

CVS Controls Series 9000/9100 3 Piece Trunnion Ball Valves

The CVS Controls Series 9000/9100 Trunnion Ball Valves are available in a variety of configurations and materials to meet specific applications.

The CVS Series 9000/9100 Ball Valves are available in 2 Inch through 12 inch, ASME Class 150/300, 600, 900, 1500, and 2500, and both full and reduced port.



Standard features include:

- Emergency sealant injection (6" and larger)
- Anti-Blowout
- Lockout Protection
- Double Block and Bleed
- Valve Cavity Pressure Relief
- Manufactured to API 6D Specifications, NACE MRO175 and ASME B16.34-latest edition standards

ABSA CRN # 0C01943.2

SPECIFICATIONS

CVS Series 9000/9100 Product Range, Full and Reduced Port, Flanged End Connection

Body Material	Class		Port	Valve Size (inches)						
	API 6D	API 6A		2*	3	4	6	8	10	12
Carbon Steel, Stainless Steel, Special	150	---	Full and Reduced	X	X	X	X	X	X	X
	300	---		X	X	X	X	X	X	X
	600	---		X	X	X	X	X	X	X
	900	2000		X	X	X	X	X	X	X
	1500	3000		X	X	X	X	X	X	X
	2500	5000		X	X	X	X	X	X	X
	---	10000		X	X	X	X	X	X	---

*Full Port Only

How To Order:

Model number identification CVS Series 9000/9100 Ball Valves. The CVS 9000 is a reduced port, while a CVS 9100 is a full port configuration.

Example: 6" F-10-7-R-2-S-N-V-4

The above model number represents a 6", Full Port, ASME Class 150, Trunnion, Raised Face End Connection, LCC Body Material, Carbon Steel Trim, Nylon Seats, Viton Seals, for NACE MRO175/ISO 15156 Service, and bare stem.

6	F	10	7	1	2	S	N	V	4	Drive Type
Valve Size	Port Config.	Pressure Class	Valve Design	Flange End	Body Material	Trim Material	Seat Material	Seal Material	End Connection	
Valve Size	R Reduced	10 150	1 Floater	R RF	Blank A105	C Carbon Steel	P PTFE	V Viton	1 Female Thread	Blank Manual
		30 300			1 LF2		N Nylon		2 Male Thread	
		60 600			S Stainless Steel		V Viton		N Nylon	
	F Full	90 900	J RTJ	S Stainless Steel		S Stainless Steel	F PTFE	3 Gear Operator		
		15 1500	7 Trunnion		3 Stainless Steel			6 BW		
		25 2500								

FLOW COEFFICIENTS

CVS Series 9000/9100 Trunnion Ball Valves

Cv is equal to volume of water @ 60°F in gallons per minute that will flow through an opening while producing a 1 psi pressure drop across the valve.

Flow Coefficient - Cv Rating						
Size (In.)	CL 150	CL 300	CL 600	CL 900	CL 1500	CL 2500
2X2	500	460	400	330	330	300
3X2	180	195	180	187	187	150
3X3	1350	1150	1050	935	830	740
4X3	545	535	550	510	510	410
4X4	2500	2200	1850	1760	1660	1460
6X4	790	765	745	740	740	590
6X6	5300	5290	4460	4405	4100	2600
8X6	1945	1945	2220	2035	1930	1400
8X8	10500	9600	8730	8475	8010	5370
10X8	4050	4040	4065	4050	3860	3050
10X10	17500	16750	14250	14205	13310	8630
12X10	6900	7100	7050	7025	6670	5350
12X12	26300	25500	22550	21430	17070	12500

CVS 9000/9100 Repair Kits

When ordering replacement parts for the Series 9000/9100 Trunnion Ball Valve, please reference the model and serial number indicated on the nameplate. For more information contact a CVS Controls Sales Representative.

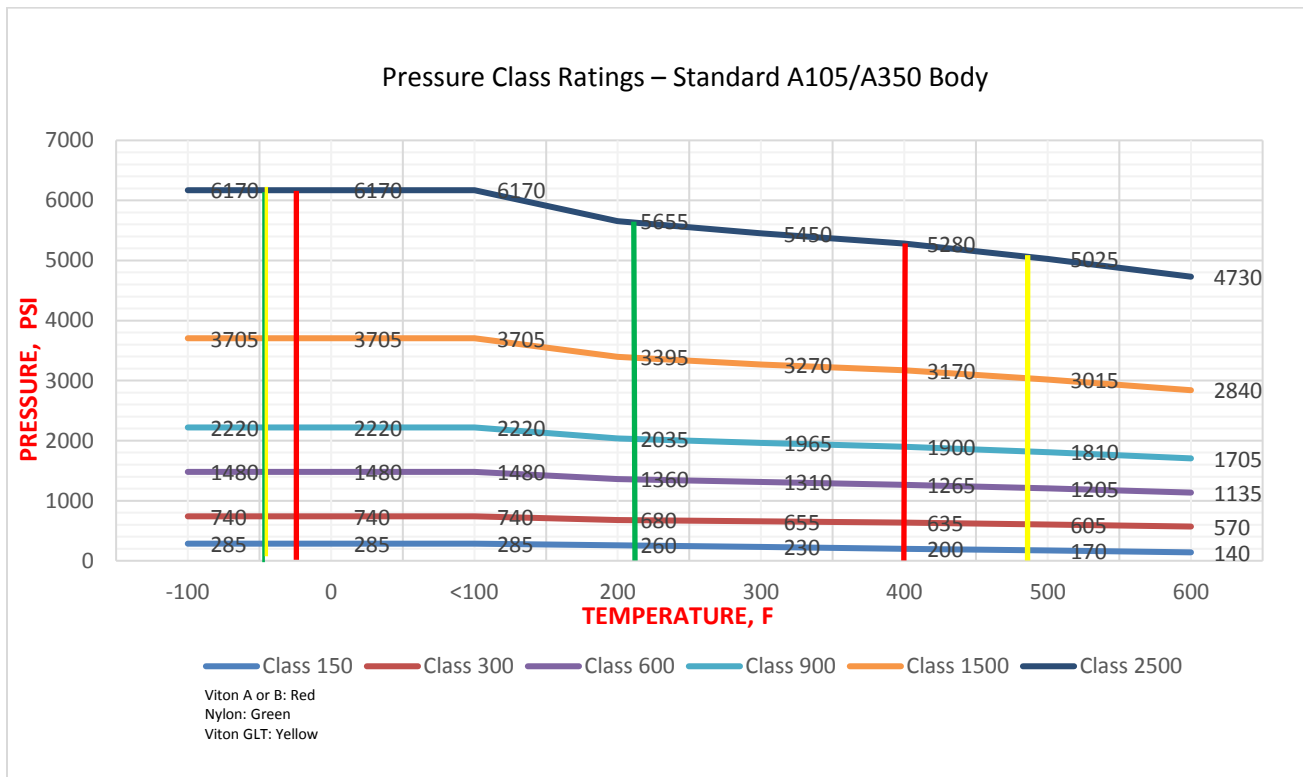


Ball Valve Stem Torques – In./lbs

To calculate stem torque at any pressure, use the formula located under the correct Class for the valve Port Size being used. ie: A 6” Class 600 at 1000psi, $2069+(4.4 \times 1000) = 9104$ in. lbs.

Seat	G/PTFE	G/PTFE	G/PTFE	Nylon	Nylon	Nylon	Nylon	Nylon	Nylon	Nylon	Nylon
Port Size	Class 150-300 Formula	Class 150 Max	Class 300 Max	Class 600 Formula	Class 600 Max	Class 900 Formula	Class 900 Max	Class 1500 Formula	Class 1500 Max	Class 2500 Formula	Class 2500 Max
	MOP (psi)	285	740	MOP (psi)	1480	2220	2220	3705	3705	6170	6170
2	$500+(0.51 \times P)$	650	880	$640+(0.62 \times P)$	1560	$700+(0.61 \times P)$	2050	$849+(0.61 \times P)$	3110	$792+(0.39 \times P)$	3200
3	$1105+(1.13 \times P)$	1430	1940	$1333+(1.47 \times P)$	3510	$1427+(1.35 \times P)$	4420	$1705+(1.14 \times P)$	5930	$1510+(0.84 \times P)$	6690
4	$1540+(1.99 \times P)$	2110	3010	$1839+(2.47 \times P)$	5490	$1985+(2.26 \times P)$	7000	$2423+(2.08 \times P)$	10130	$2345+(1.35 \times P)$	10670
6	$1630+(3.9 \times P)$	2740	4520	$2069+(4.4 \times P)$	8580	$2760+(4.1 \times P)$	11860	$4612+(5.1 \times P)$	23510	$5442+(4.2 \times P)$	31360
8	$3600+(8 \times P)$	5880	9520	$4471+(9.1 \times P)$	17940	$4162+(7.8 \times P)$	21480	$6588+(8.4 \times P)$	37710	$8463+(8.6 \times P)$	61530
10	$4280+(13 \times P)$	7990	13900	$5452+(14 \times P)$	26170	$6094+(14 \times P)$	37170	$6193+(16 \times P)$	65470	$10003+(16 \times P)$	108720
12	$5275+(20 \times P)$	10980	20080	$7444+(22 \times P)$	40000	$6800+(24 \times P)$	60080	$9558+(23 \times P)$	94770	$18889+(24 \times P)$	166970

Pressure and Temperature Limits:



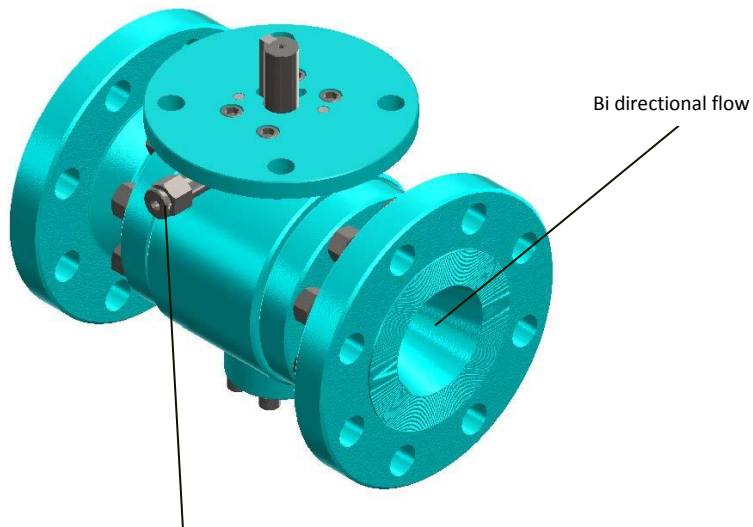
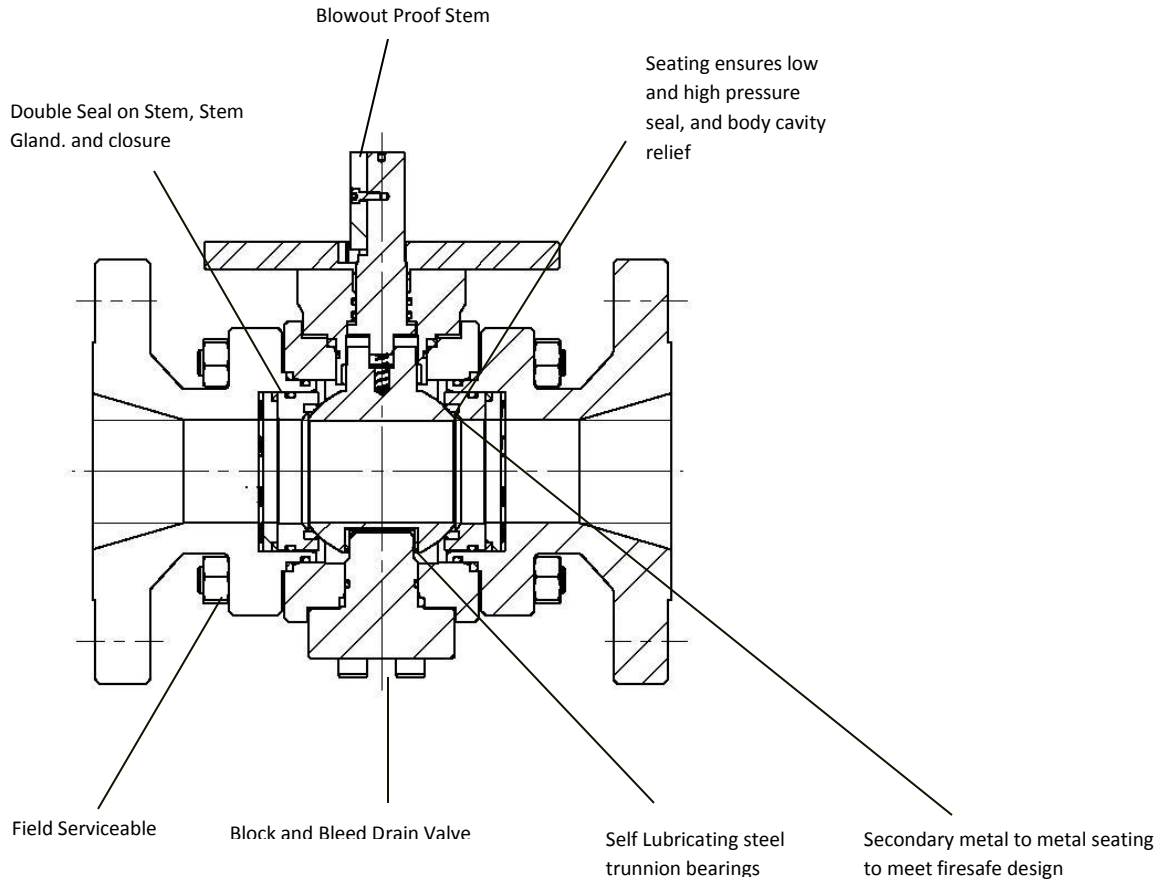
Standard Materials Temperature Limits:

Viton® A or B: -15°F through 400°F (-26°C through 204°C)

Nylon: -40°F through 212°F (-40°C through 100°C)

Viton GLT: -40°F through 482°F (-40°C through 250°C)

Series 9000/9100 – 2 through 12 Inch Features



Stem Injection Fitting
provides secondary sealing

FEATURES

Emergency Sealant Injection

All 6 inch and larger CVS Trunnion Ball Valves come standard with a seat emergency sealant system. An emergency sealant system is available on 2 thru 4 inch valves upon request.

Blowout Proof Stems

Anti-Blowout protection is standard on all CVS Trunnion Ball Valves.

Composition Seal

Low pressure sealing is achieved by the capabilities of elastomers along with the strength and durability of hard plastics in the valve seats

Metal to Metal Seating

Certain corrosive and or erosive applications demand metal to metal seating. CVS utilizes various hard face materials on the ball and seat face to achieve metal to metal seating requirements.

Lockout Protection

All CVS Trunnion Ball Valves come standard with lockout protection. Both lever and gear operated ball valves are able to be easily lockout for safety and servicing.

Actuation

Pneumatic, hydraulic, and electric actuators are easily adaptable to CVS 9000/9100 Series Ball Valves. CVS Controls is able to supply and assemble the correct ball valve/actuator solution best suited for any application.

Double Block and Bleed – Series 9000/9100

All CVS Trunnion Ball Valves allow for block and bleed applications in the closed position only. For ball valves 6” and larger, in the closed position, the valve may be completely flushed under pressure.

Valve Cavity Pressure Relief

In the closed position a Trunnion Ball Valve will trap the process inside the body cavity. Certain conditions may cause expansion and contraction within. The CVS Trunnion Ball Valve is designed to self-relieve, which will allow the process in the body to escape to the installation.

Specifications/Certifications

All CVS Controls Ball Valves are manufactured in accordance of applicable standards.

API6A, API607 and API6D certifications are maintained and current.

All Series 9000/9100 ball valves conform to NACE MRO 175 design standards.

ABSA, The Pressure Equipment Safety Authority – CRN # 0C01943.2

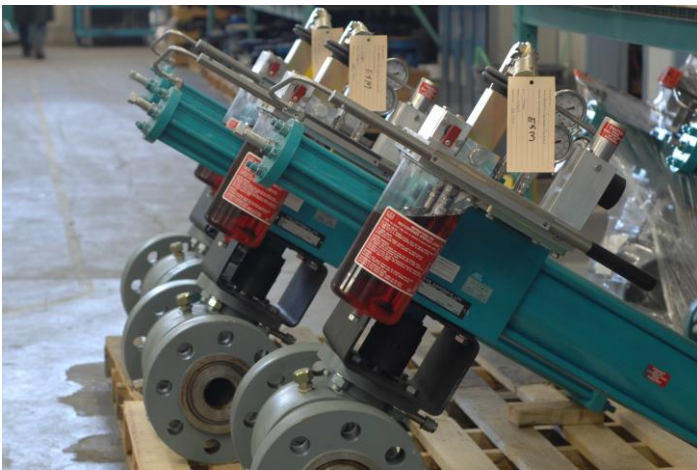
CVS Controls Ltd. is a certified and registered ISO 9001-2008 manufacturing facility. Our in house quality assurance program is dedicated to continually improve the efficiency and the effectiveness of our quality management system. Our product is confirmed by a rigid quality control program which utilizes the most up to date methods of testing and inspection.

Application and Design

CVS Controls in house engineering and application design can assist in finding the right solution best suited for your application.

Hydraulic or pneumatic actuation and Emergency Shut Down Devices (ESD) can be supplied and assembled to customer specifications. CVS Controls also has a wide variety of pressure pilots, limit switches, positioners as well as solenoid valves to complete the design package.

Contact a CVS Controls sales representative for more information.



Specifications

Bore Sizes – API 6D

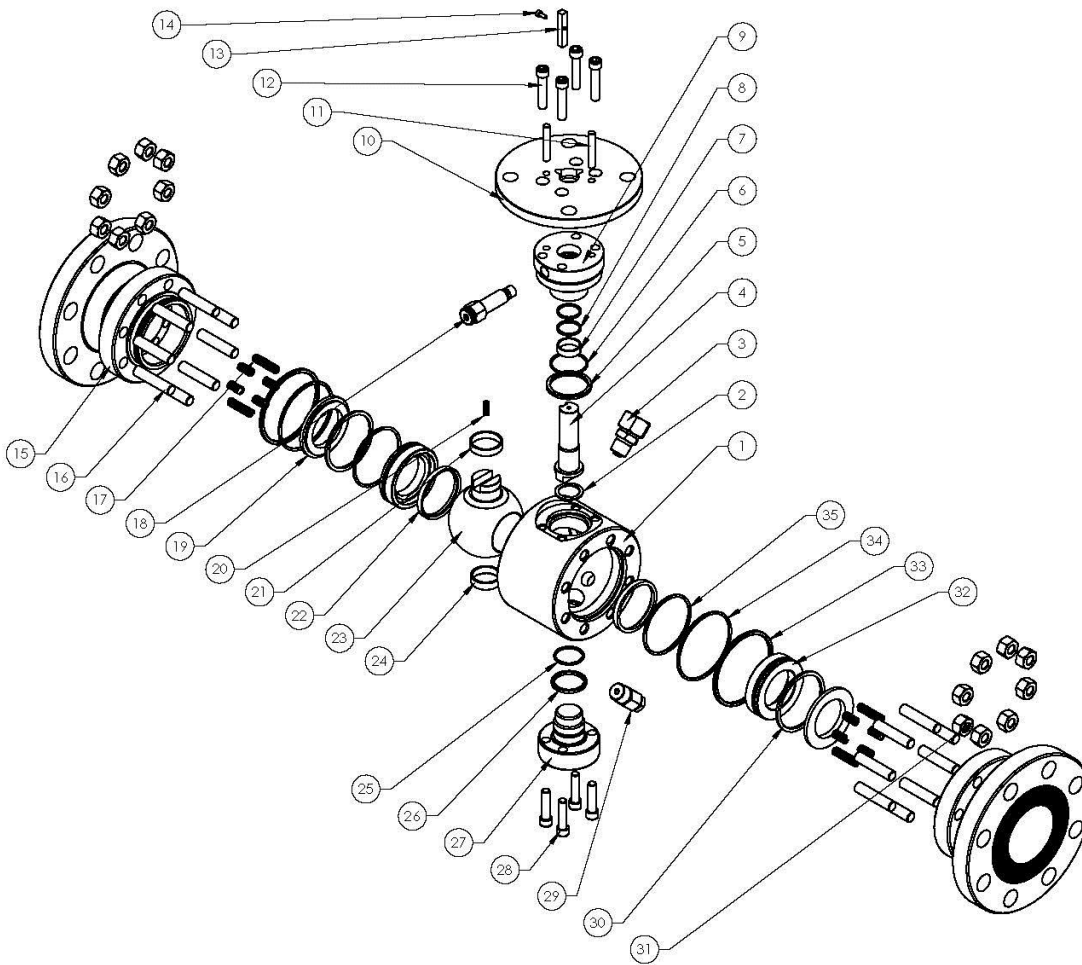
Nominal Bore Size	Actual Bore Size			
	ASME 150-600	ASME 900	ASME 1500	ASME 2500
2	2.00	2.00	2.00	1.75
3	3.00	3.00	3.00	2.50
4	4.00	4.00	4.00	3.50
6	6.00	6.00	5.75	5.25
8	8.00	8.00	7.63	7.13
10	10.00	10.00	9.50	8.88
12	12.00	12.00	11.38	10.50

Series 9000/9100 - Shipping Dimensions and Approximate Shipping Weights

Size	ASME 150		ASME 300		ASME 600	
	Wt. (lbs)	Ship Dim. (in)	Wt. (lbs)	Ship Dim. (lbs)	Wt. (lbs)	Ship Dim. (in)
2X2	60	7X8X14	65	9X7X14	70	12X7X14
3X2	75	8X10X14	90	11X9X14	100	14X9X14
3X3	110	8X10X17	125	11X9X16	140	14X9X17
4X3	140	9X12X17	150	12X11X16	200	17X12X17
4X4	190	9X12X19	220	12X11X19	270	17X12X19
6X4	270	16X14X19	285	16X14X19	395	22X15X19
6X6	425	16X14X19	460	16X14X20	515	22X15X19
8X6	505	18X18X19	575	20X17X20	675	26X18X19
8X8	565	18X18X22	715	20X17X22	1140	26X18X25
10X8	640	21X21X22	820	22X19X22	1420	31X22X25
10X10	960	21X21X26	1175	22X19X25	1700	31X22X28
12X10	1100	24X25X26	1390	26X23X25	1895	33X24X28
12X12	1310	27X25X29	1740	26X23X29	2310	33X24X34

Size	ASME 900		ASME 1500		ASME 2500	
	Wt. (lbs)	Ship Dim. (in)	Wt. (lbs)	Ship Dim. (in)	Wt. (lbs)	Ship Dim. (in)
2X2	115	15X11X16	120	15X10X17	385	18X11X18
3X2	130	15X12X16	175	19X13X17	480	23X14X28
3X3	175	15X12X16	230	19X13X18	605	23X14X20
4X3	240	18X15X16	260	22X15X18	770	27X17X20
4X4	330	18X15X22	385	22X15X20	880	27X17X20
6X4	550	24X20X22	700	27X19X20	1430	37X23X20
6X6	860	24X20X25	1155	28X19X25	2100	37X23X28
8X6	1070	29X24X25	1400	33X23X25	2580	41X26X28
8X8	1410	29X24X25	1935	33X23X30	5500	41X26X36
10X8	1760	29X24X30	2135	39X28X30	6710	51X32X36
10X10	2355	33X28X30	3430	39X28X33	7400	51X32X42
12X10	2530	38X31X36	3930	45X32X33	9350	57X26X42
12X12	3545	41X33X36	5180	45X32X36	10500	57X36X46

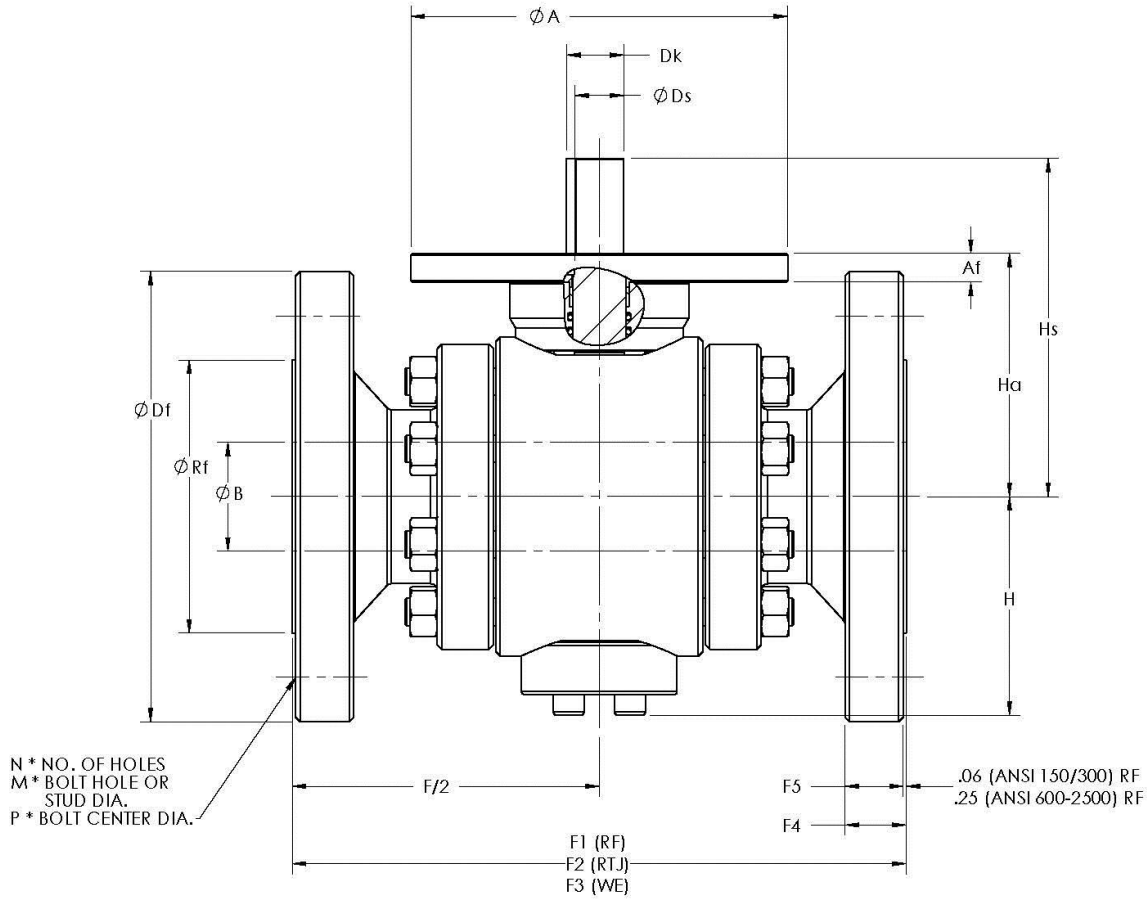
Series 9100 – 2 through 4 Inch, Class 150 and 2 inch Class 300



Item	Description	Material	Item	Description	Material
1	Body	A105/A350 LF2	19	Seat Ring Spacer	316 SST
2	Stem Thrust Bearing	CSB-11	20	Seat Ring Seal	G/PTFE
3	Body Grease Fitting	316 SST	21	Ball Bearing	CSB-11
4	Stem	316 SST	22	Seat Ring Seal	Viton
5	Gland Gasket	Graphite	23	Ball	316 SST or CF8M
6	Gland O-Ring	Viton	24	Ball Bearing	CSB-11
7	Stem Bearing	CSB-11	25	Trunnion O-Ring	Viton
8	Stem O-Ring	Viton	26	Trunnion Gasket	Graphite
9	Gland	A105 ENP	27	Trunnion	A105 ENP
10	Adapter Plate	A36	28	Trunnion Screw	ASME B18.3
11	Gland Pin	Carbon Steel	29	Drain Valve	316 SST
12	Gland Screw	A193 B7M	30	Spacer Gasket	Graphite
13	Key	Carbon Steel	31	Nut	A194 2HM
14	Key Screw	Carbon Steel	32	Seat Ring	316 SST
15	Flanged End	A105/A350 LF2	33	Seat O-Ring	Viton
16	Stud	A193 B7M	34	Seat O-Ring	Viton
17	Seat Spring	X-750	35	Seat O-Ring	Viton
18	Gland Grease Fitting	316 SST			

Dimensions (in)

Series 9100 – 2 through 4 Inch, Class 150 and 2 inch Class 300 - Full Port



Class 150 2 Inch and 4 Inch – Full Port

Size	B	Rf	F1-RF	F3-WE	H	Ha	N	M	P
2 x 2	2 X 2	3.62	7.00	8.50	3.78	4.19	4	0.75 Ø	4.75
3 x 3	3 X 3	5.00	8.00	11.17	4.69	5.20	4	0.75 Ø	6.00
4 x 4	4 X 4	6.19	9.00	12.00	5.41	6.14	8	0.75 Ø	7.50

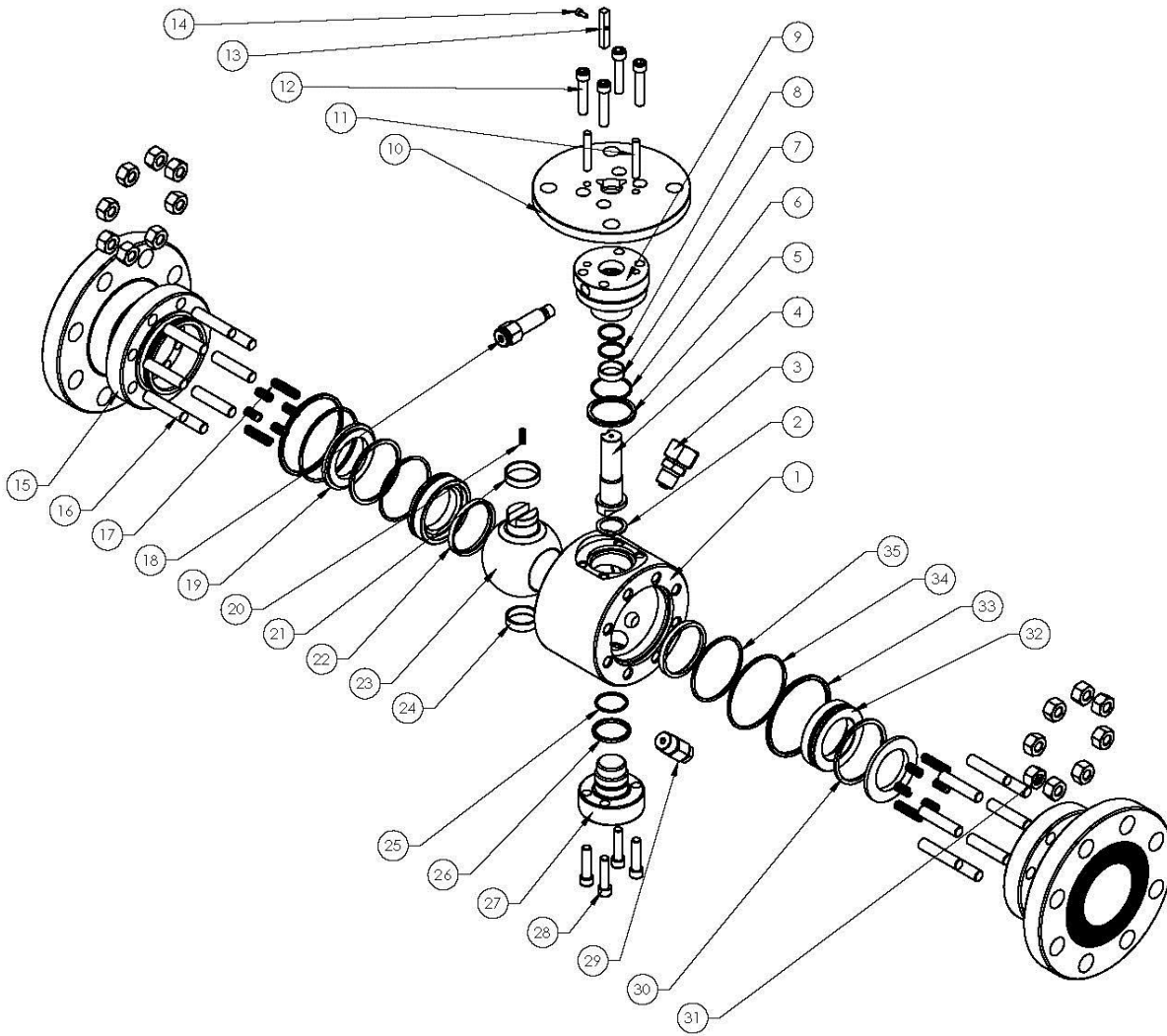
Class 300 2 Inch - Full Port

Size	B	Rf	F1-RF	F3-WE	H	Ha	N	M	P
2 X 2	2 X 2	3.62	8.50	8.50	3.78	4.2	8	0.75 Ø	5.00

Some small bore ball valves may require tapped holes on the flanges to maintain face to face dimensions specified in API6D. Refer to the reference chart to the right for suggested stud lengths for installation.

Suggested Stud Lengths		
Bore Size	Stud Bolt Size	Quantity
2" 150	5/8-11UNC X 2.25	4
3" 150	5/8-11UNC X 2.38	4
4" 150	5/8-11UNC X 2.50	8
2" 300	5/8-11UNC X 2.50	8

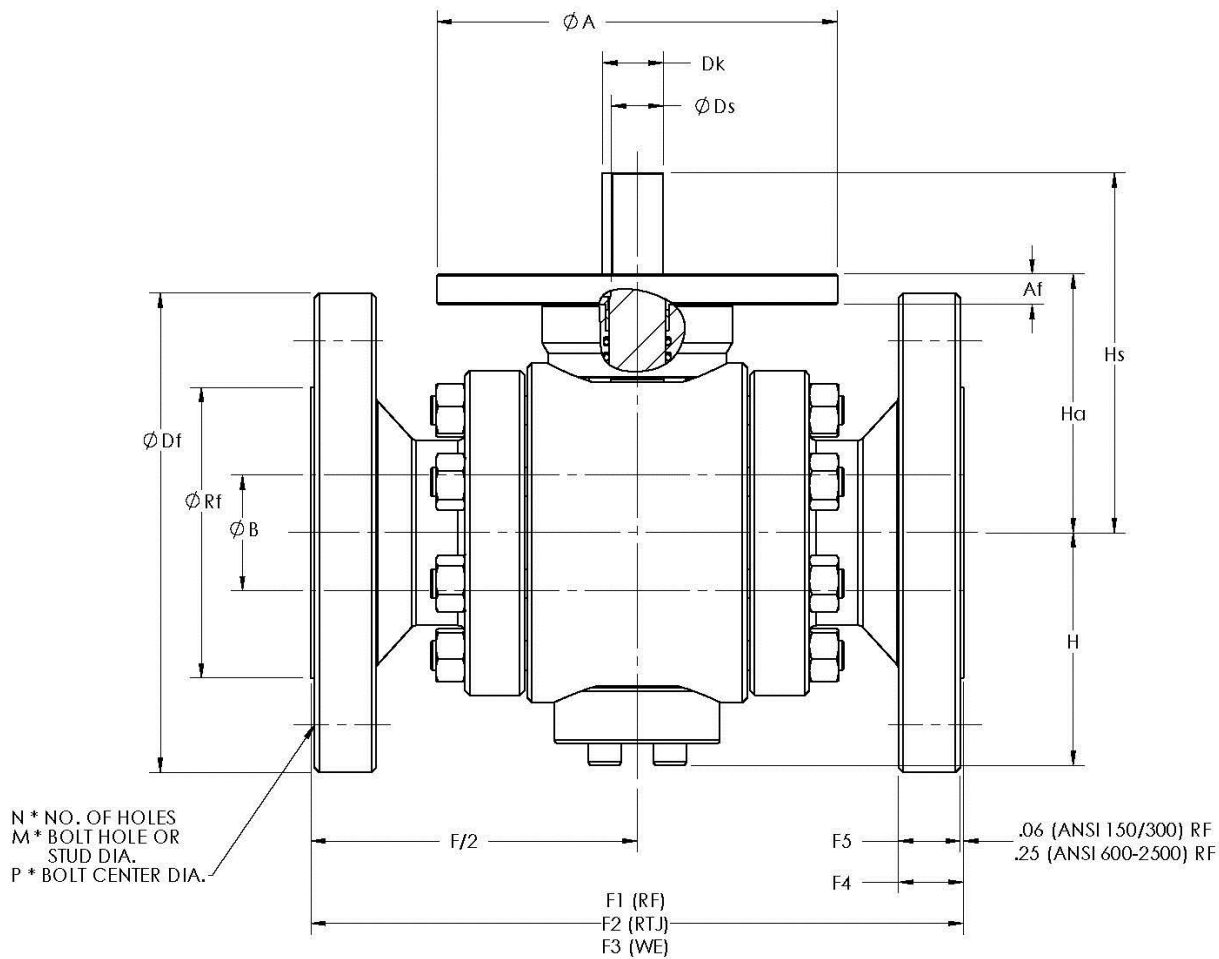
Series 9000/9100 – 3 and 4 Inch Class 300, 2 through 4 Inch Class 600, 900, 1500, 2500



Item	Description	Material	Item	Description	Material
1	Body	A105/A350 LF2	19	Seat Ring Spacer	316 SST
2	Stem Thrust Bearing	CSB-11WC	20	Seat Ring Seal	G/PTFE
3	Body Grease Fitting	316 SST	21	Ball Bearing	CSB-11
4	Stem	316 SST	22	Seat Ring Seal	Viton
5	Gland Gasket	Graphite	23	Ball	316 SST or CF8M
6	Gland O-Ring	Viton	24	Ball Bearing	CSB-11
7	Stem Bearing	CSB-11	25	Trunnion O-Ring	Viton
8	Stem O-Ring	Viton	26	Trunnion Gasket	Graphite
9	Gland	A105 ENP	27	Trunnion	A105 ENP
10	Adapter Plate	A36	28	Trunnion Screw	ASME B18.3
11	Gland Pin	Carbon Steel	29	Drain Valve	316 SST
12	Gland Screw	A193 B7M	30	Spacer Gasket	Graphite
13	Key	Carbon Steel	31	Nut	A194 2HM
14	Key Screw	Carbon Steel	32	Seat Ring	316 SST
15	Flanged End	A105/A350 LF2	33	Seat O-Ring	Viton
16	Stud	A193 B7M	34	Seat O-Ring	Viton
17	Seat Spring	X-750	35	Seat O-Ring	Viton
18	Gland Grease Fitting	316 SST			

Dimensions (in)

Series 9000/9100 – 2" Full Port through 6" Reduced Port - Class 150, 300, and 600



Class 150 6 Inch - Reduced Port

Size	B	Rf	Df	F4	F1-RF	F2-RTJ	F3-WE	H	Ha	N	M	P
6 X 4	6 X 4	8.50	11.00	1.00	15.50	16.00	18.00	5.41	6.14	8	0.88	9.50

Class 300 3 Inch Reduced Port through 6 Inch Reduced Port

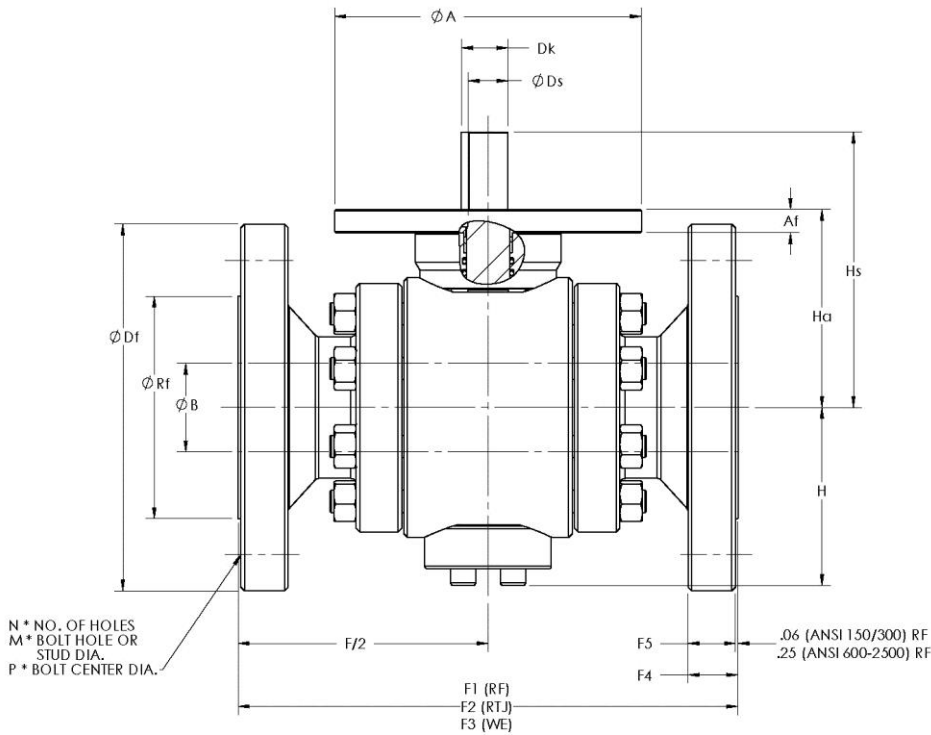
Size	B	Rf	Df	F4	F1-RF	F2-RTJ	F3-WE	H	Ha	N	M	P
3 X 2	3 X 2	5.00	8.25	1.12	11.12	11.75	11.12	3.96	4.37	8	0.88	6.62
3 X 3	3 X 3	5.00	8.25	1.12	11.12	11.75	11.12	4.69	5.20	8	0.88	6.62
4 X 3	4 X 3	6.19	10.00	1.25	12.00	12.63	12.00	4.69	5.20	8	0.88	7.88
4 X 4	4 X 4	6.19	10.00	1.25	12.00	12.63	12.00	5.41	6.14	8	0.88	7.88
6 X 4	6 X 4	8.50	12.50	1.44	15.88	16.50	18.00	5.41	6.14	12	0.88	10.62

Class 600 2 Inch Full Port through 6 Inch Reduced Port

Size	B	Rf	Df	F5	F1-RF	F2-RTJ	F3-WE	H	Ha	N	M	P
2 X 2	2 X 2	3.62	6.50	1.00	11.50	11.62	11.50	3.96	4.37	8	.75	5.00
3 X 2	3 X 2	5.00	8.25	1.25	14.00	14.12	14.00	3.96	4.37	8	0.88	6.62
3 X 3	3 X 3	5.00	8.25	1.25	14.00	14.12	14.00	4.85	5.67	8	0.88	6.62
4 X 3	4 X 3	6.19	10.75	1.50	17.00	17.12	17.00	4.85	5.67	8	1.00	8.50
4 X 4	4 X 4	6.19	10.75	1.50	17.00	17.12	17.00	5.93	6.24	8	1.00	8.50
6 X 4	6 X 4	8.50	14.00	1.88	22.00	22.12	22.00	5.93	6.24	12	1.12	11.50

Dimensions (in)

Series 9000/9100 – 2” Full Port through 6” Reduced Port - Class 900, 1500, 2500



Class 900 2 Inch Full Port through 6 Inch Reduced Port

Size	B	Rf	Df	F5	F1-RF	F2-RTJ	F3-WE	H	Ha	N	M	P
2 X 2	2 X 2	3.62	8.50	1.50	14.50	14.62	14.50	3.96	4.37	8	1.00	6.50
3 X 2	3 X 2	5.00	9.50	1.50	15.00	15.12	15.00	3.96	4.37	8	1.00	7.50
3 X 3	3 X 3	5.00	9.50	1.50	15.00	15.12	15.00	4.86	5.59	8	1.00	7.50
4 X 3	4 X 3	6.19	11.50	1.75	18.00	18.12	18.00	4.86	5.59	8	1.25	9.25
4 X 4	4 X 4	6.19	11.50	1.75	18.00	18.12	18.00	6.71	7.11	8	1.25	9.25
6 x 4	6 X 4	8.50	15.00	2.19	24.00	24.12	24.00	6.71	7.11	12	1.25	12.50

Class 1500 2 Inch Full Port through 6 Inch Reduced Port

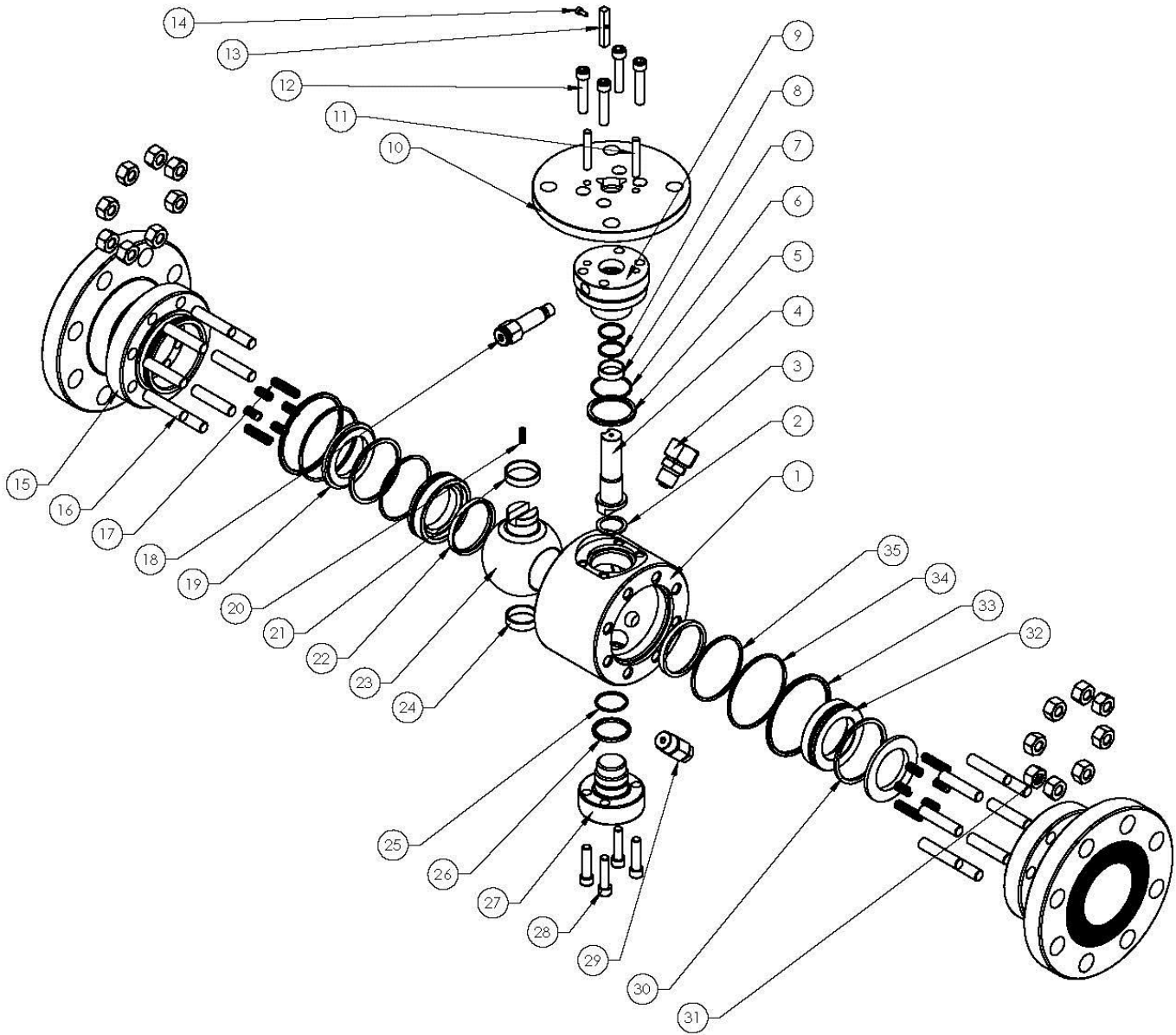
Size	B	Rf	Df	F5	F1-RF	F2-RTJ	F3-WE	H	Ha	N	M	P
2 X 2	2 X 2	3.62	8.50	1.50	14.50	14.62	14.50	4.21	4.61	8	1.00	6.50
3 X 2	3 X 2	5.00	10.50	1.88	18.50	18.62	18.50	4.21	4.61	8	1.25	8.00
3 X 3	3 X 3	5.00	10.50	1.88	18.50	18.62	18.50	5.38	5.79	8	1.25	8.00
4 X 3	4 X 3	6.19	12.25	2.12	21.50	21.62	21.50	5.38	5.79	8	1.38	9.50
4 X 4	4 X 4	6.19	12.25	2.12	21.50	21.62	21.50	6.62	7.24	8	1.38	9.50
6 X 4	5.75 X 4	8.50	15.50	3.25	27.75	28.00	27.75	6.62	7.24	12	1.50	12.50

Class 2500 2 Inch Full Port through 6 Inch Reduced Port

Size	B	Rf	Df	F5	F1-RF	F2-RTJ	F3-WE	H	Ha	N	M	P
2 X 2	1.75X1.75	3.62	9.25	2.00	17.75	17.87	17.75	6.39	7.25	8	1.12	6.75
3 X 2	1.50X1.75	5.00	12.00	2.62	22.75	23.00	22.75	6.39	7.25	8	1.38	9.00
3 X 3	2.50X2.50	5.00	12.00	2.62	22.75	23.00	22.75	8.20	8.42	8	1.38	9.00
4 X 3	3.50X2.50	6.19	14.00	3.00	26.50	26.88	26.50	8.20	8.42	8	1.63	10.75
4 X 4	3.50X3.50	6.19	14.00	3.00	26.50	26.88	26.50	7.36	8.29	8	1.63	10.75
6 X 4	5.25X3.50	8.50	19.00	4.25	36.00	36.50	36.00	7.36	8.29	8	2.12	14.50

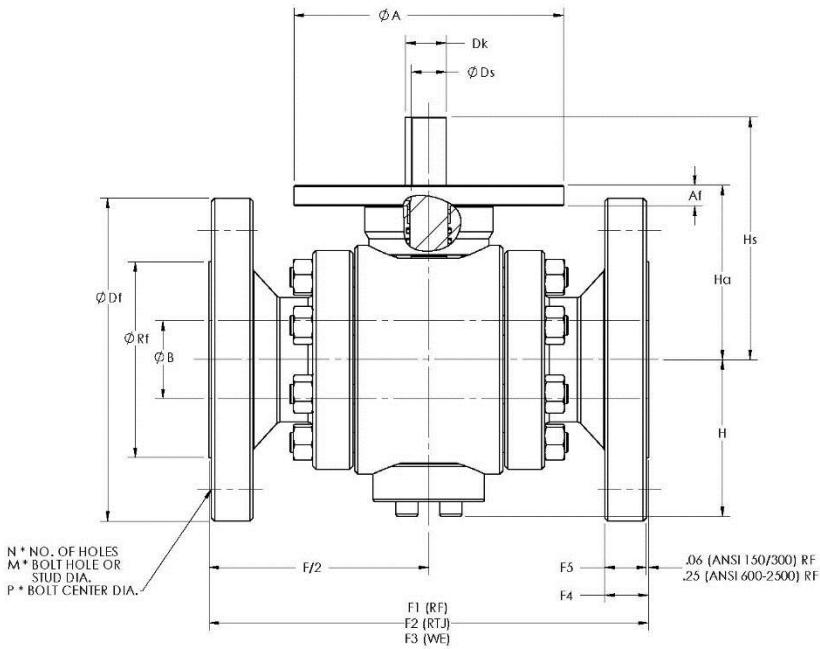
Series 9000 – 8 through 12 Inch Reduced Port Class 150, 300, 600, 900 and 1500, 6 through 12 Inch Class 2500

Series 9100 – 6 through 12 Inch Full Port Class 150, 300, 600, 900, and 1500, 6 through 10 Inch Class 2500



Dimensions (in)

Series 9000/9100 – 6" Full Port through 12" Reduced Port - Class 150, 300, 600



Class 150 6 Inch Full Port through 12 Inch Reduced Port

Size	B	Rf	Df	F4	F1-RF	F2-RTJ	F3-WE	H	Hs	N	M	P
6 X 6	6 X 6	8.50	11.00	1.00	15.50	16.00	18.00	7.39	10.59	8	0.88	9.50
8 X 6	8 X 6	10.62	13.50	1.12	18.00	18.50	20.50	7.39	10.59	8	0.88	11.75
8 X 8	8 X 8	10.62	13.50	1.12	18.00	18.50	20.50	8.97	12.85	8	0.88	11.75
10 X 8	10 X 8	12.75	16.00	1.19	21.00	21.50	22.00	8.97	12.85	12	1.00	14.25
10 X 10	10 X 10	12.75	16.00	1.19	21.00	21.50	22.00	10.43	14.29	12	1.00	14.25
12 X 10	12 X 10	15.00	19.00	1.25	24.00	24.50	25.00	10.43	14.29	12	1.00	17.00
12 X 12	12 X 12	15.00	19.00	1.25	24.00	24.50	25.00	11.57	16.14	12	1.00	17.00

Class 300 6 Inch Full Port through 12 Inch Reduce Port

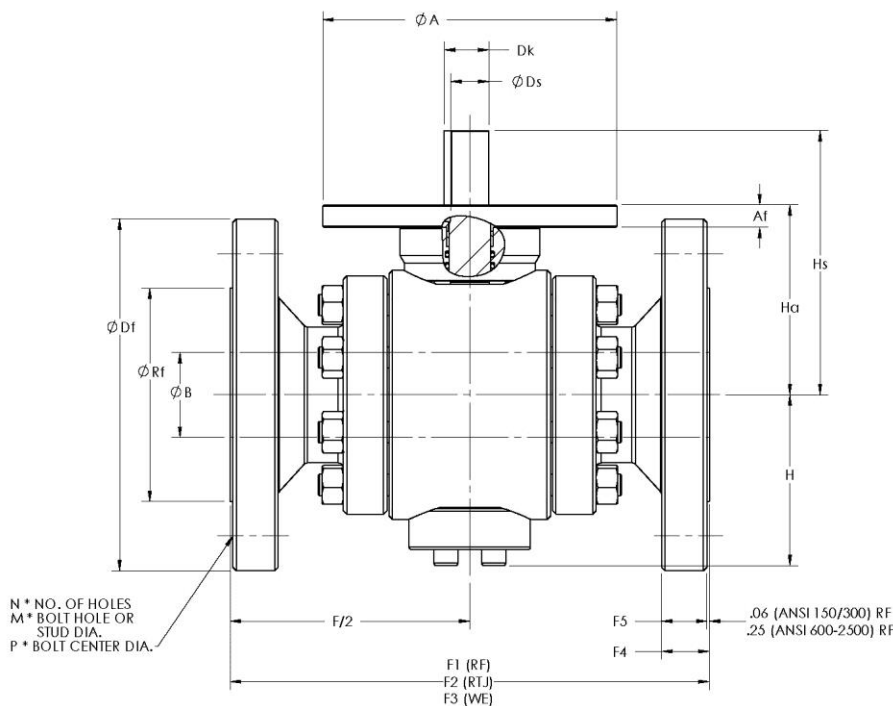
Size	B	Rf	Df	F4	F1-RF	F2-RTJ	F3-WE	H	Hs	N	M	P
6 X 6	6 X 6	8.50	12.50	1.44	15.88	16.50	18.00	7.39	10.59	12	0.88	10.62
8 X 6	8 X 6	10.62	15.00	1.62	19.75	20.38	20.50	7.39	10.59	12	1.00	13.00
8 X 8	8 X 8	10.62	15.00	1.62	19.75	20.38	20.50	8.97	12.85	12	1.00	13.00
10 X 8	10 X 8	12.75	17.50	1.88	22.38	23.00	22.00	8.97	12.85	16	1.12	15.25
10 X 10	10 X 10	12.75	17.50	1.88	22.38	23.00	22.00	10.43	14.29	16	1.12	15.25
12 X 10	12 X 10	15.00	20.50	2.00	25.50	26.12	25.00	10.43	14.29	16	1.25	17.75
12 X 12	12 X 12	15.00	20.50	2.00	25.50	26.12	25.00	11.57	15.83	16	1.25	17.75

Class 600 6 Inch Full Port through 12 Inch Reduced Port

Size	B	Rf	Df	F5	F1-RF	F2-RTJ	F3-WE	H	Hs	N	M	P
6 X 6	6 X 6	8.50	14.00	1.88	22.00	22.12	22.00	7.39	10.59	12	1.12	11.50
8 X 6	8 X 6	10.62	16.50	2.19	26.00	26.12	26.00	7.39	10.59	12	1.25	13.75
8 X 8	8 X 8	10.62	16.50	2.19	26.00	26.12	26.00	9.00	12.78	12	1.25	13.75
10 X 8	10 X 8	12.75	20.00	2.50	31.00	31.12	31.00	9.00	12.78	16	1.38	17.00
10 X 10	10 X 10	12.75	20.00	2.50	31.00	31.12	31.00	10.70	14.80	16	1.38	17.00
12 X 10	12 X 10	15.00	22.00	2.62	33.00	33.12	33.00	10.70	14.80	20	1.38	19.25
12 X 12	12 X 12	15.00	22.00	2.62	33.00	33.12	33.00	11.96	17.92	20	1.38	19.25

Dimensions (in)

Series 9000/9100 – 6" Full Port through 12" Reduced Port - Class 900, 1500 and 2500



Class 900 6 Inch Full Port through 12 Inch Reduced Port

Size	B	Rf	Df	F5	F1-RF	F2-RTJ	F3-WE	H	Hs	N	M	P
6 X 6	6 X 6	8.50	15.00	2.19	24.00	24.12	24.00	7.52	10.79	12	1.25	12.50
8 X 6	8 X 6	10.62	18.50	2.50	29.00	29.12	29.00	7.52	10.79	12	1.50	15.50
8 X 8	8 X 8	10.62	18.50	2.50	29.00	29.12	29.00	9.39	13.17	12	1.50	15.50
10 X 8	10 X 8	12.75	21.50	2.75	33.00	33.12	33.00	9.39	13.17	16	1.50	18.50
10 X 10	10 X 10	12.75	21.50	2.75	33.00	33.12	33.00	11.15	16.42	16	1.50	18.50
12 X 10	12 X 10	15.00	24.00	3.12	38.00	38.12	38.00	11.15	16.42	20	1.50	21.00
12 X 12	12 X 12	15.00	24.00	3.12	38.00	38.12	38.00	12.44	18.11	20	1.50	21.00

Class 1500 6 Inch Full Port through 12 inch Reduced Port

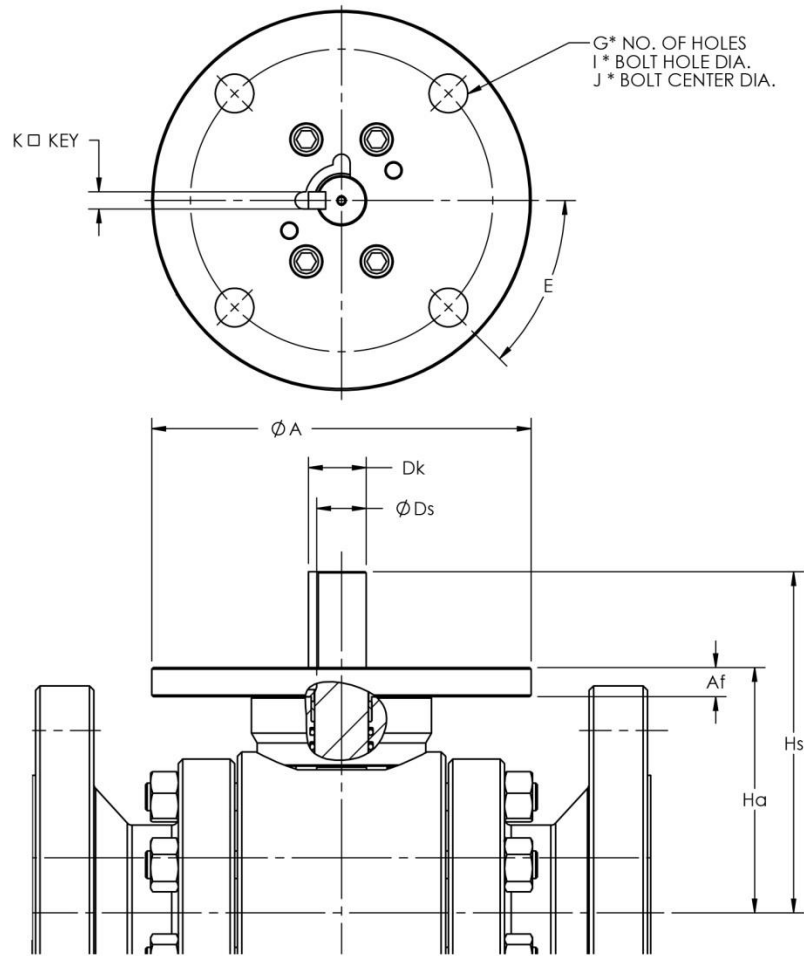
Size	B	Rf	Df	F5	F1-RF	F2-RTJ	F3-WE	H	Hs	N	M	P
6 X 6	5.75X5.75	8.50	15.50	3.25	27.75	28.00	27.75	7.48	12.30	12	1.50	12.50
8 X 6	7.63X5.75	10.62	19.00	3.62	32.75	33.13	32.75	7.48	12.30	12	1.75	15.50
8 X 8	7.63X7.63	10.62	19.00	3.62	32.75	33.13	32.75	9.45	15.95	12	1.75	15.50
10 X 8	9.50X7.63	12.75	23.00	4.25	39.00	39.38	39.00	9.45	15.95	12	2.00	19.00
10 X 10	9.50X9.50	12.75	23.00	4.25	39.00	39.38	39.00	11.02	17.60	12	2.00	19.00
12 X 10	11.38X9.50	15.00	26.50	4.88	44.50	45.12	44.50	11.02	17.60	16	2.12	22.50
12 X 12	11.38X11.38	15.00	26.50	4.88	44.50	45.12	44.50	16.98	17.83	16	2.12	22.50

Class 2500 6 Inch Full Port through 12 Inch Reduced Port

Size	B	Rf	Df	F5	F1-RF	F2-RTJ	F3-WE	H	Hs	N	M	P
6 X 6	5.25X5.25	8.50	19.00	4.25	36.00	36.50	36.00	12.74	12.70	8	2.12	14.50
8 X 6	7.14X5.25	10.62	21.75	5.00	40.25	40.87	40.25	12.74	12.70	12	2.12	17.25
8 X 8	7.14X7.14	10.62	21.75	5.00	40.25	40.87	40.25	15.22	16.63	12	2.12	17.25
10 X 8	8.88X7.14	12.75	26.50	6.50	50.00	50.88	50.00	15.22	16.63	12	2.62	21.25
10 X 10	8.88X8.88	12.75	26.50	6.50	50.00	50.88	50.00	19.73	18.25	12	2.62	21.25
12 X 10	10.50X8.88	15.00	30.00	7.25	56.00	56.88	56.00	19.73	18.25	12	2.88	24.38
12 X 12	10.50X10.50	15.00	30.00	7.25	56.00	56.88	56.00	22.06	20.79	12	2.88	24.38

Mounting Dimensions (in)

Series 9000/9100 Class 150 and Class 300

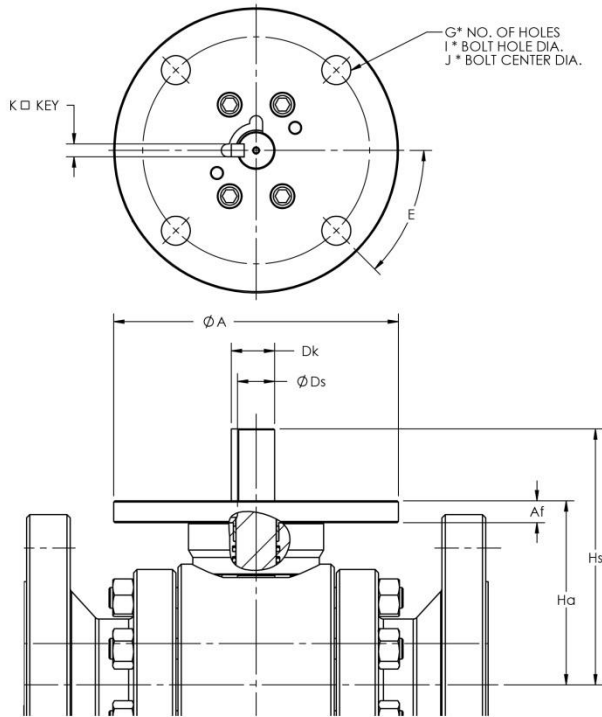


Class 150 and Class 300 Mounting Dimensions

Size	2	3	4	6	8	10	12
Dk	1.063	1.063	1.496	1.693	2.087	2.638	2.638
Ds	0.906	0.906	1.299	1.496	1.811	2.283	2.283
Ha	4.19	5.20	6.14	8.23	9.86	11.10	12.64
Hs	5.76	6.73	7.24	10.59	12.85	14.29	15.83
E (Angle)	45	45	45	45	45	22.5	22.5
G	4	4	4	4	4	8	8
A	6.90	6.90	6.90	8.07	10.00	11.42	11.42
J	5.512	5.512	5.512	6.89	7.50	10.00	10.00
K	0.315	0.315	0.394	0.394	0.55	0.709	0.709
I	0.688	0.712	0.688	0.55	0.709	0.709	0.709
Af	0.51	0.51	0.63	0.866	0.866	0.866	0.866

Mounting Dimensions (in)

Series 9000/9100 Class 600 and Class 900



Class 600 Mounting Dimensions

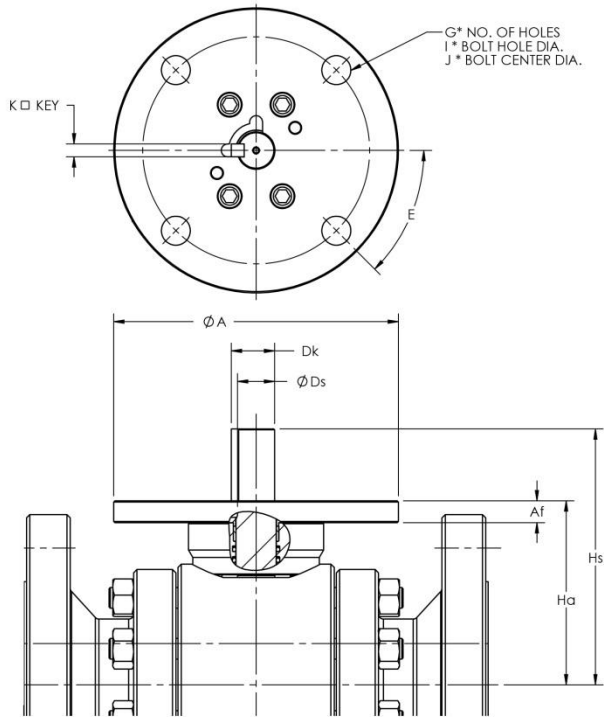
Size	2	3	4	6	8	10	12
Dk	1.063	1.496	1.496	2.087	2.638	3.071	3.071
Ds	0.906	1.299	1.299	1.811	2.283	2.677	2.677
Ha	4.37	5.67	6.24	8.23	9.82	11.42	13.27
Hs	5.94	7.91	7.30	10.59	12.78	14.80	17.72
E (Angle)	45	45	45	45	22.5	22.5	22.5
G	4	4	4	4	8	8	8
A	6.90	8.07	8.00	10.00	11.81	11.42	11.81
J	5.512	6.89	6.50	6.89	10.00	10.00	10.00
K	0.315	0.394	0.394	0.551	0.709	0.787	0.787
I	0.680	0.840	0.840	0.680	0.709	0.709	0.709
Af	0.51	0.71	0.63	0.87	1.10	0.866	1.10

Class 900 Mounting Dimensions

Size	2	3	4	6	8	10	12
Dk	1.063	1.496	1.772	2.087	2.638	3.071	3.071
Ds	0.906	12.99	1.575	1.811	2.283	2.677	2.677
Ha	4.37	5.59	7.11	8.23	9.98	11.97	13.58
Hs	5.94	7.52	9.09	10.79	13.17	16.42	18.11
E (Angle)	45	45	45	45	22.5	22.5	22.5
G	4	4	4	4	8	8	8
A		8.07		10.00	11.42	11.81	11.81
J		6.89		7.50	10.00	10.00	10.00
K	0.315	0.394	0.394	0.551	0.709	0.787	0.787
I		0.55		0.709	0.709	0.709	0.709
Af	0.51	0.71	0.63	0.87	0.87	1.10	0.94

Mounting Dimensions (in)

Series 9000/9100 Class 1500 and Class 2500



Class 1500 Mounting Dimensions

Size	2	3	4	6	8	10	12
Dk	1.063	1.496	1.693	2.087	3.071	3.465	3.264
Ds	.906	1.299	1.496	1.81	2.677	3.071	2.950
Ha	4.61	5.79	7.244	9.33	11.32	13.09	17.83
Hs	6.14	8.11	9.67	12.30	15.94	17.60	23.69
E (Angle)	45	45	45	45	22.5	22.5	22.5
G	4	4	4	4	8	8	8
A	6.25	8.07	8.07	10.00	11.81	11.81	13.19
J	4.921	6.89	6.89	7.50	10.00	10.00	11.78
K	0.315	0.394	0.374	0.551	0.787	0.787	0.750
I	0.55	0.55	0.55	0.709	0.709	0.709	0.78
Af	0.59	0.709	0.709	0.87	0.91	1.06	1.35

Class 2500 Mounting Dimensions

Size	2	3	4	6	8	10	12
Dk	1.263	1.595	2.087	2.650	3.264	3.264	3.882
Ds	1.125	1.375	1.811	2.362	2.950	2.950	3.540
Ha	7.25	8.42	8.29	12.70	16.63	18.25	20.79
Hs	10.03	11.52	11.08	18.00	21.89	22.42	25.86
E (Angle)	22.5	22.5	22.5	22.5	22.5	22.5	22.5
G	4	8	8	8	8	8	8
A	8.00	10.00	11.81	11.22	13.19	11.70	16.50
J	6.75	8.86	10.00	10.00	11.78	10.00	14.02
K	0.315	0.394	0.551	0.625	0.750	0.750	0.875
I	0.66	0.66	0.709	0.69	0.78	0.69	1.12
Af	0.80	0.85	1.10	1.75	1.75	1.50	1.50