Series 110 Control Valves

ROTORK
VALVES AND AUTOMATION

Specification

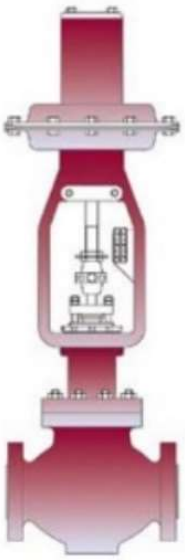
Design Code	ASME B16-34
Valve Size	15 to 600 mm (1/2" to 24")
Rating	ANSI 150 to 2500 or equivalents to DIN, BS10, JIS etc
End Connection	Flanged, Hubbed, Butt weld, Screwed
Body Material	Carbon steel, Chrome-moly steel, Stainless steel, Monel, Alloy 20, Hastelloy B/C, Duplex stainless steel, Aluminium bronze
Bonnet	Standard up to 400°C Normalising between 250°C to 500°C Extended cold service -20°C to -100°C, Cryogenic -100 °C to -250 °C Bellowseal
Gland Packing	PTFE Chevrons, Graphite, Low emission
Trim Form	Top guided contoured, Spline Micro Flow Ported cage (unbalanced / balanced) Low Noise (LR1, LR2, LR3, LR4)
Trim Material	Stainless steel, Duplex stainless steel, 13% Chrome steel, Monel Hastelloy B/C, Stellite
Flow Characteristic	Equal percentage, Linear , Quick Opening
Seat Leakage	As per ANSI / FCI 70-2-2006 Class III, IV, V and VI
Actuator Form	Diaphragm, Piston or Electric
Actuator Type	Direct / Reverse Acting
Diaphragm	Nitrile / Neoprene (nylon reinforced)
Accessories	Valve Positioners - Pneumatic, Electro-Pneumatic, Smart Instruments - Airset, Solenoid Valve, Volume Booster, Airlock, Limit Switches Features - Top or Side Mounted handwheel, Limit Stops Removable Blind Head, Steam Jacketing etc.

Design Features

- High flow capacity and rangeability.
- Large variety of trim designs.
- Top entry for ease of inspection and maintenance.
- Designed with clamped seat and trim configuration.
- Unbalanced or balanced plug design options to achieve specified leakage requirements.
- Bolts located outside of the piping stress area to eliminate gasket crush problems.
- Wide selection of actuators to meet most system requirements.

Quality and Performance Guarantee

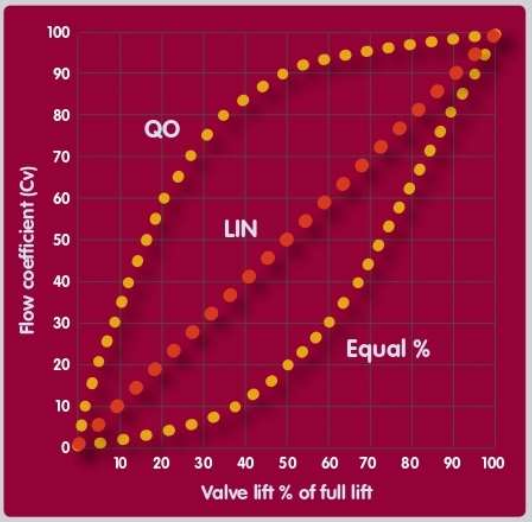
- Produced with Quality Systems accredited to ISO 9001:2008
- CE marked in accordance with European Pressure Equipment Directive 97/23/EC and ATEX compliant with European directive 94/9/EC.
- Full material certification available for all major component parts.
- Rigorous proven on-site performance.
- Full guarantee on design and performance.
- All testing performed to the requirements of ASME B16.34.



Series 110: Control valve with standard bonnet and reverse acting actuator

Series 110: Control valve with standard bonnet and direct acting actuator

Characteristic Curves



The Inherent flow characteristic of a control valve is the relationship between the flow and the lift of the plug at a constant pressure drop.

The characteristics normally available, are shown.

Linear - Flow is directly proportional to valve lift.

Equal % - Flow changes by a constant percentage of its instantaneous value for each unit of valve lift.

Quick opening - Flow increases rapidly with initial travel reaching near its maximum at a low lift.

Rangeability

Trim size		Standard rangeability			
		Spline micro trim	Contoured trim	LR trim	Multi stage trim
ins	mm				
1/2" and 3/4"	15 and 20	100 : 1	40 : 1	35 : 1	-
1 to 3	25 to 80	80 : 1	50 : 1	45 : 1	40 : 1
4 to 12	100 to 300	-	60 : 1	55 : 1	50 : 1
14 to 24	350 to 600	-	70 : 1	60 : 1	50 : 1

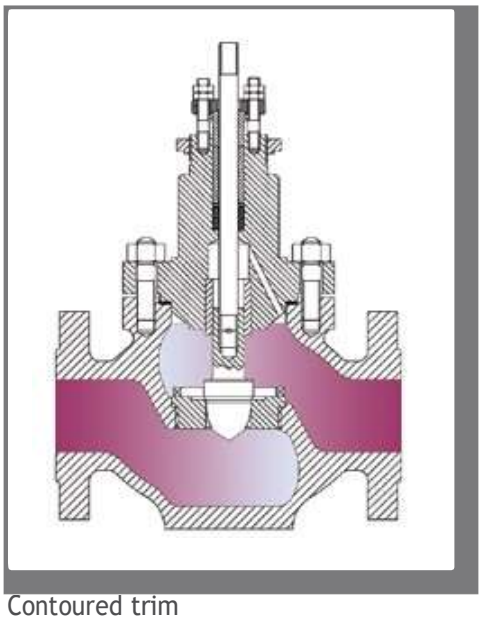
Maximum Recommended Valve Body Velocity for liquid flows

Trim style	Valve size		Valve body material		
			Carbon steel	Alloy steel	Aluminium bronze
	ins	mm	m/s	m/s	m/s
Contoured	1/2 to 2	15 to 50	12.5	14.0	8.0
	3 to 8	80 to 200	10.5	11.0	6.5
Cage Guided	1 to 12	25 to 300	13.1	15.8	8.0
	12 to 24	350 to 600	10.7	13.1	6.5

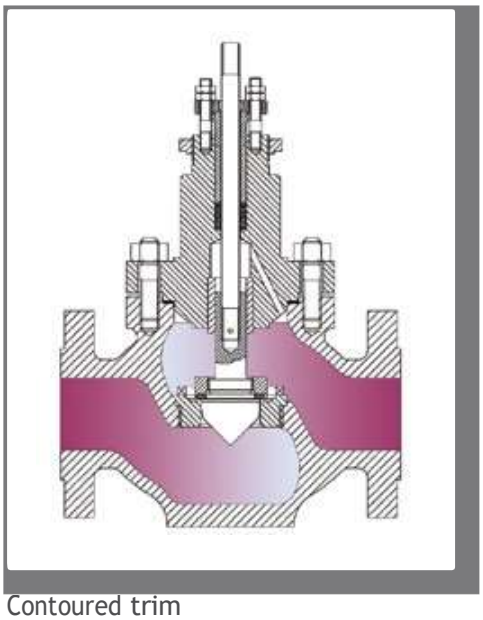
Maximum Recommended Valve Body Velocity for Gas/Vapour Flows

Trim style	Valve size		Maximum Inlet velocity	Maximum Outlet velocity	Maximum outlet mach No. for predicted noise level		
	ins	mm	m/s	m/s	>95dBA	<95dBA	<85dBA
Contoured	1/2 to 2	15 to 50	105	253	0.65	0.5	0.3
	3 and 4	80 and 100	90	253	0.65	0.5	0.3
	6 and 8	150 to 200	85	253	0.65	0.5	0.3
Cage Guided	1 to 24	25 to 600	68	253	0.65	0.5	0.3

Valve Trims - Standard Range



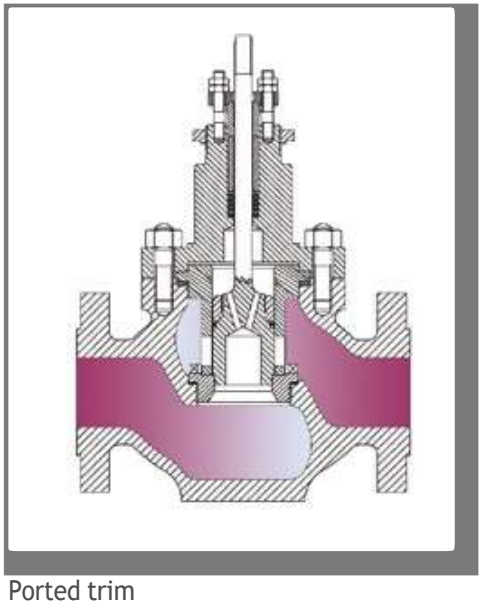
Contoured trim
Metal to Metal



Contoured trim
Soft Seated

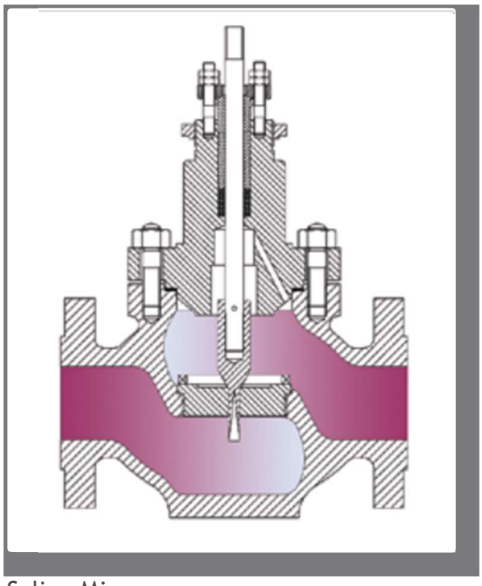
Contoured trim (Metal to Metal and Soft Seated)

- The contoured trim is the standard configuration for benign pressure drop service.
- A large diameter, precision machined plug and hardened guide bush provide the basic elements of a heavy top guided construction.
- Contoured trim available for modulating and on/off duty.
- The contoured trim configuration is available with metal to metal contact and soft seat options.



Ported trim
Metal to Metal or Soft Seated

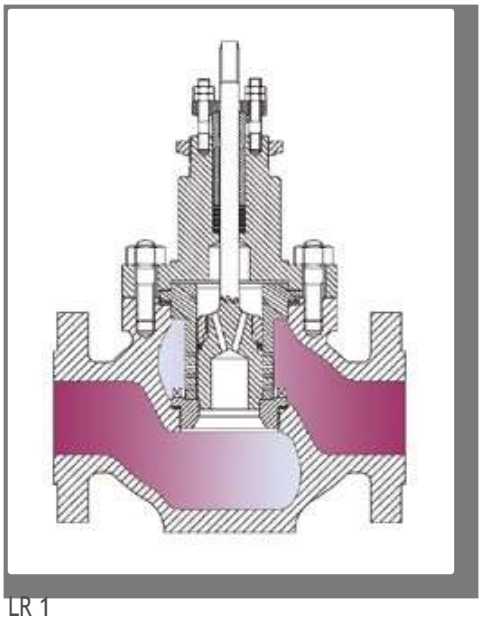
- Ported cage trim is a heavy duty cage guided design with the option of pressure balanced configuration.
- Choice of elastomer seal materials provides fluid compatibility.



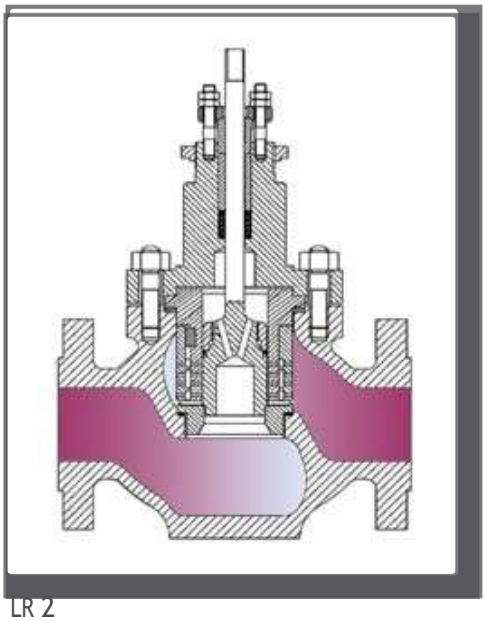
Spline Micro
Metal to Metal or Soft Seated

- This design of trim is a seat guided arrangement having a very high rangeability and designed for the accurate control of small flow applications.

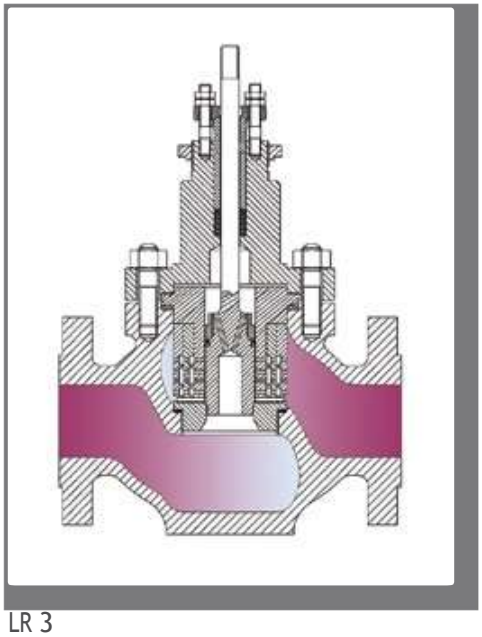
Valve Trims - Standard Range



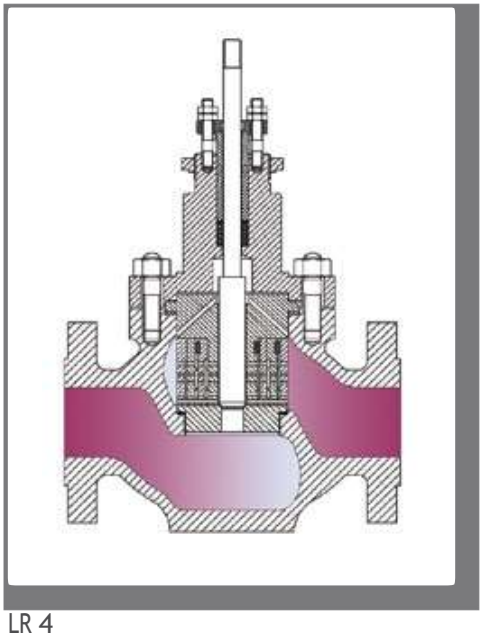
LR 1
Single Stage Low Pressure Recovery



LR 2
Double Stage Low Pressure Recovery



LR 3
Triple Stage Low Pressure Recovery



LR 4
Four Stage Low Recovery

Low Recovery trim (Metal to Metal and Soft Seated)

- All the advantages of ported cage trims.
- Multiple drilled orifices of a special size and spacing resulting in reduced noise levels compared to conventional valve trims.
- Added advantage on liquid duty valves by preventing cavitation damage.
- Low pressure recovery characteristic of LR1 suitable for flashing duty.

Guide to Bonnet and Gland Packing Selection

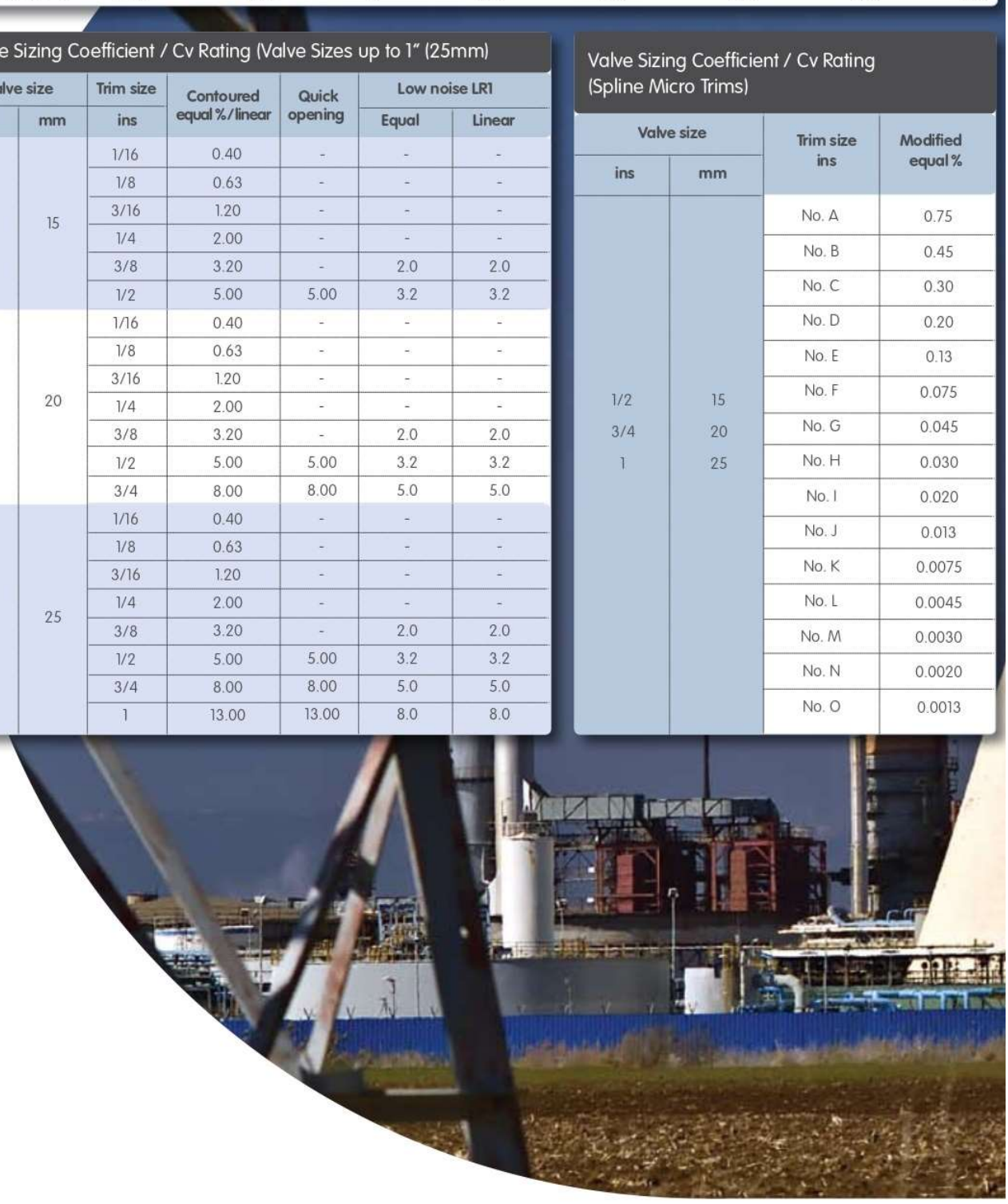
Graphite	All services except strong oxidisers - lubrication is not required						
PTFE Chevron		Resistance to most known chemicals Lubrication not required					
Standard			Common service condition				
Normalising					Provides gland-packing Protection in high temperature conditions		
Extended	Cryogenic						
Temperature °C	-200	-100	0	100	200	300	400	500

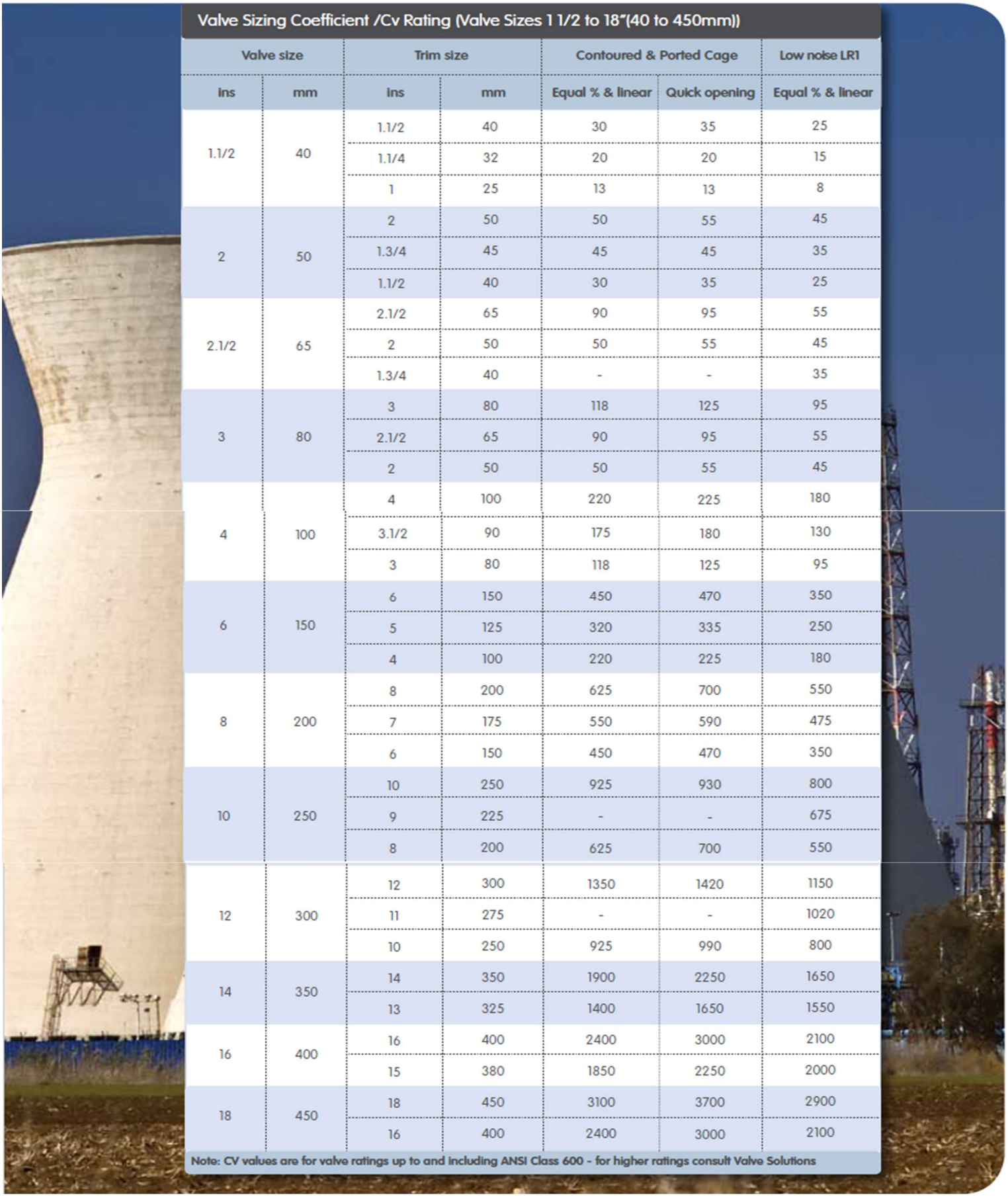
Valve Sizing Coefficient / Cv Rating (Valve Sizes up to 1" (25mm)

Valve size		Trim size	Contoured equal %/linear	Quick opening	Low noise LR1	
ins	mm	ins			Equal	Linear
1/2	15	1/16	0.40	-	-	-
		1/8	0.63	-	-	-
		3/16	1.20	-	-	-
		1/4	2.00	-	-	-
		3/8	3.20	-	2.0	2.0
		1/2	5.00	5.00	3.2	3.2
3/4	20	1/16	0.40	-	-	-
		1/8	0.63	-	-	-
		3/16	1.20	-	-	-
		1/4	2.00	-	-	-
		3/8	3.20	-	2.0	2.0
		1/2	5.00	5.00	3.2	3.2
		3/4	8.00	8.00	5.0	5.0
1	25	1/16	0.40	-	-	-
		1/8	0.63	-	-	-
		3/16	1.20	-	-	-
		1/4	2.00	-	-	-
		3/8	3.20	-	2.0	2.0
		1/2	5.00	5.00	3.2	3.2
		3/4	8.00	8.00	5.0	5.0
		1	13.00	13.00	8.0	8.0

Valve Sizing Coefficient / Cv Rating (Spline Micro Trims)

Valve size		Trim size ins	Modified equal %
ins	mm		
1/2	15	No. A	0.75
3/4	20	No. B	0.45
1	25	No. C	0.30
		No. D	0.20
		No. E	0.13
		No. F	0.075
		No. G	0.045
		No. H	0.030
		No. I	0.020
		No. J	0.013
		No. K	0.0075
		No. L	0.0045
		No. M	0.0030
		No. N	0.0020
		No. O	0.0013





Valve Sizing Coefficient /Cv Rating (Valve Sizes 1 1/2 to 18"(40 to 450mm))

Valve size		Trim size		Contoured & Ported Cage		Low noise LR1
ins	mm	ins	mm	Equal % & linear	Quick opening	Equal % & linear
1.1/2	40	1.1/2	40	30	35	25
		1.1/4	32	20	20	15
		1	25	13	13	8
2	50	2	50	50	55	45
		1.3/4	45	45	45	35
		1.1/2	40	30	35	25
2.1/2	65	2.1/2	65	90	95	55
		2	50	50	55	45
		1.3/4	40	-	-	35
3	80	3	80	118	125	95
		2.1/2	65	90	95	55
		2	50	50	55	45
4	100	4	100	220	225	180
		3.1/2	90	175	180	130
		3	80	118	125	95
6	150	6	150	450	470	350
		5	125	320	335	250
		4	100	220	225	180
8	200	8	200	625	700	550
		7	175	550	590	475
		6	150	450	470	350
10	250	10	250	925	930	800
		9	225	-	-	675
		8	200	625	700	550
12	300	12	300	1350	1420	1150
		11	275	-	-	1020
		10	250	925	990	800
14	350	14	350	1900	2250	1650
		13	325	1400	1650	1550
16	400	16	400	2400	3000	2100
		15	380	1850	2250	2000
18	450	18	450	3100	3700	2900
		16	400	2400	3000	2100

Note: CV values are for valve ratings up to and including ANSI Class 600 - for higher ratings consult Valve Solutions

Valve Sizing Coefficient / Cv Rating LR2 Trims

Valve size		Trim size	Liquid duty flow over the plug		Gas duty flow under the plug	
ins	mm	ins	Equal	Linear	Equal	Linear
2	50	2	17	17	19	19
		1.5	11	11	12	12
3	80	3	40	40	45	45
		2.5	30	30	35	35
		2	25	25	28	28
4	100	4	66	66	70	70
		3	40	40	45	45
6	150	6	170	170	185	185
		5	120	120	135	135
		4.5	90	90	105	105
8	200	8	260	260	285	285
		6	170	170	185	185
10	250	10	390	425	435	465
		9	345	360	380	390
		8	260	260	285	285
12	300	12	560	630	625	700
		11	480	525	535	585
		10	390	425	435	465

Valve Sizing Coefficient / Cv Rating LR3 Trims

Valve size		Trim size	Liquid duty flow over the plug		Gas duty flow under the plug	
ins	mm	ins	Equal	Linear	Equal	Linear
3	80	3	20	20	25	25
		2.5	13	13	17	17
		2	9	9	11	11
4	100	4	35	35	40	40
		3.5	25	25	30	30
		3	20	20	25	25
6	150	6	100	100	120	120
		5	75	75	95	95
		4.5	55	55	65	65
8	200	8	135	135	165	165
		7	100	100	120	120
10	250	10	210	210	255	255
		9	135	135	165	165
12	300	12	320	340	390	420
		11	280	295	340	360

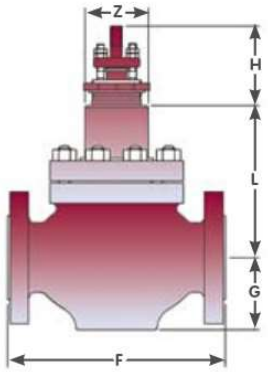
Note: CV values are for valve ratings up to and including ANSI Class 600 - for higher ratings consult Valve Solutions

Actuator Selection Guide

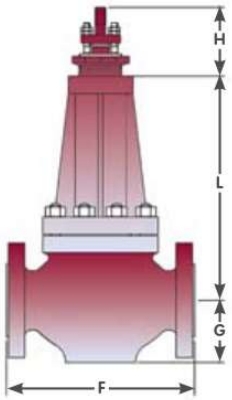
valve size	ins	1				1/1/2, 2				3			4			6, 8				10, 12			
	mm	3/16	1/4	3/8, 1/2	3/4, 1	1	1¼	1½	2	2	2½	3	2½	3	4	4	5	6	8	6	8	10	12
trim size	ins	4.5	6	10, 15	20, 25	25	32	40	50	50	65	80	65	80	100	100	125	150	200	150	200	250	300
	mm			15	25																		
act. size	load Bar	shut-off pressure in (bar)																					
030	0.2	UB	80	49	15	7.8																	
		B	N/A	N/A	N/A	N/A																	
	0.4	UB	180	115	36	20																	
		B	N/A	N/A	N/A	N/A	1 1/8" / 28mm travel																
	0.6	UB	280	182	57	30																	
		B	N/A	N/A	N/A	N/A																	
	0.8	UB	380	249	79	42																	
		B	N/A	N/A	N/A	N/A																	
055	0.2	UB					12	7.5	4.5	2.5	1.2	0.5	0.4										
		B					N/A	21	21	19	3.5	1.4	0.1										
	0.4	UB					34	20	12	7.5	6	3.5	2.75										
		B					N/A	78	78	75	39	37	36										
	0.6	UB					55	32	21	12	11	6.5	5	1 1/2" / 38mm travel									
		B					N/A	134	134	131	75	73	71										
	0.8	UB					76	45	29	17	16	9	7				2 1/2"/57mm travel						
		B					N/A	190	190	187	111	109	107										
095	0.2	UB									4.8	2.75	2	2	1.5	0.6							
		B									29	27	26	13	12	9	N/A	N/A	N/A	N/A			
	0.4	UB									13	7.8	6	7	5.5	2.5							
		B									91	89	88	56	55	52	22	21	19	17			
	0.6	UB									22	12.5	10	12	9	4.4							
		B									153	151	150	99	98	85	47	46	44	41			
	0.8	UB									30	18	13.5	17	13	6.3					3 1/2" / 90mm travel		
		B									215	213	212	142	141	138	71	70	68	65			
140	0.2	UB									9	5	4	4	3	1.5	1	0.75	0.3	0.1			
		B									59	56	55	33	32	29	10	9	7	4	N/A	N/A	N/A	N/A
	0.4	UB									21	12.5	10	11	9	4.3	3.5	2.9	1.5	0.8			
		B									150	148	147	96	95	92	45	45	43	40	23	21	18	17
	0.6	UB									34	20	15	19	14.5	7	6.5	5	2.9	1.5			
		B									241	239	238	160	159	156	81	80	78	74	45	44	41	40
	0.8	UB									46	27.5	21	26	20	9.5	9	7	4	2.2			
		B									333	330	329	223	222	219	117	116	114	111	68	66	64	63
300	0.2	UB															4	3	1.8	0.9	1.5	0.8	0.4	0.25
		B															50	50	48	45	26.5	24	22	20
	0.4	UB															10	7.5	4.5	2.4	4.3	2	1.2	0.9
		B															127	126	124	121	75	73	71	69
	0.6	UB															16	12	7	3.8	7	3.5	2	1.5
		B															204	203	201	198	124	122	120	118
	0.8	UB															22	17	10	5.3	9.7	5	2.8	2.1
		B															280	280	278	275	173	171	169	167

UB - ΔP values for contoured / ported cage unbalanced trim
B - ΔP values for low noise / ported cage balanced trim

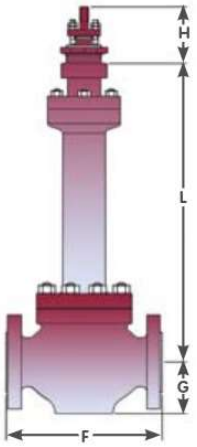
Control Valve Standard Dimensions



Valve with
Standard bonnet



Valve with
Normalising bonnet



Valve with
Bellow seal bonnet

Valve size		ANSI 150 PN 10, 16 BS-10-D,E	ANSI 300 PN 25, 40 BS-10-F, H, J	ANSI 600 PN 64, 100 BS-10-K, R	Stem in up position	Bonnet mount dia	Height from centre line			Centre line to base	Stem travel
							Standard	Normalising	Bellows		
inch	mm	Face to Face (F)			H	Z		L		G	
1/2	15	184	190	203	117	53.97	140	222	324	67	28
3/4	20	184	194	206	117	53.97	140	222	324	67	28
1	25	184	197	210	117	53.97	140	222	324	67	28
1. 1/2	40	222	235	251	117	53.97	159	292	353	83	28
2	50	254	267	286	117	53.97	168	284	362	86	28
2. 1/2	65	276	292	311	143	71.44	203	327	467	111	38
3	80	298	318	337	143	71.44	203	327	467	111	38
4	100	352	368	394	143	71.44	206	357	467	146	38
6	150	451	473	508	197	90.42	276	391	676	171	57
8	200	543	568	610	197	90.42	292	435	686	203	57
10	250	673	708	752	229	90.42	390	632	-	238	90
12	300	737	775	819	229	90.42	390	673	-	251	90
14	350	889	927	972	339	90.42	490	822	-	292	100
16	400	1016	1057	1108	244	90.42	622	927	-	343	100
18	450	1153	1194	1251	325	146	700	1005	-	512	125