22-1/8	23-5/8
	RP222	16-1/2	16-3/4	16-7/8	17-7/8	20-7/8	22-3/8	23-7/8
	RP295	17-1/4	17-1/2	17-5/8	18-5/8	21-5/8	23-1/8	24-5/8
	RP470	N/A	N/A	N/A	N/A	23-1/8	24-5/8	26-1/8
	RP586	N/A	N/A	N/A	N/A	23-3/4	25-1/4	26-3/4
	RP900	N/A	N/A	N/A	N/A	N/A	27-1/4	28-3/4
	RP1213	N/A	N/A	N/A	N/A	N/A	27-1/4	28-3/4
With BLX Positioner (except explosion proof models BLX_)								
C	RP73	14-1/2	14-3/4	14-7/8	15-7/8	N/A	N/A	N/A
(Standard Direct Actuator Mounting)	RP103	14-7/8	15-1/8	15-1/4	16-1/4	N/A	N/A	N/A
	RP148	15-3/4	16	16-1/8	17-1/8	18-1/8	19-5/8	21-1/8
	RP222	15-3/4	16	16-1/8	17-1/8	18-1/8	19-5/8	21-1/8
	RP295	16-5/8	16-7/8	17	18	19	20-1/2	22
	RP470	N/A	N/A	N/A	N/A	20-7/8	22-3/8	23-7/8
	RP586	N/A	N/A	N/A	N/A	N/A	22-3/8	23-7/8
	RP900	N/A	N/A	N/A	N/A	N/A	24-5/8	26-1/8
	RP1213	N/A	N/A	N/A	N/A	N/A	24-5/8	26-1/8
C	RP73	19-3/8	19-5/8	19-3/4	20-3/4	N/A	N/A	N/A
(With Hi-Temp Indirect Actuator Mounting)	RP103	19-3/4	19-5/8	20-1/8	21-1/8	N/A	N/A	N/A
	RP148	20-5/8	20-7/8	21	22	25	26-1/2	28
	RP222	20-5/8	20-7/8	21	22	25	26-1/2	28
	RP295	21-1/2	21-3/4	21-7/8	22-7/8	25-7/8	27-3/8	28-7/8
	RP470	N/A	N/A	N/A	N/A	27-3/4	29-1/4	30-3/4
	RP586	N/A	N/A	N/A	N/A	27-3/4	29-1/4	30-3/4
	RP900	N/A	N/A	N/A	N/A	N/A	31-1/2	33
	RP1213	N/A	N/A	N/A	N/A	N/A	31-1/2	33

Add 3/4" to "C" dimension for explosion proof models.
Add 1-7/8" to "C" dimension for mechanical limit switches or 4-20mA feedback.

Actuator	Without Positioner	Pneumatic	With BLX Positioner: Electro Pneumatic	Intrinsically Safe	Explosion Proof	Fail Freeze
RP73	7-7/8	12-7/8	12-7/8	12-7/8	13-1/8	13
RP103	9	12-7/8	12-7/8	12-7/8	13-1/8	13
RP148	9-3/4	12-7/8	12-7/8	12-7/8	13-1/8	13
RP222	12-1/4	12-7/8	12-7/8	12-7/8	13-1/8	13
RP295	12-3/4	12-7/8	12-7/8	12-7/8	13-1/8	13
RP470	15	15	15	15	15	15
RP586	16	16	16	16	16	16
RP900	18-7/8	18-7/8	18-7/8	18-7/8	18-7/8	18-7/8
RP1213	19-7/8	19-7/8	19-7/8	19-7/8	19-7/8	19-7/8

Declutchable Gear Operator

Dimension (IN)		Valve Size (IN)						
		1	1-1/2	2	3	4	6	8
C+	DG6	3-1/8	3-1/8	3-1/8	3-1/8	N/A	N/A	N/A
	DG8	N/A	N/A	N/A	N/A	3-1/4	N/A	N/A
	DG11	N/A	N/A	N/A	N/A	N/A	3-1/2	3-1/2
F Direct Mounting	DG6	5-3/4	6	6-1/8	7-1/8	N/A	N/A	N/A
	DG8	N/A	N/A	N/A	N/A	8-1/8	N/A	N/A
	DG11	N/A	N/A	N/A	N/A	N/A	9-5/8	11-1/8
F Indirect Mounting	DG6	10-5/8	10-7/8	11	12	N/A	N/A	N/A
	DG8	N/A	N/A	N/A	N/A	15	N/A	N/A
	DG11	N/A	N/A	N/A	N/A	N/A	16-1/2	18

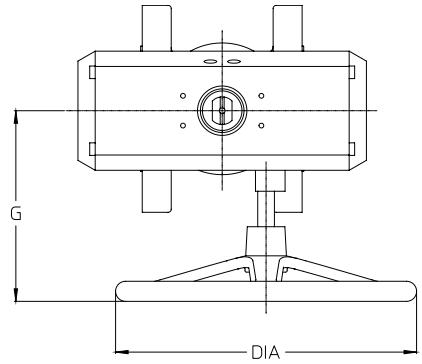
Gear Operator	Weight (LB)
DG6	11
DG8	17
DG11	27
G30	25-1/2
G50	26
G51	26-1/2

Manual Gear Operator

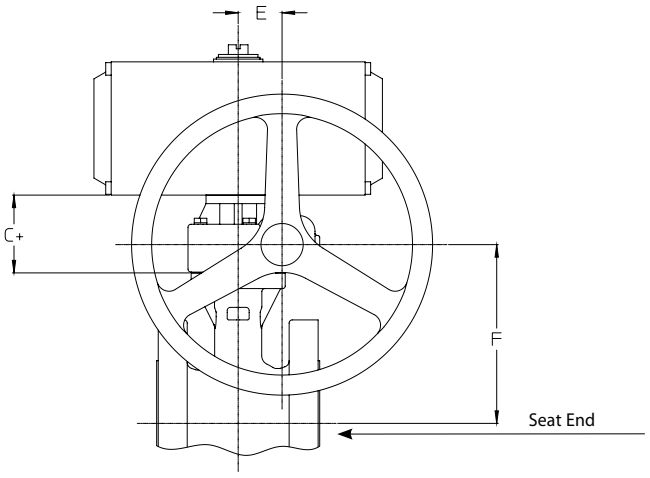
Dimension (IN)		Valve Size (IN)						
		1	1-1/2	2	3	4	6	8
C Direct Mounting	G30	8-5/8	8-7/8	9	10	11	N/A	N/A
	G50	N/A	N/A	N/A	N/A	N/A	12-1/2	N/A
	G51	N/A	N/A	N/A	N/A	N/A	N/A	14
F Direct Mounting	G30	6-7/16	6-11/16	6-13/16	7-13/16	8-13/16	N/A	N/A
	G50	N/A	N/A	N/A	N/A	N/A	10-5/16	N/A
	G51	N/A	N/A	N/A	N/A	N/A	N/A	11-13/16
C Indirect Mounting	G30	13-1/2	13-1/4	13-7/8	14-7/8	17-7/8	N/A	N/A
	G50	N/A	N/A	N/A	N/A	N/A	19-3/8	N/A
	G51	N/A	N/A	N/A	N/A	N/A	N/A	20-7/8
F Indirect Mounting	G30	11-3/16	11-9/16	11-11/16	12-11/16	15-11/16	N/A	N/A
	G50	N/A	N/A	N/A	N/A	N/A	17-3/16	N/A
	G51	N/A	N/A	N/A	N/A	N/A	N/A	18-11/16

Gear Operators	Dimension (IN)		
	E	G	Dia
DG6	1-3/4	7-5/8	12
DG8	2-5/8	9	12
DG11	3-1/2	9-1/2	12
G30	2-1/2	8	12
G50	3-1/8	8-3/8	12
G51	3-1/8	11-1/4	18

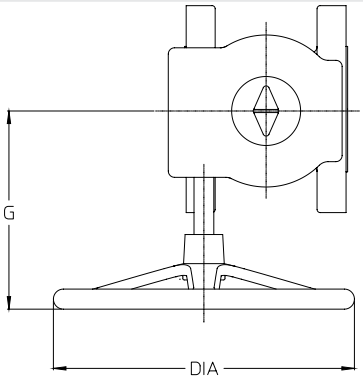
Declutchable



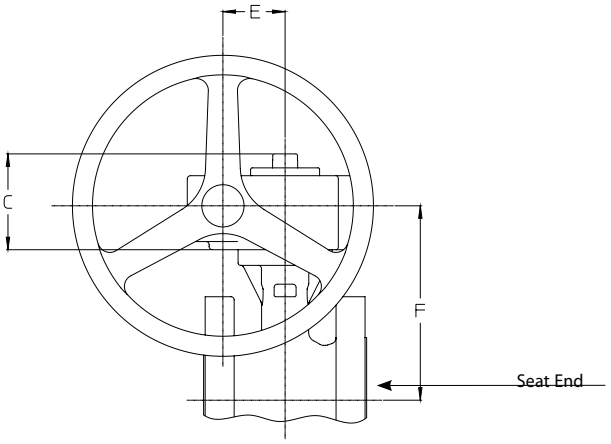
Declutchable Gear Operators



Manual



Manual Gear Operators



STEEL FLANGE DIMENSIONS AND DRILLING TEMPLATES 150 PSI (GAGE) PRIMARY SERVICE PRESSURE RATING

Nominal Pipe Size (IN)	Flange Diameter A	Minimum Flange Thickness B	Diameter of Raised Face C	Diameter of Bolt Circle D	Diameter of Bolt Holes E	Number of Bolts	Diameter of Bolts	Length of Stud Bolts w/2 Nuts F	Length of Machine Bolts G
1	4-1/4	9/16	2	3-1/8	1/2 - 13*	4	1/2	2-1/2	2
1-1/2	5	0.61	2-7/8	3-7/8	1/2 - 13*	4	1/2	2-3/4	2-1/4
2	6	5/8	3-5/8	4-3/4	3/4	4	5/8	3	2-3/4
3	7-1/2	3/4	5	6	3/4	4	5/8	3-1/2	3
4	9	15/16	6-3/16	7-1/2	3/4	8	5/8	3-1/2	3
6	11	1	8-1/2	9-1/2	7/8	8	3/4	3-3/4	3-1/4
8	13-1/2	1-1/8	10-5/8	11-3/4	7/8	8	3/4	4	3-1/2

Dimensions in inches

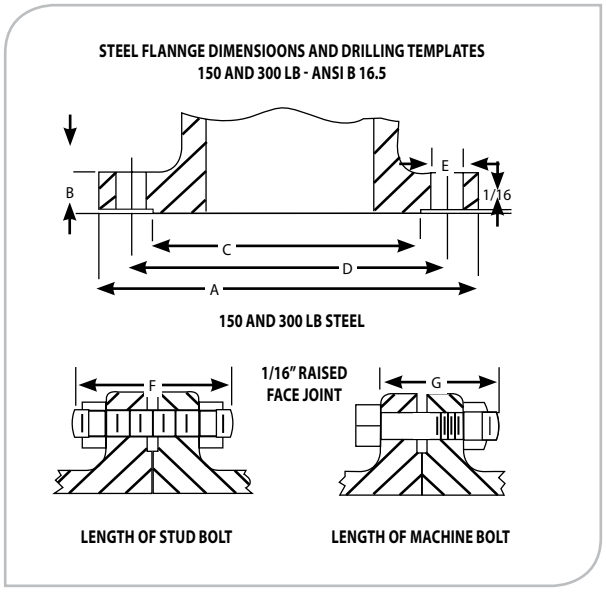
* Flanges tapped, not enough room for heavy hex nuts.

STEEL FLANGE DIMENSIONS AND DRILLING TEMPLATES 300 PSI (GAGE) PRIMARY SERVICE PRESSURE RATING

Nominal Pipe Size (IN)	Flange Diameter A	Minimum Flange Thickness B	Diameter of Raised Face C	Diameter of Bolt Circle D	Diameter of Bolt Holes E	Number of Bolts	Diameter of Bolts	Length of Stud Bolts w/2 Nuts F	Length of Machine Bolts G
1	4-7/8	11/16	2	3-1/2	5/8 - 11*	4	5/8	3	2-1/2
1-1/2	6-1/8	13/16	2-7/8	4-1/2	7/8	4	3/4	3-1/2	3
2	6-1/2	7/8	3-5/8	5	3/4	8	5/8	3-1/4	3
3	8-1/4	1-1/8	5	6-5/8	7/8	8	3/4	4	3-1/2
4	10	1-1/4	6-3/16	7-7/8	7/8	8	3/4	4-1/4	3-3/4
6	12-1/2	1-7/16	8-1/2	10-5/8	7/8	12	3/4	4-3/4	4-1/4
8	15	1-5/8	10-5/8	13	1	12	7/8	5-1/4	4-3/4

Dimensions in inches

* Flanges tapped, not enough room for heavy hex nuts.



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…
3800	Double Acting	3-15 PSI	4-20 mA	PROFIBUS Protocol	Fieldbus Protocol	Closes Valve	Open	Open	In Direction of Flow[3]
	Spring Fail Open	3-15 PSI	4-20 mA	PROFIBUS Protocol	Fieldbus Protocol	Closes Valve	Open	Open	Open
	Spring Fail Closed	3-15 PSI	4-20 mA	PROFIBUS Protocoll	Fieldbus Protocol	Opens Valve	Closed	Closed	Closed

[1] Valves with Fail Freeze Positioners Fail in Last Position on Loss of Signal.

[2] PS2 with PROFIBUS PA or Foundation Fieldbus ONLY

[3] Loss of supply to a flow-to-open valve that occurs while the valve is fully seated will probably result in the valve remaining seated. Loss of supply to a flow-to-close valve that occurs while the valve is fully open will probably result in the valve remaining fully open unless the flow rate is extremely high.

SOLENOIDS (3-WAY AND 4-WAY SINGLE SOLENOID)

Valve Type	Actuator Action	Solenoid Energized	Failure Modes
			Solenoid De-energized, Loss of Signal, or Loss of Air Supply, Valve Fails...
3800	Double Acting	Closes Valve	In Direction of Flow[1]
	Spring Fail Open	Closes Valve	Open
	Spring Fail Closed	Opens Valve	Closed

[1] Loss of supply to a flow-to-open valve that occurs while the valve is fully seated will probably result in the valve remaining seated. Loss of supply to a flow-to-close valve that occurs while the valve is fully open will probably result in the valve remaining fully open unless the flow rate is extremely high.

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.

POSITIONER FEEDBACK

Valve Type	Actuator Action	Feedback Signal3	Signal Increases as
3800	Double Acting	4-20 mA	Valve Closes
	Spring Fail Open	4-20 mA	Valve Closes
	Spring Fail Closed	4-20 mA	Valve Opens

POSITIONER LIMIT SWITCHES

Valve Type	Position	Settings	
		Switch 1	Switch 2
3800	Valve Closed	Closed	Open
	Valve Open	Open	Closed

AIR FILTER REGULATORS

Output Pressure
As customer specified to max rating of regulator. End user must supply 100 (or 120) psig minimum to the AFR. For air supply above 100 psig special user supplied gage required.

SOLENOIDS (4 WAU DUAL SOLENOID)

Valve Type	Actuator Action	Solenoid Energized	Failure Modes	
			Solenoids De-energized, Loss of Signal Valve Fails…	Loss of Air Supply Valve Fails…
3800	Double Acting	Closes Valve (A Energized, B De-Energized)	In Last Position	In Direction of Flow[1]

[1] Loss of supply to a flow-to-open valve that occurs while the valve is fully seated will probably result in the valve remaining seated. Loss of supply to a flow-to-close valve that occurs while the valve is fully open will probably result in the valve remaining fully open unless the flow rate is extremely high.

CONFIGURATIONS

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

2. OPTIONS

38□ - □□□ □ □ □ □ □ □ □ □ □

				VALVE BODY					
Model	Size	Body Material	End Connection	Trim Material	Trim Cv	Shaft Design	Shaft Material	Bearing & Seals	Packing
385 1" - 2" Bodies (EN ISO 5211-F07-N-L-11*)	**100** 1 inch	**W** WCB	**F** 150 lb. Flanged	**S** 316 Stainless Stl.	**F** Full Port	**C** Thru, Direct	**S** 17-4 Hard	**S** PEEK	**T** Teflon V-ring Self Adjusting
386 3" Bodies (EN ISO 5211-F07-N-L-14*)	**150** 1-1/2 inch	**F** CF8M	**G** 300 lb. Flanged	**T** TFE Soft Seats	**1** 1st Port Reduction	**D** Thru, Indir.	**I** Inconel	**6** Alloy 6	**G** Adjustable Graphite Indir Mtg & Alloy 6 Brngs
387 4" Bodies (EN ISO 5211-F07/F10-N-L-17*)	**200** 2 inch			**P** PEEK Soft Seats	**2** 2nd Port Reduction	**E** Split, Direct		**T** PEEK w/Fluoraz Seal	**J** Adjustable Graphite Indir Mtg & PEEK Brngs
388 6" or 8" Bodies (EN ISO 5211-F10-N-L-22*)	**300** 3 inch			**6** Alloy 6	**3** 3rd Port Reduction	**F** Split, Indir.		**Y** Alloy 6 w/Fluoraz Seal	**A** Adjustable Teflon V-ring Indir Mtg
389 6" or 8" Bodies (EN ISO 5211-F12-N-L-22*)	**400** 4 inch			**H** Alloy 6 Hard Seat					
** ISO 5211-2001 Designations*	**600** 6 inch			**Z** TTZ Ceramic 316 SS Seat					
	800 8 inch			**R** TTZ Ceramic 17-4PH Hard Seat					
				Y Y-TZP Ceramic (Ceramic Seat, Sleeve & Plug)					

ST PEEK Brngs; Self-Adj Teflon Pkg To 450F
SJ PEEK Brngs; Adj Graphite Pkg (Requires Indir Shaft) To 450F
SA PEEK Brngs; Adj Teflon Pkg (Requires Indir Shaft) To 450F
6G Alloy 6 Brngs; Adj Graphite Pkg (Requires Indir Shaft) To 800F
TT PEEK Brngs w/ Fluoraz Seal; Self-Adj Teflon Pkg To 450F
TJ PEEK Brngs w/ Fluoraz Seal; Adjustable Graphite Packing (Requires Indir Shaft) To 450F
TA PEEK Brngs w/ Fluoraz Seal; Adj Teflon Pkg (Requires Indir Shaft) To 450F
YG Alloy 6 Brngs w/ Fluoraz Seal; Adj Graphite Pkg (Requires Indir Shaft) To 500F
SG, 6J, 6T, 6A, TG, YT, YJ, YA Not Available

Actuator / Valve Compatibility:

PNEUMATIC RACK & PINION	VALVE MODEL	VALVE SIZE
073 Size RP73	385	1" - 2"
	386	3"
103 Size RP103	385	1" - 2"
	386	3"
148 Size RP148	385	1" - 2"
	386	3"
	387	4"
	388	6" & 8"
222 Size RP222	385	1" - 2"
	386	3"
	387	4"
	388	6" & 8"
295 Size RP295	385	1" - 2"
	386	3"
	387	4"
	388	6" & 8"
470 Size RP470	387	4"
	388	6" & 8"
586 Size RP586	387	4"
	388	6" & 8"
900 Size RP900	389	6" & 8"
999 Size RP1213	389	6" & 8"

ELECTRIC 120VAC	VALVE MODEL	VALVE SIZE
EA3 Size P2	385	1" - 2"
	386	3"
	387	4"
EB3 Size P3	385	1-1/2" - 2"
	386	3"
	387	4"
E04 Size P4	387	4"
	388	6" & 8"
E05 Size P5	387	4"
	388	6" & 8"
E06 Size P6	388	6" & 8"
E07 Size P7	389	8"

ACTUATOR

Flow Direction

0 None
1 Flow to Close
2 Flow to Open

Note: "0"

Not Allowed on Actuated Valve

Actuator Series

000 None

Pneu.Rack & Pinion:

073 Size RP73
103 Size RP103
148 Size RP148
222 Size RP222
295 Size RP295
470 Size RP470
586 Size RP586
900 Size RP900
999 Size RP1213

Manual gear op.:

G30 Size GO-30 w. 12" HW (1 - 4")
G50 Size GO-50 w. 12" HW (6")
G51 Size GO-50 w. 18" HW (8")

ELECTRIC 120VAC:

EA3 Size P2
EB3 Size P3
E04 Size P4
E05 Size P5
E06 Size P6
E07 Size P7

Action

0 None,

Double Act or Gear Op.

Single

Acting w. Spring Return

2 4 Sprngs
3 6 Sprngs
4 8 Sprngs
5 10 Sprngs
6 12 Sprngs

ELECTRIC:

M Modulating
T On-Off

Fail Mode

0 None or Gear Op.

PNEUMATIC:

S Single Act. Fail Open
T Single Act. Fail Closed
D Double Act. No Fail

ELECTRIC:

1 20mA to Close, Signal Loss Open
2 20mA to Open, Signal Loss Closed
3 20mA to Close, Signal Loss As Is
4 20mA to Open, Signal Loss As Is

Declutch. Gear Op.

0 None
6 Size DG6 (1-3")
8 Size DG8 (4")
1 Size DG11 (6 & 8")

NOTE:
Only for use as Accessory to Pneumatic R&P Actuator.

Positioners

0000 None

Posltioners:

BxP_ BLX Pneumatic
BxE_ BLX ElectroPneumatic
BxI_ BLX ElectroPneu. Intrn. Safe
BxX_ BLX ElectroPneu. Exp.Proof
BxF_ BLX ElectroPneu. Fail Freeze

TOZO ABB TZIDC 4-20mA. *
THN_ ABB TZIDC 4-20mA w/HART Intrn. Safe & Non-Incend *
TPN_ ABB TZIDC PROFIBUS PA Intrn. Safe & Non-Incend.
TFN_ ABB TZIDC FOUNDATION Fieldbus Intrn. Safe & Non-Incend.
THX_ ABB TZIDC 4-20mA w/HART Exp. Proof *
TPX_ ABB TZIDC PROFIBUS PA Exp. Proof
TFX_ ABB TZIDC FOUNDATION Fieldbus Exp. Proof

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 BI , BX.

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

Note: Yellow & Black raised beacons are standard.

Red & Black is a special order option for BLX.

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
R w/Proximity Switch's NO

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

A = F & **K**
B = F & **L** (Exp. Proof Models ONLY)
C = F & **P**
D = F & **R**
E = K & **L** (Exp. Proof Models ONLY)
G = K & **P**
H = K & **R**
J = F & **K** & **L** (Exp. Proof Models ONLY)
M = F & **K** & **P**
N = F & **K** & **R**

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

ACCESSORIES

Air Filter Regulators

0 None
B Type 300, 0-60 PSI
C Type 300, 0-120 PSI
D Type 350SS, 0-100 PSI

ASCO Solenoids

0 None

120 VAC COILS

C 8320G704 3-Way Brass
D 8320G714 3-Way SS
E 8342G501 4-Way Brass
F 8342G511 4-Way SS
G 8342G502* 4-Way Brass
H 8342G512* 4-Way SS
N EF8320G704 3-Way EXP Br.
P EF8320G714 3-Way EXP SS
R EF8342G501 4-Way EXP Br.
S EF8342G511 4-Way EXP SS
T EF8342G502* 4-Way EXP Br.
U EF8342G512* 4-Way EXP SS

**Fail Last Position*

NOTE*: All solenoids are direct mounted.*

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.
Actuator Orientation "**1**", "**2**", or "**3**" is optional
(See page 17 & 18)

Special Options or Set-Up "**S**"
Use this code to identify custom bodies, trim, non-default set ups, etc. not identified by another code. The description of the special option or set-up and complete process conditions must be present on the purchase order.

If your application requires a special option or set-up contact us for details.

3800 PRODUCT SPECIFICATION

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
styles:	**styles:**	**styles:**	**styles:**	**styles:**
• 2-way balanced • 2-way unbalanced • 3-way mixing • 3-way diverting	• 2-way unbalanced • 2-way low flow • 3-way mixing • 3-way diverting	• 2-way balanced • 2-way unbalanced • 3-way mixing • 3-way diverting	• 2-way rotary - flow to open - flow to close	• 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 12 in.	**sizes** 1/2 to 2 in.	**sizes** 2-1/2 to 10 in.	**sizes** 1 to 8 in.	**sizes** 1/2 to 4 in.
class 250 & 300	**class** 250 & 300	**class** 125 & 250	**class** 300	**class** 300
ends 125 FF, 150, 250, 300 RF flg	**ends** Buttweld, NPT	**ends** 125 FF, 250 RF flg	**ends** 150,300 RF flg	**ends** 150,300 RF flg, Socketweld, NPT
body Cast Iron, WCB,CF8M, Bronze (ASTM B61)	**body** Bronze, CF8M	**body** Cast Iron	**body** WCB, CF8M, Custom Alloys	**body** WCB, CF8M, Bronze (ASTM B61)
trim 316 SST, Alloy 6	**trim** Bronze, 316 SST 17-4pH, Alloy 6, TFE, PEEK	**trim** Bronze, 300 SS, 17-4pH, Alloy 6	**trim** 316 SST, Alloy 6, Ceramic, TFE, PEEK	**trim** 316 SST, 400 SST, Alloy 6, TFE, PEEK
Cv up to 1649	**Cv** up to 40	**Cv** up to 960	**Cv** up to 1420	**Cv** up to 170
temp. -20° to 800°F	**temp.** -20° to 500°F	**temp.** -20° to 400°F	**temp.** -20° to 800°F	**temp.** -20° to 800°F
body limit to 740 psi	**body limit** to 720 psi	**body limit**to 400 psi	**body limit** to 740 psi	**body limit** to 740 psi
leakage rates class III, IV, IV+	**leakage rates** class III,IV, VI	**leakage rates** class II, III, IV	**leakage rates** class IV, IV+, VI	**leakage rates** class IV, IV+, VI
rangeability 50:1	**rangeability** 50:1	**rangeability** 50:1	**rangeability** 100:1	**rangeability** 50:1
• Heavy Duty • Severe Service • High Pressure Differentials • Corrosive Materials, Liquids, Gases & Steam • Modulating or On/Off Control	• Economical • Precision Control • Suited for Gases, Steam, or Liquids that are Not Viscous or Solids Bearing	• High Capacity • General Purpose • Moderate Pressure Drops • Compatible Liquids and Gas, Steam & Water • Modulating or On/Off Control	• Eccentric, Segmented Ball • Well Suited for Erosive Service • Various Trim Options Include Ceramic for Slurries or Gritty Materials & Teflon® for Class VI Shutoff	• Highly Efficient, Compact Design • High Pressure Drops • Typically Suited for High Force Piston Actuators for Steam, Chemicals & Dirty Fluids