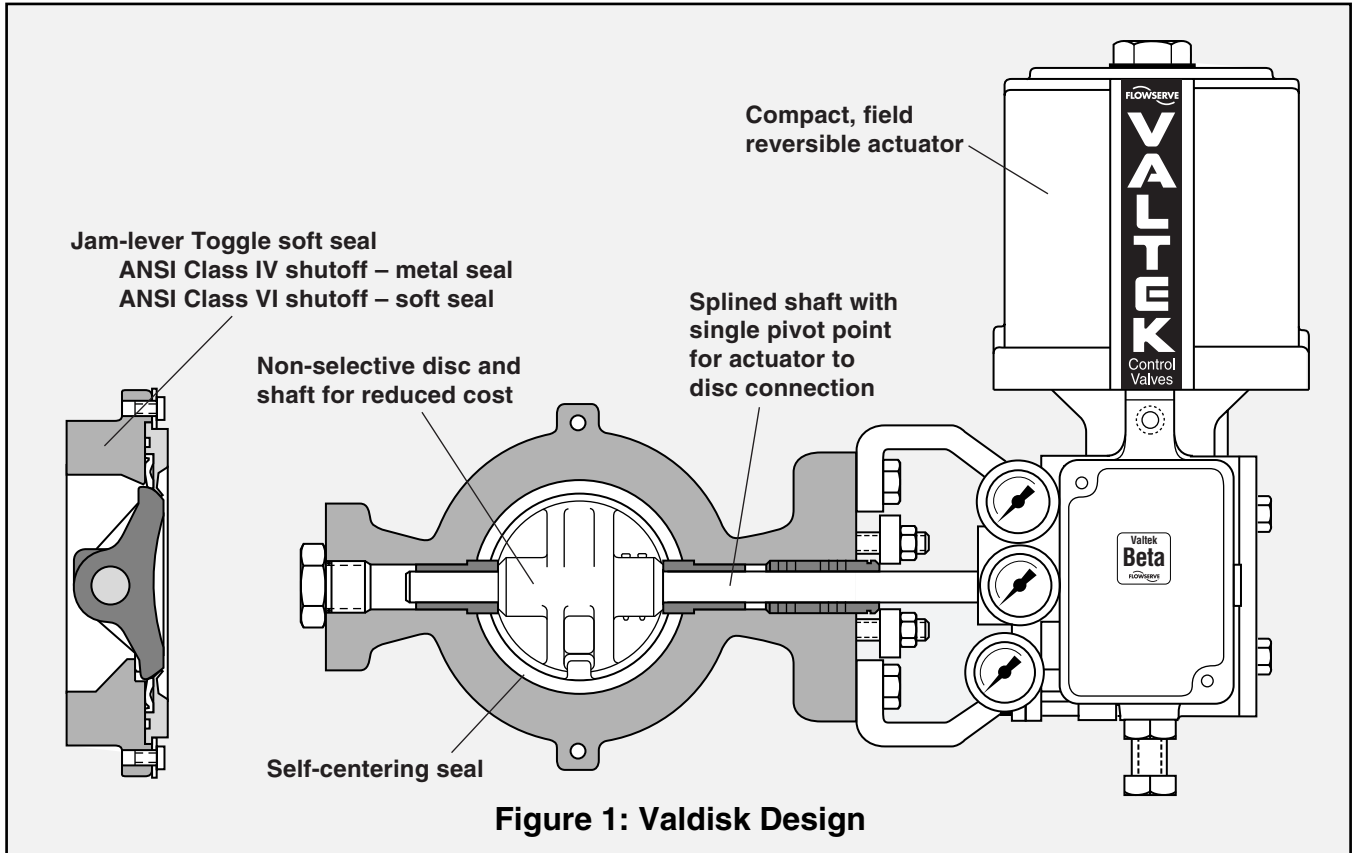


**FLOWSERVE**<sup>®</sup>

**VALTEK**<sup>®</sup>  
*Valdisk Control Valves*

# Valtek Valdisk Control Valves

## Control Valves

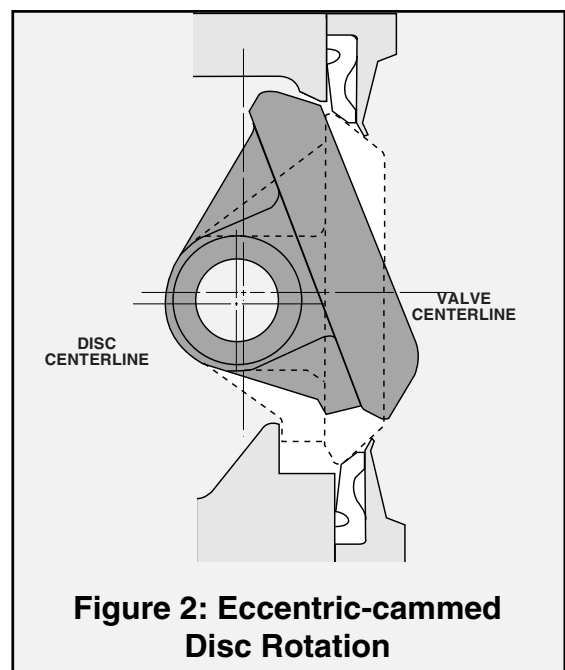


The high performance Valtek® Valdisk™ rotary control valve uses pressure assisted Jam-lever Toggle™ seating concepts to achieve bi-directional, bubble-tight shutoff while maintaining low breakout torque – at both high and low pressure drops. Valdisk is available in carbon steel, 316 stainless steel and other alloys and is available in ANSI Classes 150 through 2500, sizes 2 through 30-inch.

Jam-lever Toggle seating assures low breakout torque by utilizing the pressure drop across the valve to aid the seating process. Since much of the seating force is supplied by the pressure drop, the need for strong actuator seating force – and therefore breakout torque – is reduced. Combined with Valdisk’s high-thrust cylinder actuator and eccentric-cammed disc, it is possible to achieve especially high performance throttling – even in large pressure drops close to the seat.

### Valdisk’s Eccentric Cammed Disc

A double offset has been designed into the disc to lift it out of the seat immediately upon actuation. This avoids wear on the seat and disc, reducing leakage and parts replacement. It also improves throttling by eliminating friction.



# Valtek Valdisk Control Valves

## Features and Advantages

Valdisk's high performance is assured by the following features:

Features	Advantages
Jam-lever Toggle soft seat	Bubble-tight shutoff equal to ANSI Class VI Low breakout torque assures accurate throttling, even close to the seat Non clogging seat design Easy removal
Metal and dual seat	Shutoff better than ANSI Class IV
Eccentric-cammed disc	Disc pulls out of seat immediately, preventing seat wear Accurate throttling due to disc profile when rotating into the seat
Single pivot-point, splined shaft	Lost motion minimized between shaft and actuator
Bolted seat retainer	Uninterrupted gasket surface allows for a wide variety of gasketing
Non-selective disc and shaft	Easier maintenance Reduced cost — only replace needed part, not entire assembly
Wafer body	Rugged and lightweight for easy handling and maintenance One body serves ANSI Classes 150, 300 and 600 in sizes 2, 3, 4, 6 and 8 Industry standard MSS SP-67 permits shorter flange bolting than ball or cammed valves, increasing safety and reducing possibility of leakage
Flow capacity	Capacity greater than globe, plug and cammed control valves
Concave disc	Increased flow capacity
Disc stop in body	Prevents damage to seat due to overstroking Permits in-line disc relocation during maintenance
Wide variety of packing box configurations	Purged bonnet and lubricator options
Factory Mutual Approved	Used as fuel service valve on industrial furnaces or ovens
Fully enclosed, air purged transfer case	Extra safety Prevents atmospheric corrosion of actuator internals Disc position indicator mounted on transfer case

Valdisk also capitalizes on established features of Valtek product lines:

Cylinder actuator	High thrust for high performance throttling Compact and lightweight for easier servicing and maintenance Fully interchangeable with ShearStream ball valve actuator Actuator air pressures allowable up to 150 psi (10.3 bar)
Wide interchangeability	Spare parts stocking requirements minimized Inventory costs reduced Many Mark One and ShearStream parts are interchangeable with Valdisk
Available in variety of materials	Carbon steel, 316 stainless steel and other alloys
Seat interchangeability	Metal or TFE seats easily installed
Spool-type four-way positioner	Convertible between I/P and P/P Calibration and maintenance easy due to fewer parts

The combined features designed into Valdisk create a valve measurably superior to all other rotary valves. The information and specifications contained in the following pages are provided for comparison.

# Valtek Valdisk Control Valves Seats

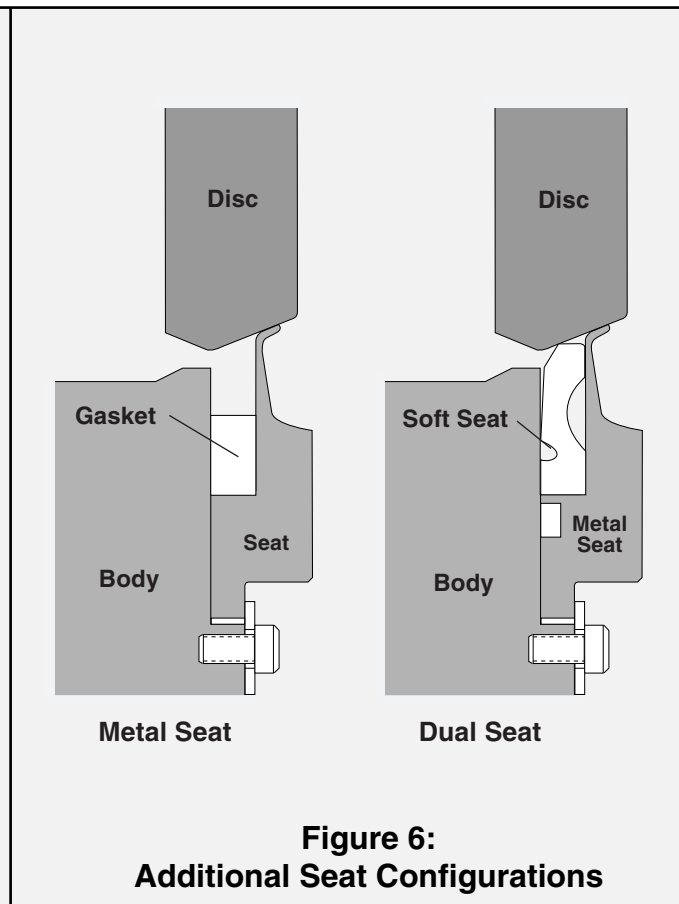
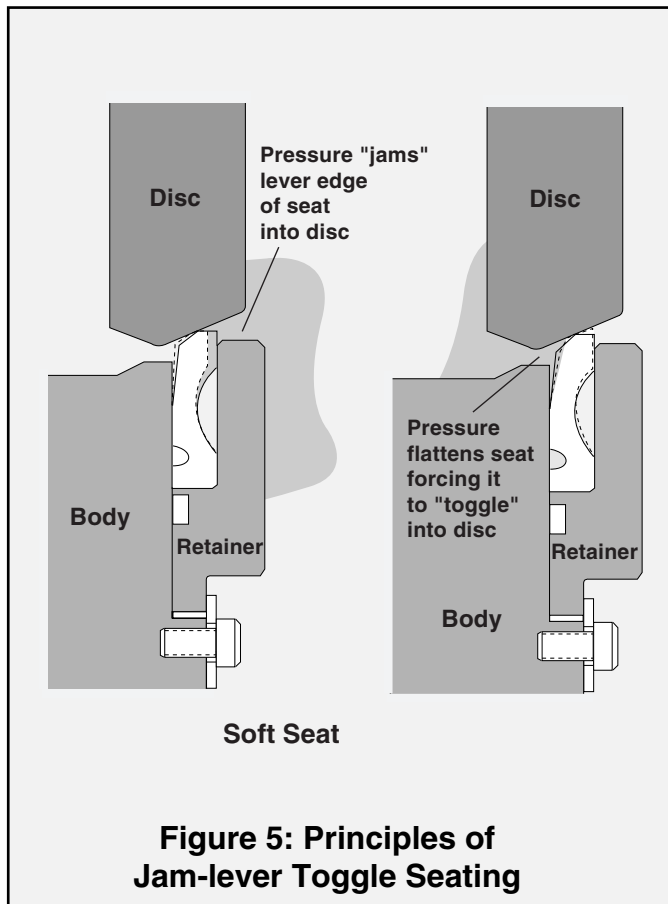
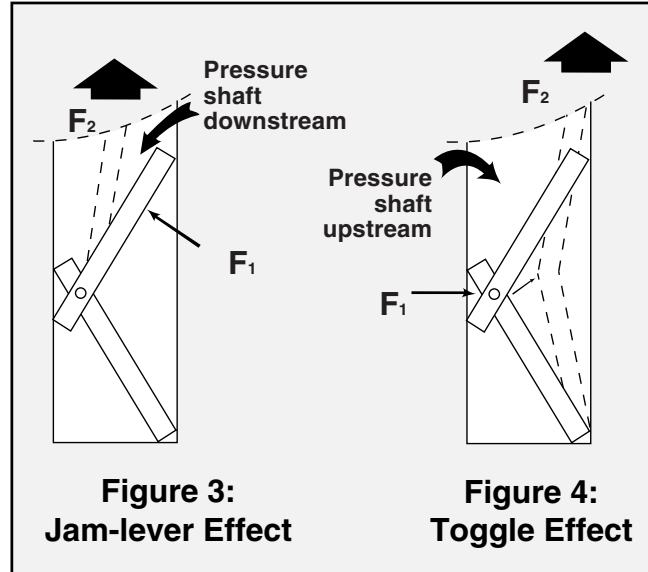
Jam-lever Toggle seating concepts utilize the pressure drop across the valve to help energize the soft seat to bubble-tight shutoff in either flow direction, including alternating flow applications. This is done in such a way that seating capacity is increased as differential pressure is increased. Jam-lever Toggle soft seats achieve ANSI Class VI shutoff.

### Jam-lever Effect (Figure 3)

As pressure enters the seat cavity with the shaft downstream, the seat jams or rotates into the disc, causing it to seat tighter against the disc.

### Toggle Effect (Figure 4)

As pressure enters the seat cavity with the shaft upstream, the seat tends to toggle or flatten out, causing it to seat tighter against the disc.



## Valtek Valdisk Control Valves

### Seats, $F_L$

#### Metal Seat

Metal seats are used for applications involving temperatures higher than those permitted by the Jam-lever Toggle soft seat. The design incorporates a highly flexible lip, which assures full circle contact between the seat and disc when the valve is closed. Because of lip flexibility, breakout torque for the metal seat is the same or less than soft seat breakout torque. Valdisk metal seats achieve ANSI Class IV shutoff.

#### Dual Seat

Valdisk dual seats incorporate both the Jam-lever Toggle soft seat and flexible lip metal seat for added protection. The dual seat can achieve Class IV leakage.

#### Flow Direction

Jam-lever Toggle seating allows Valdisk to flow either shaft downstream or shaft upstream, depending on service conditions. With the shaft downstream, the flow tends to open the valve. With the shaft upstream, the flow tends to close the valve.

#### Flow Characteristics

The inherent flow characteristic of the Valdisk valve is a modified parabolic relationship. Other characteristics are obtained by substituting an interchangeable cam in the Valtek Beta positioner that is shaped to furnish the desired output. Cams are available to provide inherent linear and equal percent flow characteristics, as well as a linear relationship between signal and shaft rotation.

#### Liquid Pressure Recovery Factor, $F_L$

The liquid pressure recovery factor,  $F_L$ , predicts the amount of pressure recovery that will occur between the vena contracta and the valve outlet. This accounts for the influence of the valve's internal geometry on the maximum capacity of the valve and the tendency to choke or cavitate. Smaller  $F_L$  will cavitate earlier.

Figure 7 shows the  $F_L$  of the Valdisk valve as compared to a typical butterfly valve. The Valdisk  $F_L$  is between a typical butterfly and globe valve. The tendency to cavitate or choke will be more than a globe valve but less than the typical butterfly valve.

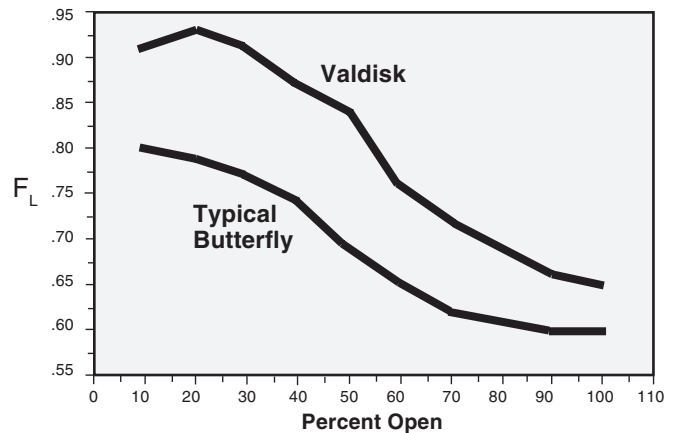


Figure 7: Valdisk  $F_L$  Curves

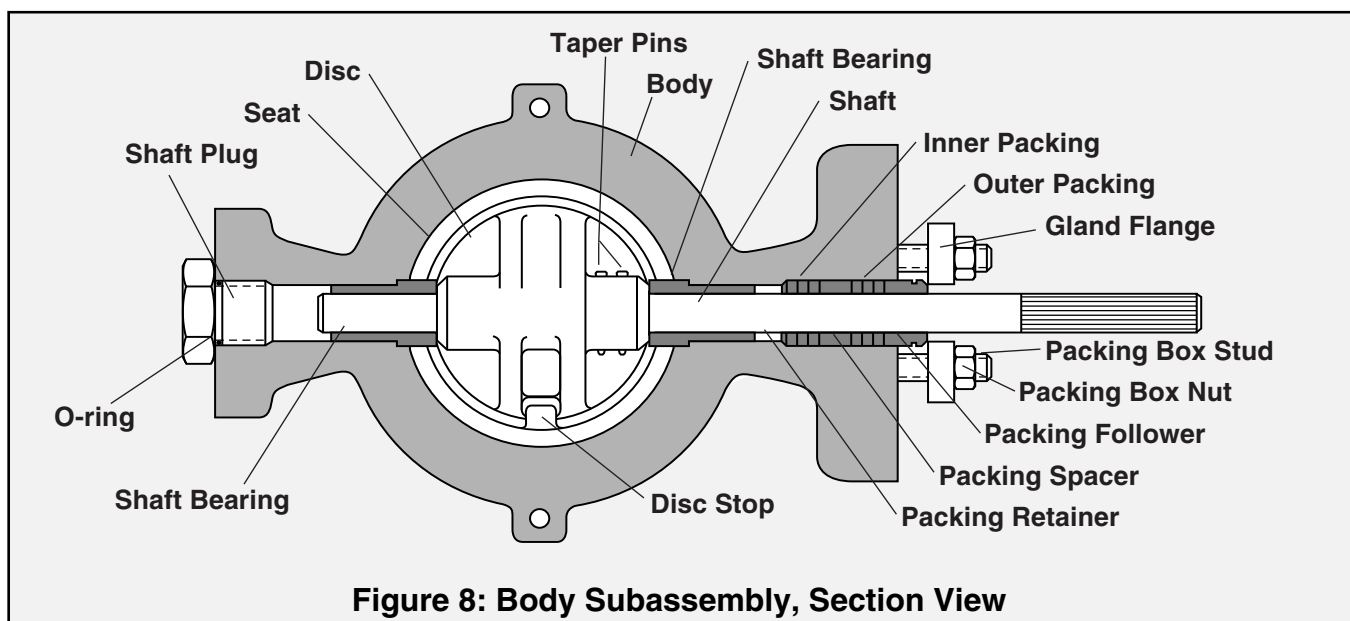


Figure 8: Body Subassembly, Section View

# Valtek Valdisk Control Valves

## Specifications

**Table I: Maximum Allowable Shutoff Pressure Drops (psi)\***

Valve Description	Flow Dir.	Temperature		Valve Size (inches)													
		(°F)	(°C)	2	3	4	6	8	10	12	14	16	18	20	24	30	
Body: carbon steel Shaft & pins: 17-4 PH Disc: 316 stainless steel (1) or carbon steel Seat: TFE/Glass-filled (2)	Shaft Upstream or Downstream	-20 to 100	-29 to 38	954	1000	1011	650	833	550	740	285	285	285	285	285	285	285
		200	93	705	705	705	650	705	550	705	260	260	260	260	260	260	260
		300	149	420	420	420	420	420	420	420	230	230	230	230	230	230	230
		400	204	150	150	150	150	150	150	150	150	150	150	150	150	150	150
		450	232	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Body: 316 stainless steel Shaft & Pins: 17-4 PH or Nitronic 50 (3) Disc: 316 stainless steel Seat: TFE/Glass-filled (2)	Shaft Upstream or Downstream	-20 to 100	-29 to 38	954	1000	1011	650	833	550	720	275	275	275	275	275	275	275
		200	93	705	705	705	650	705	550	705	240	240	240	240	240	240	240
		300	149	420	420	420	420	420	420	420	215	215	215	215	215	215	215
		400	204	150	150	150	150	150	150	150	150	150	150	150	150	150	150
		450	232	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Body: 316 stainless steel or carbon steel** Shaft & Pins: Nitronic 50 (4) Disc: 316 stainless steel	Shaft Downstream	-450 to 200	-268 to 93	593	593	593	593	593	593	593	275	275	275	275	275	275	275
		400	204	370	370	370	370	370	370	370	240	240	240	240	240	240	240
		600	316	318	318	318	318	318	318	318	215	215	215	215	215	215	215
		800	427	310	310	310	310	310	310	310	150	150	150	150	150	150	150
Body: 316 stainless steel or carbon steel** Shaft & Pins: Nitronic 50 (4) Disc: 316 stainless steel	Shaft Upstream	-450 to 200	-268 to 93	296	296	296	296	296	296	296	275	275	275	275	275	275	275
		400	204	185	185	185	185	185	185	185	185	185	185	185	185	185	185
		600	316	159	159	159	159	159	159	159	159	159	159	159	159	159	159
		800	427	155	155	155	155	155	155	155	155	155	155	155	155	155	155
Body: 316 stainless steel Shaft & Pins: 17-4 PH Disc: 316 stainless steel Seat: PEEK	Shaft Upstream or Downstream	-20 to 100	-29 to 38	954	1000	1011	650	833	550								
		200	93	720	720	720	650	720	550								
		300	149	530	530	530	530	530	530								
		400	204	300	300	300	300	300	300								
		500	260	70	70	70	70	70	70								
Body: Monel 400 Shaft & Pins: Monel K-500 Disc: Monel Seat: TFE/Glass-filled (2)	Shaft Upstream or Downstream	-20 to 100	-29 to 38	865	910	920	592	758									
		200	93	705	705	705	592	705									
		300	149	420	420	420	420	420									
		400	204	150	150	150	150	150									
		450	232	50	50	50	50	50									
Body: Hastelloy C Shaft & Pins: Hastelloy C Disc: Hastelloy C Seat: TFE/Glass-filled (2)	Shaft Upstream or Downstream	-20 to 100	-29 to 38	735	780	790	509	655									
		200	93	700	705	705	492	631									
		300	149	420	420	420	420	420									
		400	204	150	150	150	150	150									
		450	232	50	50	50	50	50									
Body: Alloy 20 (5) Shaft & Pins: Alloy 20 Disc: Alloy 20 Seat: TFE/Glass-filled (2)	Shaft Upstream or Downstream	-20 to 100	-29 to 38	295	321	340	220	276									
		200	93	258	281	297	191	239									
		300	149	218	238	251	161	202									
		400	204	150	150	150	150	150									
		450	232	50	50	50	50	50									

\* Consult factory for higher pressure drops and different material component combinations.

\*\* Do not use WCB carbon steel below -20° F

(1) 316 stainless steel disc standard through 8-inch, carbon steel chrome plated disc standard 10 to 30-inch

(2) Maximum allowable shutoff delta pressure reduced 70 psi (4.8 Bar) for virgin TFE

(3) Hardened

(4) At temperatures above 800° F, Inconel 718 shaft and pins must be used.

(5) Alloy 20 has not been formally listed by ANSI or ASME for temperatures above 300° F.

# Valtek Valdisk Control Valves

## Specifications

**Table II: Maximum Allowable Inlet Pressures\*  
for Various Body Ratings and Temperatures (psi)**

Temperature		WCB Steel (A216)**			316 Stainless Steel (SA-351-CF8M)**			Alloy 20 (A351-CN7M)**			Hastelloy C™ -276**			Monel™ 400**		
°F	C°	Pressure Class			Pressure Class			Pressure Class			Pressure Class			Pressure Class		
		150	300	600	150	300	600	150	300	600	150	300	600	150	300	600
-20 to 100	-29 to 38	285	740	1480	275	720	1440	230	600	1200	290	750	1500	230	600	1200
200	93	260	675	1350	240	620	1240	215	555	1115	260	732	1465	200	530	1055
300	149	230	655	1315	215	560	1120	200	525	1045	230	693	1388	190	495	990
400	204	200	635	1270	195	515	1030	—	—	—	200	693	1388	185	480	955
500	260	170	600	1200	170	480	955	—	—	—	185	600	1200	170	475	950
600	316	140	550	1095	140	450	905	—	—	—	140	550	1095	140	475	950
700	371	110	535	1065	110	430	865	—	—	—	110	535	1065	110	475	950
800	427	80	410	825	80	415	830	—	—	—	80	410	825	80	460	915
900	482	50	170	345	50	395	790	—	—	—	—	—	—	—	—	—
1000	538	20	50	105	20	365	725	—	—	—	—	—	—	—	—	—
1100	593	—	—	—	—	325	645	—	—	—	—	—	—	—	—	—
1200	649	—	—	—	—	205	410	—	—	—	—	—	—	—	—	—

\* For Maximum ΔP, refer to Table I.

\*\* Values as recorded in ANSI B16.34-1988.

**Table III:  
Flow Coefficients/Flange Compatibility**

Body Size (inches)	C <sub>v</sub> (90° rotation)		ANSI Rating Flange Compatibility (pressure class)*
	Shaft up	Shaft down	
2	63	58	150, 300, 600
3	134	123	
4	349	242	
6	817	819	
8	1644	1563	
10	2780	2640	150, 300
12	4000	3860	
14	6640	6380	150
16	8400	8070	
18	10350	9950	
20	13670	13300	
24	20200	19600	

\* Consult factory for higher pressure classes

**Table IV: Seat Leakage**

Metal Seat	ANSI Class IV
Jam-lever Toggle Soft Seat	ANSI Class VI
Flow ring	2.5% of rated C <sub>v</sub>
Dual Seat	ANSI Class IV

**Table V: Estimated Shipping Weights  
(with Actuator and Positioner)**

Valve Size	Weight	Valve Size	Weight
2	40	14	280
3	50	16	320
4	60	18	390
6	80	20	540
8	120	24	680
10	190	30	830
12	250		



# Valtek Valdisk Control Valves

## Specifications

**Table VI: Material Selection Temperature Chart**

Temperature (°C)		-268	-240	-212	-184	-157	-129	-18	93	121	149	177	204	232	260	288	316	343	371	399	427	454	482	510	538	566	593	621	649			
Temperature (°F)		-450	-400	-350	-300	-250	-200	0	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200			
Body / Disc	316 Stainless Steel	[Shaded]																														
	Carbon Steel <sup>(1)</sup>	[Shaded]																														
	Monel	[Shaded]																														
	Hastelloy C	[Shaded]																														
	Alloy 20 <sup>(2)</sup>	[Shaded]																														
Shaft	17-4 PH	[Shaded]																														
	Nitronic 50	[Shaded]																														
	Inconel	[Shaded]																														
	Monel	[Shaded]																														
	Hastelloy C	[Shaded]																														
Bearings	304 Stainless Steel / TFE Lined	[Shaded]																														
	Ultimet	[Shaded]																														
	Alloy 6	[Shaded]																														
Soft Seat	Glass-filled TFE	[Shaded]																														
	Virgin TFE	[Shaded]																														
	PEEK	[Shaded]																														
	PCTFE	[Shaded]																														
Metal Seat	316 Stainless Steel	[Shaded]																														
	316 Stainless Steel w/Alloy 6 Overlay	[Shaded]																														
Packing	TFE V-rings	[Shaded]																														
	Glass-filled TFE V-rings	[Shaded]																														
	Graphite	[Shaded]																														
	Braided Asbestos Free <sup>(3)</sup>	[Shaded]																														

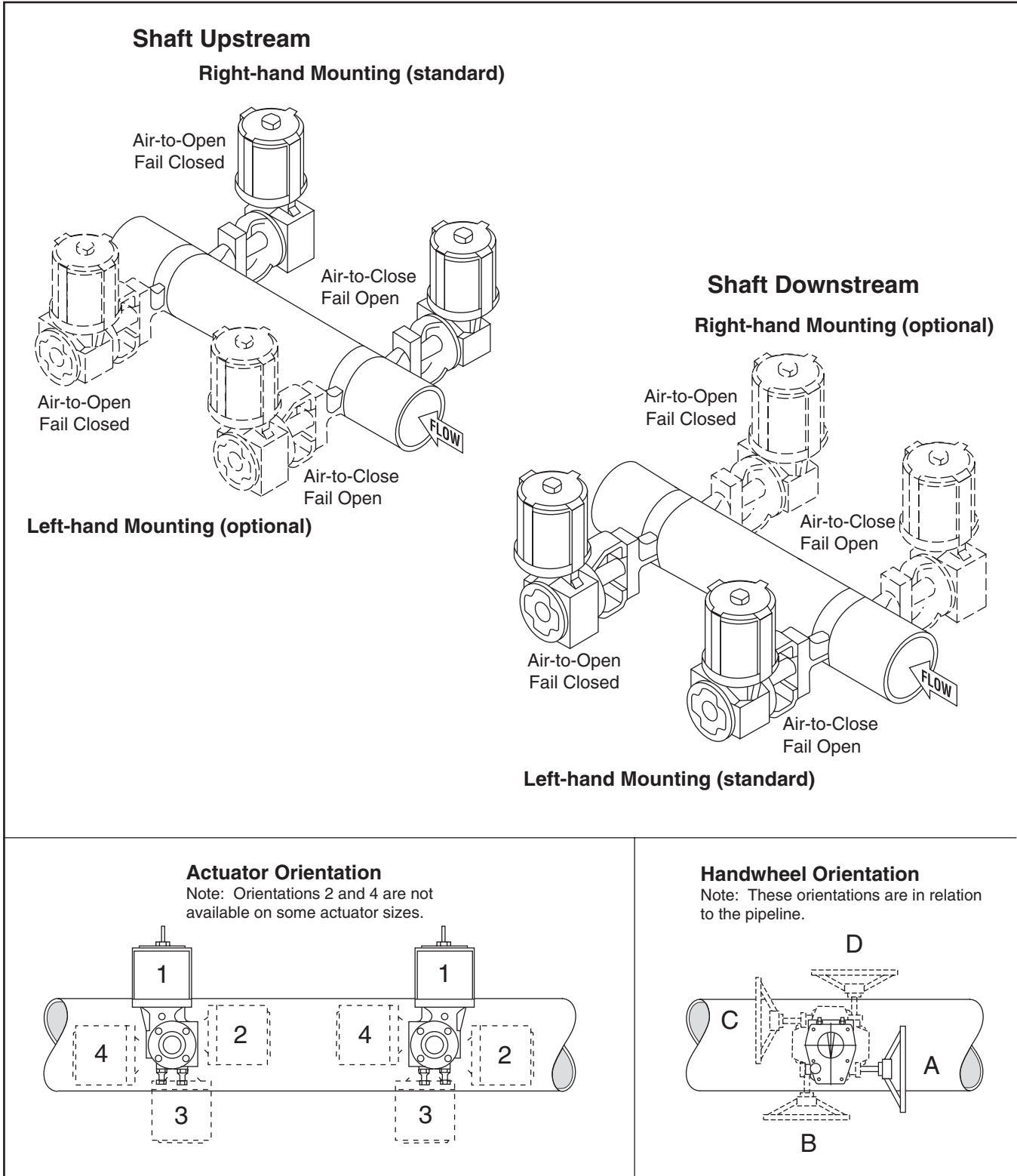
- (1) Permissible at temperatures above 800° F (427° C), but not recommended for prolonged exposure at these elevated temperature because of the possibility of graphitization.
- (2) Alloy 20 has not been formally listed by ANSI or ASME for temperatures above 600° F (315° C) for castings, 800° F (427° C) for forgings or plate
- (3) Garlock 127 AFP or equivalent

The darker shaded areas indicate increased temperature capacity of an extended body.



# Valtek Valdisk Control Valves

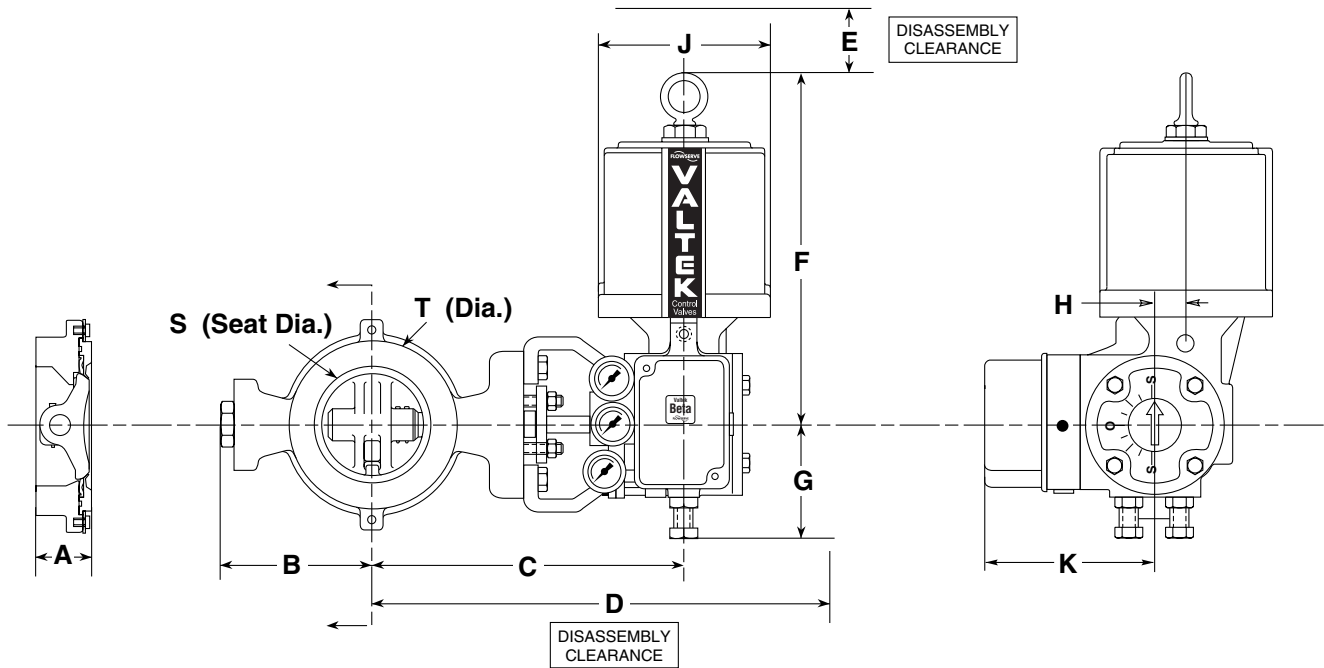
## Mounting Orientations



**Figure 9: Transfer Case Mounting**

# Valtek Valdisk Control Valves

## Dimensions



**Table VII: Valdisk Dimensions (inches / mm)**

BODY CLASSES 150, 300, 600 – 2 thru 8-inch; 150, 300 – 10 thru 12-inch (with Class 150 or 300 disc and shaft)																										
Size (in.)	Actuator Size (sq.in.)	Shaft Size	Face-to- Face* A		B		C		D		E		F		G		H		J		K		S		T	
2	25	0.625	1.8	44	4.3	110	11.4	288	18.3	465	6.0	152	13.1	333	5.6	142	1.1	29	6.5	165	6.5	166	1.7	43	4.0	102
2	50	0.625	1.8	44	4.3	110	11.4	288	19.1	485	8.0	203	18.0	457	6.7	170	2.0	50	9.1	232	7.4	188	1.7	43	4.0	102
3	25	0.625	1.9	48	5.1	130	11.7	298	18.7	475	6.0	152	13.1	333	5.6	142	1.1	29	6.5	165	6.5	166	2.6	66	5.4	137
3	50	0.625	1.9	48	5.1	130	11.7	298	19.5	495	8.0	203	18.0	457	6.7	170	2.0	50	9.1	232	7.4	188	2.6	66	5.4	137
4	25	0.750	2.1	54	5.9	151	12.4	315	19.4	493	6.0	152	13.1	333	5.6	142	1.1	29	6.5	165	6.5	166	3.7	93	6.8	171
4	50	0.750	2.1	54	5.9	151	12.4	315	20.2	513	8.0	203	18.0	457	6.7	170	2.0	50	9.1	232	7.4	188	3.7	93	6.8	171
6	50	0.875	2.3	57	7.6	192	14.3	363	22.1	561	8.0	203	18.0	457	6.7	170	2.0	50	9.1	232	7.4	188	5.5	141	8.5	216
6	100	0.875	2.3	57	7.6	192	14.3	363	24.5	622	11.0	279	22.6	574	9.1	230	2.4	61	12.5	318	8.5	215	5.5	141	8.5	216
8	50	1.125	2.5	64	8.6	219	16.3	415	24.1	612	8.0	203	18.0	457	6.7	170	2.0	50	9.1	232	7.4	188	7.2	182	10.8	273
8	100	1.125	2.5	64	8.6	219	16.3	415	26.5	673	11.0	279	22.6	574	9.1	230	2.4	61	12.5	318	8.5	215	7.2	182	10.8	273
10	50	1.125	2.8	71	9.7	246	17.5	444	25.2	640	8.0	203	18.0	457	6.7	170	2.0	50	9.1	232	7.4	188	9.2	233	12.8	324
10	100	1.125	2.8	71	9.7	246	17.5	444	27.7	704	11.0	279	22.6	574	9.1	230	2.4	61	12.5	318	8.5	215	9.2	233	12.8	324
12	100	1.500	3.2	81	11.2	283	18.7	474	28.9	734	11.0	279	22.6	574	9.1	230	2.4	61	12.5	318	8.5	215	11.0	280	15.0	381

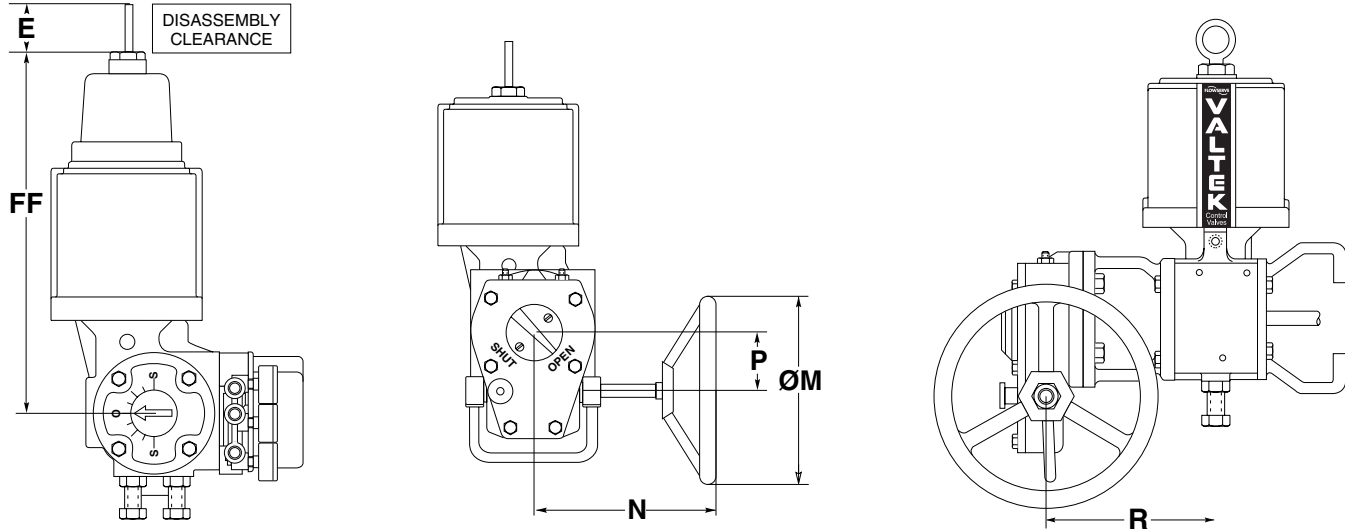
All dimensions are to be used for estimation only. Certified drawings will be supplied upon request.

For 14 thru 30-inch Valdisk, contact factory.

\* MSS SP67 Body Only

# Valtek Valdisk Control Valves

## Dimensions, Ordering Information



**Table VIII: Handwheel and Extended, Heavy-duty Spring Dimensions (inches/mm)**

Actuator Size (sq. in.)	E		FF		M		N		P		R	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
25	9.3	236	17.3	439	10.0	254	9.8	249	2.6	66	7.4	188
50	9.8	249	23.8	605	12.0	305	10.3	262	3.4	86	10.1	257
100	8.5	216	23.0	584	18.0	457	13.3	338	5.4	137	9.7	246
200	9.0	229	24.3	617	18.0	457	13.3	338	5.4	137	9.7	246

### Ordering Information

The following information must be provided when ordering a Valdisk control valve:

- Preferred body size and critical dimensions
- Start-up and operating conditions: inlet and outlet pressures; temperature, flow rate, fluid's specific gravity or molecular weight, vapor pressure or gas compressibility
- Maximum operating temperatures and pressures
- Body and disc pressure rating
- Materials required: body, disc, shaft, packing and bearings
- Line size and schedule
- Specify if used as FM APPROVED fuel service valve (sizes 2, 3, 4, 6-inches)
- Actuator requirements: type (pneumatic or manual), failure position, size and minimum air supply
- Actuator position: style and orientation (Figure 9)
- Accessories required

## Valtek Valdisk Control Valves

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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Hastelloy C is a trademark of Cabit Corporation. Monel is a trademark of Huntington Alloy.

For more information, contact:

For more information about Flowserve and its products, contact [www.flowserve.com](http://www.flowserve.com) or call USA 972 443 6500

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APPROVED  
as Fuel Service Valve  
(NFPA 86 A - B)



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