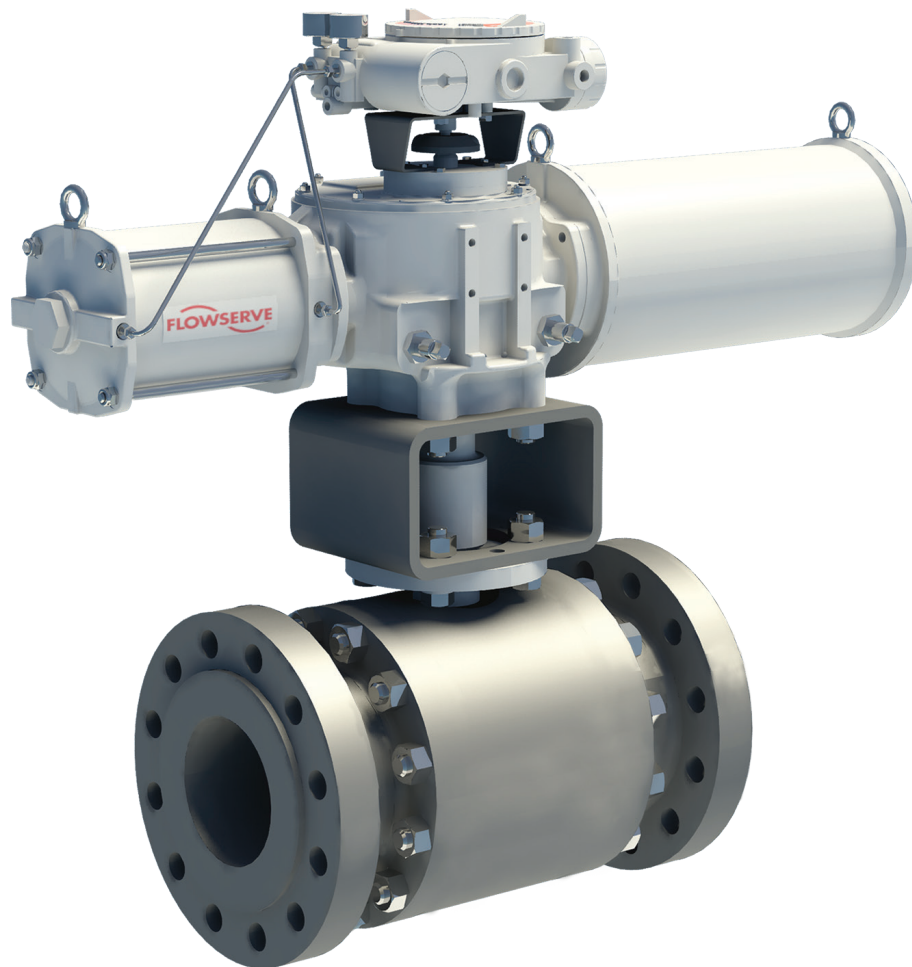


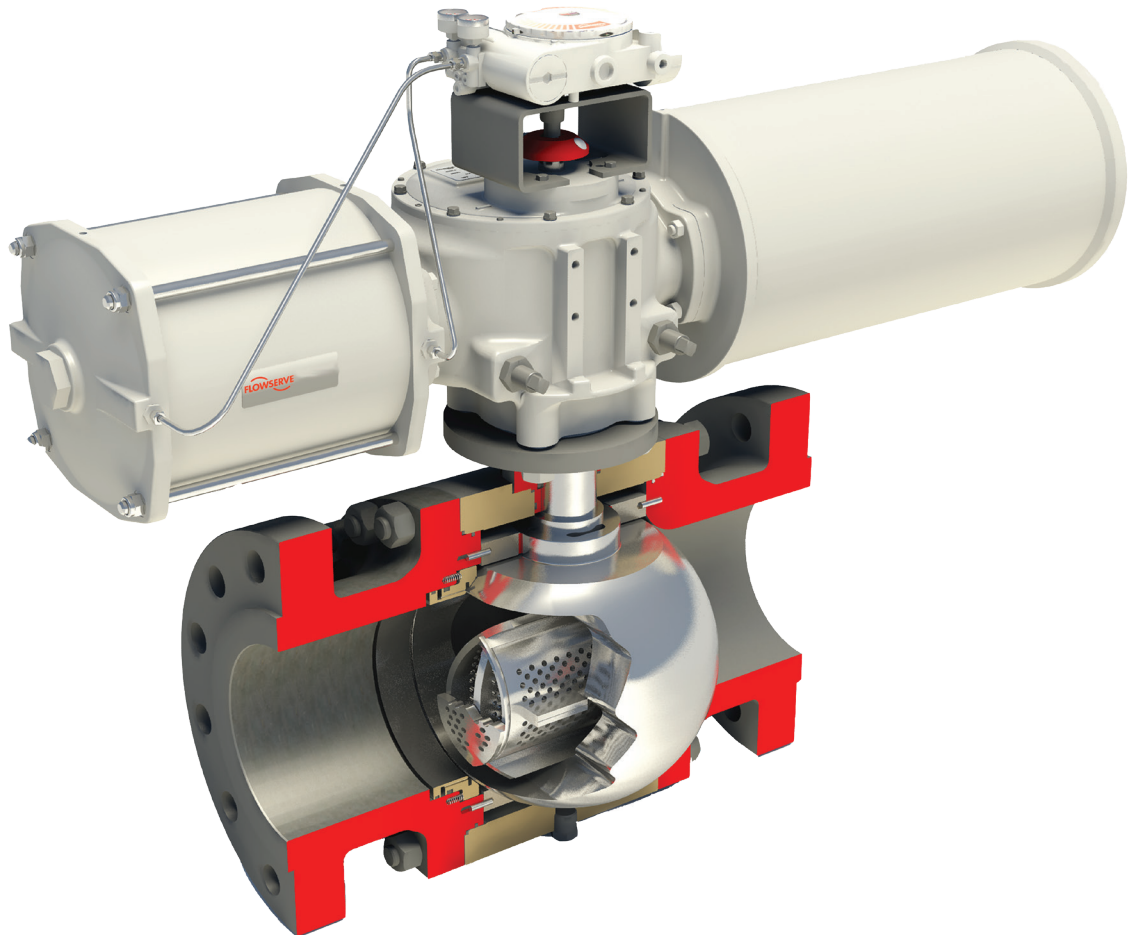
Valbart™ TMCBV Trunnion-Mounted Control Ball Valve



High-rangeability noise control

The Valbart TMCBV trunnion-mounted ball valve has inherent high rangeability and provides exceptional control for both minimum operating conditions as well as high flow rate requirements.

Severe-service trims designed for liquid and gas applications reduce noise and cavitation, even for the most challenging conditions. Combined with a tungsten carbide coating on the ball and seat, they provide reliable continuous control.



Flowserve has an unrivaled combination of technical expertise and practical experience to help you solve the toughest fluid motion control challenges. We help maximize your systems' efficiency and uptime by applying flow-specific technologies and advanced aftermarket capabilities, all supported by a vast team of technical resources.

Advantages and specifications

Table 1: Features and advantages

Features	Advantages
Rangeability	High rangeability of 300:1 provides control of minimum operating conditions and high flow rates.
Severe-service trims	Effective noise attenuation and cavitation control in the most demanding applications
Tungsten carbide coated seat	Tungsten carbide coating on the ball and seat provide low-friction throttling to improve control and increase seat reliability.
Excellent shut-off	Soft or metal seat provides reliable long-life, shut-off capability.
Fugitive emissions packing	Variety of packing configurations designed to provide low fugitive emission compliance with strict environmental regulations
Compact design	Higher flow capacity for a given size results in a smaller size valve and actuator, thus leading to significant space, weight and cost savings.
Few moving parts	Higher level of reliability and performance at a lower cost
High-power actuator	High-thrust actuator allows small, accurate movements.
Tight shaft connections	Tight tolerances on the connections among ball, shaft and actuator provide precise process control.

Table 2: Specifications

Sizes and pressure classes	NPS 4 to 56: Class 150, 300, 600 NPS 4 to 48: Class 900, 1500 NPS 4 to 24: Class 2500 NPS 2 to 11: API 3000, 5000, 10000
End connection	Integral flange or integral hub
Flange facing	Raised face (RF), flat face (FF) or ring-type joint (RTJ)
Body material	A350 LF2, A182 F316; alloys upon request
Face-to-face	API 6D, ASME B16.10, API 6A
Body style	Side-entry or top-entry
Trim style	Full port, reduced port
Bonnet type	Standard, extended, cryogenic or high-temperature
Packing	PTFE V-ring, graphite; others upon request
Fire safety	API 607, ISO 10497, API 6FA
Temperature	-196°C to 450°C (-320°F to 842°F)
Shut-off	ANSI/FCI 70-2: Class IV or V (metal seat) or VI (soft seat)

Design standards

API 6D, API 6A, IEC 60534, ISA 75

Test standards

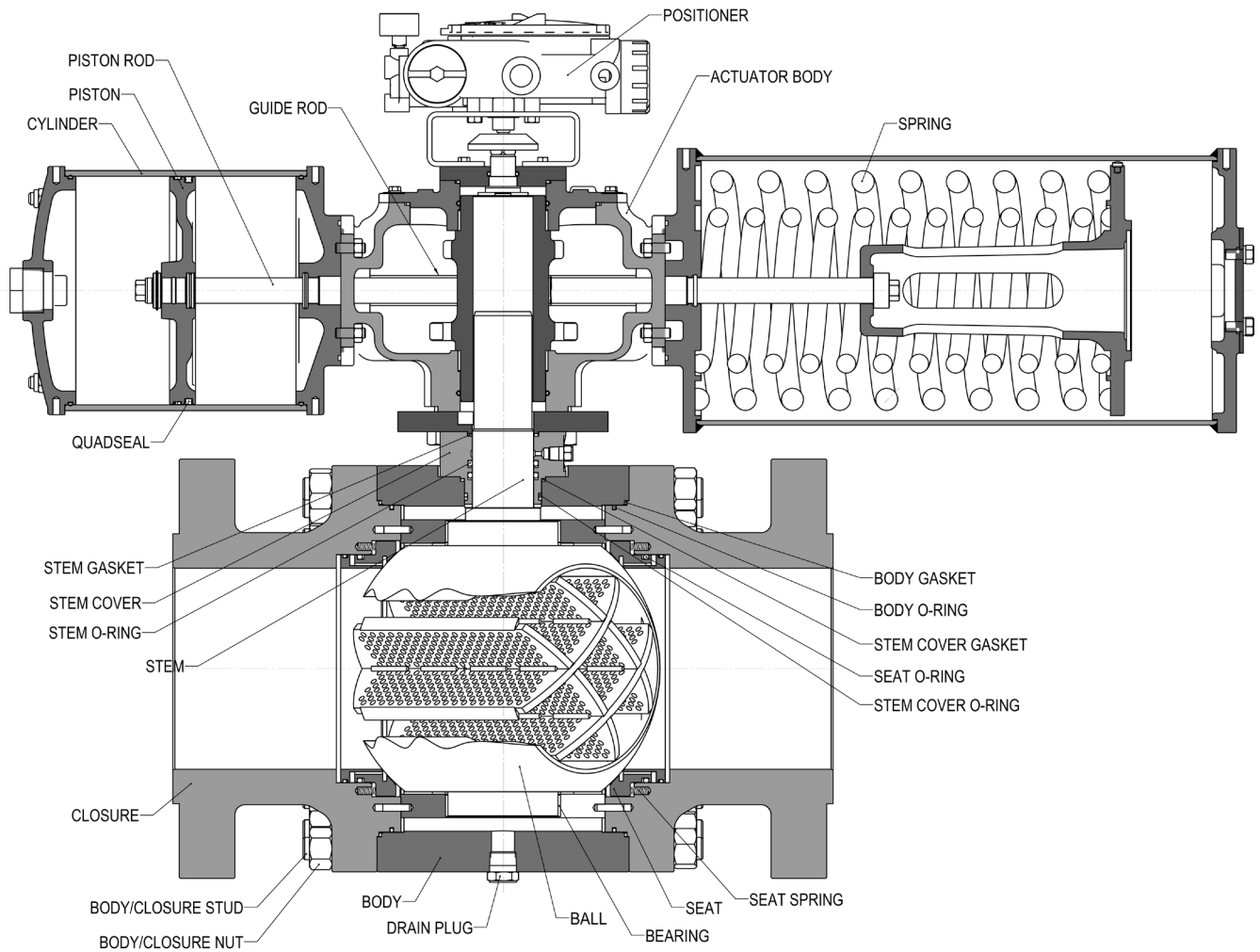
API 6D, API 6A, API 598, ANSI/FCI 70-2,
IEC 60534-4

Certifications/approvals

ISO 9001, PED, CRN, TRCU, ATEX, TSG,
ISO 15848, IEC 61508, API 6FA

Typical design and materials of construction

Section view



Materials

Body and Bonnet	A 350 Gr. LF 2
	A 105
	A 182 Gr. F316/316L
	A 182 Gr. F51 (Duplex)
	ASTM A 351 CF3M/CF8M
	A 182 Gr. F53 (Super-Duplex)
	A 182 Gr. F44 (Super-Austenitic)
	Inconel® 625
	AISI 4130 API 6A 60K
	Other
Body Overlay Materials	316L SS
	Inconel 625
Seals: Body, Closures and Seats	O-rings (Viton® AED, HNBR, others)
	HNBR
	Viton AED
	Lip Seal (PTFE-Elgiloy)
	Graphite
Stem Seals	PTFE V-ring
	Graphite Packing
Bearings	CS + PTFE
	316 SS + PTFE
	Inconel + PTFE
	Inconel (HT)

Body Bolting	B7/2H
	L7/7
	B8/8
	B7M/2HM
	L7M/7M
	B8M/8M
Ball and Seat Ring	A 182 Gr. F316
	A 182 Gr. F316LN
	ASTM A 351 CF3M/CF8M
	A 182 Gr. F51
	A 182 Gr. F53
	Inconel 625
	A 350 Gr. LF2 + 316SS Overlay
A 350 Gr. LF2 + Inconel Overlay	
Ball Coating	Tungsten Carbide Coating (TCC)
	Chromium Carbide Coating (CCC)
Soft Seat	Nylon 6 MoS2
	Nylon PA-12
	Devlon® V-API
	PEEK®
	RPTFE

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© Viton is a registered trademark of the DuPont Company.

© PEEK is a registered trademark of Victrex plc Corp.

Options

Seats

Metal seated valves

The metal seat is suitable for a wide range of demanding applications requiring tight shut-off. Both the seat surfaces (ball and seat) are coated with tungsten carbide as a standard option.

ANSI/FCI 70-2 Class IV shutoff

Soft seated valves

A resilient material is inserted into the metal seat holder to provide a soft seating action in addition to the metal to metal seating between the ball and the seat rings. An optional delta ring insert is also available upon request.

ANSI/FCI 70-2 Class VI shutoff

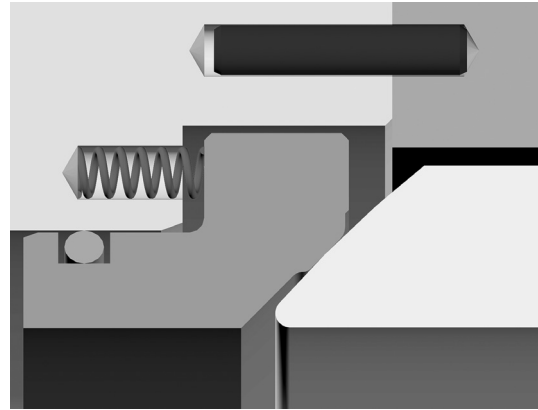


Figure 1: Metal seated

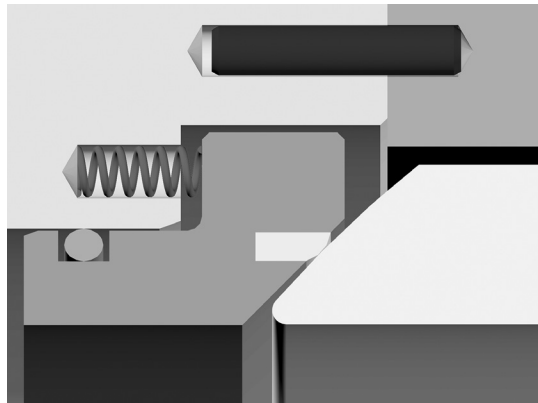


Figure 2: Soft seated

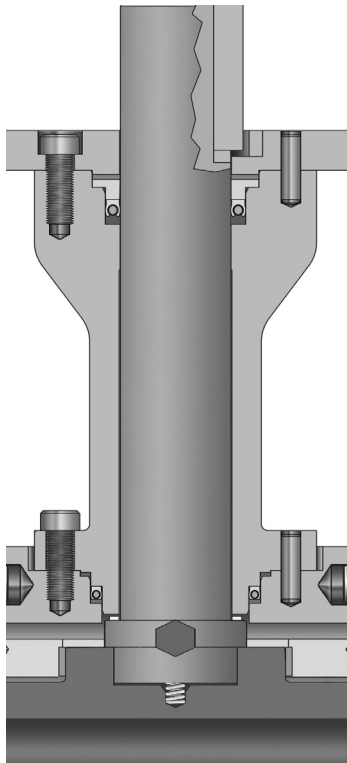


Figure 3: Extended bonnet

Bonnets

Valve designs are available with bonnet extensions for applications involving extremely low or high temperatures. PTFE V-ring or graphite packing is available upon request.

Standard bonnet

Standard bonnets are suitable for most typical applications.

Temperature range: -50°C to 200°C (-58°F to 392°F)

Extended bonnet

Extended bonnets are available for higher temperature applications or installations in which the actuator must be further from the valve.

Temperature range: -50°C to 450°C (-58°F to 842°F)

Cryogenic bonnet

Cryogenic bonnets are recommended for cold applications, such as liquefied natural gas (LNG) service.

Temperature range: -196°C to 200°C (-320°F to 392°F)

Severe-service trims

Noise reduction trims

TMCBV noise reduction trims effectively reduce control valve noise in a range of gas applications by controlling turbulence carried into the downstream piping. Each stage is designed to take a small pressure drop, avoiding the high velocities through gradual pressure reduction.

D1 trim

Two-stage trim providing noise attenuation for difficult low flows, then opening up to optimize flow and rangeability

N2 trim

Three- to four-stage trims providing up to 30 dBA attenuation. Flow path is controlled to maximize noise reduction.

Cavitation reduction trims

TMCBV cavitation control trims reduce or eliminate cavitation, depending on the application requirements. The trims are available in multiple styles optimized for cavitation control and flow capacity.

C1 trim

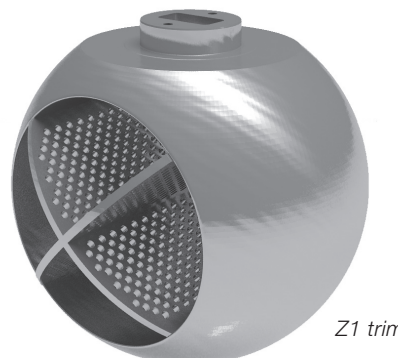
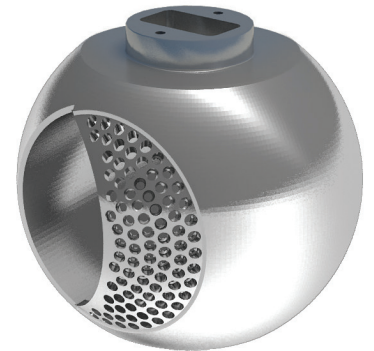
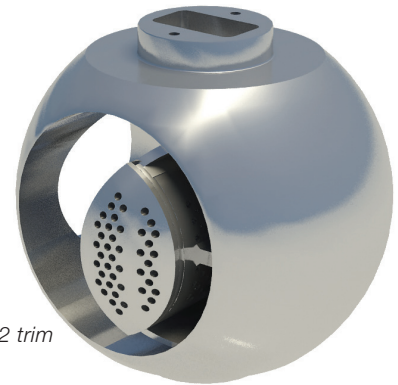
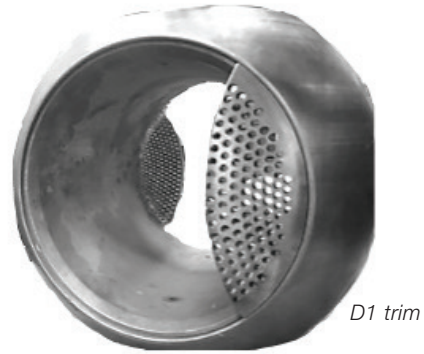
Minimizes the cavitation damage to valve internals by controlling the location and concentration of cavitation vapor bubble implosion in an area away from the metal parts

C2 trim

An extension of the C1 trim customized for applications which see cavitation in lower openings but would need more flow capacity at higher openings

Z1/Z2 trim

Omnidirectional and self-cleaning. Useful for preventing cavitation and noise for dual-phase applications.



Cv at 100% open – Full port

Table 3: Cvs for noise reduction trims by pressure class and valve size

NPS	Standard Trim				D1				N2-3				N2-4			
	150/ 300/ 600	900	1500	2500	150/ 300/ 600	900	1500	2500	150/ 300/ 600	900	1500	2500	150/ 300/ 600	900	1500	2500
4	1,850	1,800	1,700	1,100	576	220	208	135	324	253	239	155	N/A			
6	4,600	4,380	3,800	2,500	1,180	536	465	306	730	616	535	352	527	505	438	288
8	9,000	8,500	7,400	5,300	2,160	1,040	906	649	1,308	1,196	1,041	746	945	980	853	611
10	14,700	14,500	11,500	8,300	3,283	1,774	1,407	1,016	2,057	2,040	1,618	1,168	1,486	1,672	1,326	957
12	22,500	21,100	18,000	13,000	4,492	2,582	2,203	1,591	2,975	2,969	2,532	1,829	2,144	2,434	2,076	1,499
14	28,000	25,000	21,000		6,480	3,059	2,570		3,594	3,517	2,954		2,562	2,883	2,422	
16	37,200	34,500	27,500		7,716	4,222	3,365		4,772	4,854	3,869		3,386	3,979	3,172	
18	49,000	45,000	37,000		10,621	5,506	4,528		6,170	6,331	5,205		4,336	5,190	4,267	
20	59,000	55,200	47,800		12,297	6,755	5,849		7,787	7,766	6,725		5,468	6,366	5,513	
22	68,200				15,127				9,679				6,819			
24	92,000	83,800	70,000		17,960	10,254	8,566		11,888	11,790	9,848		8,440	9,665	8,073	
26	110,000				20,764				13,724				9,750			
28	121,000	113,000			25,108	13,827			16,027	15,898			11,386	13,033		
30	144,000	130,000			29,380	15,908			18,509	18,290			13,149	14,993		
32	170,000	151,000			32,557	18,477			20,788	21,244			14,768	17,415		
34	189,000				36,635				23,602				16,767			
36	210,000	198,200			42,440	24,253			26,167	27,885			18,590	22,859		
40	267,500				50,288				32,639				23,187			
42	280,000				54,205				35,643				25,321			
48	384,000				69,551				46,581				33,091			
56	521,000				100,208				63,350				45,005			

Table 4: Cvs for cavitation reduction trims by pressure class and valve size

NPS	C1				C2-40				Z1				Z2			
	150/ 300/ 600	900	1500	2500	150/ 300/ 600	900	1500	2500	150/ 300/ 600	900	1500	2500	150/ 300/ 600	900	1500	2500
4	84	80	76	46	409				708	481	454	294	463	422	399	258
6	142	181	157	103	583	632	548	361	1,393	1,171	1,016	668	901	1,027	891	586
8	278	351	305	219	1,142	1,226	1,067	764	2,605	2,272	1,978	1,417	1,753	1,994	1,736	1,243
10	464	599	475	343	1,853	2,091	1,659	1,197	4,319	3,876	3,074	2,219	2,969	3,401	2,697	1,947
12	725	871	743	537	2,817	3,043	2,596	1,875	6,541	5,641	4,812	3,475	4,557	4,949	4,222	3,049
14	921	1,032	867		3,481	3,606	3,029		8,264	6,683	5,614		5,808	5,863	4,925	
16	1,248	1,424	1,135		4,592	4,976	3,966		11,357	9,223	7,352		8,006	8,091	6,450	
18	1,678	1,858	1,527		5,960	6,490	5,336		14,526	12,030	9,891		10,422	10,554	8,678	
20	2,060	2,279	1,973		7,069	7,961	6,894		17,955	14,757	12,779		13,056	12,946	11,211	
22	2,429				8,048				21,616				15,872			
24	3,341	3,459	2,889		10,690	12,086	10,096		25,444	22,403	18,713		18,770	19,654	16,417	
26	4,003				12,824				30,556				21,957			
28	4,451	4,664			14,436	16,297			35,943	30,209			25,854	26,502		
30	5,295	5,366			17,548	18,749			41,663	34,753			30,171	30,489		
32	6,327	6,233			20,687	21,778			47,236	40,367			34,653	35,414		
34	7,039				22,984				53,681				40,218			
36	7,834	8,181			26,298	28,585			59,850	52,985			46,505	46,484		
40	9,985				33,510				74,952				58,794			
42	11,098				35,841				82,611				64,514			
48	14,453				48,523				108,344				84,854			
56	19,654				66,541				147,614				115,547			

Cv at 100% open – Reduced port

Table 5: Cvs for noise reduction trims by pressure class and valve size

NPS	Standard Trim				D1			N2-3			N2-4					
	150/ 300/ 600	900	1500	2500	150/ 300/ 600	900	1500	2500	150/ 300/ 600	900	1500	2500	150/ 300/ 600	900	1500	2500
6 x 4	790	790	780	745	440				222	216	204	132				
8 x 6	2,150	2,150	2,150	2,150	1,006				552	526	456	300	453	431	374	246
10 x 8	4,300	4,450	4,450	4,100	1,920				1,080	1,020	888	636	886	836	728	522
12 x 10	7,550	8,000	9,000	7,550	3,024				1,764	1,740	1,380	996	1,447	1,427	1,132	817
14 x 10	6,000	6,100	6,100		2,828				1,696	1,673	1,327		1,391	1,372	1,088	
14 x 12	14,000	12,800	13,000		4,378				2,700	2,532	2,160		2,214	2,076	1,771	
16 x 12	9,100	8,900	8,900		4,029				2,596	2,434	2,077		2,128	1,996	1,703	
16 x 14	15,000	14,200	14,100		6,056				3,360	3,000	2,520		2,755	2,460	2,066	
18 x 16	21,000	19,200	19,000		7,383				4,464	4,140	3,300		3,661	3,395	2,706	
20 x 16	15,300	13,800	12,000		6,857				4,292	3,980	3,173		3,519	3,264	2,602	
20 x 18	28,400	25,000	25,000		10,194				5,880	5,400	4,440		4,822	4,428	3,641	
24 x 20	28,000	25,100	20,600		11,277				6,807	6,368	5,514		5,581	5,222	4,522	
30 x 24	36,000	32,900			16,125				10,614	9,668			8,703	7,927		
36 x 30	64,000	61,500			27,075				16,613	14,997			13,622	12,298		
36 x 32	87,000	69,500			31,252				19,612	17,420			16,082	14,284		
42 x 36	96,000				39,525				24,227				19,866			

Table 6: Cvs for cavitation reduction trims by pressure class and valve size

NPS	C1				C2-40			Z1			Z2					
	150/ 300/ 600	900	1500	2500	150/ 300/ 600	900	1500	2500	150/ 300/ 600	900	1500	2500	150/ 300/ 600	900	1500	2500
6 x 4	83	76	71	43	351				491	433	409	265	383	380	359	232
8 x 6	142	170	147	97	558				1,129	1,054	914	602	816	925	802	528
10 x 8	277	330	287	206	1,102				2,212	2,045	1,780	1,275	1,617	1,794	1,562	1,119
12 x 10	463	563	446	322	1,802				3,775	3,489	2,767	1,997	2,773	3,061	2,427	1,752
14 x 10	462	622	494		1,758				3,412	3,527	2,798		2,619	3,095	2,454	
14 x 12	725	819	698		2,788				6,205	5,077	4,331		4,439	4,454	3,799	
16 x 12	723	906	773		2,691				5,313	5,133	4,379		4,076	4,503	3,842	
16 x 14	920	970	815		3,410				7,434	6,015	5,053		5,497	5,277	4,433	
18 x 16	1,246	1,339	1,067		4,519				10,368	8,301	6,617		7,636	7,282	5,805	
20 x 16	1,244	1,481	1,181		4,390				9,044	8,393	6,690		7,058	7,363	5,869	
20 x 18	1,676	1,746	1,436		5,881				13,488	10,827	8,902		10,018	9,498	7,810	
24 x 20	2,055	2,370	2,052		6,858				15,158	13,429	11,628		11,854	11,781	10,202	
30 x 24	3,327	3,597			10,262				20,895	20,386			16,703	17,885		
36 x 30	5,280	5,581			17,018				35,766	31,626			27,691	27,745		
36 x 32	6,317	5,859			20,340				43,494	36,734			33,092	32,227		
42 x 36	7,814				25,558				52,409				42,746			

Dimensions and weights

ASME Class 150

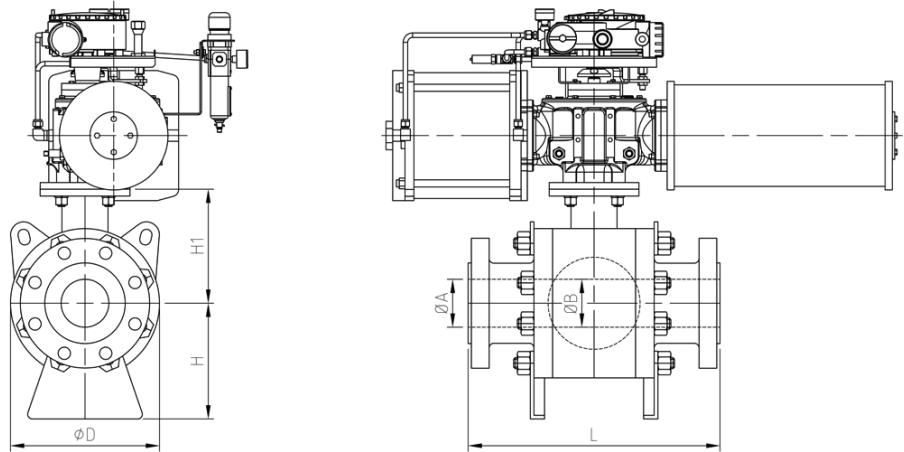


Table 7: ASME Class 150 – Full and reduced bore

NPS	Pressure Class	Metric							U.S.						
		L (mm)	ØA (mm)	ØB (mm)	ØD (mm)	H (mm)	H' (mm)	Weight (kg)	L (in.)	ØA (in.)	ØB (in.)	ØD (in.)	H (in.)	H' (in.)	Weight (lb)
4 x 3	150	229	100	74	198	136	154	49	9.02	3.94	2.91	7.80	5.35	6.06	107
4	150	229	100	100	245	154	182	73	9.02	3.94	3.94	9.65	6.06	7.17	161
6 x 4	150	394	150	100	245	154	182	100	15.51	5.91	3.94	9.65	6.06	7.17	220
6	150	394	150	150	325	220	227	154	15.51	5.91	5.91	12.80	8.66	8.94	340
8 x 6	150	457	201	150	325	220	227	191	17.99	7.91	5.91	12.80	8.66	8.94	421
8	150	457	201	201	402	265	267	256	17.99	7.91	7.91	15.83	10.43	10.51	564
10 x 8	150	533	252	201	402	265	267	304	20.98	9.92	7.91	15.83	10.43	10.51	670
10	150	533	252	252	472	315	301	385	20.98	9.92	9.92	18.58	12.40	11.85	849
12 x 10	150	610	303	252	472	315	301	467	24.02	11.93	9.92	18.58	12.40	11.85	1,030
14 x 10	150	686	334	252	472	315	301	475	27.01	13.15	9.92	18.58	12.40	11.85	1,047
12	150	610	303	303	581	370	369	656	24.02	11.93	11.93	22.87	14.57	14.53	1,446
14 x 12	150	686	334	303	581	370	369	664	27.01	13.15	11.93	22.87	14.57	14.53	1,464
16 x 12	150	762	385	303	581	370	369	834	30.00	15.16	11.93	22.87	14.57	14.53	1,839
14	150	686	334	334	610	380	383	725	27.01	13.15	13.15	24.02	14.96	15.08	1,598
16 x 14	150	762	385	334	610	380	383	893	30.00	15.16	13.15	24.02	14.96	15.08	1,969
18 x 14	150	864	436	334	610	380	383	1,000	34.02	17.17	13.15	24.02	14.96	15.08	2,205
16	150	762	385	385	684	445	421	1,130	30.00	15.16	15.16	26.93	17.52	16.57	2,491
18 x 16	150	864	436	385	684	445	421	1,238	34.02	17.17	15.16	26.93	17.52	16.57	2,729
20 x 16	150	914	487	385	684	445	421	1,374	35.98	19.17	15.16	26.93	17.52	16.57	3,029
18	150	864	436	436	772	480	467	1,562	34.02	17.17	17.17	30.39	18.90	18.39	3,444
20 x 18	150	914	487	436	772	480	467	1,698	35.98	19.17	17.17	30.39	18.90	18.39	3,743
20	150	914	487	487	846	530	500	2,015	35.98	19.17	19.17	33.31	20.87	19.69	4,442
24 x 20	150	1,067	589	487	846	530	500	2,369	42.01	23.19	19.17	33.31	20.87	19.69	5,223
22	150	991	538	538	924	590	545	2,543	39.02	21.18	21.18	36.38	23.23	21.46	5,606
24	150	1,067	589	589	998	620	582	3,118	42.01	23.19	23.19	39.29	24.41	22.91	6,874
30 x 24	150	1,295	735	589	998	620	582	3,896	50.98	28.94	23.19	39.29	24.41	22.91	8,589
26	150	1,143	633	633	1,099	670	654	4,170	45.00	24.92	24.92	43.27	26.38	25.75	9,193
28	150	1,245	684	684	1,185	770	676	4,990	49.02	26.93	26.93	46.65	30.31	26.61	11,001
30	150	1,295	735	735	1,245	760	707	5,850	50.98	28.94	28.94	49.02	29.92	27.81	12,897
36 x 30	150	1,524	874	735	1,245	760	707	6,922	60.00	34.41	28.94	49.02	29.92	27.83	15,260
32	150	1,372	779	779	1,320	798	744	6,937	54.02	30.67	30.67	51.97	31.42	29.29	15,293
34	150	1,473	830	830	1,405	853	806	8,466	57.99	32.68	32.68	55.31	33.58	31.73	18,664
36	150	1,524	874	874	1,470	885	838	9,523	60.00	34.41	34.41	57.87	34.84	32.99	20,995
40	150	1,753	976	976	1,605	990	950	12,560	69.02	38.43	38.43	63.19	38.98	37.40	27,690
42	150	1,790	1,020	1,020	1,692	1,025	930	14,052	70.47	40.16	40.16	66.61	40.35	36.61	30,979
48	150	1,995	1,166	1,166	1,920	1,200	1,079	21,900	78.54	45.91	45.91	75.59	47.24	42.48	48,281
56	150	2,489	1,360	1,360	2,270	1,370	1,250	34,100	97.99	53.54	53.54	89.37	53.94	49.21	75,178

ASME Class 300

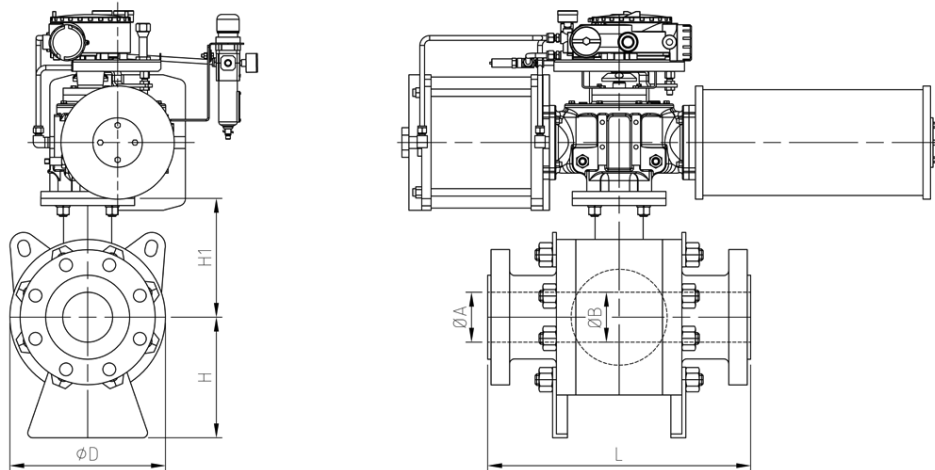


Table 8: ASME Class 300 – Full and reduced bore

NPS	Pressure Class	Metric							U.S.						
		L (mm)	ØA (mm)	ØB (mm)	ØD (mm)	H (mm)	H' (mm)	Weight (kg)	L (in.)	ØA (in.)	ØB (in.)	ØD (in.)	H (in.)	H' (in.)	Weight (lb)
4 x 3	300	305	100	74	220	143	167	74	12.01	3.94	2.91	8.66	5.63	6.57	163
4	300	305	100	100	254	159	186	100	12.01	3.94	3.94	10.00	6.26	7.32	220
6 x 4	300	403	150	100	254	159	186	138	15.87	5.91	3.94	10.00	6.26	7.32	304
6	300	403	150	150	324	235	227	171	15.87	5.91	5.91	12.76	9.25	8.94	377
8 x 6	300	502	201	150	324	235	227	235	19.76	7.91	5.91	12.76	9.25	8.94	518
8	300	502	201	201	404	280	277	312	19.76	7.91	7.91	15.91	11.02	10.91	688
10 x 8	300	568	252	201	404	280	277	367	22.36	9.92	7.91	15.91	11.02	10.91	809
10	300	568	252	252	497	343	327	485	22.36	9.92	9.92	19.57	13.50	12.87	1,069
12 x 10	300	648	303	252	497	343	327	579	25.51	11.93	9.92	19.57	13.50	12.87	1,276
14 x 10	300	762	334	252	497	343	327	678	30.00	13.15	9.92	19.57	13.50	12.87	1,495
12	300	648	303	303	581	370	369	723	25.51	11.93	11.93	22.87	14.57	14.53	1,594
14 x 12	300	762	334	303	581	370	369	822	30.00	13.15	11.93	22.87	14.57	14.53	1,812
16 x 12	300	838	385	303	581	370	369	974	32.99	15.16	11.93	22.87	14.57	14.53	2,147
14	300	762	334	334	610	390	383	918	30.00	13.15	13.15	24.02	15.35	15.06	2,024
16 x 14	300	838	385	334	610	390	383	1,070	32.99	15.16	13.15	24.02	15.35	15.08	2,359
18 x 14	300	914	436	334	610	390	383	1,239	35.98	17.17	13.15	24.02	15.35	15.08	2,732
16	300	838	385	385	696	458	428	1,341	32.99	15.16	15.16	27.40	18.03	16.85	2,956
18 x 16	300	914	436	385	696	458	428	1,511	35.98	17.17	15.16	27.40	18.03	16.85	3,331
20 x 16	300	991	487	385	696	458	428	1,705	39.02	19.17	15.16	27.40	18.03	16.85	3,759
18	300	914	436	436	778	500	467	1,801	35.98	17.17	17.17	30.63	19.69	18.39	3,971
20 x 18	300	991	487	436	778	500	467	1,995	39.02	19.17	17.17	30.63	19.69	18.39	4,398
20	300	991	487	487	867	535	515	2,380	39.02	19.17	19.17	34.13	21.06	20.28	5,247
24 x 20	300	1,143	589	487	867	535	515	2,873	45.00	23.19	19.17	34.13	21.06	20.28	6,334
22	300	1,092	538	538	943	600	553	3,065	42.99	21.18	21.18	37.13	23.62	21.77	6,757
24	300	1,143	589	589	1,024	635	596	3,745	45.00	23.19	23.19	40.31	25.00	23.46	8,256
30 x 24	300	1,397	735	589	1,024	635	596	4,860	55.00	28.94	23.19	40.31	25.00	23.46	10,714
26	300	1,245	633	633	1,103	720	656	4,830	49.02	24.92	24.92	43.43	28.35	25.83	10,648
28	300	1,346	684	684	1,180	770	693	5,922	52.99	26.93	26.93	46.46	30.31	27.26	13,056
30	300	1,397	735	735	1,271	775	741	6,980	55.00	28.94	28.94	50.04	30.51	29.15	15,388
36 x 30	300	1,727	874	735	1,271	775	741	8,675	67.99	34.41	28.94	50.04	30.51	29.17	19,125
32	300	1,524	779	779	1,340	810	755	8,188	60.00	30.67	30.67	52.76	31.89	29.72	18,051
34	300	1,626	830	830	1,430	870	783	9,992	64.02	32.68	32.68	56.30	34.25	30.83	22,029
36	300	1,727	874	874	1,496	900	829	11,432	67.99	34.41	34.41	58.90	35.43	32.64	25,203
40	300	1,750	976	976	1,660	1,020	940	13,775	68.90	38.43	38.43	65.35	40.16	37.01	30,369
42	300	1,780	1,020	1,020	1,727	1,040	981	15,600	70.08	40.16	40.16	67.99	40.94	38.62	34,392
48	300	2,070	1,166	1,166	1,960	1,210	1,084	21,796	81.50	45.91	45.91	77.17	47.64	42.68	48,052
56	300	2,570	1,360	1,360	2,320	1,410	1,290	38,155	101.18	53.54	53.54	91.34	55.51	50.79	84,117

ASME Class 600

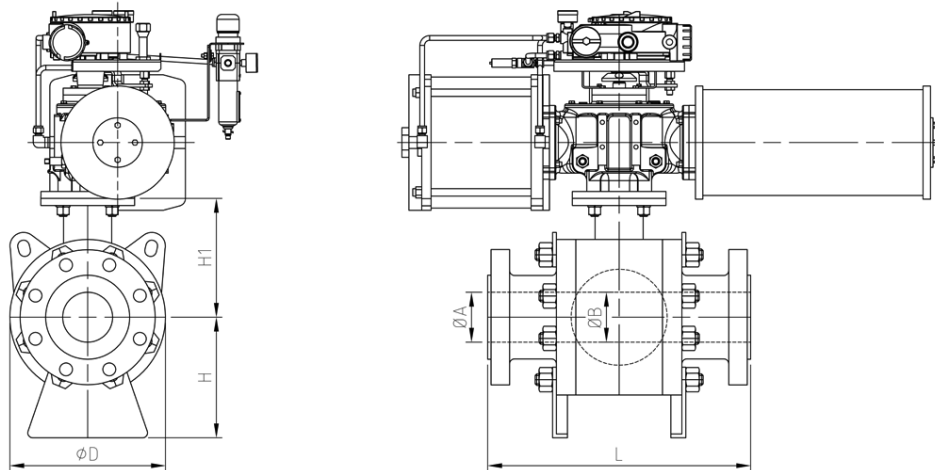


Table 9: ASME Class 600 – Full and reduced bore

NPS	Pressure Class	Metric							U.S.						
		L (mm)	ØA (mm)	ØB (mm)	ØD (mm)	H (mm)	H' (mm)	Weight (kg)	L (in.)	ØA (in.)	ØB (in.)	ØD (in.)	H (in.)	H' (in.)	Weight (lb)
4 x 3	600	432	100	74	216	143	167	75	17.01	3.94	2.91	8.50	5.63	6.57	165
4	600	432	100	100	254	159	186	110	17.01	3.94	3.94	10.00	6.26	7.32	243
6 x 4	600	559	150	100	254	178	186	160	22.01	5.91	3.94	10.00	7.01	7.32	353
6	600	559	150	150	329	245	227	251	22.01	5.91	5.91	12.95	9.65	8.94	553
8 x 6	600	660	201	150	329	245	227	332	25.98	7.91	5.91	12.95	9.65	8.94	732
8	600	660	201	201	406	280	277	406	25.98	7.91	7.91	15.98	11.02	10.91	895
10 x 8	600	787	252	201	406	280	277	566	30.98	9.92	7.91	15.98	11.02	10.91	1,248
10	600	787	252	252	512	343	331	688	30.98	9.92	9.92	20.16	13.50	13.03	1,517
12 x 10	600	838	303	252	512	343	331	789	32.99	11.93	9.92	20.16	13.50	13.03	1,739
14 x 10	600	889	334	252	512	343	331	891	35.00	13.15	9.92	20.16	13.50	13.03	1,964
12	600	838	303	303	610	395	384	935	32.99	11.93	11.93	24.02	15.55	15.12	2,061
14 x 12	600	889	334	303	610	395	384	1,037	35.00	13.15	11.93	24.02	15.55	15.12	2,286
16 x 12	600	991	385	303	610	395	384	1,301	39.02	15.16	11.93	24.02	15.55	15.12	2,868
14	600	889	334	334	622	400	390	1,206	35.00	13.15	13.15	24.49	15.75	15.35	2,659
16 x 14	600	991	385	334	622	400	390	1,470	39.02	15.16	13.15	24.49	15.75	15.35	3,241
18 x 14	600	1,092	436	334	622	400	390	1,761	42.99	17.17	13.15	24.49	15.75	15.35	3,882
16	600	991	385	385	712	465	428	1,751	39.02	15.16	15.16	28.03	18.31	16.85	3,860
18 x 16	600	1,092	436	385	712	465	428	2,042	42.99	17.17	15.16	28.03	18.31	16.85	4,502
20 x 16	600	1,194	487	385	712	465	428	2,383	47.01	19.17	15.16	28.03	18.31	16.85	5,254
18	600	1,092	436	436	809	515	482	2,431	42.99	17.17	17.17	31.85	20.28	18.98	5,359
20 x 18	600	1,194	487	436	809	515	482	2,772	47.01	19.17	17.17	31.85	20.28	18.98	6,111
20	600	1,194	487	487	893	550	530	3,186	47.01	19.17	19.17	35.16	21.65	20.87	7,024
24 x 20	600	1,397	589	487	893	550	530	4,108	55.00	23.19	19.17	35.16	21.65	20.87	9,057
22	600	1,295	538	538	980	620	590	4,115	50.98	21.18	21.18	38.58	24.41	23.23	9,072
24	600	1,397	589	589	1,060	655	630	5,151	55.00	23.19	23.19	41.73	25.79	24.80	11,356
30 x 24	600	1,651	735	589	1,060	655	630	6,535	65.00	28.94	23.19	41.73	25.79	24.80	14,407
26	600	1,448	633	633	1,148	715	675	6,364	57.01	24.92	24.92	45.20	28.15	26.57	14,030
28	600	1,549	684	684	1,215	770	715	7,758	60.98	26.93	26.93	47.83	30.31	28.15	17,103
30	600	1,651	735	735	1,280	820	771	8,681	65.00	28.94	28.94	50.39	32.28	30.35	19,138
36 x 30	600	2,083	874	735	1,280	820	771	11,668	82.01	34.41	28.94	50.39	32.28	30.35	25,724
32	600	1,778	779	779	1,400	850	815	11,227	70.00	30.67	30.67	55.12	33.46	32.09	24,750
34	600	1,930	830	830	1,482	900	857	13,199	75.98	32.68	32.68	58.35	35.43	33.74	29,099
36	600	2,083	874	874	1,535	995	899	15,110	82.01	34.41	34.41	60.43	39.17	35.39	33,312
40	600	2,080	976	976	1,716	1,048	976	18,548	81.89	38.43	38.43	67.56	41.26	38.43	40,891
42	600	2,175	1,020	1,020	1,825	1,162	1,031	20,903	85.63	40.16	40.16	71.85	45.75	40.59	46,083
48	600	2,435	1,166	1,166	2,075	1,265	1,182	31,681	95.87	45.91	45.91	81.69	49.80	46.54	69,845
56	600	2,710	1,360	1,360	2,380	1,450	1,306	46,858	106.69	53.54	53.54	93.70	57.09	51.42	103,304

ASME Class 900

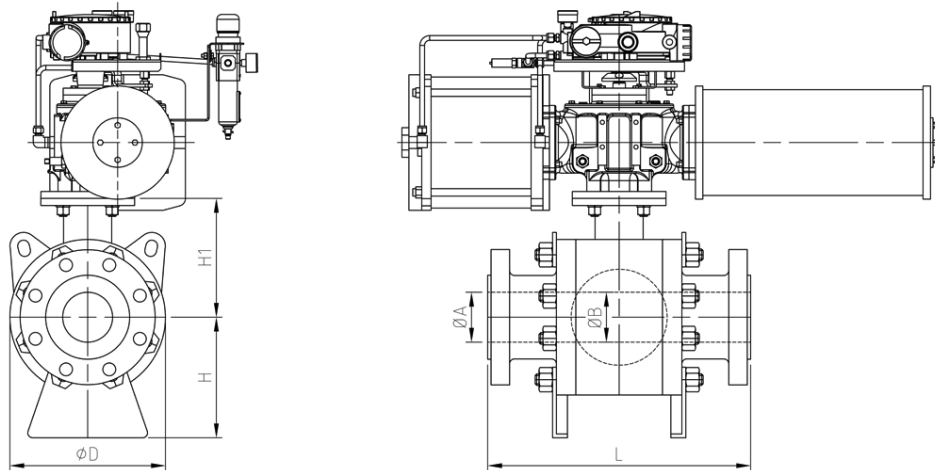


Table 10: ASME Class 900 – Full and reduced bore

NPS	Pressure Class	Metric							U.S.						
		L (mm)	ØA (mm)	ØB (mm)	ØD (mm)	H (mm)	H' (mm)	Weight (kg)	L (in.)	ØA (in.)	ØB (in.)	ØD (in.)	H (in.)	H' (in.)	Weight (lb)
4 x 3	900	457	100	74	215	146	167	124	17.99	3.94	2.91	8.46	5.75	6.57	273
4	900	457	100	100	275	170	199	150	17.99	3.94	3.94	10.83	6.69	7.83	331
6 x 4	900	610	150	100	275	191	199	214	24.02	5.91	3.94	10.83	7.50	7.83	472
6	900	610	150	150	360	263	253	329	24.02	5.91	5.91	14.17	10.35	9.96	724
8 x 6	900	737	201	150	360	263	253	466	29.02	7.91	5.91	14.17	10.35	9.96	1,027
8	900	737	201	201	470	305	310	555	29.02	7.91	7.91	18.50	12.01	12.20	1,224
10 x 8	900	838	252	201	470	305	310	701	32.99	9.92	7.91	18.50	12.01	12.20	1,545
10	900	838	252	252	530	378	339	803	32.99	9.92	9.92	20.87	14.88	13.35	1,769
12 x 10	900	965	303	252	530	378	339	1,020	37.99	11.93	9.92	20.87	14.88	13.35	2,249
14 x 10	900	1,029	322	252	530	378	339	1,220	40.51	12.68	9.92	20.87	14.88	13.35	2,690
12	900	965	303	303	615	395	387	1,225	37.99	11.93	11.93	24.21	15.55	15.24	2,701
14 x 12	900	1,029	322	303	615	395	387	1,425	40.51	12.68	11.93	24.21	15.55	15.24	3,142
16 x 12	900	1,130	373	303	615	395	387	1,724	44.49	14.69	11.93	24.21	15.55	15.24	3,801
14	900	1,029	322	322	655	433	406	1,650	40.51	12.68	12.68	25.79	17.05	15.98	3,638
16 x 14	900	1,130	373	322	655	433	406	1,949	44.49	14.69	12.68	25.79	17.05	15.98	4,297
18 x 14	900	1,219	423	322	655	433	406	2,436	47.99	16.65	12.68	25.79	17.05	15.98	5,370
16	900	1,130	373	373	750	485	456	2,328	44.49	14.69	14.69	29.53	19.09	17.95	5,132
18 x 16	900	1,219	423	373	750	485	456	3,115	47.99	16.65	14.69	29.53	19.09	17.95	6,867
20 x 16	900	1,321	471	373	750	485	456	3,363	52.01	18.54	14.69	29.53	19.09	17.95	7,414
18	900	1,219	423	423	843	550	505	3,323	47.99	16.65	16.65	33.19	21.65	19.88	7,326
20 x 18	900	1,321	471	423	843	550	505	3,871	52.01	18.54	16.65	33.19	21.65	19.88	8,534
20	900	1,321	471	471	949	600	577	4,610	52.01	18.54	18.54	37.36	23.62	22.72	10,163
24 x 20	900	1,549	570	471	949	600	577	6,059	60.98	22.44	18.54	37.36	23.62	22.72	13,358
24	900	1,549	570	570	1,137	695	694	7,341	60.98	22.44	22.44	44.76	27.36	27.32	16,184
30 x 24	900	1,880	712	570	1,137	695	694	8,582	74.02	28.03	22.44	44.76	27.36	27.32	18,920
28	900	1,713	665	665	1,282	770	761	9,600	67.44	26.18	26.18	50.47	30.31	29.96	21,164
30	900	1,880	712	712	1,360	850	839	11,072	74.02	28.03	28.03	53.54	33.46	33.03	24,410
36 x 30	900	2,286	855	712	1,360	850	839	15,836	90.00	33.66	28.03	53.54	33.46	33.03	34,912
32	900	2,032	760	760	1,380	900	855	15,200	80.00	29.92	29.92	54.33	35.43	33.66	33,510
34	900	2,159	808	808	1,490	950	870	17,170	85.00	31.81	31.81	58.66	37.40	34.25	37,853
36	900	2,286	855	855	1,605	1,000	894	19,142	90.00	33.66	33.66	63.19	39.37	35.20	42,201

ASME Class 1500

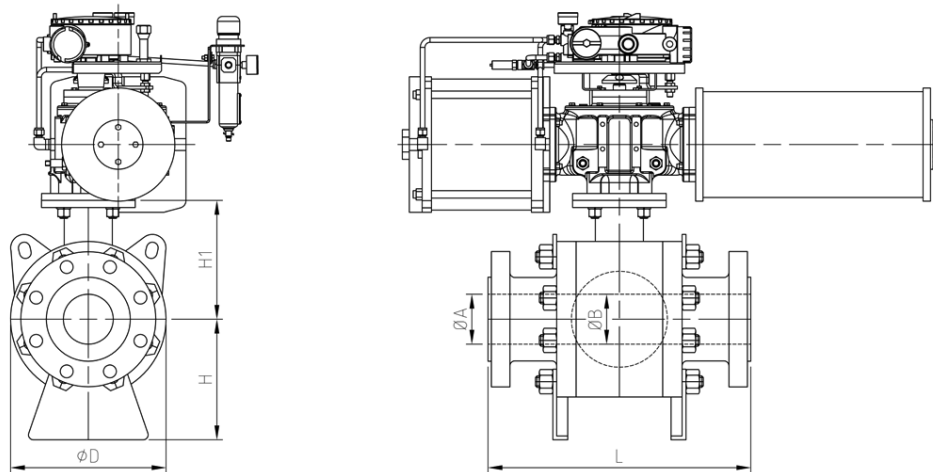


Table 11: ASME Class 1500 – Full and reduced bore

NPS	Pressure Class	Metric							U.S.						
		L (mm)	ØA (mm)	ØB (mm)	ØD (mm)	H (mm)	H' (mm)	Weight (kg)	L (in.)	ØA (in.)	ØB (in.)	ØD (in.)	H (in.)	H' (in.)	Weight (lb)
4 x 3	1500	546	100	74	216	156	167	140	21.50	3.94	2.91	8.50	6.12	6.57	309
4	1500	546	100	100	273	169	199	200	21.50	3.94	3.94	10.75	6.65	7.83	441
6 x 4	1500	705	144	100	273	197	199	310	27.76	5.67	3.94	10.75	7.76	7.83	683
6	1500	705	144	144	430	295	304	490	27.76	5.67	5.67	16.93	11.61	11.97	1,080
8 x 6	1500	832	192	144	430	295	304	650	32.76	7.56	5.67	16.93	11.61	11.97	1,433
8	1500	832	192	192	537	350	339	957	32.76	7.56	7.56	21.14	13.78	13.35	2,110
10 x 8	1500	991	239	192	537	350	339	1,180	39.02	9.41	7.56	21.14	13.78	13.35	2,601
10	1500	991	239	239	600	400	371	1,490	39.02	9.41	9.41	23.62	15.75	14.61	3,285
12 x 10	1500	1,130	287	239	600	400	371	1,850	44.49	11.30	9.41	23.62	15.75	14.61	4,079
14 x 10	1500	1,257	315	239	600	400	371	2,145	49.49	12.40	9.41	23.62	15.75	14.61	4,729
12	1500	1,130	287	287	675	453	411	2,167	44.49	11.30	11.30	26.57	17.83	16.18	4,777
14 x 12	1500	1,257	315	287	675	453	411	2,620	49.49	12.40	11.30	26.57	17.83	16.18	5,776
16 x 12	1500	1,384	360	287	675	453	411	2,860	54.49	14.17	11.30	26.57	17.83	16.18	6,305
14	1500	1,257	315	315	755	515	461	3,000	49.49	12.40	12.40	29.72	20.28	18.15	6,614
16 x 14	1500	1,384	360	315	755	515	461	3,450	54.49	14.17	12.40	29.72	20.28	18.15	7,606
18 x 14	1500	1,537	406	315	755	515	461	3,800	60.51	15.98	12.40	29.72	20.28	18.15	8,378
16	1500	1,384	360	360	860	570	514	4,255	54.49	14.17	14.17	33.86	22.44	20.24	9,381
18 x 16	1500	1,537	406	360	860	570	514	4,970	60.51	15.98	14.17	33.86	22.44	20.24	10,957
20 x 16	1500	1,664	454	360	860	570	514	5,135	65.51	17.87	14.17	33.86	22.44	20.24	11,321
18	1500	1,537	406	406	949	612	587	5,515	60.51	15.98	15.98	37.36	24.09	23.11	12,158
20 x 18	1500	1,664	454	406	949	612	587	6,450	65.51	17.87	15.98	37.36	24.09	23.11	14,220
20	1500	1,664	454	454	1,070	680	670	7,540	65.51	17.87	17.87	42.13	26.77	26.38	16,623
24 x 20	1500	1,943	546	454	1,070	680	670	10,875	76.50	21.50	17.87	42.13	26.77	26.38	23,975
24	1500	1,943	546	546	1,305	750	720	14,550	76.50	21.50	21.50	51.38	29.53	28.35	32,077

ASME Class 2500

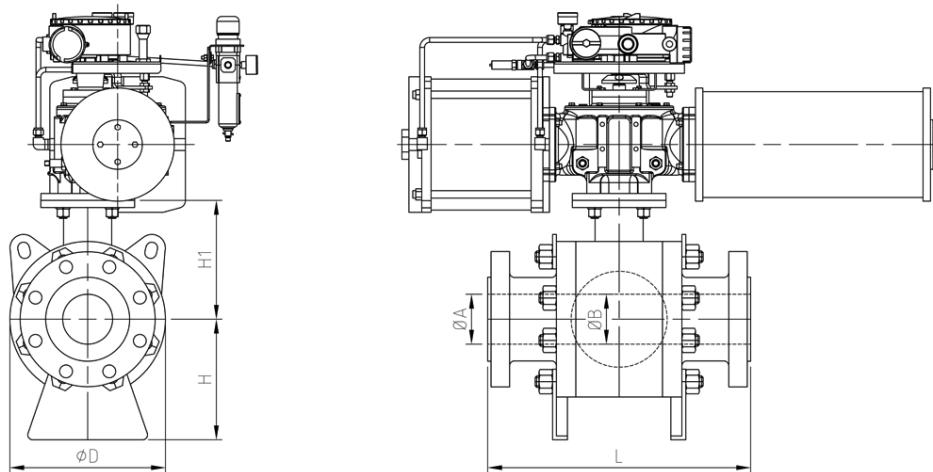


Table 12: ASME Class 2500 – Full and reduced bore

NPS	Pressure Class	Metric							U.S.						
		L (mm)	ØA (mm)	ØB (mm)	ØD (mm)	H (mm)	H' (mm)	Weight (kg)	L (in.)	ØA (in.)	ØB (in.)	ØD (in.)	H (in.)	H' (in.)	Weight (lb)
4 x 3	2500	673	87	62	305	196	219	388	26.50	3.43	2.44	12.01	7.72	8.62	855
4	2500	673	87	87	375	220	272	388	26.50	3.43	3.43	14.76	8.66	10.71	855
6 x 4	2500	914	131	87	375	242	272	700	35.98	5.16	3.43	14.76	9.51	10.71	1,543
6	2500	914	131	131	525	340	353	1,042	35.98	5.16	5.16	20.67	13.39	13.90	2,297
8 x 6	2500	1,022	179	131	525	340	353	1,230	40.24	7.05	5.16	20.67	13.39	13.90	2,712
8	2500	1,022	179	179	650	400	415	1,685	40.24	7.05	7.05	25.59	15.75	16.32	3,715
10 x 8	2500	1,270	223	179	650	400	415	2,450	50.00	8.78	7.05	25.59	15.75	16.32	5,401
10	2500	1,270	223	223	800	490	489	3,236	50.00	8.78	8.78	31.50	19.29	19.25	7,134
12 x 10	2500	1,422	265	223	800	490	489	3,750	55.98	10.43	8.78	31.50	19.29	19.25	8,267
14 x 10	2500	1,422	265	265	870	555	531	4,504	55.98	10.43	10.43	34.25	21.85	20.91	9,930
12	1500	1,130	287	287	675	453	411	2,167	44.49	11.30	11.30	26.57	17.83	16.18	4,777

API pressure ratings

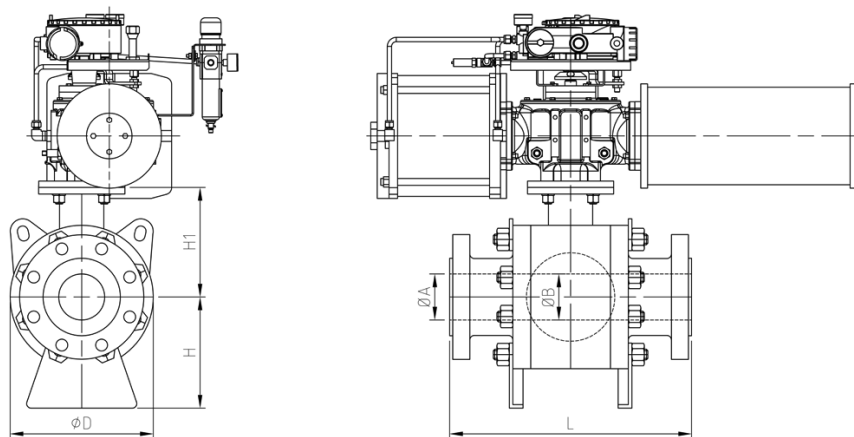


Table 13: API 20.7 MPa (3,000 psi) – Full and reduced bore

Nominal Flange Size	Pressure Rating	Metric						U.S.					
		L (mm)	ØA (mm)	ØD (mm)	H (mm)	H ¹ (mm)	Weight (kg)	L (in.)	ØA (in.)	ØD (in.)	H (in.)	H ¹ (in.)	Weight (lb)
2 1/16	3000	371	2.07	6.42	4.65	5.35	(1)	14.61	2.07	6.42	4.65	5.35	(1)
2 3/16	3000	384	2.58	8.27	5.63	6.57	(1)	15.12	2.58	8.27	5.63	6.57	(1)
3 1/8	3000	422	3.07	8.27	5.63	6.57	(1)	16.61	3.07	8.27	5.63	6.57	(1)
4 1/16	3000	460	4.07	10.83	6.69	7.83	(1)	18.11	4.07	10.83	6.69	7.83	(1)
5 1/8	3000	613	5.14	14.17	10.35	9.96	(1)	24.13	5.14	14.17	10.35	9.96	(1)
7 1/16	3000	740	7.07	17.13	12.01	12.20	(1)	29.13	7.07	17.13	12.01	12.20	(1)
9	3000	1,000	9.02	23.62	15.75	14.61	(1)	39.37	9.02	23.62	15.75	14.61	(1)
11	3000	1,146	11.02	26.57	17.83	16.18	(1)	45.12	11.02	26.57	17.83	16.18	(1)

Table 14: API 34.5 MPa (5,000 psi) – Full and reduced bore

Nominal Flange Size	Pressure Rating	Metric						U.S.					
		L (mm)	ØA (mm)	ØD (mm)	H (mm)	H ¹ (mm)	Weight (kg)	L (in.)	ØA (in.)	ØD (in.)	H (in.)	H ¹ (in.)	Weight (lb)
2 1/16	5000	371	52.5	208	150	154	(1)	14.61	2.07	8.19	5.91	6.06	(1)
2 3/16	5000	473	65.5	305	200	200	(1)	18.62	2.58	12.01	7.87	7.87	(1)
3 1/8	5000	473	78	375	219	240	(1)	18.62	3.07	14.76	8.62	9.45	(1)
4 1/16	5000	549	103.5	415	280	296	(1)	21.61	4.07	16.34	11.00	11.65	(1)
5 1/8	5000	711	130.5	455	340	352	(1)	27.99	5.14	17.91	13.39	13.86	(1)
7 1/16	5000	841	179.5	630	400	400	(1)	33.11	7.07	24.80	15.75	15.75	(1)
9	5000	1,292	229	800	490	489	(1)	50.87	9.02	31.50	19.29	19.25	(1)
11	5000	1,600	280	870	555	531	(1)	62.99	11.02	34.25	21.85	20.91	(1)

Table 15: API 69.0 MPa (10,000 psi) – Full and reduced bore

Nominal Flange Size	Pressure Rating	Metric						U.S.					
		L (mm)	ØA (mm)	ØD (mm)	H (mm)	H ¹ (mm)	Weight (kg)	L (in.)	ØA (in.)	ØD (in.)	H (in.)	H ¹ (in.)	Weight (lb)
2 1/16	10000	521	52.5	300	211	218	(1)	20.51	2.07	11.81	8.31	8.58	(1)
2 3/16	10000	565	65.5	335	235	247	(1)	22.24	2.58	13.19	9.25	9.72	(1)
3 1/8	10000	619	78	435	310	312	(1)	24.37	3.07	17.13	12.20	12.28	(1)
4 1/16	10000	670	103.5	460	310	326	(1)	26.38	4.07	18.11	12.20	12.83	(1)
5 1/8	10000	737	130.5	565	390	393	(1)	29.02	5.14	22.24	15.35	15.47	(1)
7 1/16	10000	889	179.5	842	546	556	(1)	35.00	7.07	33.15	21.50	21.89	(1)
9	10000	1,292	229	900	618	607	(1)	50.87	9.02	35.43	24.33	23.90	(1)
11	10000	1,600	280	1,060	774	677	(1)	62.99	11.02	41.73	30.47	26.65	(1)

Actuation



Limitorque LPS pneumatic Scotch yoke actuator

The Limitorque LPS pneumatic Scotch yoke actuator is designed to meet or exceed the oil and gas industry's most stringent safety and performance standards. It is ideal for medium or large valve actuation and any application requiring robust design, long service life and high-speed operation. Its modular construction allows easy on-site maintenance without special tools or valve removal. The actuator's 25-year design life and maintenance intervals of up to six years contribute to its low cost of ownership.

Available in single- and double-acting configurations.

Limitorque LPC compact pneumatic Scotch yoke actuator

Like the LPS actuator, the Limitorque LPC compact actuator meets or exceeds the oil and gas industry's toughest safety and performance standards. It is ideal for on/off, inching and light modulating applications on small-to-medium sized, quarter-turn valves in general, protective and safety services. Its heavy-duty design and excellent corrosion resistance contribute to its 25-year design life with maintenance intervals as long as five years.

Available in single- and double-acting configurations.



Limitorque QX Series B smart quarter-turn electric actuator

The Limitorque QX Series B (QXb) electric actuator from Flowserve provides unmatched reliability and precision while lowering the cost of ownership in a range of demanding applications.

This next-generation device boasts a double-sealed IP68 enclosure for improved reliability and advanced brushless DC motors for more accurate positioning. It also features a large, high-resolution LCD screen and a simplified multi-language interface that accelerates commissioning by as much as 50%.



Digital positioners



Logix™ 3800 digital positioner

Compatible with linear and rotary valves and actuators, the Logix 3800 digital positioner delivers high reliability in harsh environments. It provides unparalleled modularity and versatility within a single unit. Its ability to handle double- or single-acting, linear and rotary applications reduces inventory and operating costs.

Easy configuration and calibration

Installation and operation are made easy by the innovative quick-calibration feature to simplify commissioning. A quick-calibration button automatically configures the zero, span and gain of the positioner for most valves in less than 60 seconds.

Predictive diagnostics

With five pressure sensors, the Logix 3800 digital positioner enables operators to identify and assess the severity of developing problems in valves and actuators so action can be taken before a critical event.



PMV™ D3 digital positioner

Featuring a zero-bleed pneumatic relay, the PMV D3 positioner is suitable for linear or rotary valves, single- or double-acting actuators, and special applications. Available with general purpose, intrinsically safe or explosion-proof housings, and with plug-in modules for limit switches and feedback.

Steady-state zero-bleed

The zero-bleed pneumatic relay offers savings due to very low air consumption; it only consumes air while positioning. The Piezo valves completely shut off the air consumption and pulse the air during positioning with remarkable precision.

Fail freeze

This special version offers the unique feature of upon loss of input signal, the D3 positioner will fail in last position — a function that is highly valued for dampers or other critical applications.

Global service network



Service when and where you need it most

Flowserve Quick Response Centers (QRCs) are strategically located around the world to ensure rapid response to your time-critical repair needs, routine maintenance and product upgrades.

Single point of contact

Our QRCs serve as a local, single point of contact for the full inventory of Flowserve products and services, including the machinery to manufacture custom-built units. We offer better than 95% on-time performance for all repairs and can turn around new and custom-built units within 72 hours.



Time-critical repairs

To meet your time-critical repair needs, Flowserve offers 24-hour emergency repair, free pick-up and delivery within QRC service areas, and mobile and on-site repairs. When a service technician is needed on-site, we can have one there within 24 hours anywhere in North America, and 48 hours outside of North America.

To locate a Flowserve representative near you, visit www.flowserve.com



Increased visibility to condition and performance

Compatibility with IoT tools, such as the RedRaven platform from Flowserve, provides advanced condition monitoring and predictive analytics to alert operators before equipment issues cause unplanned downtime.



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