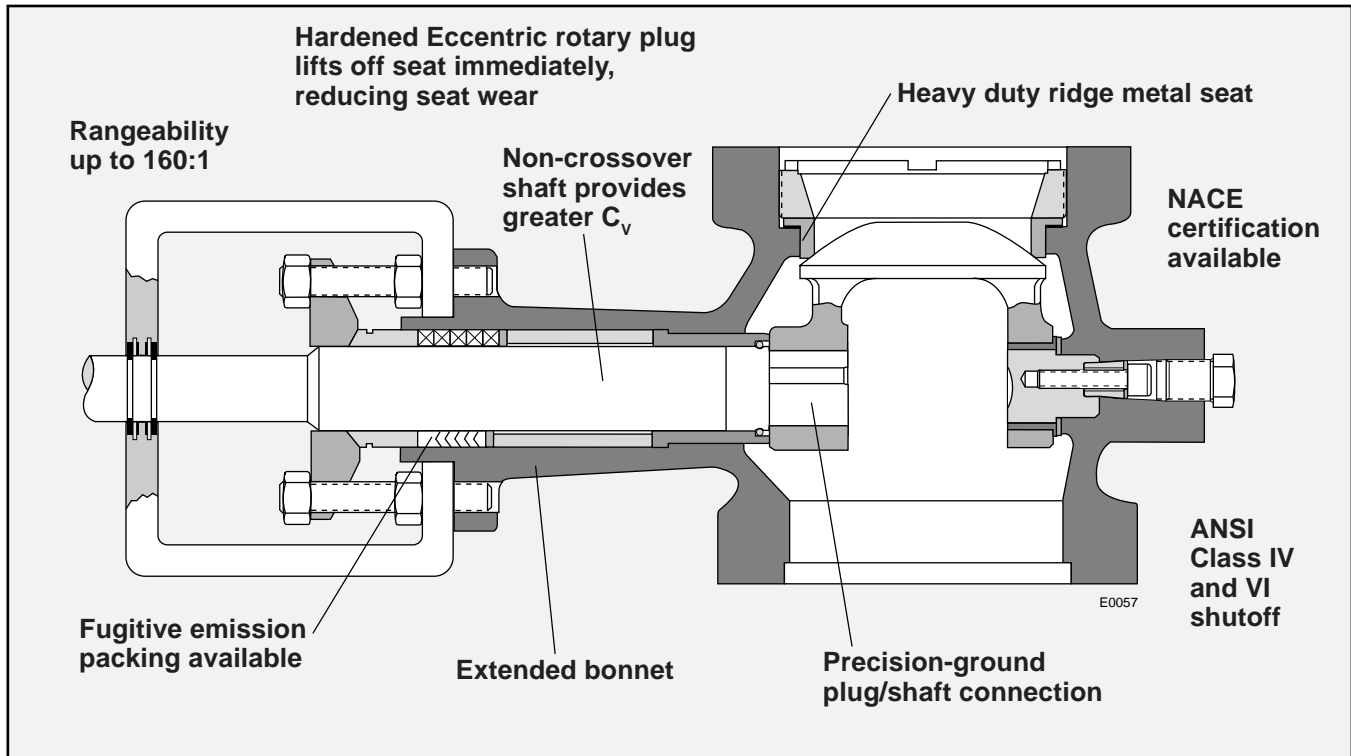




**FLOWSERVE**<sup>TM</sup>

*Valtek MaxFlo  
Control Valves*

## Valtek MaxFlo™ Control Valves



**Figure 1: MaxFlo™ Rotary Plug Control Valve, Body Subassembly**

### Introduction

The Valtek® MaxFlo™ is an eccentric plug, high performance, rotary control valve designed for use in a wide variety of applications ranging from low pressure, high  $C_v$  to slurry and pulp services, to oil and gas services. MaxFlo can handle shutoff pressure drops up to 1450 psig / 100 Barg and operating temperatures from -150° Fahrenheit to 800° F / -100° Celsius to 430° C.

Maxflo's eccentric plug has rangeability up to 160:1, compared to 50:1 for typical globe valves and 20:1 for most butterfly valves. The MaxFlo plug design will either fail-open (with shaft downstream) or closed (with shaft upstream) in the event of air or instrument signal loss. In addition, MaxFlo's rugged plug design reduces valve failure caused by water hammer.

A heavy-duty, non-crossover valve shaft increases flow capacity up to 70 percent higher than other rotary plug valves, while the cylinder actuator insures low hysteresis plug rotation.

NACE certification is available and Valtek packing sets (SureGuard) are available for services with Environmental Protection Agency requirements to control fugitive emissions.

The MaxFlo control valve is available in 1 through 12-inches and in two body styles: flanged (ANSI Classes 150 and 300) or flangeless (Classes 150, 300 and 600). Multiple reduced trims for each valve size are available. Standard body material is carbon steel with stainless steel as an option. Trim options include a Stellite plug and seat ring for severe services or a soft seat (TFE) for tight (ANSI Class VI) shutoff services.

High flow capacities in standard or rugged applications show the advantage of the Valtek MaxFlo control valve.

### Reliability

Maxflo's large, oversized shaft essentially eliminates shaft failures and provides a large shaft bearing surface – reducing bearing wear and increasing reliability.

The hardened 17-4PH plug increases plug life, provides tight shutoff and proves reliable in a range of applications including flashing, erosive, mild cavitation and steam.

The anti-clogging design of the non-crossover shaft allows uninterrupted flow. When the valve is in the open

# Valtek MaxFlo™ Control Valves

position, the fluid flow is not deflected into the seat or retainer, providing greater reliability even after years of service.

MaxFlo's precision-ground, plug/shaft connection has no keys or pins to corrode or vibrate loose, and the sheer mass of the heavy-duty rigid seat stands up to high-pressure applications.

In addition, the extended bonnet design adds reliability to the actuator and positioner by positioning it further away from hot or cold pipes.

The typical maintenance cycle for MaxFlo exceeds five years and more than 20 years for total valve cycle expectancy. Most MaxFlo actuators have a cycle life exceeding 1 million cycles, making MaxFlo one of the most reliable control valves on the market.

## Performance

After looking at reliability, further consideration should be directed toward performance. The flow capacity for MaxFlo exceeds all other eccentric plug valves by almost two times, and its turndown ratio of 160:1 is the highest of any eccentric plug valve on the market.

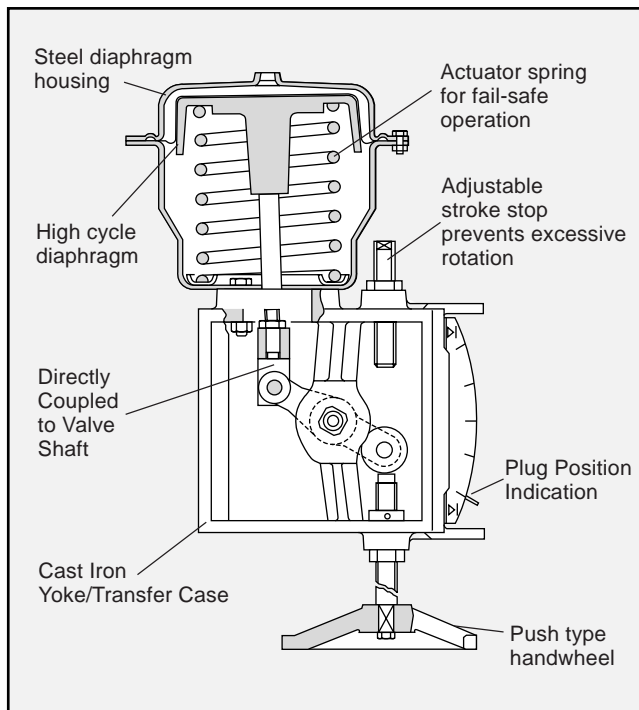


Figure 2: Diaphragm Actuator

## Actuator Selection Diaphragm

*Diaphragm actuator should be applied when the process requires the following:*

1. Single acting
2. Field reversible
3. Low supply pressure + 20 to 50 psi
4. High controllability (ball bearing, no O-ring friction)
5. Low cost handwheel (push only jack screw)
6. Materials = steel casing diaphragm, cast iron yoke
7. 60° or 80° shaft rotation

## Piston / Cylinder

*Cylinder actuator should be applied when the process requires the following:*

1. Double acting
2. Field reversible
3. Light weight, compact design
4. High stiffness (for throttling near seat)
5. Actuation speed  $\leq 1$  sec.
6. High supply pressure + 50 to 150 psi
7. Interchangeability with Valtek rotary products (Valdisk, Valdisk 150 and ShearStream)
8. Materials = Aluminum cylinder/piston, cast iron yoke
9. 90° shaft rotation

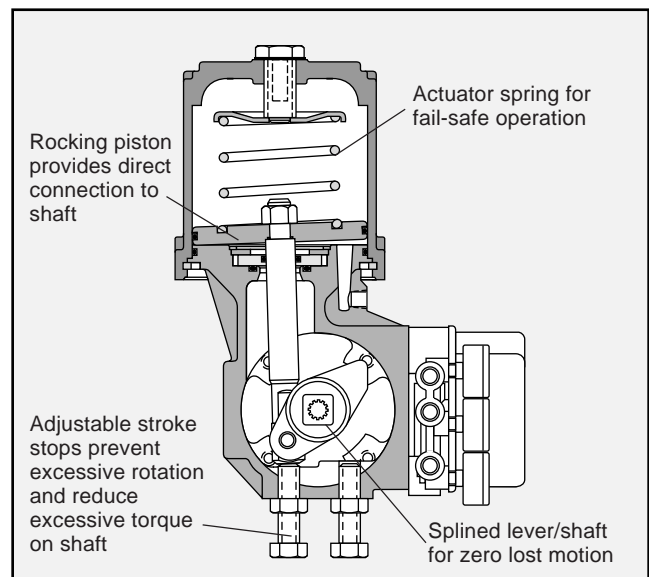


Figure 3: Rotary Actuator

## Valtek MaxFlo™

### Features and Advantages

Features	Advantages
High flow coefficients	Up to 100 percent more flow than other manufacturers' rotary plug designs Reduced trims also available
Superior quality	Standard shaft and trim materials allow higher pressure drops than other manufacturers' rotary plug designs, especially in NACE applications
Non-crossover shaft	Shaft is out of flow path for higher flow capacities and less erosion damage Valve may be used in paper pulp concentrations to 3 percent
Eccentric rotary plug	No breakout torque Plug lifts off seat immediately, reducing seat wear
Rugged plug design	17-4PH plug is standard material
Accurate throttling	Plug throttles without contact with seat
High control	Rangeability up to 160:1
Increased safety	Fluid will assist plug to fail-open or fail-closed position upon air failure
High pressure drops	Design allows drops up to 1450 psi / 100 Bar
Bidirectional shutoff	Allows valve to be mounted with shaft upstream or downstream
Nonselective plug and shaft	Easier maintenance Reduced cost – replace only the part needed, not entire assembly
Flanged	ANSI Classes 150-300
Flanged or Flangeless	Rugged and lightweight for easy handling and maintenance
Flangeless	ANSI Classes 150-600
NACE certification	Allows valve's use in petrochemical applications
Reduced trims	Available in 100, 70 and 40 percent
Excellent shutoff	Metal seat design provides Class IV shutoff; soft seat provides Class VI
Multiple packing options	Configurations/materials available for most applications Fugitive emission options meet EPA requirements
Shutoff Drops	Up to 1450 psig/100 Barg
Operating Temperatures	-150° F to 800° F / -100° C to 430° C
Sizes	1, 1½, 2, 3, 4, 6, 8, 10, 12
Shutoff rating (ANSI)	Metal seat: Class IV Soft seat: Class VI
Certifications	NACE,* CMTRs**

The combined features designed into MaxFlo create a valve measurably superior to other valves in its class.

## Valtek MaxFlo™

### Seating / Components / Options

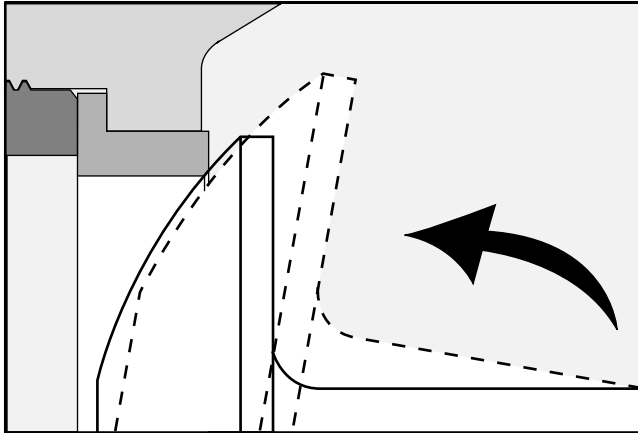


Figure 4: MaxFlo Plug – Closing

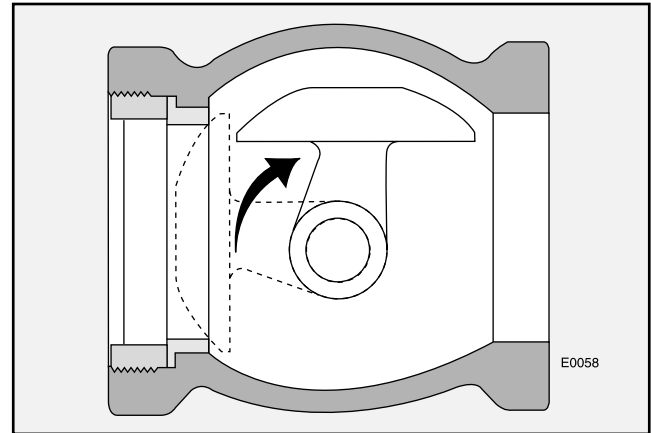


Figure 5: MaxFlo Plug – Open

#### Tight Seating, Low Maintenance

The MaxFlo double offset eccentric plug rotates into the seat at an angle that eliminates sliding over the seat surface (Figure 2). The design reduces seat wear, and thereby maintenance requirements and costs. At the same time a tight ANSI Class VI shutoff is easily obtainable using the soft seat design.

#### High $C_v$ , Zero Breakout Torque

As the valve opens and the plug rotates smoothly out of the seat (Figure 3), the chances of water hammer are significantly reduced. And since the plug and non-crossover shaft do not obstruct the flow, the MaxFlo obtains a higher flow coefficient ( $C_v$ ) rating than other manufacturers' rotary valves. In addition, the MaxFlo has a zero breakout torque requirement, which allows smaller actuators to be used – reducing costs and maintenance time.

#### Options

<b>Valve Size (in.)</b> 1 1½ 2 3 4 6 8 10 12	<b>Body Material</b> Carbon steel (A216 WCC) Stainless steel (A351 CF3M) Carbon steel NACE (A216 WCC NACE) Stainless steel NACE (A351 CF3M NACE)	<b>Trim Area</b> 100% Full 70% Reduction 40% Reductions*	<b>Packing Material</b> TFE Braided TFE/Kevlar Graphite ribbon braid SureGuard	<b>Fail Direction</b> Air-to-close Air-to-open Lock-in-place	
<b>ANSI Class</b> 150 300 600**	<b>End Connection</b> Flanged Flangeless	<b>Plug Material</b> 17-4 (std.) 316L/Stellite	<b>Seat Material</b> 316L S.S. (std.) 3-15 psi 416 S.S. 316L/Stellite PTFE (soft)	<b>Positioner Type</b> Equal 6-30 psi 4-20 mA	<b>Characteristics</b> Linear Equal Percent

\*Valve sizes 1 thru 6-inches only. \*\*Flangeless body only

NOTE: 17-4 shafts are standard. Carbon steel valves include 440 C bearings; stainless steel valves include URANUS 45-N bearings.

## Valtek MaxFlo™

**Table I: Maximum Allowable  $\Delta P^*$** 

Valve Size (inches)	Maximum Allowable Differential Pressure	
	PSI	Bar
1 – 6	1450	100
8	1100	76
10	450	31
12	320	22

\* Actual data dependent on trim size and material, actuator size, and shaft orientation. See Sizing & Selection for specific data.

**Table II: Diaphragm Valve/Actuator Compatibility**

Actuator Size	Valve Size (inches)									
	1	1½	2	3	4	6	8	10	12	
1	■	■	■	■						
2					■					
3							■	■	■	■

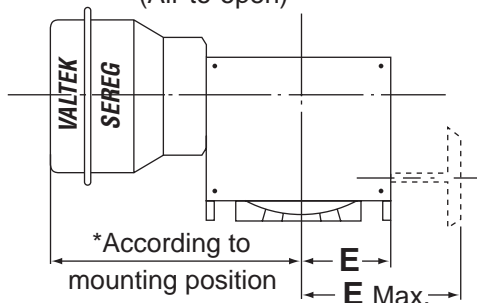
**Table III: Piston / Cylinder Valve/Actuator Compatibility**

Actuator Size (sq. in.)	Spring Type	Valve Size (inches)									
		1	1½	2	3	4	6	8	10	12	
25	STD.	■	■	■	■	■					
25	H.D.	■	■	■	■	■					
50	STD.						■	■	■	■	
50	H.D.						■	■	■	■	
100	STD.							■	■	■	
100	H.D.							■	■	■	
200	STD.									■	
200	H.D.									■	

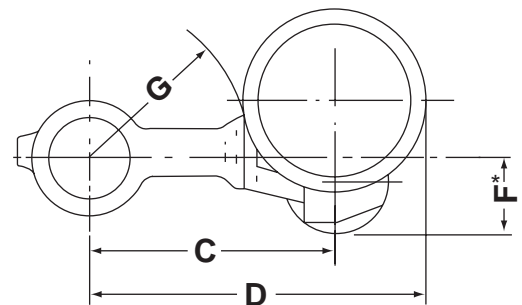
**Table IV: Maximum Flow Capacity ( $C_v$ )**

Body Size (In.)	Trim Size											
	100				750/70				40			
	Shaft Direction											
	Up		Down		Up		Down		Up		Down	
	Metal	Soft	Metal	Soft	Metal	Soft	Metal	Soft	Metal	Soft	Metal	Soft
1	1	12	18	10	15	8	13	7	8	N/A	7	N/A
1½	50	40	47	39	35	35	33	33	20	20	19	19
2	78	69	80	71	55	55	56	56	31	31	32	32
3	238	238	260	260	167	167	182	182	95	95	104	104
4	376	376	424	424	263	263	297	297	150	150	170	170
6	810	810	955	955	567	567	669	669	324	324	382	382
8	1130	1130	1700	1700	848	847	1275	1275	Not Available			
10	1785	1785	2505	2505	1339	1339	1879	1879				
12	2560	2560	3600	3600	1920	1920	2700	2700				

Close on Air Failure  
(Air-to-open)



\*Optional installation



\* Optional installation: vertical axis or horizontal axis

# Valtek MaxFlo™

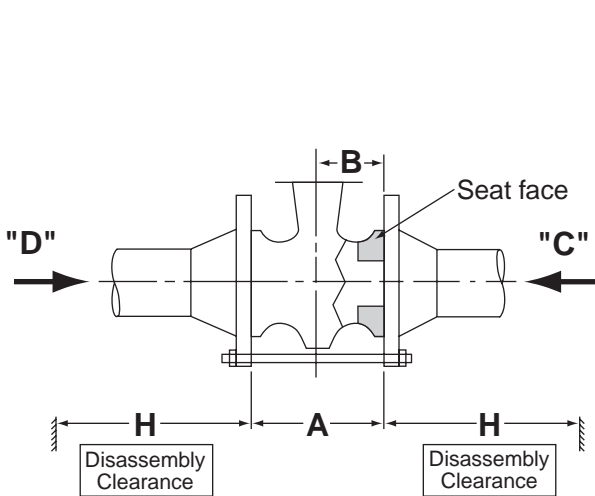
## Dimensions / Weights

**Table V: MaxFlo, Wafer with Sereg Diaphragm Actuator (inches / mm)**

Dia. (in.)	A		B		C		D		E		E max		F		G		H		L1-L2 L5-L6		L3-L8		L4-L7		M1-M6		M2-M5		M3-M4 M7-M8		Weight (lbs.)	
1	4.02	102	1.85	47	9.02	229	12.80	325	3.46	88	4.37	220	4.37	111	5.35	136	9.06	230	9.57	243	9.41	239	9.72	247	5.28	134	5.59	142	5.43	138	33.1	15
1½	4.49	114	2.24	57	10.00	254	13.78	350	3.46	88	8.66	220	4.45	113	6.30	160	10.43	265	9.57	243	9.33	237	9.80	249	5.20	132	5.67	144	5.43	138	35.3	16
2	4.88	124	2.44	62	10.08	256	13.86	352	3.46	88	8.66	220	4.45	113	6.38	162	10.83	275	9.57	243	9.33	237	9.80	249	5.20	132	5.67	144	5.43	138	39.7	18
3	6.50	165	3.35	85	14.25	362	20.31	516	4.92	125	12.20	310	6.54	166	8.35	212	13.58	345	13.78	350	13.46	358	14.09	358	8.27	210	8.90	226	8.58	218	99.2	45
4	7.64	194	3.82	97	14.45	367	20.51	521	4.92	125	12.20	310	6.54	166	8.54	217	15.55	395	13.78	350	13.46	358	14.09	358	8.27	210	8.90	226	8.58	218	110.2	50
6	9.02	229	5.00	127	17.44	443	25.71	653	6.42	163	17.72	450	11.54	293	9.53	242	18.50	476	19.13	486	18.74	496	19.53	496	11.89	302	12.68	322	12.28	312	286.6	130
8	9.57	243	5.75	146	17.87	454	26.14	664	6.42	163	17.72	450	11.54	293	9.96	253	20.08	476	19.13	486	18.74	496	19.53	496	11.89	302	12.68	322	12.28	312	324.1	147
10	10.75	273	6.61	168	20.59	523	28.86	733	6.42	163	17.72	450	11.73	298	12.60	320	22.24	471	19.13	486	18.54	501	19.72	501	11.69	297	12.87	327	12.28	312	385.8	175
12	11.50	292	7.28	185	21.57	548	29.84	758	6.42	163	17.72	450	11.73	298	13.58	345	23.62	471	19.13	486	18.54	471	19.72	501	11.69	297	12.87	327	12.28	312	463.0	210

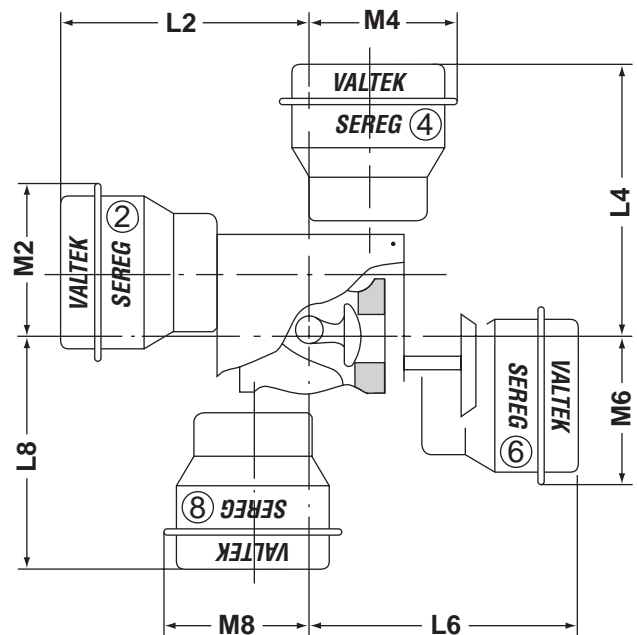
**Table VI: MaxFlo, Flanged with Sereg Diaphragm Actuator (inches / mm)**

Dia. (in.)	A		B		C		D		E		Emax		F		G		H		L1-L2 L5-L6		L3-L8		L4-L7		M1-M6		M2-M5		M3-M4 M7-M8		Weight lbs.	
1	4.02	102	2.01	51	9.02	229	12.80	325	3.46	88	8.66	220	4.37	111	5.31	135	9.57	243	9.41	239	9.72	247	5.28	134	5.59	142	5.43	138	37.5	17		
1½	4.49	114	2.24	57	10.00	254	13.78	350	3.46	88	8.66	220	4.45	113	6.30	160	9.57	243	9.33	237	9.80	249	5.20	132	5.67	144	5.43	138	44.1	20		
2	4.88	124	2.44	62	10.08	256	13.86	352	3.46	88	8.66	220	4.45	113	6.38	162	9.57	243	9.33	237	9.80	249	5.20	132	5.67	144	5.43	138	48.5	22		
3	6.50	165	3.25	83	14.25	362	20.31	516	4.92	125	12.20	310	6.54	166	8.27	210	13.78	350	13.46	342	14.09	358	8.27	210	8.90	226	8.58	218	116.8	53		
4	7.64	194	3.82	97	14.45	367	20.51	521	4.92	125	12.20	310	6.54	166	8.46	215	13.78	350	13.46	342	14.09	358	8.27	210	8.90	226	8.58	218	141.1	64		
6	9.02	229	4.65	118	17.44	443	25.71	653	6.42	163	17.72	450	11.54	293	9.37	238	19.13	486	18.74	476	19.53	496	11.89	302	12.68	322	12.28	312	330.7	150		
8	9.57	243	5.35	136	17.87	454	26.14	664	6.42	163	17.72	450	11.54	293	9.96	253	19.13	486	18.74	476	19.53	496	11.89	302	12.68	322	12.28	312	403.4	183		
10	10.75	273	6.22	158	20.59	523	28.86	733	6.42	163	17.72	450	11.73	298	12.60	320	19.13	486	18.54	471	19.72	501	11.69	297	12.87	327	12.28	312	511.5	232		
12	11.50	292	6.77	172	21.57	548	29.84	758	6.42	163	17.72	450	11.73	298	13.58	345	19.13	486	18.54	471	19.72	501	11.69	297	12.87	327	12.28	312	632.7	287		



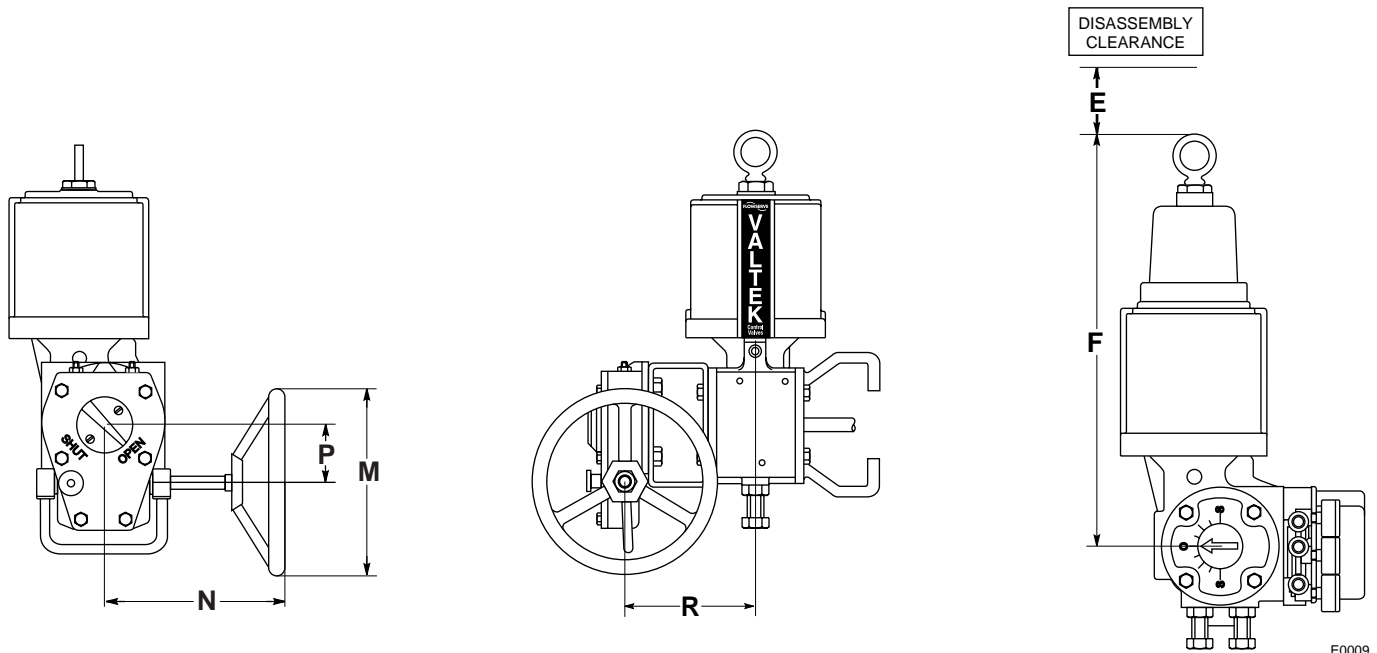
"C" Flow-to-open, see Table VII

"D" Flow-to-close, see Table VIII



## Valtek MaxFlo™

### Dimensions / Weights



**Table VII: MaxFlo – Handwheel and Heavy-duty Spring Dimensions (inches / mm)**

Actuator Size	E		F		M		N		P		R	
25	10.0	254	16.5	419	9.8	249	6.0	152	2.6	58	6.9	175
50	10.3	262	23.5	597	12.0	305	8.0	203	3.4	86	9.1	231
100	12.8	325	N/A		18.0	457	9.0	229	5.4	138	10.4	264
200	12.8	325	N/A		18.0	457	9.0	229	5.4	138	10.4	264

**Table VIII:  
Estimated Shipping Weight (lbs / kg)  
(with standard actuator and positioner)**

Valve Size	Flangeless Body		Flanged Body	
	lbs	kg	lbs	kg
1	39	18	45	20
1½	41	19	50	23
2	46	21	54	25
3	59	27	77	35
4	70	32	101	46
6	157	71	201	91
8	195	88	274	124
10	256	116	382	173
12	433	197	602	274

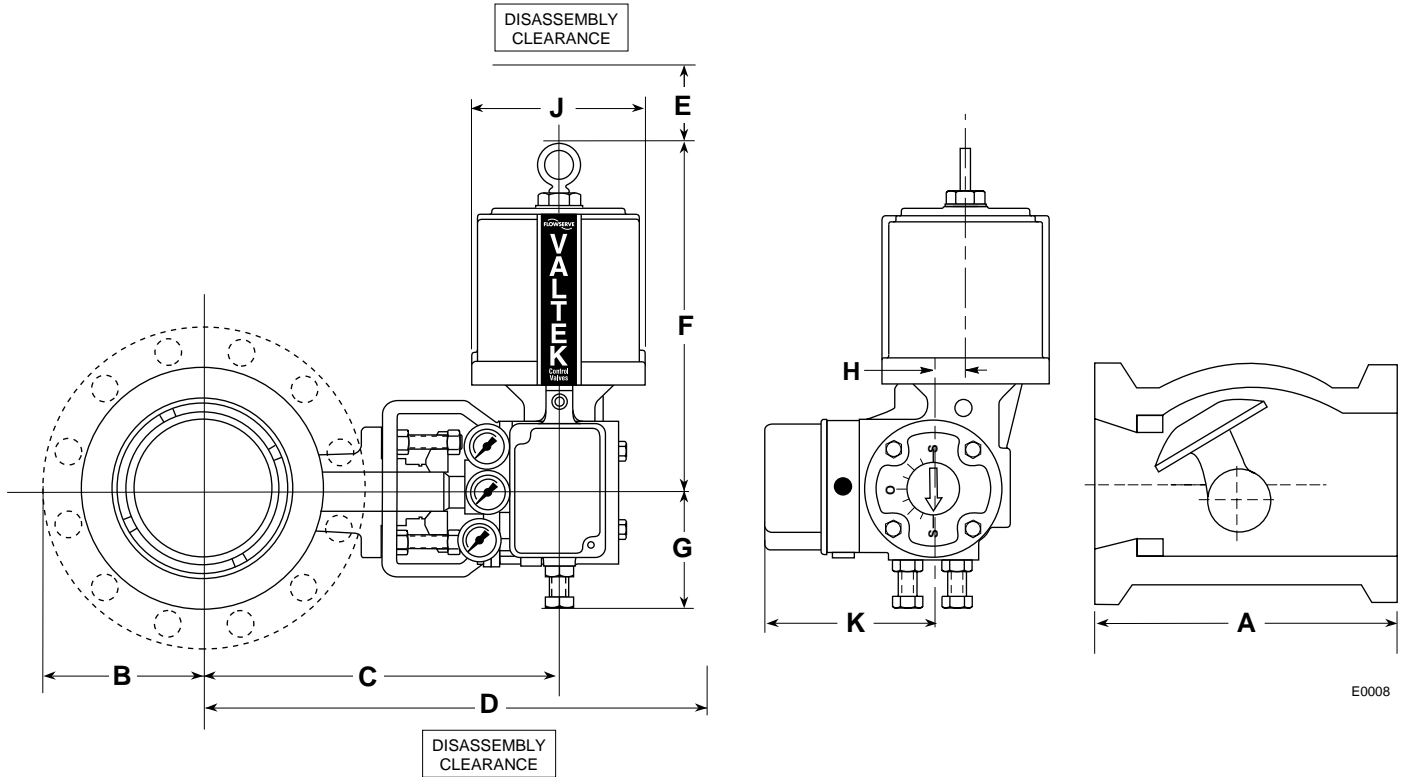
### MaxFlo Sizing

Procedures and data to size MaxFlo valves – including determining actuator size – are contained in Valtek Performance! valve sizing program, and the Sizing & Selection Manual, sections 3 and 16.



# Valtek MaxFlo™

## Dimensions



E0008

**Table IX: MaxFlo Dimensions (inches / mm)**

Valve Size (in.)	Actuator Size (sq.in.)	Shaft Size	A		B		C		D		E		F		G		H		J		K		
1	25	0.4	11	4.0	102	1.8	46	11.7	297	20.0	510	6.0	152	13.1	332	5.6	142	1.1	28	6.5	165	6.5	165
1½	25	0.6	16	4.5	114	2.5	63	12.7	322	21.0	535	6.0	152	13.1	332	5.6	142	1.1	28	6.5	165	6.5	165
2	25	0.6	16	4.9	124	3.2	82	12.8	324	21.0	535	6.0	152	13.1	332	5.6	142	1.1	28	6.5	165	6.5	165
2	50	0.6	16	4.9	124	3.2	82	12.8	324	21.0	535	8.0	203	18.0	457	6.7	170	2.0	51	9.1	231	7.4	188
3	25	0.9	23	6.5	165	4.7	120	16.5	419	25.0	635	6.0	152	13.1	332	5.6	142	1.1	28	6.5	165	6.5	165
3	50	0.9	23	6.5	165	4.7	120	16.5	419	25.0	635	8.0	203	18.0	457	6.7	170	2.0	51	9.1	231	7.4	188
4	25	0.9	23	7.6	194	4.9	125	16.7	423	26.0	661	6.0	152	13.1	332	5.6	142	1.1	28	6.5	165	6.5	165
4	50	0.9	23	7.6	194	4.9	125	16.7	423	26.0	661	8.0	203	18.0	457	6.7	170	2.0	51	9.1	231	7.4	188
6	50	1.0	26	9.0	229	6.4	161	18.4	468	27.0	680	8.0	203	18.0	457	6.7	170	2.0	51	9.1	231	7.4	188
6	100	1.0	26	9.0	229	6.4	161	18.4	468	29.0	722	11.0	279	22.6	574	9.1	231	2.4	61	12.5	318	8.5	216
8	50	1.0	26	9.6	243	6.9	176	18.8	479	27.0	685	8.0	203	18.0	457	6.7	170	2.0	51	9.1	231	7.4	188
8	100	1.0	26	9.6	243	6.9	176	18.8	479	29.0	733	11.0	279	22.6	574	9.1	231	2.4	61	12.5	318	8.5	216
10	50	1.0	26	10.7	273	8.4	213	21.6	548	30.0	751	8.0	203	18.0	457	6.7	170	2.0	51	9.1	231	7.4	188
10	100	1.0	26	10.7	273	8.4	213	21.6	548	32.0	802	11.0	279	22.6	576	9.1	231	2.4	61	12.5	318	8.5	216
12	100	1.5	37	11.5	292	9.4	238	22.5	573	33.0	827	11.0	279	22.6	576	9.1	231	2.4	61	12.5	318	8.5	216

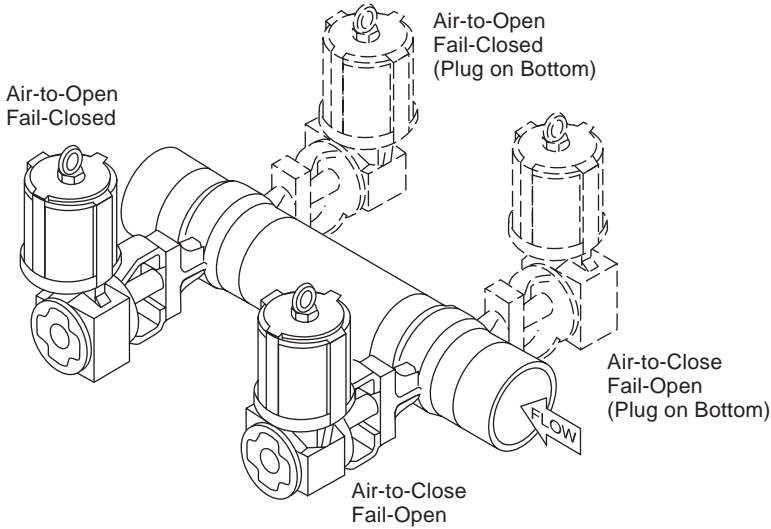
All dimensions are to be used for estimation only. Certified drawings will be supplied upon request. Face-to-face dimensions according to ISA S75-04 for sizes 1 thru 8-inch.

**Valtek MaxFlo™**

**Mounting Orientations**

**Shaft Upstream**

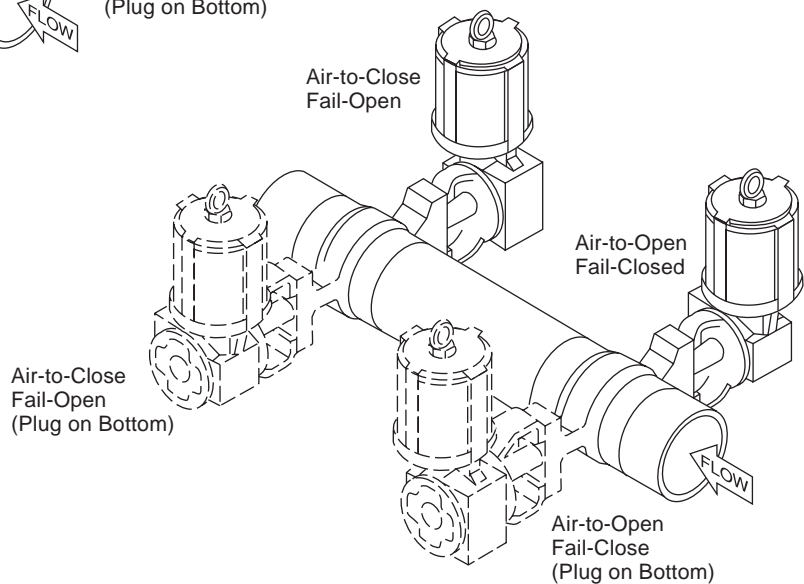
Right hand mounting (optional)



Left hand mounting (standard)

**Shaft Downstream**

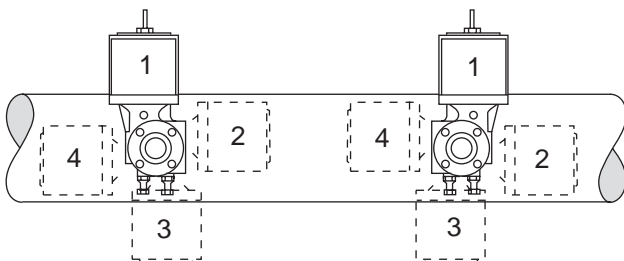
Right hand mounting (standard)



Left hand mounting (optional)

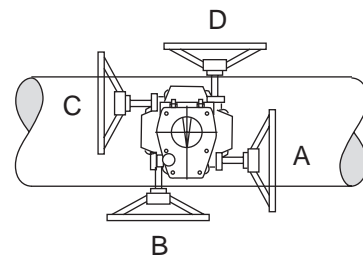
**Actuator Orientation**

Note: Orientations 2 and 4 are not available on some actuator sizes.



**Handwheel Orientation**

Note: These orientations are in relation to the pipeline.



***Valtek MaxFlo™***

## Valtek MaxFlo™

Flowserve Corporation has established industry leadership in the design and manufacture of its products. When properly selected, this Flowserve product is designed to perform its intended function safely during its useful life. However, the purchaser or user of Flowserve products should be aware that Flowserve products might be used in numerous applications under a wide variety of industrial service conditions. Although Flowserve can (and often does) provide general guidelines, it cannot provide specific data and warnings for all possible applications. The purchaser/user must therefore assume the ultimate responsibility for the proper sizing and selection, installation, operation and maintenance of Flowserve products. The purchaser/user should read and understand the Installation Operation Maintenance (IOM) instructions included with the product, and train its employees and contractors in the safe use of Flowserve products in connection with the specific application.

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