FLOWSERVE®

VALTEK®

Valdisk Control Valves

Valtek Valdisk Control Valves

Control Valves

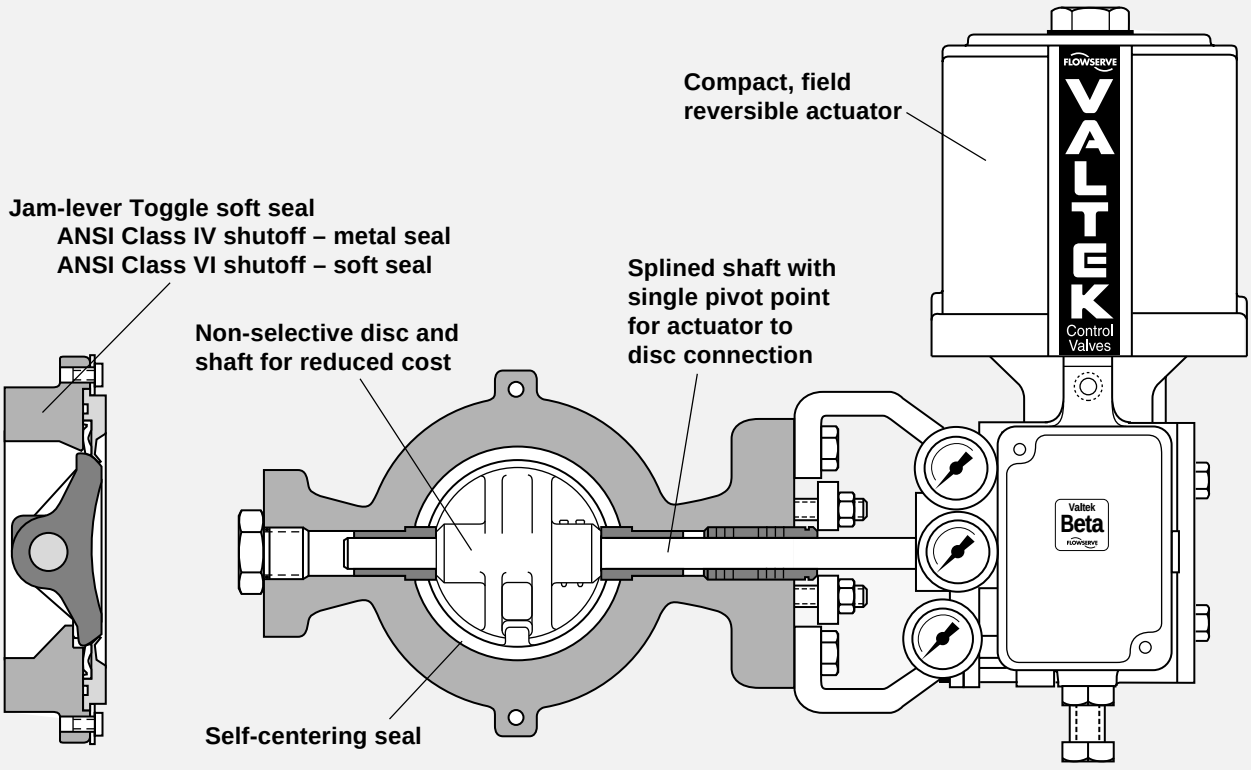


Figure 1: Valdisk Design

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.

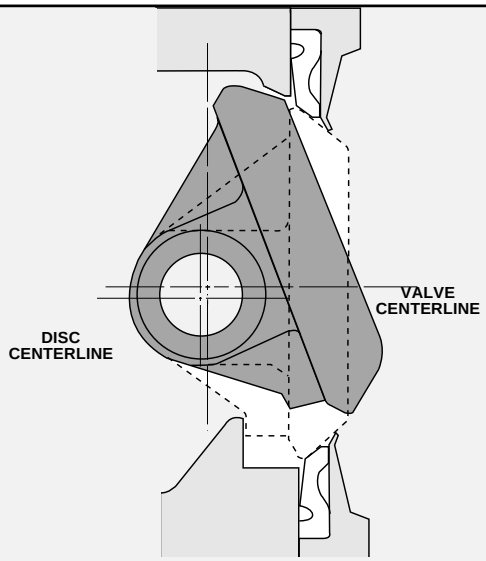


Figure 2: Eccentric-cammed Disc Rotation

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.

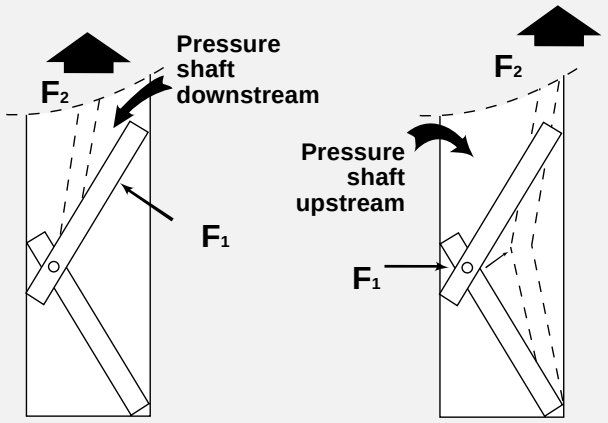


Figure 3: Jam-lever Effect

Figure 4: Toggle Effect

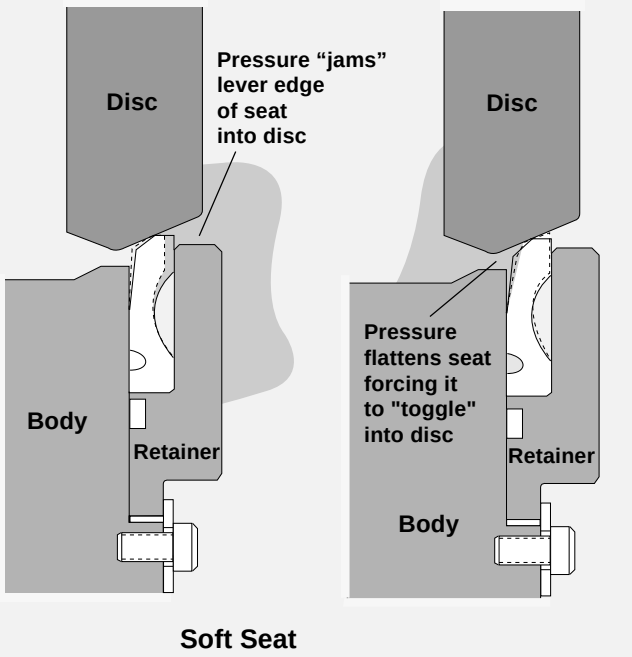


Figure 5: Principles of Jam-lever Toggle Seating

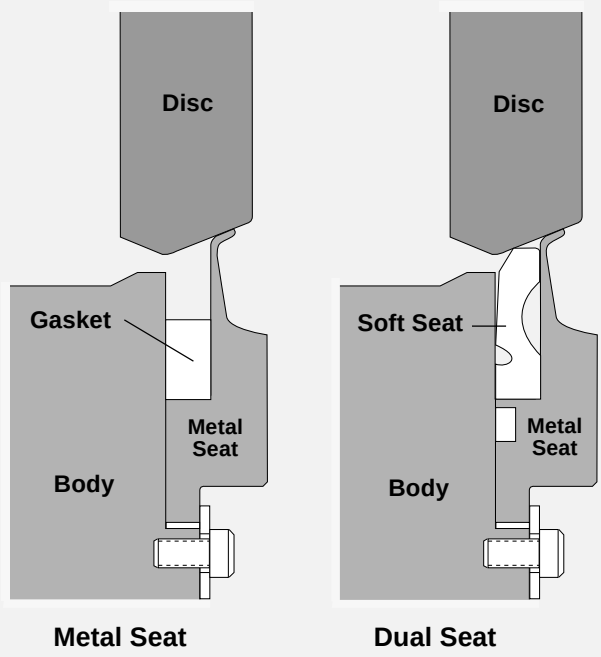


Figure 6: Additional Seat Configurations

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.

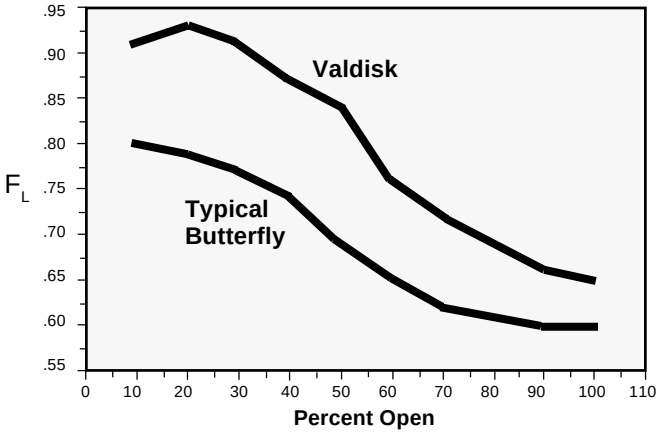


Figure 7: Valdisk F_L Curves

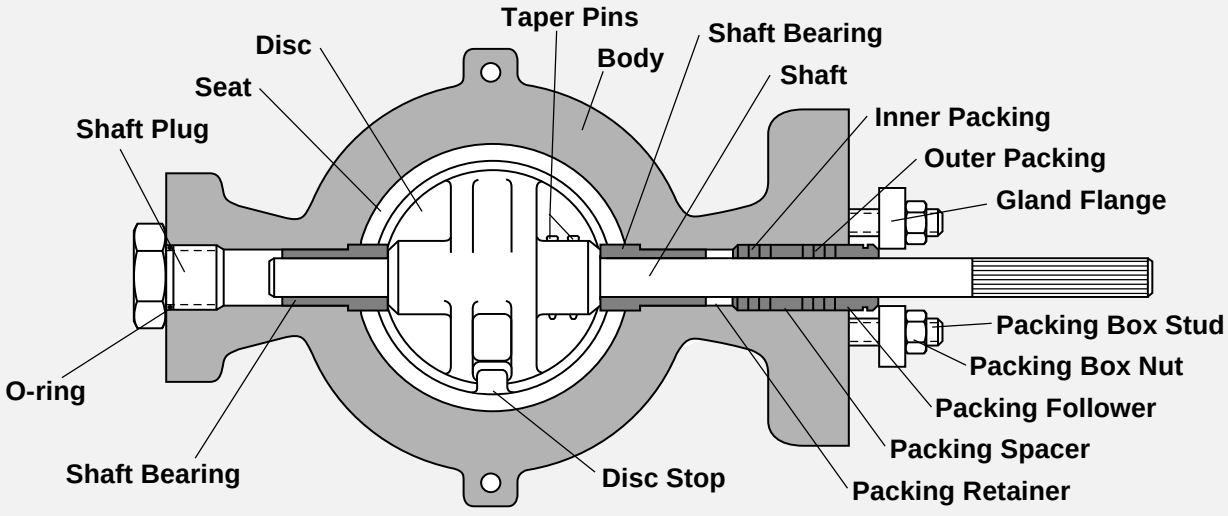


Figure 8: Body Subassembly, Section View

Valtek Valdisk Control Valves
Specifications

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

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

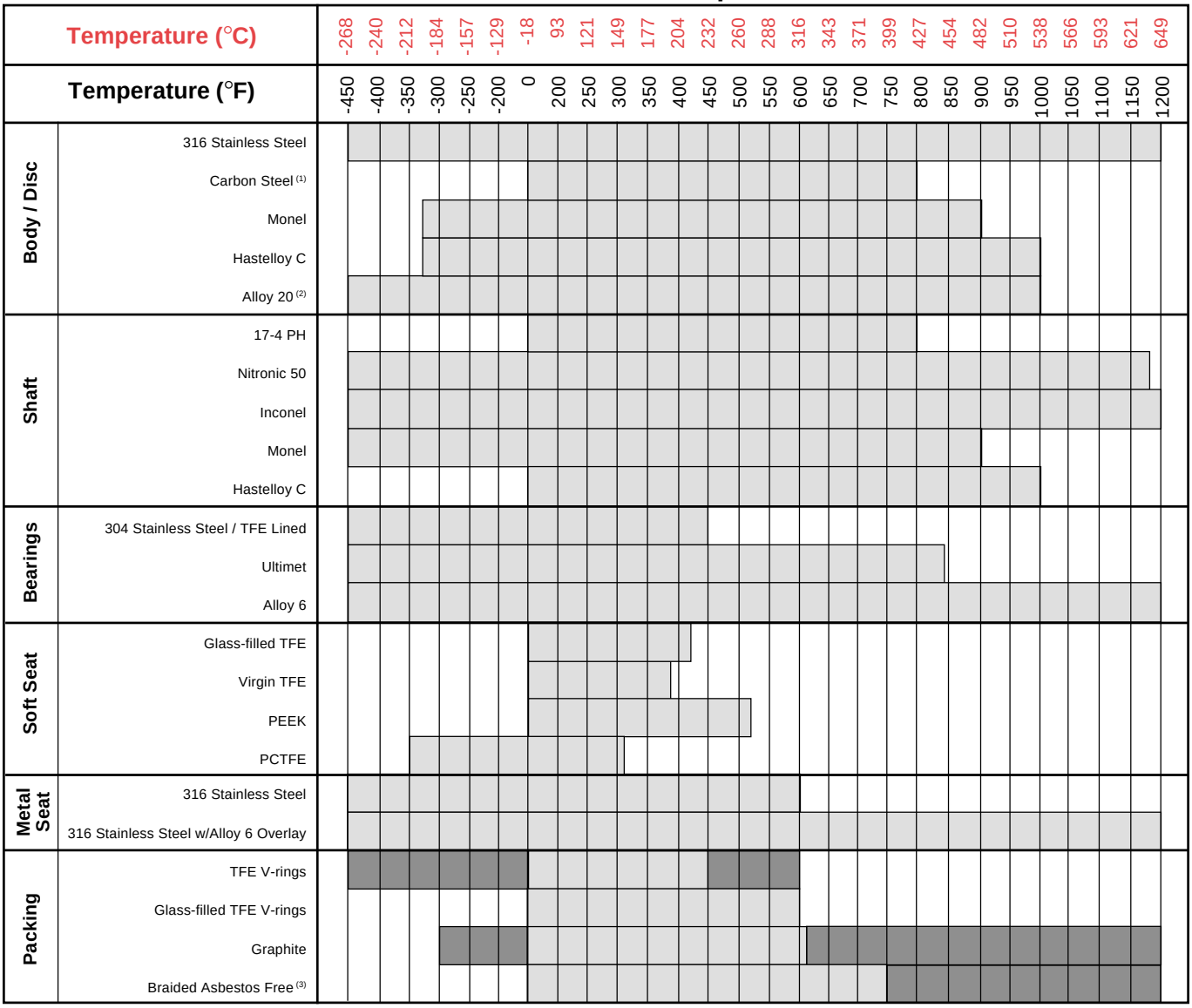
Metal Seat	ANSI Class IV
Jam-lever Toggle Soft Seat	ANSI Class VI
Flow ring	2.5% of rated C_V
Dual Seat	ANSI Class IV

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



(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

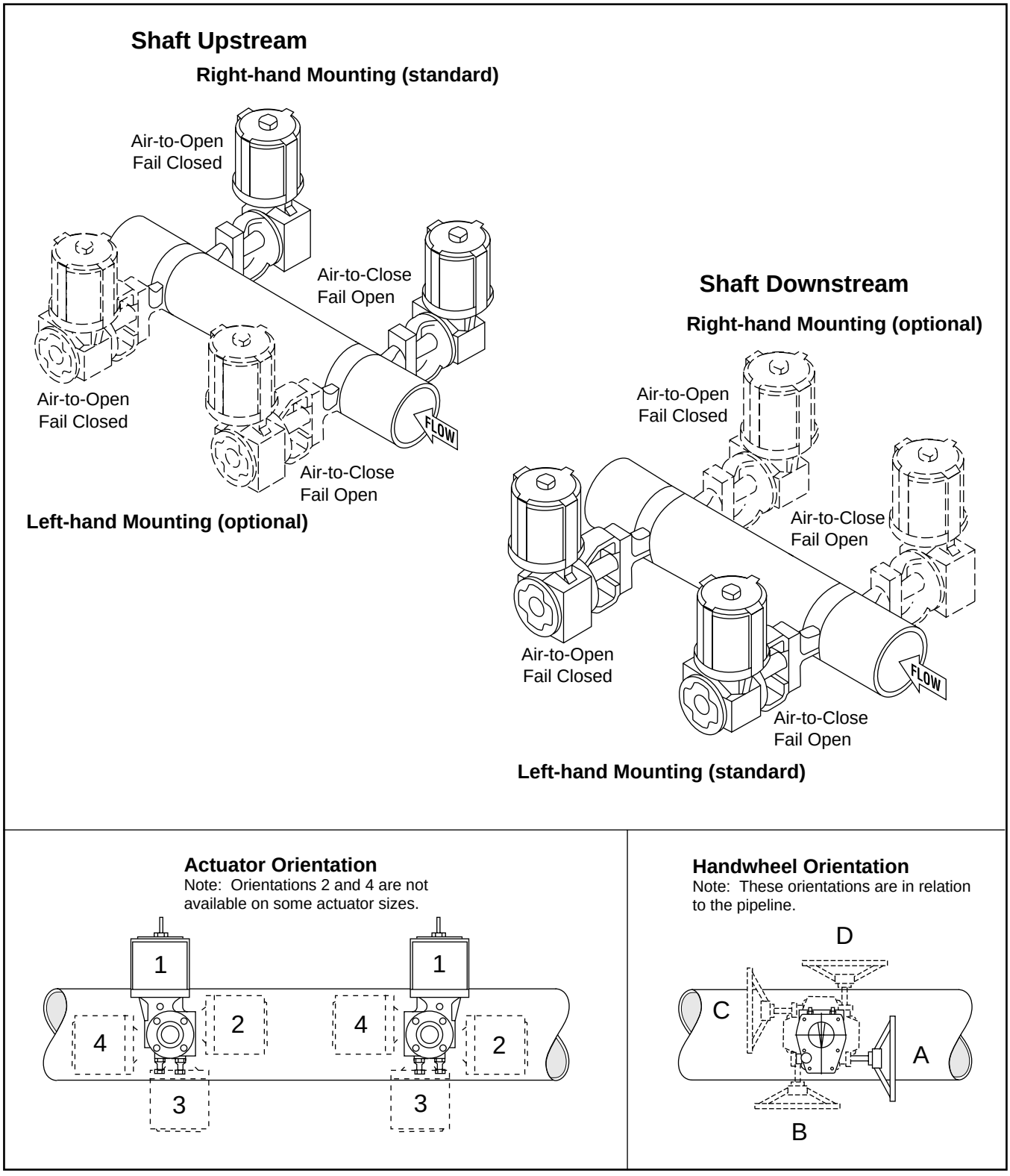


Figure 9: Transfer Case Mounting

Valtek Valdisk Control Valves

Dimensions

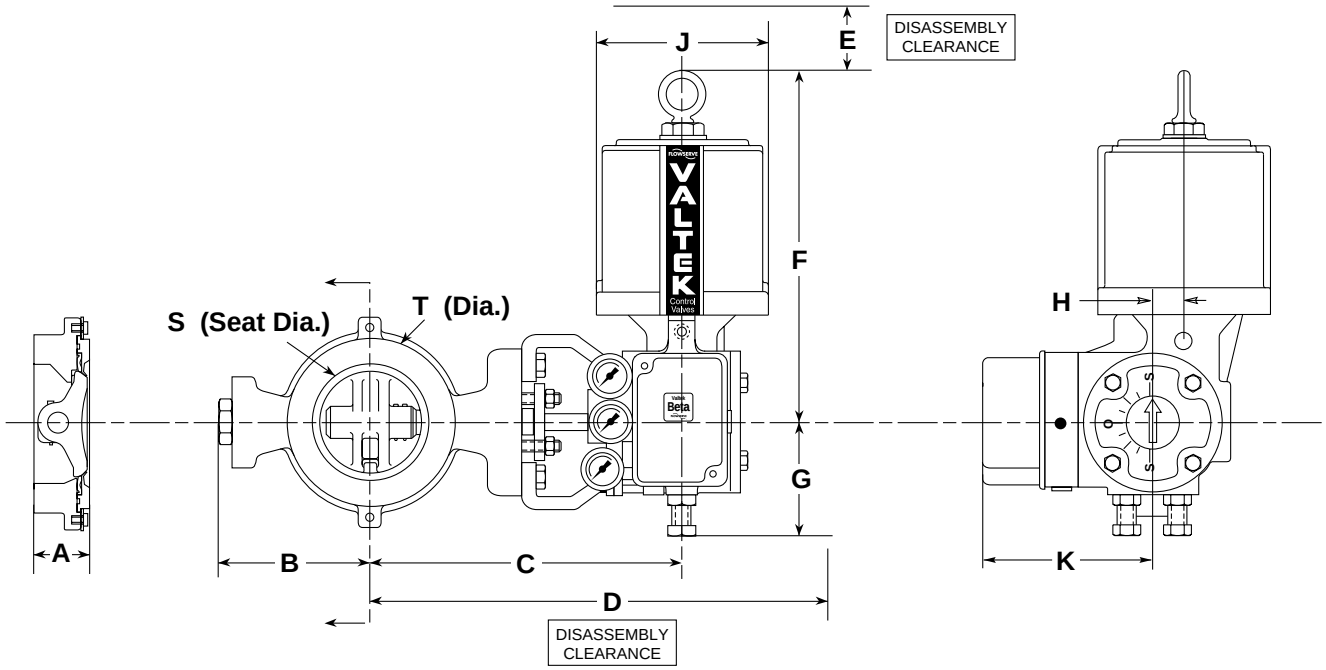


Table VII: Valdisk Dimensions (inches / mm)

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

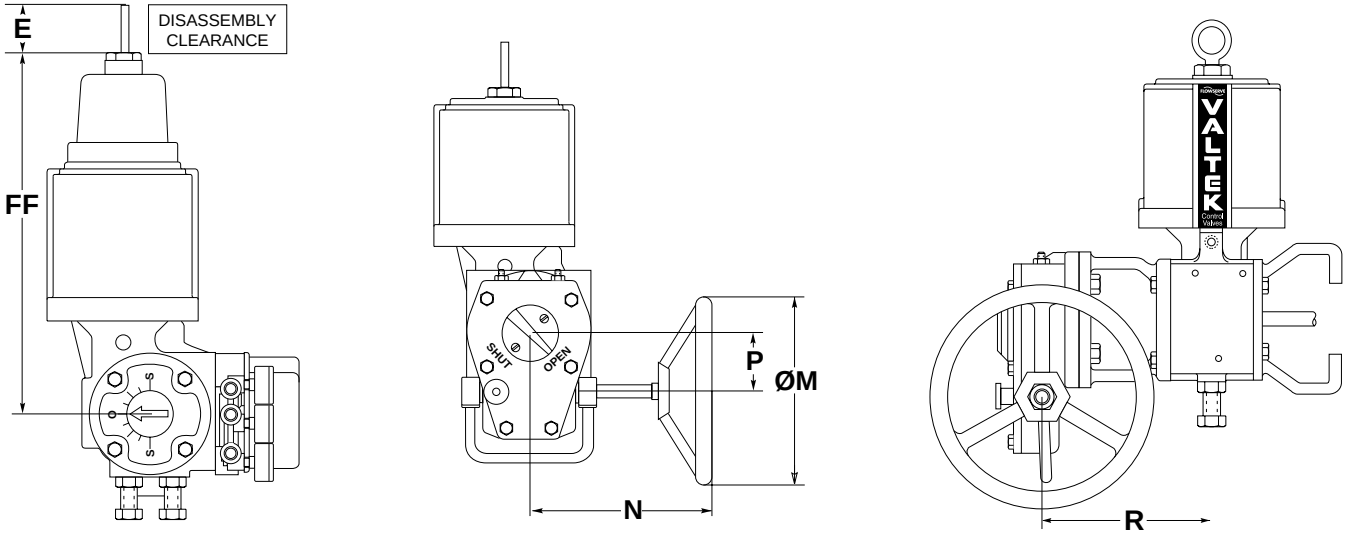


Table VIII: Handwheel and Extended, Heavy-duty Spring Dimensions (inches/mm)

Actuator Size (sq. in.)	E		FF		M		N		P		R	
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:

1. Preferred body size and critical dimensions
2. Start-up and operating conditions: inlet and outlet pressures; temperature, flow rate, fluid's specific gravity or molecular weight, vapor pressure or gas compressibility
3. Maximum operating temperatures and pressures
4. Body and disc pressure rating
5. Materials required: body, disc, shaft, packing and bearings
6. Line size and schedule
7. Specify if used as FM APPROVED fuel service valve (sizes 2, 3, 4, 6-inches)
8. Actuator requirements: type (pneumatic or manual), failure position, size and minimum air supply
9. Actuator position: style and orientation (Figure 9)
10. 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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