FLOWSERVE

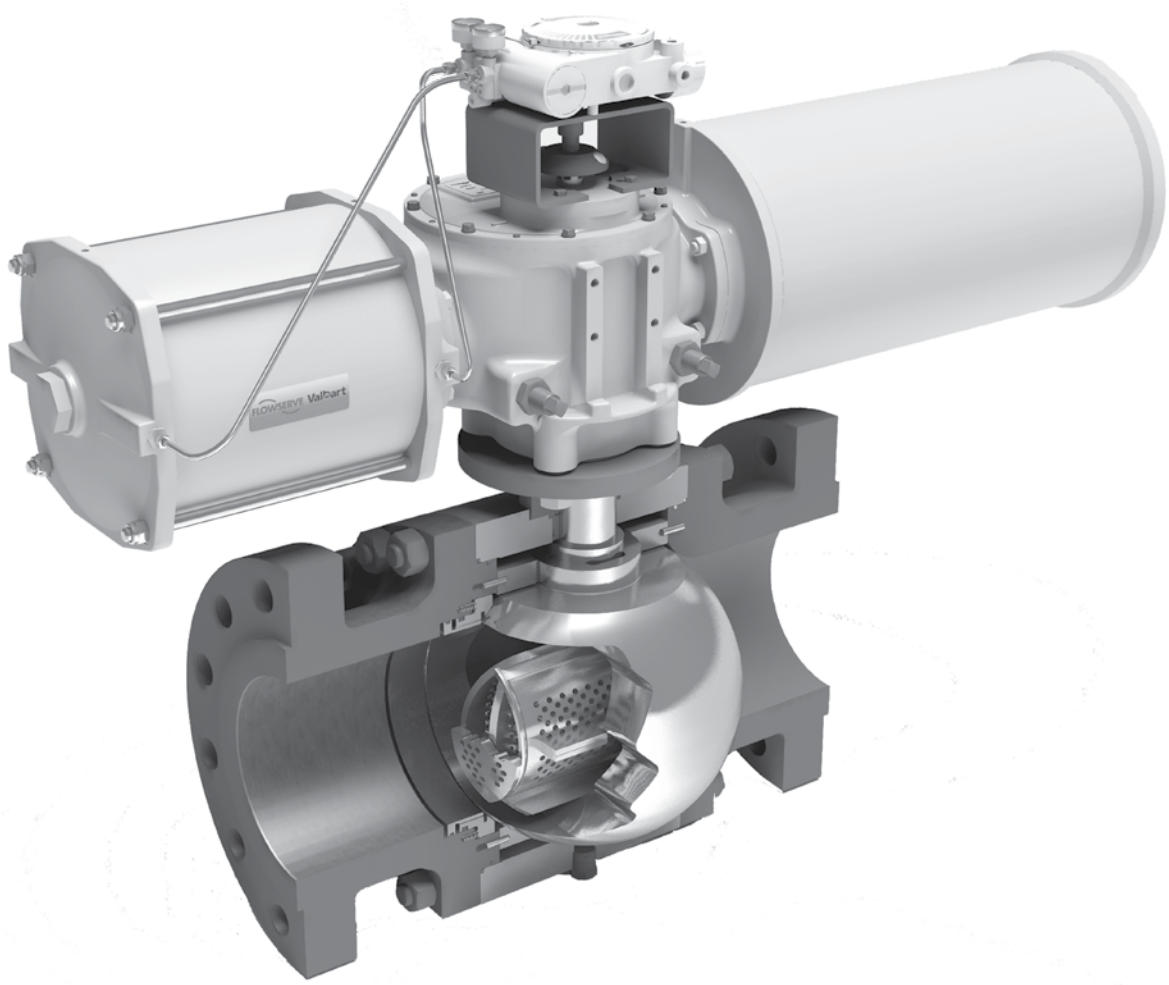
Experience in Motion

TECHNICAL BULLETIN

Valbart TMCBV

Trunnion-Mounted Control Ball Valve

FCD VLENTB0068-02 11/10



High range of control with superior flow capacity for severe service applications in a smaller footprint.

The TMCBV leverages technology from the leaders of trunnion-mounted ball valves and control valves for severe service applications. The TMCBV is available in the widest range of sizes and pressure ratings, thanks to its lower operating torques even at very high pressures.

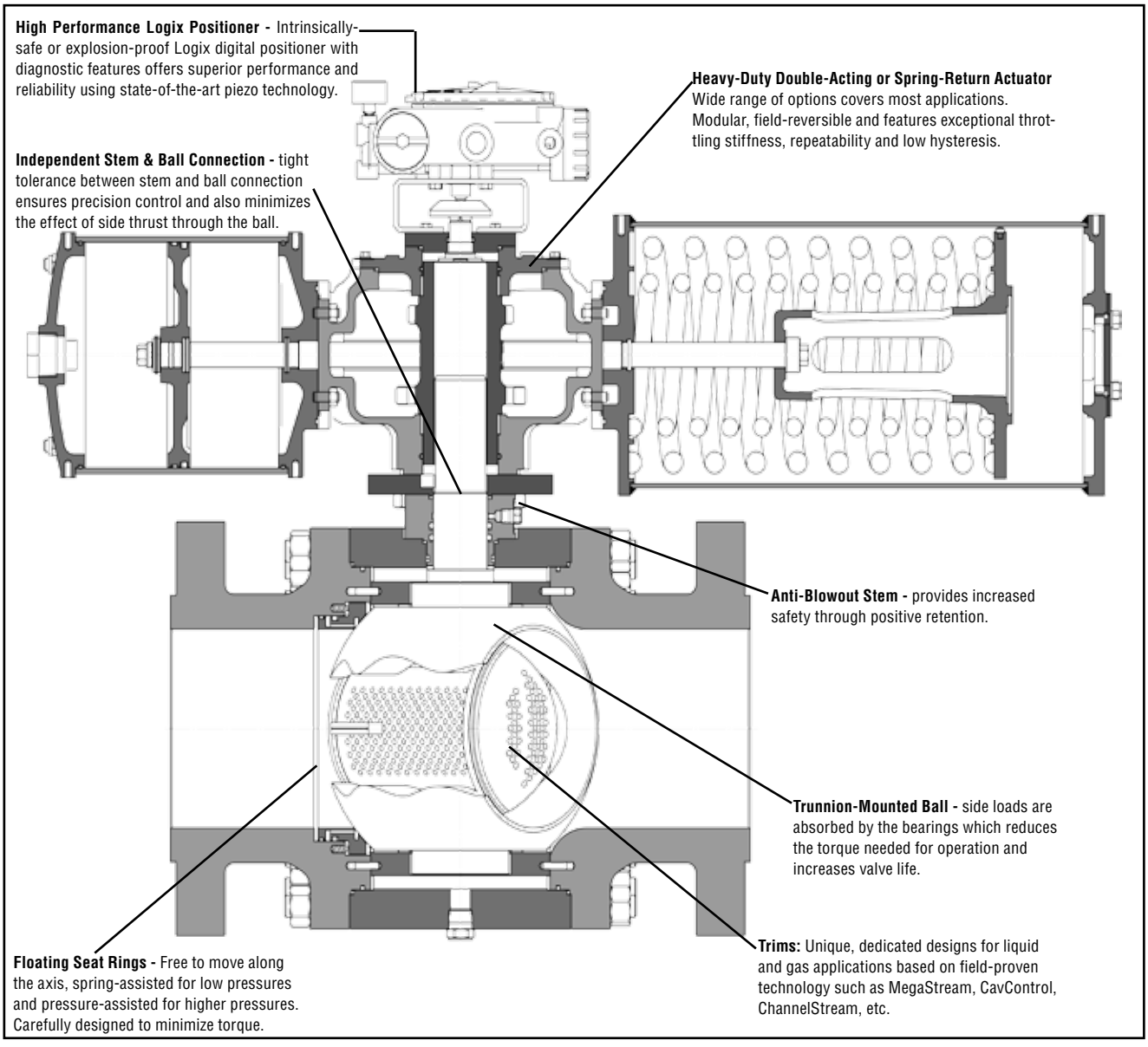
As a result of its inherent higher rangeability combined with its increased flow capacity, the TMCBV can be smaller in size and dimensional envelope for a given process condition, thus becoming the most economical solution when compared with traditional control valve offerings.

Metal-seated TMCBV has tungsten carbide coating on ball and seat, which enhances the life of the valve by ensuring class IV or Class V tight shut-off even after prolonged usage in service.

Carefully designed rotary seals, precision machining, and accurate trunnion guiding, all contribute to zero external leakage ensuring that the TMCBV meets all environmental standards.

The TMCBV has exclusive trims designed for liquid and gas applications based on field-proven technologies such as MegaStream, CavControl, ChannelStream, etc. to ensure that no compromize is made when dealing with unique challenges associated with cavitation control and noise attenuation.

Operated by a heavy-duty pneumatic/hydraulic double-acting or spring -return actuator through a high-performance Logix digital positioner, the TMCBV maintains high positioning accuracy, repeatability, controlled high speed and reliable response. With the advanced diagnostic solutions which can be seamlessly integrated into a host control and/or plant asset management system, the TMCBV is the most economical integrated control valve with state-of-the-art features and performance.



TMCBV Advantages & Features

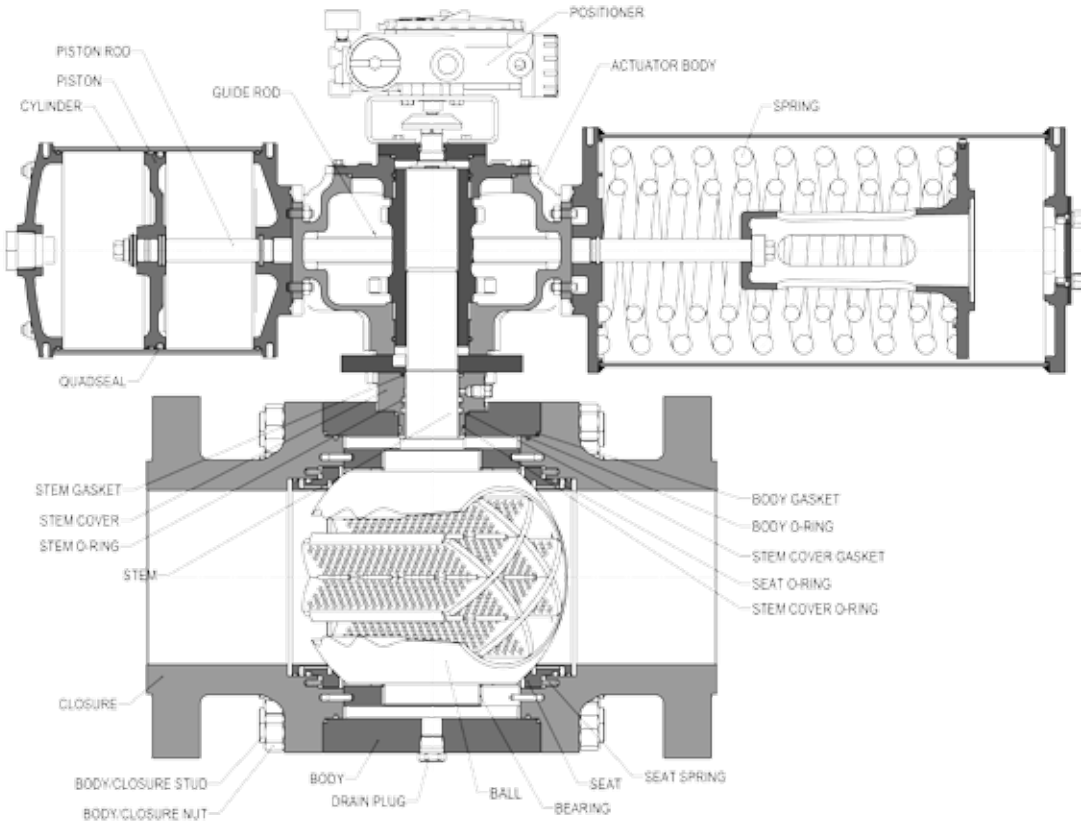
Features	Advantages
Wide range of trim designs based on industry-proven technologies such as MegaStream, CavControl, ChannelStream, Z-trim etc. Trims can be custom-engineered for unique applications.	Effective cavitation control and noise attenuation in the most demanding applications
Metal to Metal, tungsten carbide-coated seats can provide ANSI class IV and Class V shut-off up to class 2500 Soft seats can achieve class VI shutoff.	Tight Shut-off even after prolonged usage
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.
Very high rangeability in excess of 300:1	Wide range of control
Accurate machining of stem and bonnet sealing surfaces ensures compliance with the most severe pollution control regulations.	Low emission stem seals
Geometry allows easier overlay of special alloys on wetted parts including body, seat, ball and seat pockets.	Lower cost on corrosive/erosive applications
Fewer moving parts	Higher level of reliability and performance at a lower cost
Very tight tolerances maintained in stem-to-ball and stem-to-actuator connections.	Precise Control
Actuator has Quad seals and wear rings on piston and also a precisely machined guide bar to withstand lateral loads.	Higher cycle life
Logix digital positioners are equipped with advanced diagnostics features which can be seamlessly integrated into a host control and/or plant asset management program, thus allowing for predictive and preventive maintenance.	Lower cost of maintenance and decreased downtime
QUICK-CAL™ button, DIP switches, Jog buttons and variable gain selector allow setup and calibration in minutes.	Shorter commissioning times and costs

Product Range and Specifications

Size & Class	6” thru 56” Class 150, 300, 600
	6” thru 48” Class 900, 1500
	6” thru 24” Class 2500
Design Standard	API 6D
Body Design	Side-Entry, Top-Entry, Welded
Body Style	Full Port, Reduced Port
End Connection	Integral Flange, Butt Weld
Face-to-Face	API 6D/ASME B16.10
Flange Facing	Raised Face, RTJ
Bonnet Type	Standard, Extended, Cryogenic
Overlay Options	Seat Pocket & Stem Seal
	All Seal Areas
	All Wetted Parts
Fire safe Certification	API 6FA, API 607, BS 6755 Part 2

Actuator Type	Double-acting Pneumatic/Hydraulic cylinder, Fail-safe Spring-return, or Electric Modulating
Manual Overrides	Jack screw, Bevel gear, De-clutchable worm gear, hydraulic
Fail Safe Action	Fail-to-open or Fail-to-close (field reversible)
Positioner	Intrinsically-safe, Explosion-proof HART, FOUNDATION Fieldbus *(for detailed positioner specification see page 23)*
Deadband	<0.1% full scale
Repeatability	<0.05% full scale
Linearity	<0.5% (rotary), <0.8%, (sliding stem) full scale

Typical Construction & Materials



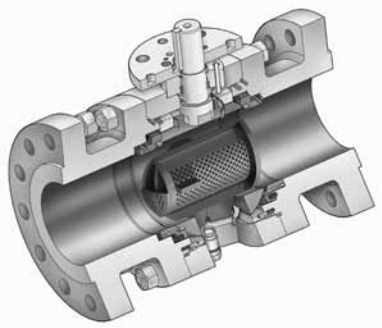
Body & Bonnet	A 350 Gr. LF 2
	A 105
	A 182 Gr. F316/316L
	A 182 Gr. F51 (Duplex)
	A 182 Gr. F53 (Super-Duplex)
	A 182 Gr. F44 (Super-Austenitic)
	Inconel 625
	Other
Body Overlay Material	316L SS
	Inconel 625
Seals	Viton GLT/AED
	HNBR
	Viton AED
	Lip Seal (PTFE-Elgiloy)
	Graphite
Bearings	CS + PTFE
	316 SS + PTFE
	Inconel + PTFE
	Inconel (HT)

Body Bolting	B7/2H
	L7/7
	B8/8
	B7M/2HM
	L7M/7M
	B8M/8M
Ball & Seat Ring	A 182 Gr. F316
	A 182 Gr. F316LN
	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

Stem Material	17-4PH
	XM-19 (Nitronic 50)
	A 182 Gr. F51
	A 182 Gr. F53
	Inconel 718
Actuator	Cylinder: Hard-chrome-plated Carbon Steel
	Body: Ductile iron/Low temp CS
	Piston: Ductile Iron
	Piston rod: Alloy steel
	Seals: Nitrile/Viton/Fluorosilicone
	Spring: Alloy steel
Positioner	Housing: Powder-painted die-cast Aluminum/ Stainless steel
	Soft goods: Nitrile/Viton/ Fluorosilicone

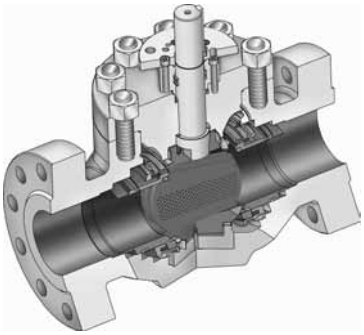
Body Designs

Side-Entry Body



Standard, economical construction

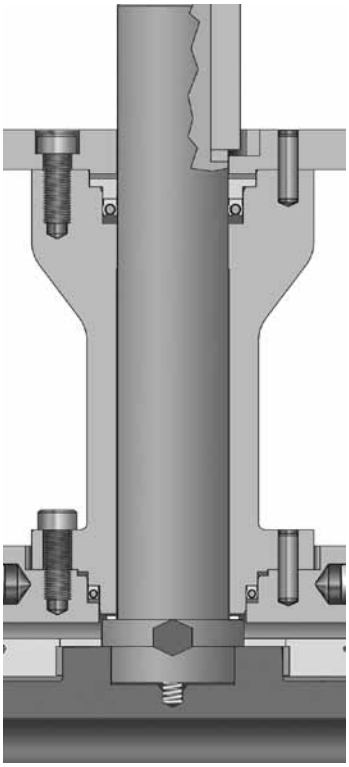
Top-Entry Body



Facilitates in-line maintenance without removing the valve from the pipeline.

Bonnet Options

Valve designs are available with bonnet extensions for applications involving extremely low or high temperatures.



Extended Bonnet

Extended bonnets are recommended for service at temperatures down to -50°C (-58°F) or temperatures above 220°C (428°F).

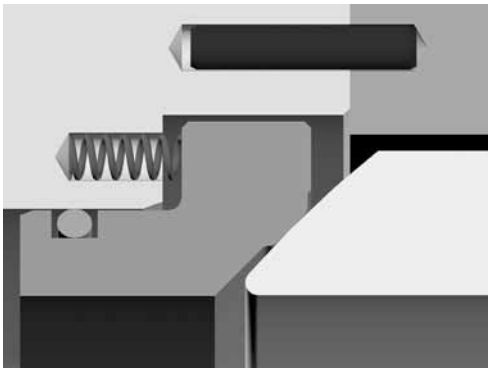
Cryogenic Bonnet Extensions

Cryogenic bonnet extensions are recommended for applications such as LNG service for temperature ranges between -47°C (-52°F) and -196°C (-320°F).

Seat Options

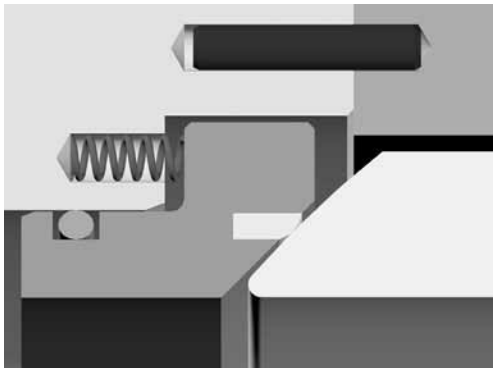
Metal Seated Valves

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



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.



TMCBV Noise Reduction Trims

Noise reduction trims, based on the industry proven MegaStream design, eliminate the problem of control valve noise by dealing effectively with gaseous pressure reduction, and by controlling turbulence carried into the downstream piping. The pressure drop in the trim is distributed so that it occurs not only at the throttling point between the ball and seat, but also at each stage, from the inside of the attenuator to the outside through expansion holes. This pressure drop occurs largely as a result of the sudden expansions and contractions that take place as the flow passes through the trim. Each stage is designed to take a small pressure drop, avoiding the high velocities present in single throttling-point trims. The gradual pressure reduction is achieved by designing sufficient stages to keep the velocity low.

The TMCBV noise reduction trims effectively reduce control valve noise in a range of gas applications. The trim is available in two styles optimized for noise attenuation and flow capacity.

N1 Trim

The N1 trim (Figures 1-3) is a very economical option with two or more stages for noise reduction, up to 20 dBA.

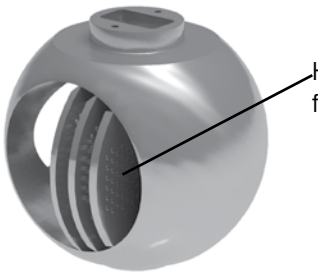


Figure 1: N1 Noise Reduction Trim

Design

A series of straight plates with carefully designed holes are spaced at specific angles between each other. The spacing is designed to meet the inherent feature of a rotary valve. During lower openings where the valve could see higher velocities, almost all of the plates act as pressure reduction stages, thereby providing better noise attenuation. As the valve opens further, flow capacities could become a governing factor and the design allows for straight-through flow, ensuring higher capacity. The design is tolerant of particles and has an inherent self-cleaning feature.

Figure 2: N1 CFD

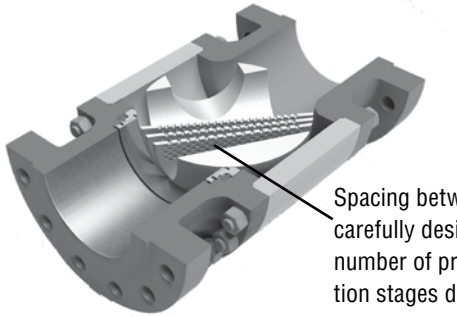


Figure 3: N1 Noise Reduction Trim

N2 Trim

The N2 trim (Figures 4 & 5) is a highly effective multistage (3 or more stages) design for noise reduction up to 30 dBA.

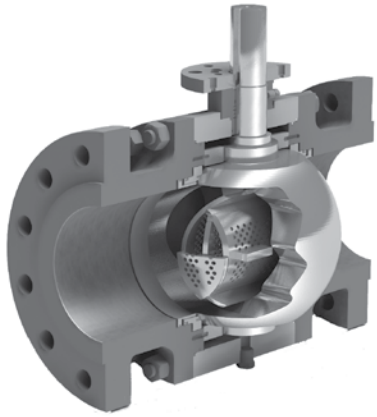


Figure 4: N2 Noise Reduction Trim

Design

A specially-engineered trim comprising of curved plates and closed ends which ensure higher pressure drops across the stages thereby make it ideal for severe noise reduction applications. The fluid enters an annular area in the ball and is forced to go through all the pressure reduction stages. Each stage is designed to take a small pressure drop, avoiding the high velocities present in single throttling point trims. This gradual pressure reduction is achieved by designing sufficient stages to keep the velocity low.

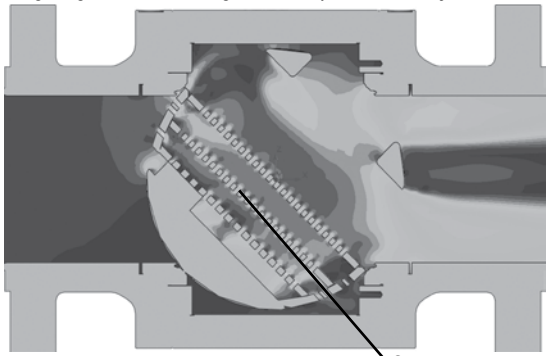


Figure 5: N2 CFD

TMCBV Cavitation Control Trims

TMCBV cavitation control trims, based on the industry proven CavControl and ChannelStream designs, effectively isolate or eliminate cavitation depending on the application requirements. The trims are available in multiple styles optimized for cavitation control and flow capacity.

C1 Trim

The C1 trim (Figures 6-8), based on the CavControl design, is a very economical trim which 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.

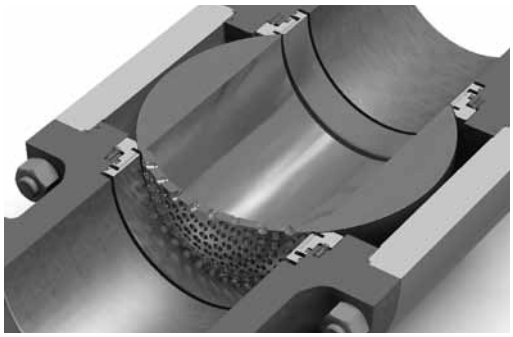


Figure 6: C1 Trim

Design

Small, diametrically-opposed flow nozzles through the ball, suppress the effect of cavitation and also help in reducing the hydrodynamic noise (between 15 and 20 dBA). As the valve opens, each nozzle admits a jet of cavitating liquid which impinges at a common focal point. Nozzles are used to ensure orifice type flow rather than tube type flow through the ball; thus the vena contracta is established externally rather than inside the ball thickness. The impinging fluid jets form a fluid cushion and an area of pressure recovery that cause the collapse of the vapor bubbles in the fluid stream away from the metal parts. The turbulence of the impinging flow promotes the collapse of vapor bubbles at the center of the ball thereby minimizing the damage to the valve trim.

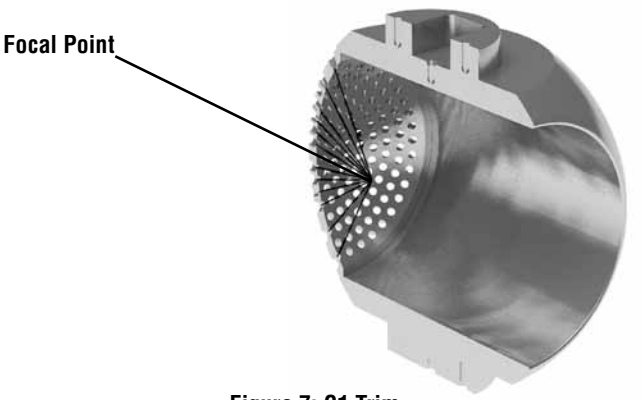


Figure 7: C1 Trim

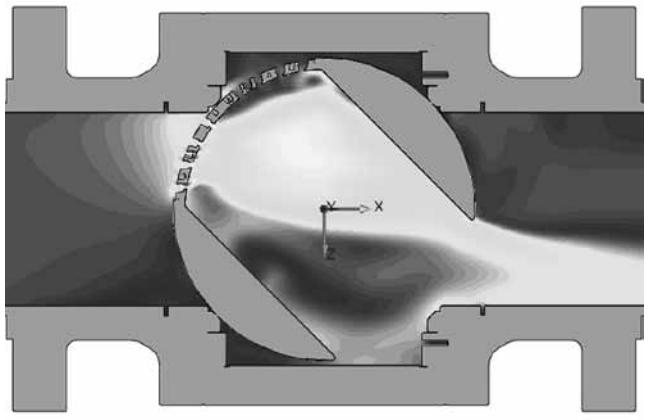


Figure 8: C1 Trim CFD

C2 Trim

The C2 Trim (Figures 9 & 10) is an extension of the C1 trim customized for applications which see cavitation in lower openings but would need more flow capacity at higher openings where there would be no sign of cavitation.

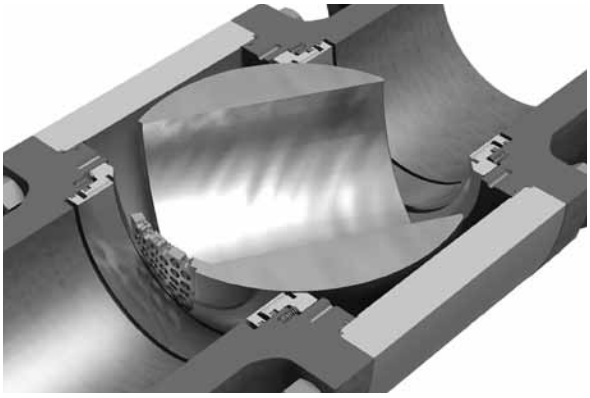


Figure 9: C2 Trim

Figure 10: C2 Trim

C3 Trim

The C3 Trim (Figures 11 & 12), based on the ChannelStream design, is a highly-effective multistage cavitation control design which prevents cavitation from forming and minimizes hydrodynamic noise even under the most severe applications. This unique design not only eliminates cavitation damage, but also provides easy maintenance and long life, even when installed in the most difficult applications.

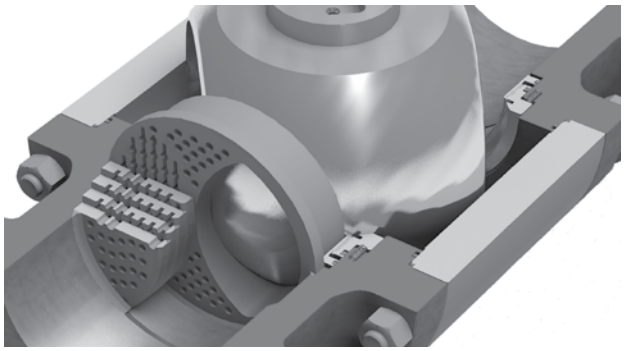


Figure 11: C3 Trim

Design

The cartridge has a series of plates with drilled holes and channels. Rather than acting as a flow restriction, the drilled holes in the cartridge are used as expansion areas for the fluid as it enters from restrictive channels machined in each stage of the cartridge. Successive intersections of the restrictive channels result in additional pressure losses, while expansion holes connected to the channel create a series of expansions and contractions that result in a series of pressure drops. This staged pressure drop eliminates cavitation in many applications and minimizes the energy of cavitation that my still occur in others.

Depending on the applications, C3 can be custom engineered to control severe cavitation associated with higher pressure drops at lower openings, while providing the upper-end flow capacity which could be the governing factor at higher openings.

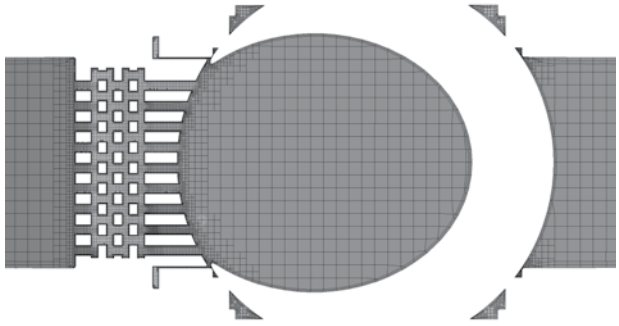


Figure 12: C3 Trim CFD

Z-Trims

Z-Trims combine the benefits of an advanced control valve with the simplicity of a ball valve. Most effective with low to medium pressure drops, the Z-trims (Figures 13-15) excel at eliminating noise in high flow services.

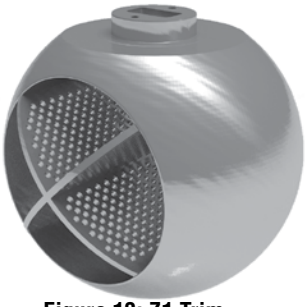


Figure 13: Z1 Trim

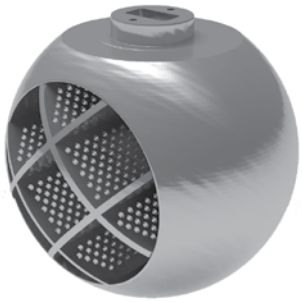


Figure 14: Z2 Trim

The Z-Trims are omnidirectional and self-cleaning. Z1 trim may reduce noise by 17 dB. Z2 trim may give 23 dB. Both are also useful for preventing cavitation at low pressure ratios. The inclined plates give smooth transition as the valve travels, without stair-stepping in the characteristic curve.

Figure 15: Z2 Trim (shown on a reduced port valve)

Standard Trim

Standard trim for the Trunnion-Mounted Control Ball valve is a simple full port as shown below.

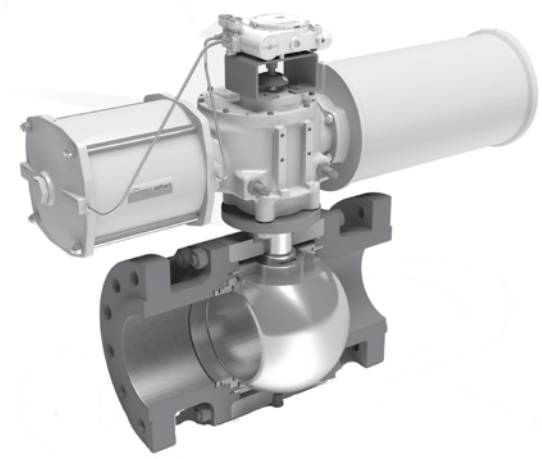


Figure 16: TMCBV with Standard Trim

Dimensions and Weights

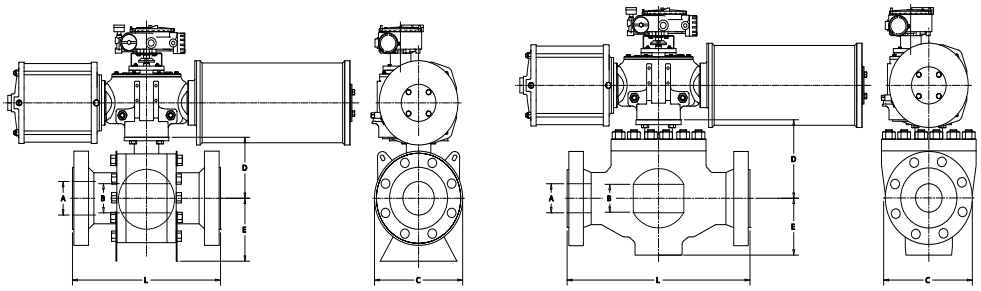


Table 1: ASME Class 150 Full Bore

All Types			Side-Entry						Top-Entry					
Size in/mm	A	B	L-RF	L-WE	C	D	E	Weight lb/kg*	L-RF	L-WE	C	D	E	Weight lb/kg*
6 150	5.91 150	5.91 150	15.5 394	15 457	12.09 307	9.72 247	7.36 187	352 160	22 559	22 559	12.72 323	10.83 275	8.62 219	473 215
8 200	7.91 201	7.91 201	18 457	20.5 521	15.43 392	11.02 280	8.82 224	557 253	26 660	26 660	15.94 405	12.64 321	10.43 265	895.4 407
10 250	9.92 252	9.92 252	21 533	22 559	18.31 465	12.60 320	10.94 278	851 387	31 787	31 787	19.29 490	13.98 355	12.40 315	1232 560
12 300	11.93 303	11.93 303	24 610	25 635	21.38 543	13.27 337	12.05 306	1230 559	33 838	33 838	22.24 565	18.50 470	15.94 405	1562 710
14 350	13.15 334	13.15 334	27 686	30 762	23.94 608	14.72 374	13.15 334	1672 760	35 889	35 889	25.98 660	17.91 455	17.01 432	1672 760
16 400	15.16 385	15.16 385	30 762	33 838	26.57 675	16.06 408	14.09 358	2244 1020	39 991	39 991	27.56 700	18.11 460	17.76 451	2420 1100
18 450	17.17 436	17.17 436	34 864	36 914	25.00 635	17.28 439	15.35 390	2673 1215	43 1092	43 1092	29.41 747	19.80 503	18.58 472	3326.4 1512
20 500	19.17 487	19.17 487	36 914	39 991	33.43 849	19.37 492	17.09 434	3945 1793	47 1194	47 1194	33.43 849	22.05 560	22.05 560	4246 1930
22 550	21.18 538	21.18 538	40 991	43 1092	36.81 935	20.79 528	18.78 477	5190 2359	51 1296	51 1296	36.81 935	22.24 565	23.27 591	6050 2750
24 600	23.19 589	23.19 589	42 1067	45 1143	39.57 1005	23.15 588	20.59 523	6818 3099	55 1397	55 1397	39.57 1005	24.02 610	23.62 600	7040 3200
26 650	24.92 633	24.92 633	45 1143	49 1245	41.97 1066	24.69 627	22.20 564	8107 3685	57 1448	57 1448	41.97 1066	26.38 670	24.88 632	8360 3800
28 700	26.93 684	26.93 684	49 1244	53 1347	44.72 1136	25.35 644	25.91 658	9878 4490	61 1549	61 1549	44.72 1136	28.74 730	27.95 710	10120 4600
30 750	28.94 735	28.94 735	51 1295	55 1397	38.78 985	27.20 691	27.72 704	11473 5215	65 1651	65 1651	49.57 1259	31.50 800	31.10 790	12386 5630
32 800	30.67 779	30.67 779	54 1371	60 1524	51.18 1300	29.21 742	29.37 746	14960 6800	70 1778	70 1778	51.18 1300	33.31 846	32.68 830	15587 7085
34 850	32.68 830	32.68 830	58 1473	64 1626	53.94 1370	29.88 759	30.43 773	17160 7800	76 1930	76 1930	55.12 1400	34.25 870	34.65 880	17160 7800
36 900	34.41 874	34.41 874	60 1524	68 1728	56.30 1430	31.97 812	31.77 807	19360 8800	82 2083	82 2083	56.61 1438	36.81 935	36.73 933	20020 9100
40 1000	38.42 976	38.43 976	69 1753	77 1956	62.80 1595	35.43 900	35.35 898	27632 12560	92 2337	92 2337	64.96 1650	39.84 1012	40.55 1030	28138 12790
42 1050	40.16 1020	40.16 1020	70.47 1790	82 2083	64.96 1650	37.13 943	36.89 937	31416 14280	96 2437	96 2437	66.93 1700	42.13 1070	41.93 1065	33220 15100
48 1200	45.91 1166	45.91 1166	78.54 1995	94 2388	75.59 1920	43.19 1097	41.97 1066	48180 21900	100 2540	100 2540	76.77 1950	46.85 1190	48.43 1230	49720 22600
56 1400	53.54 1360	53.54 1360	97.99 2489	97.99 2489	88.98 2260	51.26 1302	49.33 1253	70520 34100	TBA TBA	TBA TBA	TBA TBA	TBA TBA	TBA TBA	TBA TBA

**Weight figures are relevant to flanged end, bare stem valves. Add the appropriate actuator weight to get the total weight.*

Note: For dimensions and weights in larger sizes, consult the factory.

Dimensions C, D, E and weights are subject to change without notice.

Face-to-face dimensions not listed in industry standards are subject to change without notice.

Dimensions and Weights (continued)

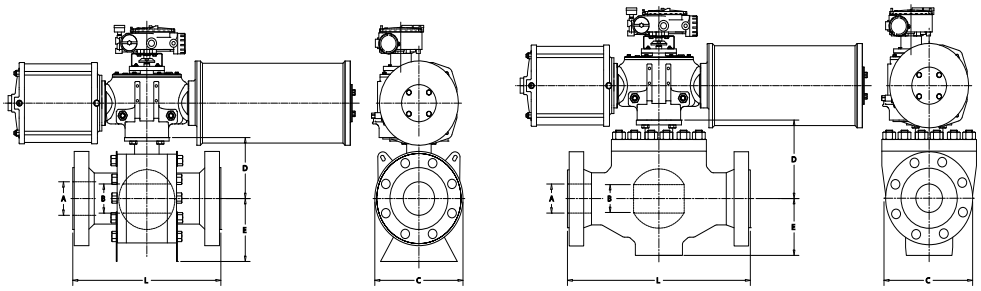


Table 2: ASME Class 150 Reduced Bore

All Types			Side-Entry						Top-Entry					
Size in/mm	A	B	L-RF	L-WE	C	D	E	Weight lb/kg*	L-RF	L-WE	C	D	E	Weight lb/kg*
6 x 4 150 x 100	5.91 150	3.94 100	15.5 394	18 457	10.98 279	7.80 198	6.42 163	220 100	22.01 559	22.01 559	10.98 279	10.63 270	5.63 143	286 130
8 x 6 200 x 150	7.91 201	5.91 150	18 457	20.5 521	13.50 343	9.92 252	7.36 187	407 185	25.98 660	25.98 660	13.50 343	10.83 275	8.46 215	550 250
10 x 8 250 x 200	9.92 252	7.91 201	21 533	22 559	15.98 406	11.02 280	8.74 222	640 291	30.98 787	30.98 787	15.98 406	12.60 320	10.31 262	1001 455
12 x 10 300 x 250	11.93 300	9.92 252	24 610	25 635	19.02 483	12.72 323	11.02 280	1016 462	32.99 838	32.99 838	19.09 485	13.98 355	12.20 310	1067 485
14 x 10 350 x 250	13.15 334	9.92 252	27 686	30 762	21.06 535	12.76 324	10.83 275	1140 518	35.00 889	35.00 889	21.06 535	13.98 355	12.20 310	1463 665
14 x 12 350 x 300	13.15 334	11.93 303	27 686	30 762	21.06 535	13.46 342	11.81 300	1342 610	35.00 889	35.00 889	21.06 535	18.70 475	15.55 395	1738 790
16 x 12 400 x 300	15.16 385	11.93 303	30 762	33 838	23.43 595	13.62 346	11.93 303	1536 698	39.02 991	39.02 991	23.43 595	18.70 475	15.55 395	2068 940
16 x 14 400 x 350	15.16 385	13.15 334	30 762	33 838	23.43 595	14.57 370	13.19 335	1804 820	39.02 991	39.02 991	25.98 660	17.72 450	16.93 430	1997.6 908
18 x 16 450 x 400	17.17 436	15.16 385	34 864	36 914	25.00 635	16.34 415	13.70 348	2332 1060	42.99 1092	42.99 1092	27.56 700	18.11 460	17.72 450	2745.6 1248
20 x 16 500 x 400	19.17 487	15.16 385	36 914	39 991	27.56 700	16.34 415	13.78 350	2420 1100	47.01 1194	47.01 1194	27.56 700	18.11 460	17.72 450	3392.4 1542
20 x 18 500 x 450	19.17 487	17.17 436	36 914	39 991	27.56 700	17.28 439	15.35 390	2618 1190	47.01 1194	47.01 1194	29.33 745	19.49 495	18.50 470	3828 1740
24 x 20 600 x 500	23.19 589	19.17 487	42 1067	45 1143	32.09 815	19.29 490	17.13 435	4334 1970	55.00 1397	55.00 1397	34.25 870	21.65 550	22.83 580	5231.6 2378
30 x 24 750 x 600	28.94 735	23.19 589	51 1295	55 1397	38.78 985	23.15 588	20.28 515	7150 3250	65.00 1651	65.00 1651	40.16 1020	23.23 590	23.31 592	8817.6 4008
36 x 30 900 x 750	34.41 874	28.94 735	60 1524	68 1728	46.06 1170	27.17 690	27.56 700	13891 6314	82.01 2083	82.01 2083	49.21 1250	31.30 795	30.12 765	15505.6 7048

**Weight figures are relevant to flanged end, bare stem valves. Add the appropriate actuator weight to get the total weight.*

Note: For dimensions and weights in larger sizes, consult the factory.

Dimensions: C, D, E and weights are subject to change without notice.

Face-to-face dimensions not listed in industry standards are subject to change without notice.

Dimensions and Weights (continued)

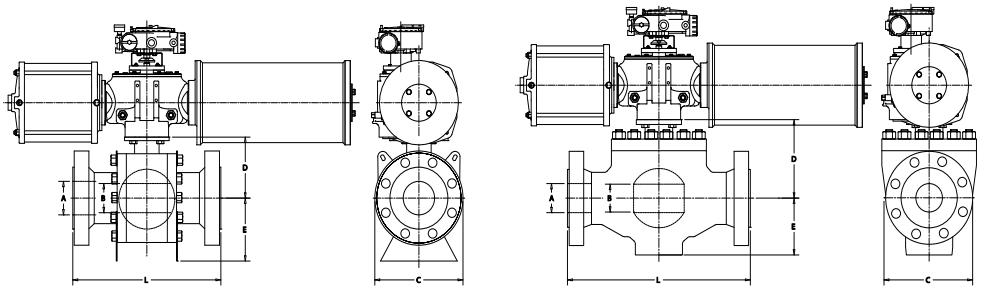


Table 3: ASME Class 300 Full Bore

All Types			Side-Entry						Top-Entry					
Size in/mm	A	B	L-RF	L-WE	C	D	E	Weight lb/kg*	L-RF	L-WE	C	D	E	Weight lb/kg*
6 150	5.91 150	5.91 150	15.9 403	18.0 457	12.5 318	9.6 245	7.9 200	400 182	22.01 559	22.01 559	12.99 330	11.10 282	8.82 224	486 221
8 200	7.91 201	7.91 201	19.8 502	20.5 521	15.2 385	10.8 275	9.1 230	612 278	25.98 660	25.98 660	16.14 410	12.80 325	10.63 270	906 412
10 250	9.92 252	9.92 252	22.4 568	22.0 559	18.5 470	13.0 330	11.6 295	1100 500	30.98 787	30.98 787	19.69 500	14.17 360	12.60 320	1245 566
12 300	11.93 303	11.93 303	25.5 348	25.0 365	21.3 540	14.0 355	13.0 330	1613 733	32.99 838	32.99 838	22.44 570	18.70 475	16.14 410	1573 715
14 350	13.15 334	13.15 334	30.0 762	30.0 762	2438 630	15.4 390	13.6 345	2264 1029	35.00 889	35.00 889	26.18 665	18.11 460	17.20 437	1685 766
16 400	15.16 385	15.16 385	33.0 838	33.0 838	27.3 396	16.9 430	15.4 390	3120 1418	39.02 991	39.02 991	27.83 707	18.31 465	17.95 465	2433 1106
18 450	17.17 436	17.17 436	36.0 914	36.0 914	30.3 770	17.9 455	16.1 410	3502 1592	42.99 1092	42.99 1092	29.61 752	20.00 508	18.78 477	3342 1519
20 500	19.17 487	19.17 487	39.0 991	39.0 991	33.5 850	19.7 500	18.3 465	4829 2195	47.01 1194	47.01 1194	33.66 855	22.24 565	22.24 565	4259 1936
22 550	21.18 538	21.18 538	43.0 1092	43.0 1092	37.0 940	20.7 525	18.9 480	6134 2788	51.02 1296	51.02 1296	37.09 942	22.52 572	23.46 596	60.63 2756
24 600	23.19 589	23.19 589	45.0 1143	45.0 1143	40.2 1020	23.2 590	21.5 545	7612 3460	55.00 1397	55.00 1397	39.76 1010	24.29 617	23.82 605	7058 3208
26 650	24.92 633	24.92 633	49.0 1245	49.0 1245	42.5 1080	24.8 630	22.8 580	10252 4660	57.01 1448	57.01 1448	42.20 1072	26.69 678	25.08 637	8378 3808
28 700	36.93 684	26.93 684	53.0 1346	53.0 1346	45.3 1150	25.2 640	26.2 665	12694 5770	60.98 1549	60.98 1549	44.92 1141	29.06 738	28.15 715	10135 4607
30 750	28.94 735	28.94 735	55.0 1397	55.0 1397	48.6 1235	27.6 700	28.7 730	14498 6590	65.00 1651	65.00 1651	49.80 1265	31.93 811	31.30 795	12404 5638
32 800	30.67 779	30.67 779	60.0 1524	60.0 1524	52.0 1320	29.3 745	30.1 765	17450 7932	70.00 1778	70.00 1778	51.65 1312	33.46 850	32.87 835	15602 7092
34 850	32.68 830	32.68 830	64.0 1626	64.0 1626	54.7 1390	29.9 760	31.5 800	19888 9040	75.98 1930	75.98 1930	55.43 1408	34.53 877	34.84 885	17184 7811
36 900	34.41 874	34.41 874	68.0 1727	68.0 1727	56.9 1445	31.7 805	32.5 825	22205 10093	82.01 2083	82.01 2083	56.89 1445	37.09 942	36.93 938	20046 9112
40 1000	38.43 976	38.43 976	77.0 1956	77.0 1956	63.8 1620	35.4 900	36.2 920	30305 13775	92.01 2337	92.01 2337	65.47 1663	40.16 1020	40.79 1036	28156 12798
42 1050	40.16 1020	40.16 1020	82.0 2083	82.0 2083	66.3 1685	38.1 968	37.4 950	35431 16105	95.94 2437	95.94 2437	67.52 1715	42.56 1081	42.13 1070	33249 15113
48 1200	45.91 1166	45.91 1166	85.4 2170	85.4 2170	57.5 1460	43.3 1100	53.3 1100	52932 24060	100.00 2540	100.00 2540	77.36 1965	47.28 1201	48.66 1236	49751 22614
56 1400	53.54 1360	53.54 1360	108.0 2743	108.0 2743	89.6 2275	50.6 1285	50.0 1270	83941 38155	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*

**Weight figures are relevant to flanged end, bare stem valves. Add the appropriate actuator weight to get the total weight.*

(1) Please consult the factory.

Dimensions C,D,E and weights are subject to change without notice,

Face-to-face Dimensions not listed in industry standards are subject to change without notice.

Dimensions and Weights (continued)

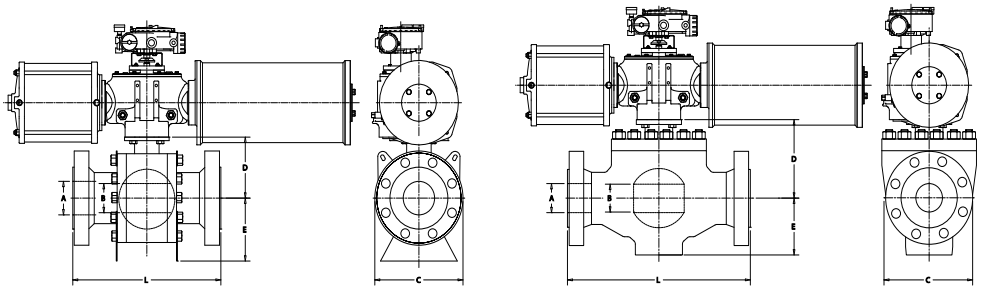


Table 4: ASME Class 300 Reduced Bore

All Types			Side-Entry						Top-Entry					
Size in/mm	A	B	L-RF	L-WE	C	D	E	Weight lb/kg*	L-RF	L-WE	C	D	E	Weight lb/kg*
6 x 4 150 x 100	5.91 150	3.94 100	15.9 403	18.0 457	12.5 318	7.9 200	6.3 160	253 115	22.0 559	22.0 559	12.5 318	11.3 286	5.7 145	354.2 161
8 x 6 200 x 150	7.91 201	5.91 150	19.8 502	20.5 521	15.0 381	9.6 245	7.8 200	481.8 219	26.0 660	26.0 660	15.0 381	11.1 282	8.8 224	627 285
10 x 8 250 x 200	9.92 252	7.91 201	22.4 568	22.0 559	17.5 445	10.8 275	9.1 230	642.4 292	31.0 787	31.0 787	17.5 445	12.8 325	10.6 270	1179.2 536
12 x 10 300 x 250	11.93 303	9.92 252	25.5 648	25.0 635	20.5 520	13.0 330	11.6 295	1306.8 594	33.0 838	33.0 838	20.5 520	14.2 360	12.6 320	1258.4 572
14 x 10 350 x 250	13.15 334	9.92 252	30.0 762	30.0 762	23.0 585	13.0 330	11.6 295	1414.6 643	35.0 889	35.0 889	20.5 520	14.2 360	12.6 320	1718.2 781
14 x 12 350 x 300	13.15 334	11.93 303	30.0 762	30.0 762	23.0 585	14.0 355	13.0 330	1795.2 816	35.0 889	35.0 889	23.0 585	18.7 475	16.1 410	2015.2 916
16 x 12 400 x 300	15.16 385	11.93 303	33.0 838	33.0 838	25.6 650	14.0 355	13.0 330	2123 965	39.0 991	39.0 991	25.6 650	18.7 475	16.1 410	2402.4 1092
16 x 14 400 x 350	15.16 385	13.15 334	33.0 838	33.0 838	25.6 650	15.4 390	13.6 345	2475 1125	39.0 991	39.0 991	26.2 665	18.1 460	17.2 437	2409 1095
18 x 16 450 x 400	17.17 436	15.16 385	36.0 914	36.0 914	28.0 710	16.9 430	15.4 390	3504.6 1593	43.0 1092	43.0 1092	28.0 710	18.3 465	18.0 456	3216.4 1462
20 x 16 500 x 400	19.17 487	15.16 385	39.0 991	39.0 991	30.5 775	16.9 430	15.4 390	3658.6 1663	47.0 1194	47.0 1194	30.5 775	18.3 465	18.0 456	3979.8 1809
20 x 18 500 x 450	19.17 487	17.17 436	39.0 991	39.0 991	30.5 775	17.9 455	16.1 410	3942.4 1792	47.0 1194	47.0 1194	30.5 775	20.0 508	18.8 477	4450.6 2023
24 x 20 600 x 500	23.19 589	19.17 487	45.0 1143	45.0 1143	36.0 915	19.7 500	18.3 465	5854.2 2661	55.0 1397	55.0 1397	36.0 915	22.2 565	22.2 565	6102.8 2774
30 x 24 750 x 600	28.94 735	23.19 589	55.0 1397	55.0 1397	42.9 1090	23.2 590	21.5 545	9864.8 4484	65.0 1651	65.0 1651	42.9 1090	24.3 617	23.8 605	10263 4665
36 x 30 900 x 750	34.41 874	28.94 735	68.0 1727	68.0 1727	50.0 1270	27.6 700	28.7 730	18002.6 8183	82.0 2083	82.0 2083	50.0 1270	31.9 811	31.3 795	18255.6 8298

**Weight figures are relevant to flanged end, bare stem valves. Add the appropriate actuator weight to get the total weight.*

Note: For dimensions and weights in larger sizes, consult the factory.

Dimensions C, D, E, and weights are subject to change without notice.

Face-to-face dimensions not listed in industry standards are subject to change without notice.

Dimensions and Weights (continued)

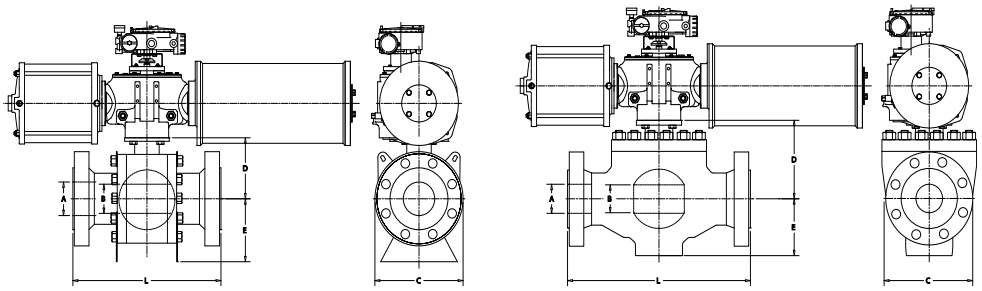


Table 5: ASME Class 600 Full Bore

All Types			Side-Entry							Top-Entry						
Size in/mm	A	B	L-RF	L-RTJ	L-WE	C	D	E	Weight lb/kg*	L-RF	L-RTJ	L-WE	C	D	E	Weight lb/kg*
6 150	5.91 150	5.91 150	22.0 559	22.13 562	22.0 559	14.0 356	9.8 250	7.9 200	557 253	22.01 559	22.13 562	22.01 559	13.19 335	11.30 287	5.08 129	497 226
8 200	7.91 201	7.91 201	26.0 660	26.13 664	26.0 660	16.5 419	11.3 288	10.0 255	1067 485	25.98 660	26.13 664	25.98 660	16.34 415	12.76 324	10.83 275	917 417
10 250	9.92 252	9.92 252	31.0 787	31.13 791	31.0 787	20.1 510	13.0 330	12.1 308	1668 758	30.98 787	31.13 791	30.98 787	19.88 505	14.37 365	12.80 325	1254 570
12 300	11.93 303	11.93 303	33.0 838	33.13 841	33.0 838	22.6 575	14.9 378	13.7 348	2347 1067	32.99 838	33.13 841	32.99 838	22.64 575	18.90 480	16.34 415	1584 720
14 350	13.15 334	13.15 334	35.0 889	35.13 892	35.0 889	24.7 628	15.5 394	14.2 360	2383 1083	35.00 889	35.13 892	35.00 889	26.38 670	18.31 465	17.40 442	1694 770
16 400	15.16 385	15.16 385	39.0 991	39.13 994	39.0 991	27.6 700	16.9 430	16.1 410	3355 1525	39.02 991	39.13 994	39.02 991	28.03 712	18.50 470	18.15 461	2446 1112
18 450	17.17 436	17.17 436	43.0 1092	43.13 1095	43.0 1092	30.5 774	18.4 467	16.9 430	4609 2095	42.99 1092	43.13 1095	42.99 1092	29.80 757	20.16 512	18.98 482	3351 1523
20 500	19.17 487	19.17 487	47.0 1194	47.25 1200	47.0 1194	34.1 865	19.7 500	19.4 492	5804 2638	47.01 1194	47.25 1200	47.01 1194	33.86 860	22.44 570	22.44 570	4268 1940
22 550	21.18 538	21.18 538	51.0 1296	51.38 1305	51.0 1296	37.4 950	37.4 950	19.9 505	8331 3787	51.02 1296	51.38 1305	51.02 1296	37.28 947	22.76 578	23.70 602	6072 2760
24 600	23.19 589	23.19 589	55.0 1397	55.38 1406	55.0 1397	40.5 1028	23.4 594	22.4 570	10419 4736	55.00 1397	55.38 1406	55.00 1397	39.96 1015	24.49 622	24.02 610	7069 3213
26 650	24.92 633	24.92 633	57.0 1448	57.50 1460	57.0 1448	40.0 1015	24.8 630	24.3 618	12423 5647	57.01 1448	57.50 1460	57.01 1448	42.44 1078	26.85 682	25.20 640	8389 3813
28 700	26.93 684	26.93 684	61.0 1549	61.50 1562	61.0 1549	46.1 1172	26.2 665	27.2 692	14868 6758	60.98 1549	61.50 1562	60.98 1549	45.12 1146	29.21 742	28.43 722	10146 4612
30 750	28.94 735	28.94 735	66.3 1684	65.50 1697	66.3 1684	50.8 1290	29.2 741	31.5 800	18429 8377	66.30 1684	65.50 1697	66.30 1684	50.00 1270	32.17 817	31.65 804	12408 5640
32 800	30.67 779	30.67 779	70.0 1778	70.72 1794	70.0 1778	52.4 1330	29.8 756	31.7 804	21424 9738	70.00 1778	70.72 1794	70.00 1778	51.85 1317	33.66 855	33.07 840	15627 7103
34 850	32.68 830	32.68 830	76.0 1930	76.52 1946	76.0 1930	55.1 1400	30.8 782	32.2 817	24939 11336	75.98 1930	76.52 1946	75.98 1930	56.02 1423	35.16 893	35.04 890	17208 7822
36 900	34.41 874	34.41 874	82.0 2083	82.63 2098	82.0 2083	60.9 1546	34.2 869	37.2 945	29256 13298	82.01 2083	82.63 2098	82.01 2083	57.09 1450	37.28 947	37.17 944	20060 9118
40 1000	38.43 976	38.43 976	81.9 2080	85.43 2170	85.4 2170	64.8 1645	36.1 916	38.6 980	40337 18335	85.43 2170	85.43 2170	85.43 2170	65.67 1668	40.35 1025	40.98 1041	28171 12805
42 1050	40.16 1020	40.16 1020	85.6 2175	85.63 2175	85.6 2175	70.7 1795	39.2 995	43.7 1110	46983 21356	85.63 2175	85.63 2175	85.63 2175	67.72 1720	42.76 1086	42.32 1075	33260 15118
48 1200	45.91 1166	45.91 1166	95.9 2435	95.87 2435	95.9 2435	81.5 2070	44.6 1132	49.8 1265	68629 31195	95.87 2435	95.87 2435	95.87 2435	77.56 1970	59.29 1506	48.82 1240	49762 22619
50 1400	53.54 1360	53.54 1360	106.7 2710	106.69 2710	106.7 2710	94.1 2390	50.8 1290	57.1 1450	104463 47483	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*

**Weight figures are relevant to flanged end, bare stem valves. Add the appropriate actuator weight to get the total weight.*

(1) Please consult the factory

Note: For dimensions and weights in larger sizes, consult the factory.

Dimensions C, D, E, and weights are subject to change without notice

Face-to-face dimensions not listed in industry standards are subject to change without notice.

Dimensions and Weights (continued)

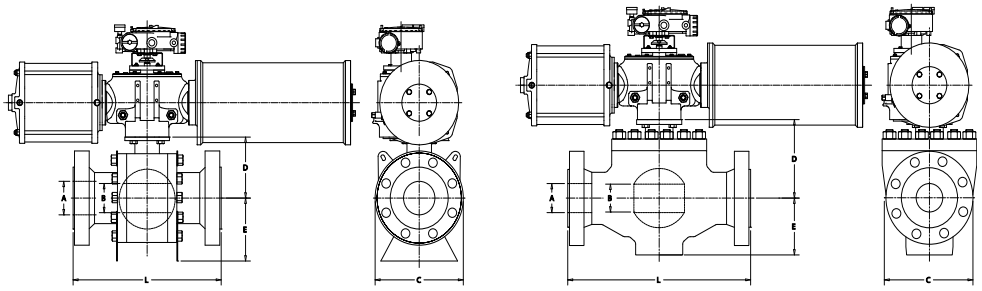


Table 6: ASME Class 600 Reduced Bore

All Types			Side-Entry							Top-Entry						
Size in/mm	A	B	L-RF	L-RTJ	L-WE	C	D	E	Weight lb/kg*	L-RF	L-RTJ	L-WE	C	D	E	Weight lb/kg*
6 x 4 150 x 100	5.91 150	3.94 100	22.0 559	22.13 562	22.0 559	14.0 356	8.3 210	6.3 160	330 150	22.0 559	22.13 562	22.0 559	14.0 356	11.6 294	5.9 150	180 82
8 x 6 200 x 150	7.91 201	5.91 150	26.0 660	26.13 664	26.0 660	16.5 419	9.8 250	7.9 200	642 292	26.0 660	26.13 664	26.0 660	16.5 419	11.3 287	5.1 129	699.6 318
10 x 8 250 x 200	9.92 252	7.91 201	31.0 787	31.13 791	31.0 787	20.1 510	11.3 288	10.0 255	1210 550	31.0 787	31.13 791	31.0 787	20.1 510	12.8 324	10.8 275	1320 600
12 x 10 300 x 250	11.93 303	9.92 252	33.0 838	33.13 841	33.0 838	22.0 560	13.0 330	12.1 308	1784 811	33.0 838	33.13 841	33.0 838	22.0 560	14.4 365	12.8 325	1582 719
14 x 10 350 x 250	13.15 334	9.92 252	35.0 889	35.13 892	35.0 889	23.8 605	13.0 330	12.1 308	2006 912	35.0 889	35.13 892	35.0 889	23.8 605	14.4 365	12.8 325	2180 991
14 x 12 350 x 300	13.15 334	11.93 303	35.0 889	35.13 892	35.0 889	23.8 605	14.9 378	13.7 348	2519 1145	35.0 889	35.13 892	35.0 889	23.8 605	18.9 480	16.3 415	2620 1191
16 x 12 400 x 300	15.16 385	11.93 303	39.0 991	39.13 994	39.0 991	27.0 685	14.9 378	13.7 348	29.66 1348	39.0 991	39.13 994	39.0 991	27.0 685	18.9 480	16.3 415	3104 1411
16 x 14 400 x 350	15.16 385	13.15 334	35.0 889	39.13 994	35.0 889	24.7 628	15.5 394	14.2 360	2383 1083	39.0 991	39.13 994	39.0 991	27.0 685	18.3 465	17.4 442	3029 1377
18 x 16 450 x 400	17.17 436	15.16 385	43.0 1092	43.13 1095	43.0 1092	29.3 745	16.9 430	16.1 410	3696 1680	43.0 1092	43.13 1095	43.0 1092	29.3 745	18.5 470	18.1 461	4083 1856
20 x 16 500 x 400	19.17 487	15.16 385	47.0 1194	47.25 1200	47.0 1194	32.1 815	16.9 430	16.1 410	4587 2085	47.0 1194	47.25 1200	47.0 1194	32.1 815	18.5 470	18.1 461	6371 2896
20 x 18 500 x 450	19.17 487	17.17 36	47.0 1194	47.25 1200	47.0 1194	32.1 815	18.4 467	16.9 430	5225 2375	47.0 1194	47.25 1200	47.0 1194	32.1 815	20.2 512	19.0 482	5755 2616
24 x 20 600 x 500	23.19 589	19.17 487	55.0 1397	55.38 1406	55.0 1397	37.0 940	19.7 500	19.4 492	7146 3248	55.0 1397	55.38 1406	55.0 1397	37.0 940	22.4 570	22.4 570	7740 3518
30 x 24 750 x 600	28.94 735	23.19 589	66.3 1684	65.50 1697	66.3 1684	44.5 1130	23.4 594	22.4 570	12690 5768	66.3 1684	65.50 1697	66.3 1684	44.5 1130	24.5 622	24.0 610	13130 5968
36 x 30 900 x 750	34.41 874	28.94 735	82.0 2083	82.63 2098	82.0 2083	51.8 1315	27.9 708	29.6 751	22827 10376	82.0 2083	82.63 2098	82.0 2083	51.8 1315	32.2 817	31.7 804	23258 10572

**Weight figures are relevant to flanged end, bare stem valves. Add the appropriate actuator weight to get the total weight.*

Note: For dimensions and weights in larger sizes, consult the factory.

See pages 21-23 for dimensions and weight details of the actuator and positioner.

Dimensions C, D, E, and weights are subject to change without notice.

Face-to-face dimensions not listed in industry standards are subject to change without notice.

Dimensions and Weights (continued)

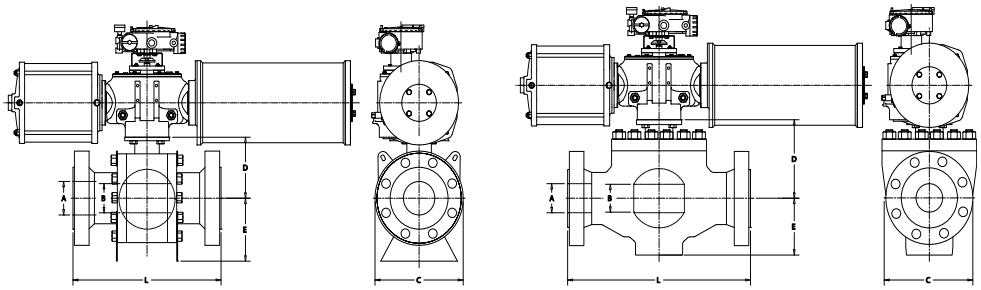


Table 7: Class 900 Full Bore

All Types			Side-Entry							Top-Entry						
Size in/mm	A	B	L-RF	L-RTJ	L-WE	C	D	E	Weight lb/kg*	L-RF	L-RTJ	L-WE	C	D	E	Weight lb/kg*
6 150	5.91 150	5.91 150	24.02 610	24.13 613	24.02 610	15.00 381	10.20 259	8.39 213	792 360	24.02 610	24.13 613	24.02 610	15.00 381	11.14 283	13.11 333	946 430
8 200	7.91 201	7.91 201	29.02 737	29.13 740	29.02 737	18.50 470	11.69 297	10.39 264	1276 580	29.02 737	29.13 740	29.02 737	18.50 470	13.15 334	10.79 274	1760 800
10 250	9.92 252	9.92 252	32.99 838	33.11 841	32.99 838	21.46 545	13.46 342	13.11 333	2222 1010	32.99 838	33.11 841	32.99 838	21.46 545	14.93 380	12.60 320	2200 1000
12 300	11.93 303	11.93 303	37.99 965	38.11 968	37.99 965	24.02 610	15.12 384	14.92 379	3322 1510	37.99 965	38.11 968	37.99 965	24.02 610	19.96 507	16.46 418	2860 1300
14 350	12.68 322	12.68 322	40.51 1029	40.87 1038	40.51 1029	25.20 640	15.67 398	14.48 368	3190 1450	40.51 1029	40.87 1038	40.51 1029	25.20 640	20.47 520	17.44 443	3729 1695
16 400	14.69 373	14.69 373	44.49 1130	44.88 1140	44.49 1130	27.95 710	17.17 436	17.29 437	4730 2150	44.49 1130	44.88 1140	44.49 1130	27.95 710	21.18 538	18.19 462	5632 2560
18 450	16.65 425	16.65 423	47.99 1219	48.50 1232	47.99 1219	31.50 800	19.06 484	19.57 497	6204 2820	47.99 1219	48.50 1232	47.99 1219	31.50 800	22.83 580	19.17 487	7480 3400
20 500	18.54 471	18.54 471	52.01 1321	52.48 1333	52.01 1321	35.04 890	20.94 532	19.80 503	9240 4200	52.01 1321	52.48 1333	52.01 1321	35.04 890	24.61 625	23.82 605	9680 4400
24 600	22.44 570	22.44 570	60.98 1549	61.73 1568	60.98 1549	41.69 1059	24.29 617	24.92 633	14960 6800	60.98 1549	61.73 1568	60.98 1549	41.69 1059	27.17 690	24.61 625	15840 7200
28 700	26.18 665	26.18 665	69.02 1753	69.88 1775	69.02 1753	48.58 1234	26.54 674	27.80 706	21780 9900	69.02 1753	69.88 1775	69.02 1753	48.58 1234	32.28 820	28.46 723	22880 10400
30 750	28.03 712	28.03 712	74.02 1880	74.88 1902	74.02 1880	51.18 1300	28.46 723	30.59 777	26796 12180	74.02 1880	74.88 1902	74.02 1880	51.18 1300	34.65 880	31.50 800	28325 12875
32 800	29.92 760	29.92 760	80.00 2032	80.87 2054	80.00 2032	53.43 1357	30.87 784	31.85 809	26004 11820	80.00 2032	80.87 2054	80.00 2032	53.43 1357	36.93 938	34.25 870	35090 15950
34 850	31.81 808	31.81 808	85.00 2159	86.14 2188	85.00 2159	57.80 1468	31.77 807	33.54 852	37840 17200	85.00 2159	86.14 2188	85.00 2159	57.80 1468	38.66 982	36.22 920	38500 17500
36 900	33.66 855	33.66 855	90.00 2286	91.14 2315	90.00 2286	60.31 1532	33.39 848	35.35 898	41580 18900	90.00 2286	91.14 2315	90.00 2286	60.31 1532	41.34 1050	38.98 990	45320 20600

**Weight figures are relevant to flanged end, bare stem valves. Add the appropriate actuator weight to get the total weight.*

Note: For dimensions and weights in larger sizes, consult the factory.

See pages 21-23 for dimensions and weight details of the actuator and positioner.

Dimensions C, D, E, and weights are subject to change without notice.

Face-to-face dimensions not listed in industry standards are subject to change without notice.

Dimensions and Weights (continued)

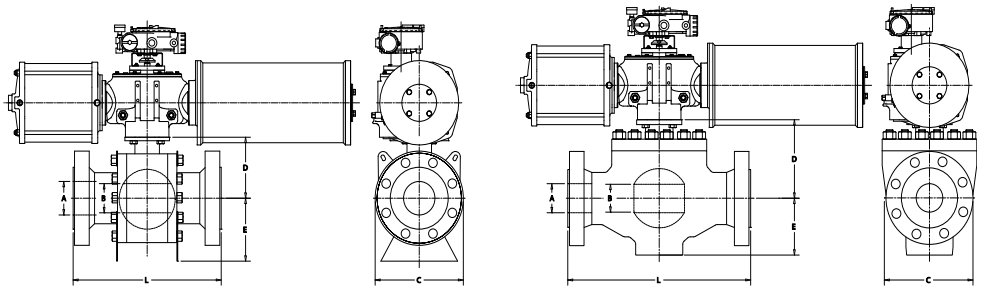


Table 8: ASME Class 900 Reduced Bore

All Types			Side-Entry							Top-Entry						
Size in/mm	A	B	L-RF	L-RTJ	L-WE	C	D	E	Weight lb/kg*	L-RF	L-RTJ	L-WE	C	D	E	Weight lb/kg*
6 x 4 150 x 100	5.91 150	3.94 100	24.02 610	24.13 613	24.02 610	15.00 381	8.19 208	6.42 163	451 205	24.02 610	24.13 613	24.02 610	15.00 381	10.87 276	5.71 145	601 273
8 x 6 200 x 150	7.91 201	5.91 150	29.02 737	29.13 740	29.02 737	18.50 470	10.35 263	8.39 213	968 440	29.02 737	29.13 740	29.02 737	18.50 470	11.02 280	8.78 223	1206 548
10 x 8 150 x 200	9.92 252	7.91 201	32.99 838	33.11 841	32.99 838	21.46 545	11.57 294	10.59 269	1518 690	32.99 838	33.11 841	32.99 838	21.46 545	13.35 339	10.67 271	1993 906
12 x 10 300 x 250	11.93 303	9.92 252	37.99 965	38.11 968	37.99 965	24.02 610	13.70 348	12.91 328	25.41 1155	37.99 965	38.11 968	37.99 965	24.02 610	14.96 380	12.76 324	2398 1090
14 x 10 350 x 250	12.68 322	9.92 252	40.51 1029	40.87 1038	40.51 1029	25.20 640	13.70 348	12.91 328	2728 1240	40.51 1029	40.87 1038	40.51 1029	25.20 640	14.96 380	12.76 324	3289 1495
14 x 12 350 x 300	12.68 322	11.93 303	40.51 1029	40.87 1038	40.51 1029	25.20 640	15.75 400	15.04 382	3597 1635	40.51 1029	40.87 1038	40.51 1029	25.20 640	20.28 515	16.14 410	3960 1800
16 x 12 400 x 300	14.69 373	11.93 303	44.49 1130	44.88 1140	44.49 1130	27.76 705	15.75 400	15.04 382	3806 1730	44.49 1130	44.88 1140	44.49 1130	27.76 705	20.28 515	16.14 410	46.20 2100
16 x 14 400 x 350	14.69 373	12.68 322	44.49 1130	44.88 1140	44.49 1130	27.56 700	15.83 402	17.32 440	3740 1700	44.49 1130	44.88 1140	44.49 1130	27.76 705	20.47 520	17.52 445	4400 2000
18 x 16 450 x 400	16.65 423	14.69 373	47.99 1219	48.50 1232	47.99 1219	31.10 790	17.28 439	17.40 442	5368 2440	47.99 1219	48.50 1232	47.99 1219	30.91 785	21.10 536	18.23 463	6241 2837
20 x 16 500 x 400	18.54 471	14.69 373	52.01 1321	52.48 1333	52.01 1321	31.10 790	17.28 439	17.40 442	6325 2875	52.01 1321	52.48 1333	52.01 1321	33.66 855	21.10 536	18.23 463	7733 3515
20 x 18 500 x 450	18.54 471	16.65 423	52.01 1321	52.48 1333	52.01 1321	33.66 855	18.90 480	19.09 485	7150 3250	52.01 1321	52.48 1333	52.01 1321	33.66 855	22.83 580	19.09 485	8525 3875
24 x 20 600 x 500	22.44 570	18.54 471	60.98 1549	61.73 1568	60.98 1549	40.94 1040	21.02 534	19.69 500	11880 5400	60.98 1549	61.73 1568	60.98 1549	40.94 1040	24.76 629	23.78 604	11869 5395
30 x 24 750 x 600	28.03 712	22.44 570	74.02 1880	74.88 1902	74.02 1880	48.43 1230	23.94 608	24.88 632	19140 8700	74.02 1880	74.88 1902	74.02 1880	48.43 1230	25.20 640	26.18 665	19800 9000
36 x 30 900 x 750	33.66 855	28.03 712	90.00 2286	91.14 2315	90.00 2286	57.48 1460	28.70 729	30.87 784	33770 15350	90.00 2286	91.14 2315	90.00 2286	57.48 1460	30.59 777	31.30 795	33517 15235

**Weight figures are relevant to flanged end, bare stem valves. Add the appropriate actuator weight to get the total weight.*

Note: For dimensions and weights in larger sizes, consult the factory.

See pages 21-23 for dimensions and weight details of the actuator and positioner.

Dimensions C, D, E, and weights are subject to change without notice.

Face-to-face dimensions not listed in industry standards are subject to change without notice.

Dimensions and Weights (continued)

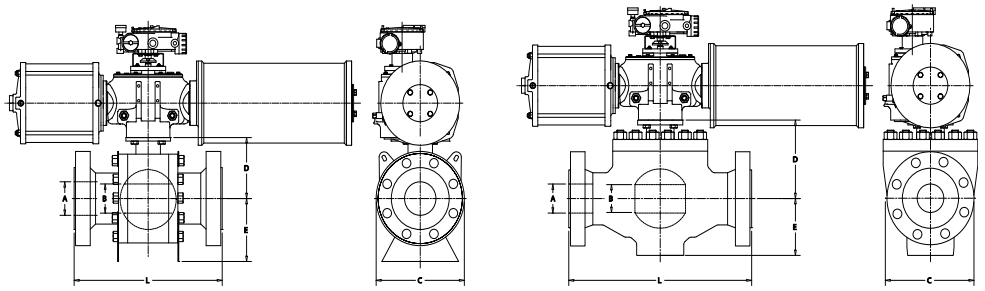


Table 9: ASME Class 1500 Full Bore

All Types			Side-Entry							Top-Entry						
Size in/mm	A	B	L-RF	L-RTJ	L-WE	C	D	E	Weight lb/kg*	L-RF	L-RTJ	L-WE	C	D	E	Weight lb/kg*
6 150	5.67 144	5.67 144	27.76 705	27.99 711	27.76 705	15.51 394	10.24 260	9.17 233	1056 480	27.76 705	27.99 711	27.76 705	15.51 394	11.93 303	9.29 236	1320 600
8 200	7.56 192	7.56 192	32.76 832	33.11 841	32.76 832	19.02 483	11.97 304	11.42 290	1804 820	32.76 832	33.11 841	32.76 832	19.02 483	13.94 354	11.22 285	2420 1100
10 250	9.41 239	9.41 239	39.02 991	39.37 1000	39.02 991	23.03 585	14.29 363	13.86 352	3300 1500	39.02 991	39.37 1000	39.02 991	23.03 585	15.67 398	13.11 333	3164 1438
12 300	11.30 287	11.30 287	44.49 1130	45.11 1146	44.49 1130	27.91 709	16.42 417	16.73 425	4950 2250	44.49 1130	45.11 1146	44.49 1130	27.91 709	20.47 520	16.81 427	4437 2017
14 350	12.40 315	12.40 315	49.49 1257	50.24 1276	49.49 1257	30.12 765	17.20 437	16.77 426	6270 2850	49.49 1257	50.24 1276	49.49 1257	30.12 765	21.65 550	17.95 456	5746 2612
16 400	14.17 360	14.17 360	54.49 1384	55.39 1407	54.49 1384	33.39 848	18.70 475	19.41 493	8954 4070	54.49 1384	55.39 1407	54.49 1384	33.39 848	22.24 565	19.17 487	8558 3890
18 450	15.94 405	15.94 405	58.15 1477	59.01 1499	60.51 1537	38.58 980	22.17 563	23.94 608	13629 6195	58.15 1477	59.01 1499	60.51 1537	38.58 980	23.31 592	20.75 527	11220 5100
20 500	17.91 455	17.91 455	65.51 1664	66.38 1686	65.51 1664	39.96 1015	24.29 617	25.39 645	19965 9075	65.51 1664	66.38 1686	65.51 1664	39.96 1015	25.59 650	24.80 630	14692 6678
24 600	20.87 530	20.87 530	70.15 1782	71.25 1810	80.43 2043	50.91 1293	27.48 698	28.50 724	31416 14280	70.15 1782	71.25 1810	80.43 2043	50.91 1293	25.98 660	25.20 640	25740 11700

Table 10: ASME Class 2500 Full Bore

All Types			Side-Entry							Top_Entry						
Size in/mm	A	B	L-RF	L-RTJ	L-WE	C	D	E	Weight lb/kg*	L-RF	L-RTJ	L-WE	C	D	E	Weight lb/kg*
4 100	3.43 87	3.43 87	26.50 673	26.89 683	26.50 673	14.02 356	8.94 227	9.17 233	836 380	26.50 673	26.89 683	26.50 673	14.33 364	11.77 299	6.46 164	1034 470
6 150	5.16 131	5.16 131	35.98 914	36.50 927	35.98 914	19.02 483	10.39 264	9.92 252	1694 770	35.98 914	36.50 927	35.98 914	19.02 483	13.98 355	9.57 243	2061 937
8 200	7.05 179	7.05 179	40.24 1022	40.87 1038	40.24 1022	24.41 620	15.08 383	13.35 339	2985 1357	40.24 1022	40.87 1038	40.24 1022	21.65 550	16.69 424	11.50 292	3102 1410
10 250	8.78 223	8.78 223	50.00 1270	50.87 1292	50.00 1270	29.33 745	17.83 453	16.61 422	4620 2100	50.00 1270	50.87 1292	50.00 1270	26.57 675	19.80 503	13.86 352	5720 2600
12 300	10.43 265	10.43 265	55.98 1422	56.89 1445	55.98 1422	34.25 870	20.47 520	18.98 482	7062 3210	55.98 1422	56.89 1445	55.98 1422	30.12 765	23.15 588	17.17 436	9240 4200

**Weight figures are relevant to flanged end, bare stem valves. Add the appropriate actuator weight to get the total weight.*

Note: For dimensions and weights in larger sizes consult the factory.

See pages 21-23 for dimensions and weight details of the actuator and positioner.

Dimensions C, D, E, and weights are subject to change without notice.

Face-to-face dimensions not listed in industry standards are subject to change without notice.

Dimensions and Weights (continued)

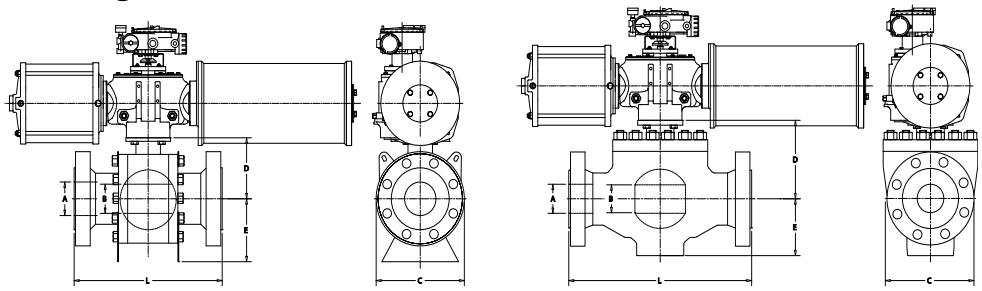


Table 11: ASME Class 1500 Reduced Bore

All Types			Side-Entry							Top-Entry						
Size in/mm	A	B	L-RF	L-RTJ	L-WE	C	D	E	Weight lb/kg*	L-RF	L-RTJ	L-WE	C	D	E	Weight lb/kg*
6 x 4 150 x 100	5.67 144	3.94 100	27.76 705	27.99 711	27.76 705	15.51 394	8.39 213	6.61 168	627 285	27.76 705	27.99 711	27.76 705	15.51 394	11.30 287	6.02 153	827 376
8 x 6 200 x 150	7.56 192	5.67 144	32.76 832	33.11 841	32.76 832	19.02 483	10.43 265	9.02 229	1245 566	32.76 832	33.11 841	32.76 832	19.02 483	11.93 303	9.29 236	1547 703
10 x 8 250 x 200	9.41 239	7.56 192	39.02 991	39.37 1000	39.02 991	23.03 585	11.69 297	11.30 287	2248 1022	39.02 991	39.37 1000	39.02 991	23.03 585	13.74 349	11.22 285	2801 1273
12 x 10 300 x 250	11.30 287	9.41 239	44.49 1130	45.12 1146	44.49 1130	26.57 675	14.17 360	13.66 347	3872 1760	44.49 1130	45.12 1146	44.49 1130	26.57 675	15.91 404	12.99 330	337 1535
14 x 10 350 x 250	12.40 315	9.41 239	49.49 1257	50.24 1276	49.49 1257	29.53 750	14.17 360	13.66 347	4719 2145	49.49 1257	50.24 1276	49.49 1257	29.53 750	15.91 404	12.99 3.30	4620 2100
14 x 12 350 x 300	12.40 315	11.30 287	49.49 1257	50.24 1276	49.49 1257	29.53 750	16.69 424	16.61 422	5500 2500	49.49 12.57	50.24 1276	49.79 1257	29.53 750	20.87 530	16.81 427	5936 2698
16 x 12 400 x 300	14.17 360	11.30 287	54.49 1384	55.39 1407	54.49 1384	32.48 825	16.69 424	16.61 422	6160 2800	54.49 1384	55.39 1407	54.49 1384	32.48 825	20.87 530	16.81 427	7040 3200
16 x 14 400 x 350	14.17 360	12.40 315	54.49 1384	55.39 1407	54.49 1384	32.48 825	17.44 443	16.85 428	7139 3245	54.49 1384	55.39 1407	54.49 1384	32.48 825	21.26 540	17.91 455	6820 3100
18 x 16 450 x 400	15.94 405	14.17 360	5815 1477	59.01 1499	60.51 1537	36.06 916	19.06 484	19.76 502	10934 4970	5815 1477	59.01 1499	60.51 1537	36.06 916	21.93 557	19.41 493	9240 4200
20 x 16 500 x 400	17.91 455	14.17 360	65.51 1664	66.38 1686	35.51 1664	38.78 985	19.06 484	19.76 502	11297 5135	65.51 1664	66.38 1686	65.51 1664	38.78 985	21.93 557	19.41 493	9900 4500
20 x 18 500 x 450	17.91 455	15.94 405	65.51 1664	66.38 1686	65.51 1664	38.78 985	21.85 555	23.74 603	16500 7500	65.51 1664	66.38 1686	65.51 1664	38.78 985	23.35 596	20.75 527	12980 5900
24 x 20 600 x 500	20.87 530	17.91 455	70.15 1782	71.25 1810	80.43 2043	46.06 1170	24.57 624	25.31 643	23925 10875	70.15 1782	71.25 1810	80.43 2043	46.06 1170	25.87 657	24.41 620	20240 9200

Table 12: ASME Class 2500 Reduced Bore

All Types			Side-Entry							Top-Entry						
Size in/mm	A	B	L-RF	L-RTJ	L-WE	C	D	E	Weight lb/kg*	L-RF	L-RTJ	L-WE	C	D	E	Weight lb/kg*
6 x 4 150 x 100	5.16 131	3.43 87	35.98 914	36.50 927	35.98 914	19.02 483	8.94 227	9.17 233	1122 510	35.98 914	36.50 927	35.98 914	19.02 483	11.77 299	6.46 164	1474 670
8 x 6 200 x 150	7.05 179	5.16 131	40.24 1022	40.87 1038	40.24 1022	21.65 550	10.39 264	9.92 252	2398 1090	40.24 1022	40.87 1038	40.24 1022	21.65 550	13.98 355	9.57 243	2530 1150
10 x 8 250 x 200	8.78 223	7.05 179	50.00 1270	50.87 1292	50.00 1270	26.57 675	15.08 383	13.35 339	3659 1663	50.00 1270	50.87 1292	50.00 1270	26.57 675	16.69 424	11.50 292	4620 2100
12 x 10 300 x 250	10.43 265	8.78 223	55.98 1422	56.89 1445	55.98 1422	29.92 760	20.47 520	18.98 482	5621 2555	55.98 1422	56.89 1445	55.98 1422	29.92 760	19.80 503	13.86 352	7260 3300

**Weight figures are relevant to flanged end, bare stem valves. Add the appropriate actuator weight to get the total weight.*

Note: For dimensions and weights in larger sizes, consult the factory.

See pages 21-23 for dimensions and weight details of the actuator and positioner.

Dimensions C, D, E, and weights are subject to change without notice.

Face-to-face dimensions not listed in industry standards are subject to change without notice.

Cv Tables

Flow Coefficient (Cv) @ 100% Open - Full Bore TMCBV												
Valve Size (in)	Standard Trim				N1-3 stage				N2-3 stage			
	150/300/600	900	1500	2500	150/300/600	900	1500	2500	150/300/600	900	1500	2500
6	4600	4380	3800	2500	563	536	465	306	647	616	535	352
8	9000	8500	7400	5300	1101	1040	906	649	1266	1196	1041	746
10	14700	14500	11500	8300	1799	1774	1407	1016	2068	2040	1618	1168
12	22500	21100	18000	13000	2753	2582	2203	1591	3165	2969	2532	1829
14	28000	25000	21000		3426	3059	2570		3939	3517	2954	
16	37200	34500	27500		4552	4222	3365		5234	4854	3869	
18	49000	45000	37000		5996	5506	4528		6894	6331	5205	
20	59000	55200	47800		7220	6755	5849		8301	7766	6725	
22	68200				8345				9595			
24	92000	83800	70000		11258	10254	8566		12943	11790	9848	
26	110000				13460				15476			
28	121000	113000			14806	13827			17023	15898		
30	144000	130000			17621	15908			20259	18290		
32	170000	151000			20802	18477			23917	21244		
34	189000				23127				26590			
36	210000	198200			25697	24253			29545	27885		
40	267500				32733				37634			
42	280000				34262				39393			
48	384000				46988				54025			
56	521000				63752				73299			

Flow Coefficient (Cv) @ 100% Open - Full Bore TMCBV												
Valve Size (in)	N2-4stage				C1				Z1			
	150/300/600	900	1500	2500	150/300/600	900	1500	2500	150/300/600	900	1500	2500
6	531	505	438	288	190	181	157	103	1376	1311	1137	748
8	1038	980	853	611	372	351	305	219	2693	2543	2214	1586
10	1695	1672	1326	957	607	599	475	343	4399	4339	3441	2484
12	2595	2434	2076	1499	929	871	743	537	6733	6314	5386	3890
14	3229	2883	2422		1156	1032	867		8378	7481	6284	
16	4290	3979	3172		1536	1424	1135		11131	10323	8229	
18	5651	5190	4267		2023	1858	1527		14662	13465	11071	
20	6805	6366	5513		2435	2279	1973		17654	16517	14303	
22	7866				2815				20407			
24	10611	9665	8073		3798	3459	2889		27528	25075	20946	
26	12687				4541				32914			
28	13955	13033			4995	4664			36206	33812		
30	16608	14993			5944	5366			43088	38899		
32	19607	17415			7017	6233			50868	45183		
34	21798				7802				56553			
36	24220	22859			8668	8181			62837	59306		
40	30852				11042				80042			
42	32293				11558				83782			
48	44288				15851				114901			
56	60089				21506				155895			

NOTE: *Please consult the factory for Cv tables and characteristics of trims and stages not listed.*

Cv Tables (continued)

Flow Coefficient (Cv) @ 100% Open - Reduced Bore TMCBV

Valve Size (in)	Standard Trim				N1-3 stage				N2-3 stage			
	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	183	183	180	172	198	198	196	187
8 X 6	2150	2150	2150	2150	507	482	418	275	552	526	456	300
10 X 8	4300	4450	4450	4100	991	936	815	584	1080	1020	888	636
12 X 10	7550	8000	9000	7550	1619	1597	1266	914	1764	1740	1380	996
14 X 12	14000	12800	13000		2478	2324	1982		2700	2532	2160	
16 X 14	15000	14200	14100		3084	2753	2313		3360	3000	2520	
18 X 16	21000	19200	19000		4097	3799	3029		4464	4140	3300	
20 X 18	28400	25000	25000		5396	4956	4075		5880	5400	4440	
14 X 10	6000	6100	6100		1637	1614	1280		1696	1673	1327	
16 X 12	9100	8900	8900		2505	2350	2005		2596	2434	2077	
20 X 16	15300	13800	12000		4142	3842	3062		4292	3980	3173	
24 X 20	28000	25100	20600		6570	6147	5323		6800	6368	5514	
30 X 24	36000	32900			10244	9331			10614	9668		
36 X 30	64000	61500			16035	14476			16613	14997		

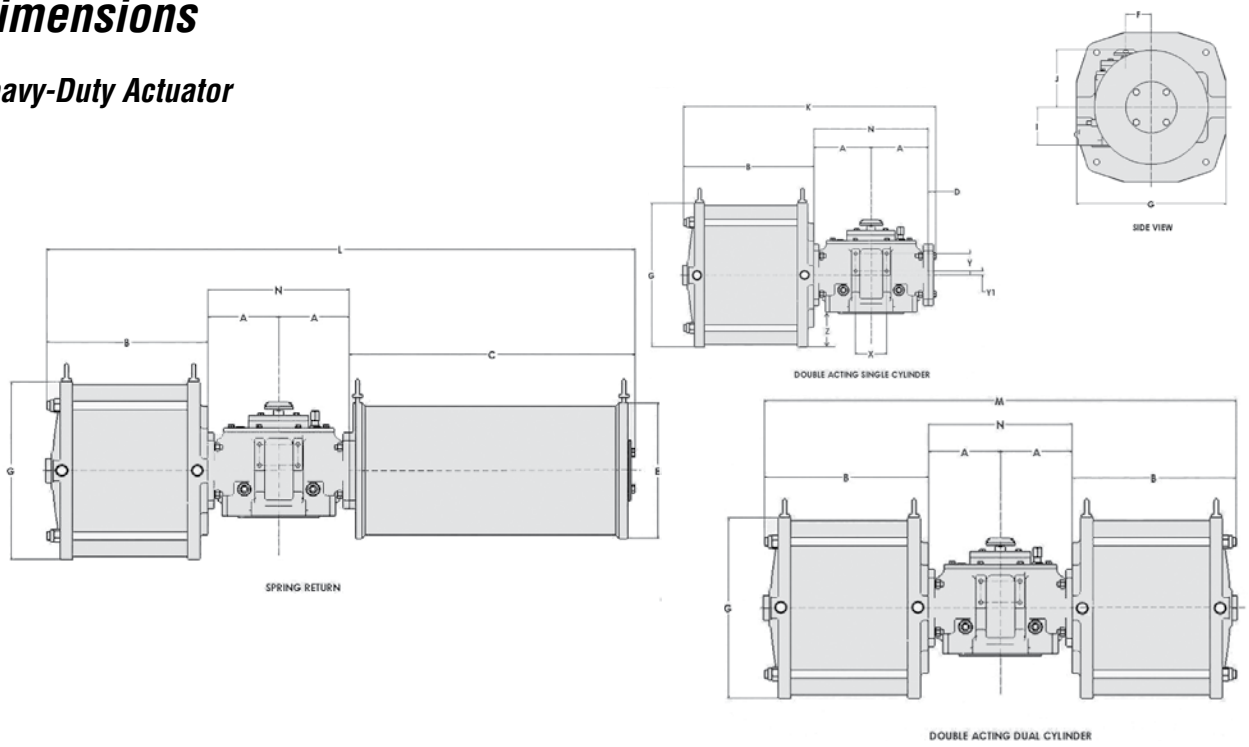
Flow Coefficient (Cv) @ 100% Open - Reduced Bore TMCBV

Valve Size (in)	N2-4stage				C1				Z1			
	150/300/600	900	1500	2500	150/300/600	900	1500	2500	150/300/600	900	1500	2500
6 X 4	163	163	161	153	93	93	101	93				
8 X 6	453	431	374	246	178	170	147	97	1239	1180	1023	673
10 X 8	886	836	728	522	348	330	287	206	2424	2289	1993	1427
12 X 10	1447	1427	1132	817	570	563	446	322	3959	3905	3097	2235
14 X 12	2214	2076	1771		873	819	698	504	6059	5682	4847	3501
16 X 14	2755	2460	2067		1086	970	815		7540	6733	5655	
18 X 16	3661	3395	2706		1443	1339	1067		10018	9291	7406	
20 X 18	4822	4428	3641		1901	1746	1436		13196	12119	9964	
14 X 10	1391	1372	1088		631	622	494	356	4003	3948	3131	2260
16 X 12	2128	1996	1703		966	906	773	558	6127	5745	4901	3540
20 X 16	3519	3264	2601		1597	1481	1181		10129	9394	7488	
24 X 20	5576	5222	4522		2523	2370	2052		16065	15031	13016	
30 X 24	8703	7927			3949	3597	3005		25051	22818	19060	
36 X 30	13622	12298			6182	5581			39210	35398		

NOTE: *Please consult the factory for Cv tables and characteristics of trims and stages not listed.*

Dimensions

Heavy-Duty Actuator



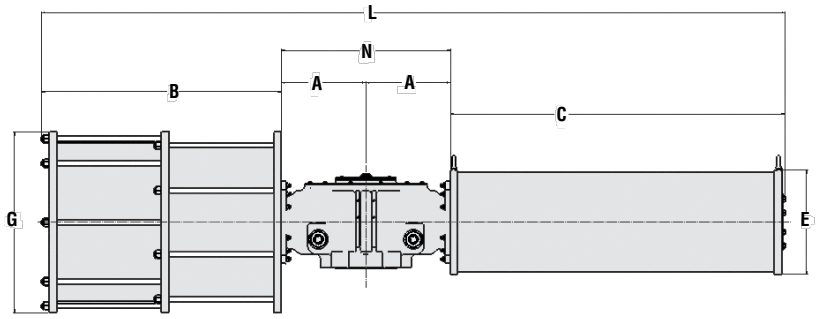
Actuator Dimensions, mm (inch)															
SERIES	**A**	**B**	**C**	**D**	**E**	**F**	**I**	**J**	**K**	**L**	**M**	**N**	**X**	**Y**	**Y1**
RG1	141 (5.55)	310 (12.20)	498 (19.61)	18,5 (0.73)	264 (10.39)	55 (2.17)	99 (3.90)	139 (5.47)	610.5 (24.04)	1090 (42.91)	902 (35.51)	282 (11.10)	68 (2.68)	50 (1.97)	-9 (-0.35)
RG2	162 (6.38)	368 (14.49)	586 (23.07)	20 (0.79)	322 (12.68)	65 (2.56)	116 (4.57)	154 (6.06)	712 (28.03)	1278 (50.31)	1060 (41.73)	324 (12.76)	68 (2.68)	50 (1.97)	8 (0.31)
RG3	175 (6.98)	444 (17.48)	706 (27.80)	23 (0.91)	380 (14.96)	75 (2.95)	111 (4.37)	161 (6.34)	817 (32.17)	1500 (59.06)	1238 (48.74)	350 (13.78)	95 (3.74)	50 (1.97)	15 (0.59)
RG4	243 (9.57)	565 (22.24)	868 (34.17)	23 (0.91)	467 (18.39)	91 (3.58)	145 (5.71)	185 (7.28)	1074 (42.28)	1919 (75.55)	1616 (63.62)	486 (19.13)	95 (3.74)	70 (2.76)	0 (0.00)
RG5	312 (12.28)	716 (28.19)	1008 (39.69)	26 (1.02)	568 (22.36)	145 (5.71)	175.5 (6.91)	199.5 (7.85)	1366 (53.78)	2348 (92.44)	2056 (80.94)	624 (24.57)	95 (3.74)	70 (2.76)	15.5 (0.61)
RG6	394 (15.51)	756 (29.76)	1640 (64.57)	28 (1.10)	600 (23.62)	185 (7.28)	208 (8.19)	228 (8.98)	1572 (61.89)	3184 (125.35)	2300 (90.55)	788 (31.02)	95 (3.74)	70 (2.76)	25.5 (1.00)
RG7	500 (19.69)	810 (31.89)	2030 (79.92)	50 (1.97)	615 (24.21)	220 (8.66)	265 (10.43)	310 (12.20)	1860 (73.23)	3840 (151.18)	2620 (103.15)	1000 (39.37)	266 (10.47)	150 (5.91)	11.5 (0.45)
RG8	665 (26.18)	860 (33.86)	2600 (102.36)	55 (2.17)	680 (26.77)	280 (11.02)	306 (12.05)	365.5 (14.39)	2245 (88.39)	4790 (188.58)	3050 (120.08)	1330 (52.36)	266 (10.47)	200 (7.87)	-21 (-0.83)

Cylinder Size	**5"**	**6"**	**7"**	**8"**	**9"**	**10"**	**12"**	**14"**	**16'**	**18"**	**20"**	**22"**	**24"**	**28"**	**32"**	**36"**	**40"**
G	178 (7.01)	178 (7.01)	196 (7.72)	222 (8.74)	248 (9.76)	274 (10.79)	324 (12.76)	375 (14.76)	438 (17.24)	486 (19.13)	532 (20.94)	588 (23.15)	648 (25.51)	865 (34.06)	967 (38.07)	1069 (42.09)	1170 (46.06)
Port Size NPT	3/8˝	3/8˝	3/8˝	3/8˝	3/8˝	1/2˝	3/4˝	3/4˝	3/4˝	1˝	1˝	1˝	1˝	1½˝	1½˝	1½˝	2˝

Dimension Z, mm (inch)																	
SERIES	**5"**	**6"**	**7"**	**8"**	**9"**	**10"**	**12"**	**14"**	**16'**	**18"**	**20'**	**22"**	**24"**	**28"**	**32"**	**36"**	**40"**
RG1	10 (0.39)	10 (0.39)	11 (0.04)	12 (0.47)	25 (0.98)	38 (1.50)	63 (2.48)	–	–	–	–	–	–	–	–	–	–
RG2	–	–	–	5 (0.20)	8 (0.31)	21 (0.83)	46 (1.81)	71,5 (2.81)	103 (4.06)	–	–	–	–	–	–	–	–
RG3	–	–	–	–	–	26 (1.02)	51 (2.01)	76,5 (3.01)	108 (4.25)	132 (5.20)	155 (6.10)	–	–	–	–	–	–
RG4	–	–	–	–	–	–	–	42,5 (1.67)	74 (2.91)	98 (3,86)	121 (4.76)	149 (5.87)	179 (7.05)	–	–	–	–
RG5	–	–	–	–	–	–	–	–	43,5 (1.71)	67,5 (2.66)	90,5 (3.56)	118,5 (4.67)	148,5 (5.85)	257 (10.12)	–	–	–
RG6	–	–	–	–	–	–	–	–	–	35 (1.38)	58 (2.28)	86 (3.39)	116 (4.57)	224,5 (8.84)	275,5 (10.85)	326,5 (12.85)	–
RG7	–	–	–	–	–	–	–	–	–	–	–	–	59 (2.32)	167,5 (6.59)	218,5 (8.6)	269,5 (10.61)	320 (12.60)
RG8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	177,5 (6.99)	228,5 (9.00)	279 (10.98)

Dimensions

Heavy-Duty Actuator



Double Acting Tandem Cylinder

Dimensions for Spring Return Tandem Cylinders, mm (inch)							
SERIES	**A**	**B**	**C**	**E**	**G**	**N**	**L**
RG8 32-32	665 (26.18)	1715 (67.52)	2600 (102.36)	680 (26.77)	1170 (46.06)	1330 52.36)	5645 (222.24)
RG836-36	665 (26.18)	1740 (68.50)	2600 102.36)	680 (26.77)	1170 (46.06)	1330 52.36)	5670 (223.23)

Actuator Weights					
Model	**Kg**	**Lbs**	**Model**	**Kg**	**Lbs**
RG1 DA	61	135	RG5 DA	620	1360
RG1 DD	79	174	RG5 DD	786	1734
RG1 SR	148	326	RG5 SR	1409	3106
RG2 DA	113	248	RG6 DA	1211	2671
RG2 DD	135	298	RG6 DD	1379	3041
RG2 SR	275	606	RG6 SR	2714	5985
RG3 DA	210	462	RG7 DA	2290	5049
RG3 DD	247	544	RG7 DD	3046	6716
RG3 SR	466	1028	RG7 SR	4320	9525
RG4 DA	400	883	RG8 DA	3581	7895
RG4 DD	442	974	RG8 DD	5471	12062
RG4 SR	826	1822	RG8 SR	6955	15335

**DA - Double Acting*

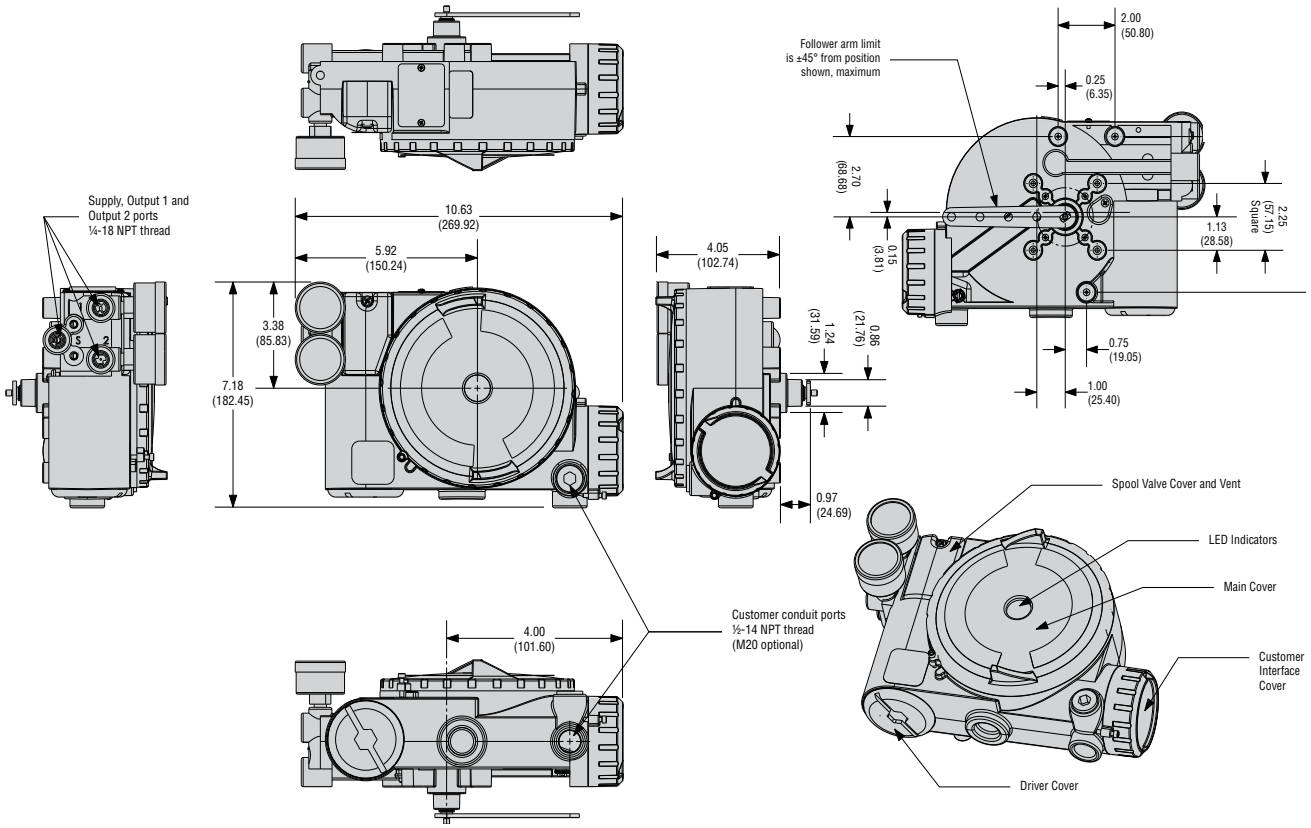
***DD - Dual Cylinder*

****Spring Return*

Dimensions

High Performance Logix Digital Positioner

NOTE: Dimensions in inches (mm)



Electrical Specifications Logix 3200MD	
Power Supply	Two-wire, 4-20 mA 10.0 to 30.0 VDC
Compliance Voltage	10.0 VDC @ 20 mA
Effective Resistance	495 Ω @ 20 mA Typical Add 20 Ω when HART communication active
Communications	HART Protocol ITK 5,6
Minimum Operating Current	3.6 mA without AO board 3.7 mA with AO board
Maximum Voltage	30.0 VDC

Environmental Conditions Logix 3200MD		
Operating Temperature Range	Standard	-4° to 176°F (-20° to 80°C)
	Low	-40° to 176°F (-40° to 80°C)
Transport and Storage Temperature Range	-40° to 176°F (-40° to 80°C)	
Operating Humidity	0 - 100% non-condensing	

Note: The air supply must conform to ISA Standard ISA 7.0.01 (a dew point at least 18 degrees Fahrenheit below ambient temperature, particle size below five microns—one micron recommended—and oil content not to exceed one part per million).

Electrical Specifications Logix 3400MD	
Power Supply	Two-wire, 9-32 VDC FF compatible
IS	Fisco compliant
Communications	FF Protocol ITK 4.6x, 5.0
Operating Current	23 mA
Maximum Voltage	36.0 VDC

Environmental Conditions Logix 3400MD		
Operating Temperature Range	Standard	-40° to 176°F (-40° to 80°C)
Transport and Storage Temperature Range	-40° to 176°F (-40° to 80°C)	
Operating Humidity	0 - 100% non-condensing	

Note: The air supply must conform to ISA Standard ISA 7.0.01 (a dew point at least 18 degrees Fahrenheit below ambient temperature, particle size below five microns—one micron recommended—and oil content not to exceed one part per million).

Other Specifications	
Weight	8.3 pounds (3.9 kg) aluminum
	20.5 pounds (9.3 kg) stainless steel
Air Consumption	<0.3 SCFM (0.5 Nm3/hr) @ 60 psi (4 bar)
Air Supply	30-150 psig (ISA 7.0.0.1 compliant)
Air Delivery	12 SCFM @ 60 psi (0.27 Cv)

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FV VLENTB0068-02 Printed in USA.

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