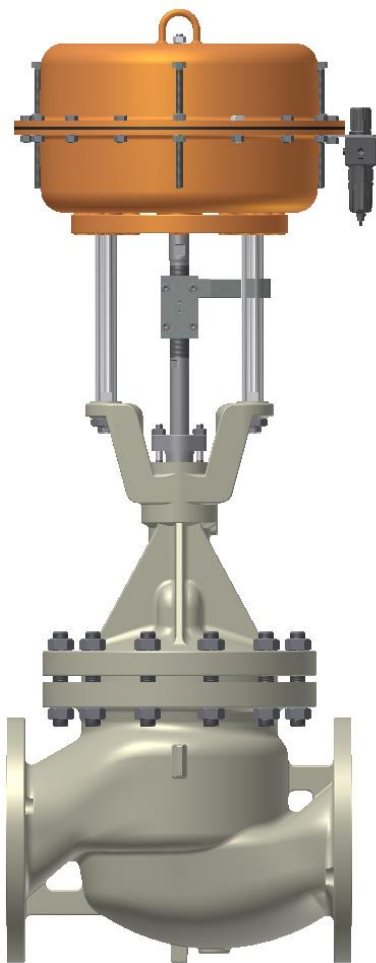


Series 9000

Cage Guided Control Valve



Series 9000 Control Valve

Series 9000 are high performance cage type control valves.

The body design allows a very high capacity.

Cage type valves are very suitable for severe service trim versions.

The top entry construction makes in-line maintenance and inspection ease.

Valve bodies are available with flanges and face to face dimensions to the European and ASME Standards.

Bonnets, bonnet bolting and trims are fully interchangeable in both versions.

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Features

- Compact
- Ease maintenance
- Full range trims
- EN and ASME valve bodies
- All kind of actuation
- Proven design



Specifications Series 9000 Control Valves

Style	Top Entry Single Seated Straight Through Globe Valve									
Sizes	Inch	1	1 ½	2	3	4	6	8	10	12
	mm	25	40	50	80	100	150	200	250	300
Pressure Ratings	ANSI 300, 600, 900 / PN 40, 65, 100, 160, DN 25 to 200 (1 inch to 8 inch) ANSI 300/PN 40; DN250 and 300 mm (10 inch to 12 inch)									
End Connections	Flanged	Raised face (RF)								
	ANSI 300, 600	Raised face with small groove								
	900	Raised face with groove for ring type joint (RTJ)								
	Flanged	Raised face (RF)								
	PN 40, 64, 100, 160	Raised face with groove according to DIN 2512								
	Butt weld ends	According to ANSI B16.5 According to DIN 3239 B								
	Flanged	RF, RTJ								
	Welded Ends	Socket Welded, Butt Welded								
Bonnet and Packing	Bonnet Type	Packing Type			Process Temperature in Degrees Celsius					
	Standard	PTFE V-Ring			-10 +220					
		PTFE Silk			-10 +220					
		Graphite			-200 +530					
	Extention	PTFE V-Ring			-60 +350					
		PTFE Silk			-10 +280					
		Graphite			-200 +530					
	Bellows Seal	Same as Extension Bonnet								
	Cryogenic	PTFE V-Ring			-200 +0					
		PTFE Silk			-200 +0					
Flow Direction	Pressure Balanced	Liquids		FTC for standard, NRE-2 and NRC trim						
		Gas / Steam		FTC for standard trim; FTO for NRE-2 and NRE-21 trim						
		Liquids		FTO for standard trim						
		Gas / Steam		FTO for standard, NRE-2 and NRE-21 trim						
Characteristics	Equal Percentage		=%							
	Linear		Lin							
	Quick Opening		QO							
Rangeability	50 : 1									
Leakage rates	Trim Form (Valve Size in DN)									
to EN IEC 60534-4 ANSI / FCI 70-2	Class	Approx % of Cv	Standard	Low Flow	Pressure Balanced	Soft Seat				
	I	-	15 - 150	15 - 25	100 - 150	15 - 150				
	II	0,5	15 - 150	15 - 25	100 - 150	15 - 150				
	III	0,1	15 - 150	15 - 25	100 - 150	15 - 150				
	IV	0,01	15 - 150	15 - 25	100 - 150	15 - 150				
	V	0,001	15 - 50	15 - 25	-	15 - 150				
	VI	0,0001	-	-	-	15* - 150				
* including Low Flow 15 - 25										
Trim Types	Single Seat	Standard	Plug, Metal and Soft Seat							
	=%, Lin, QO	Pressure Balanced	Plug, Metal and Soft Seat, Metal and Soft Seal Ring							
	Low Noise	Standard	Plug, Metal and Soft Seat							
	=%, Lin, QO	Pressure Balanced	Plug, Metal and Soft Seat, Metal and Soft Seal Ring							
	Cavitation Control	Standard	Plug, Metal Seat or Cage							
	=%, Lin, QO	Pressure Balanced	Plug, Metal Seat or Cage, Metal and Soft Seal Ring							
	Low Noise	NRE - 1	Standard Plug with Baffle Cage							
		NRE - 2	Multi Hole Plug / Cage							
		NRE - 21	Combination of NRE - 1 with NRE - 2							
	Cavitation Control	Multi Hole Plug / Cage with double drilled Holes								



Body – Bolting – Temperature Standards

EN Grades

Body / Bonnet Material	Description	Standard Norm for Body / Bonnet Material	Temperature Range	Bolting Material	Standard Norm for Bolting Material
1.0619 ¹	Carbon Steel	EN 10213	-10 + 450 °C	1.7218	EN 10269
1.4581 ²	Stainless Steel	EN 10213	-100 + 450 °C	1.4571	EN 10272
1.7357 ³	High Temperature Steel	EN 10213	-10 + 530 °C	1.7709	EN 10269
1.1131 ⁴	Low Temperature Steel	EN 10213	-40 + 450 °C	1.7218	EN 10269
1.4469 ⁵	Duplex (Oil & Gas)	EN 10213	-70 + 450 °C	1.4980	EN 10269
1.4536	Duplex (Chemical)	SEW 410-7	-45 + 450 °C	1.4980	EN 10269

Notes:

- 1 For Sizes up to and including 2 Inch, Bonnet Material is 1.5638 to EN 10213
- 2 For Sizes up to and including 2 Inch, Bonnet Material is 1.4571 to EN 10272
- 3 For Sizes up to and including 2 Inch, Bonnet Material is 1.7335 to EN 10273
- 4 For Sizes up to and including 2 Inch, Bonnet Material is 1.5638 to EN 10213
- 5 For Sizes up to and including 2 Inch, Bonnet Material is 1.4462 to EN 10272

ASTM Grades

Body / Bonnet Material	Grade	Description	Temperature Range	Bolting Material	Grade
SA-352 ⁶	LCC	Low Temperature Carbon Steel	-46 + 345 °C	SA-320	L7
SA-216 ⁷	WCB	Carbon Steel	-29 + 425 °C	SA-193	B7
SA-182 ⁸	F51	Duplex	-70 + 315 °C	SA-453	660
SA-351 ⁹	CF8M	Stainless Steel	-200 + 540 °C	SA-193	B8
SA-217 ¹⁰	WC6	High Temperature Steel	-29 + 595 °C	SA-193	B7

Notes:

- 6 For Sizes up to and including 2 Inch, Bonnet Material is SA 350 Gr. LF2
- 7 For Sizes up to and including 2 Inch, Bonnet Material is SA 105
- 8 For Sizes up to and including 2 Inch, Bonnet Material is SA 479 Gr. S31803
- 9 For Sizes up to and including 2 Inch, Bonnet Material is SA 182 Gr. F316H
- 10 For Sizes up to and including 2 Inch, Bonnet Material is SA 739 Gr. B11

Flow Co-efficients Control Valves

Type	Trim	Flow Direction	z-Values ¹¹					Kc	FI	XT
			Rates Cv 0,001-1,0	Rates Cv 1,0-4,0	Rates Cv 6,3 - 40	Rates Cv 56 - 160	Rates Cv > 200			
2000	Parabolic	Open ¹²	0,7	0,6	0,4	0,35	-	0,68	0,9	0,72
	Plug	Close	0,5	0,45	0,25	0,2	-	0,58	0,78	0,54
9000	V-Port	Open	-	-	0,35	0,3	0,25	0,65	0,9	0,72
	Plug	Close	-	-	0,35	0,3	0,25	0,65	0,86	0,66
800	Cage	Open	-	0,45	0,4	0,35	0,3	0,7	0,9	0,72
	Ports	Close	-	0,45	0,4	0,35	0,3	0,72	0,88	0,72
800-30	Cage	Open	-	0,5	0,45	0,45	0,4	0,7	0,95	0,72
	Holes	Close	-	0,5	0,45	0,45	0,4	0,72	0,95	0,75
	Cav. Contr.	Close	-	-	0,6	0,6	0,55	0,9	0,95	0,8
2003 / 13	V-Port	Mix	-	-	0,35	0,3	0,25	0,65	0,86	0,62
9003 / 13	Plug	Divert	-	-	0,35	0,3	0,25	0,65	0,86	0,66

Notes:

- 11 Apply for 75% of Valve Opening
- 12 Preferred Flow Direction



Flow Co-efficients Series 9000

Cv Standard

Trims		Valve Size	Inch mm	1 25	1½ 40	2 50	3 80	4 100	6 150	8 200	10 250	12 300
Seat Diameter in mm		Full		27	42	51	78	96	149	233	233	296
Characteristics	Trim Size	Cv values										
		Linear	Full	15	37	58	130	210	420	825	930	1625
	Reduced	8.2	19	29	58	74	190	365	365	650		
	Equal Percentage	Full	13	33	52	120	190	365	650	730	1390	
		Reduced	7.4	19	29	74	116	235	420	420	825	
	Quick Opening	Full	-	42	62	145	220	-	-	-	-	

Cv Low Flow Trims

Seat Diameter in mm		Full	10	10
		1st Reduction	5	5
		2nd Reduction	3	3
Characteristics	Trim Size	Cv values		
		Linear	Full	1.17, 1.9, 2.9
	1st Reduction	0.29, 0.47, 0.74		
	2nd Reduction	0.01, 0.019, 0.029, 0.047, 0.074, 0.117, 0.19		
	Equal Percentage	Full	1.17, 1.9, 2.9	
		1st Reduction	0.29, 0.47, 0.74	

Cv Low Noise Trims

Trims		Valve Size	Inch mm	1 25	1½ 40	2 50	3 80	4 100	6 150	8 200	10 250	12 300	
Seat Diameter in mm		Same as for Standard Trims											
Characteristics	Trim Size	Cv values											
		NRE - 2	Linear	Full	15	33	47	105	163	260	580	580	930
	Reduced	7.4	12	19	47	74	116	190	190	420			
	Equal Percentage	Full	12	26	37	82	130	190	465	465	730		
		Reduced	7.4	16	23	52	82	116	290	290	465		
	NRE - 21	Linear	Full	13	29	42	93	116	190	495	495	650	
		Reduced	7.4	11	16	42	65	105	163	163	365		
	Equal Percentage	Full	11	23	33	74	93	145	390	390	520		
		Reduced	7.4	14	21	47	74	93	260	260	420		
	Cavitation Control	Linear	Full	15	33	47	105	163	260	580	580	930	
		Reduced	7.4	12	19	47	74	116	190	190	420		
	Equal Percentage	Full	12	26	37	82	130	190	465	465	730		
		Reduced	7.4	16	23	52	82	116	290	290	465		
	NRE-21	Linear	Full	0.12, 0.29, 0.74, 1.2, 2.4				Available for 1/2 and 1 Inch Valve Size Only					
	Low Flow	Equal Percentage	Full	0.29, 0.74, 1.2, 2.4									

Valve Factors

FI and Xt	Trim Style	Flow Direction	Standard		Low Flow		NRE 2		NRE-21		Cav Con	
			FTO	FTC	FTO	FTC	FTO	FTC	FTO	FTC	FTO	FTC
FI	Full Trim		0.9	0.8	0.95	0.9	0.9	0.8	0.9	0.9	0.95	0.95
			0.95	0.88	0.95	0.9	0.95	0.88	0.95	0.95	0.95	0.95
Xt	Full Trim		0.73	0.58	0.8	0.73	0.73	0.58	0.73	-	-	-
			0.8	0.7	0.8	0.73	0.8	0.7	0.8	-	-	-



Dimensions and shipping weights

Dimensions Millimetres

Actuator	Body size mm	Body A					H1 Std bnt	H2 Bellows ANSI ANSI	H3 Ext bnt	K1 Std bnt	K2 Bellows Seal ANSI ANSI	K3 Ext bnt	M	X1	C (dia)		
		PN		ANSI													
		40	64 160	300	600	900											
2109	25	160	230	197	210	229	185	366	444	297	168	349	427	280	110	50	M12 x 1
2112							172	353	431	284							
2112 / 2112T	40	200	260	235	251	280	229	446	574	341	192	409,5	537	304	141	50	M12 x 1
2112 / 2112T	50	230	300	267	286	330	246	462	589	435	209	425,5	552,5	398	141	50	M12 x 1
2112 / 2112T	65	290	340	292	311	330	264	478	606	451	227	441,5	569	414	141	50	M12 x 1
2112-50 & T-50 2116	80	310	380	318	336	381	294	617	671	458	266	589,5	643	430	112,5	50	M16 x 1,5
2112-50 & T-50 2116	100	350	430	368	394	432	296	621	705	452	268	593,5	677,5	424	117,5	50	M16 x 1,5
2112-50 & T-50 2116	150	480	550	473	508	559	357,5	676	747	480	329,5	648,5	719	452,5	119	50	M20 x 1,5
2116 / 2116T	200	600	650	568	610	650	691	1253	1608		528	1090	1445		201	50	M30 x 2
2116 / 2116T	250	730		730			691	1253			528	1090			201	50	M30 x 2
2116 / 2116T	300	850		850			741	1303			578	1140			203,5	50	M30 x 2

Shipping Weight

Body size inch	Standard Bonnet		Bellows seal bonnet		Extension bonnet	
	ND40	ANSI 900	ND40	ANSI 900	ND40	ANSI 900
	Kg	Kg	Kg	Kg	Kg	Kg
1	12	16	15	20	13	18
1½	18	25	22	29	20	27
2	25	38	30	43	28	41
3	50	81	58	90	55	87
4	70	124	78	133	75	130
6	132	290	142	302	136	295
8	270	590	295	620		
10	336		361			
12	450		475			

Notes:

- 1 For actuators with cast yoke use dimension 'M'
- 2 Body assembly only

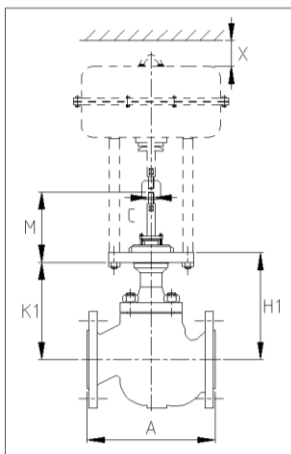


Fig. 1: Valve with standard bonnet

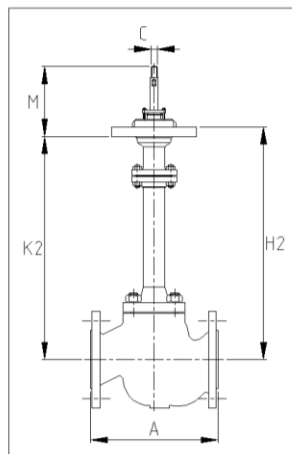


Fig. 2: Valve with bellows seal bonnet

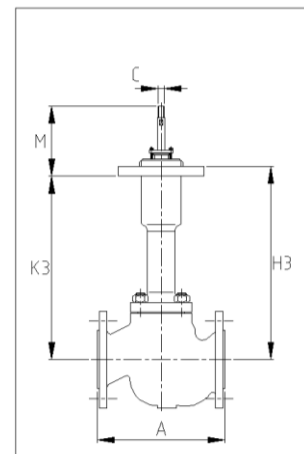


Fig. 3: Valve with extension bonnet



Valves according:

- CE
- ATEX
- PED
- EN / NEN / ANSI / ASME



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