Technical Bulletin B-070

Series 07 Single/Double Seated Globe Valves for ANSI 150 – 600 (PN20- 100) DIN/BS 4504 PN10-PN100

Series 07 Features

General

The Series 07 control valves has been developed to provide a cost effective solution to the " final control element" used in modern plants.

The valve design combines the successful high integrity features of the series 07 with a high capacity, economic design philosophy as well as excellent control.

Performance :

- High Cv to body size ratio.
- Streamlined flow passages to optimize capacity.
- High Cv to valve weight ratio.
- Excellent flow control rangeability.

Design Flexibility :

- Modular construction design available with a range of different connections and styles.
- All trim components removable from the top for easy of maintenance.
- Wide range of supplementary noise control options.
- Inherently characterized trim offered in equal percentage, linear, quick opening and modified-parabolic (options).
- Multi trim sizes available.
- Full range of body and trim material options.
- Fully rationalized and interchangeable features.
- Full range of bonnet and packing designs to suit various temperatures and fluids.

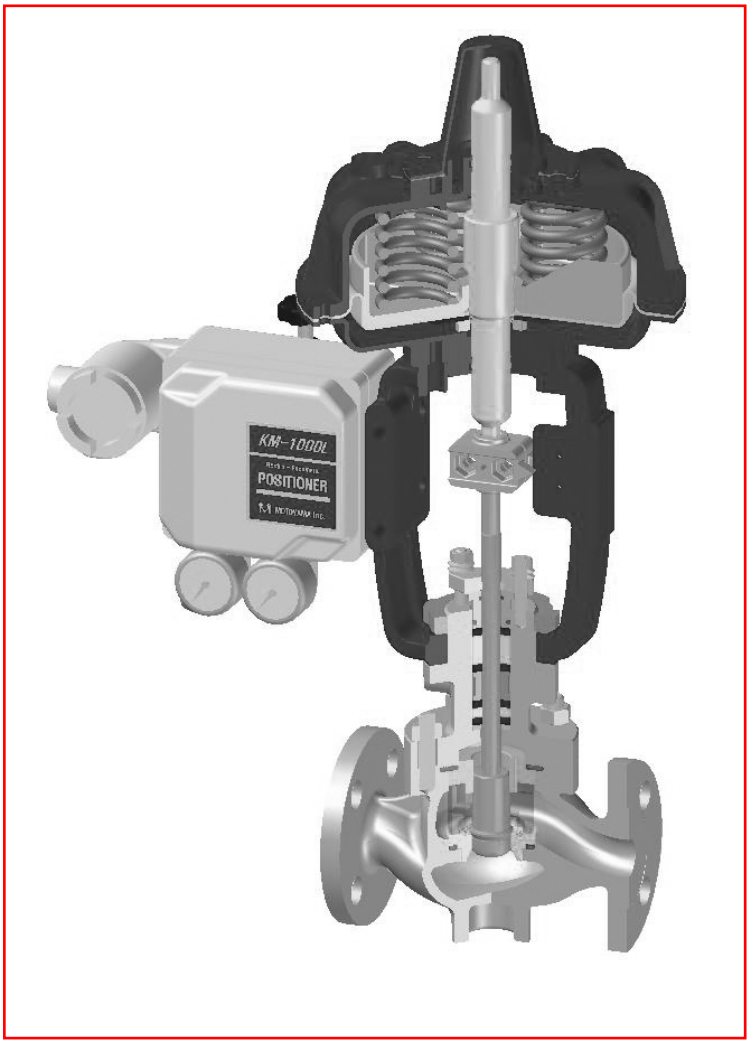
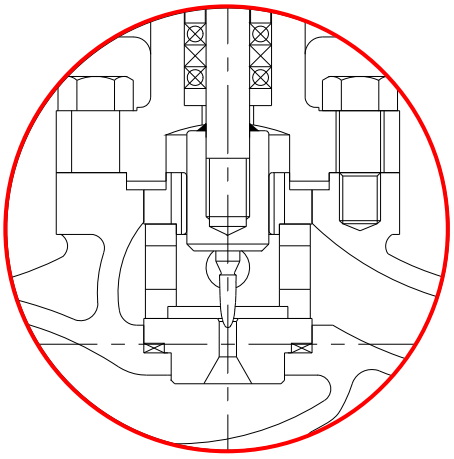


Figure 1. Class Series 07 Valve incorporating Contoured Trim and complete with Series ' 5500' Actuator

Design Integrity :

- Heavy duty top guiding with no bottom guide to obstruct seat bore and potentially trap debris.
- Large diameter stems.
- Clamped bonnet and seat ring gaskets are fully retained for easy maintenance.



(Small size)

Quality Manufacturing :

- Rigorously tested to ensure specified performance on site.
- Quality assurance system in accordance with ISO 9001.
- Optional full NACE MR-01-75 certification.

Scope of Design

End connection sizes : 1/2” to 16” (15mm to 400mm)

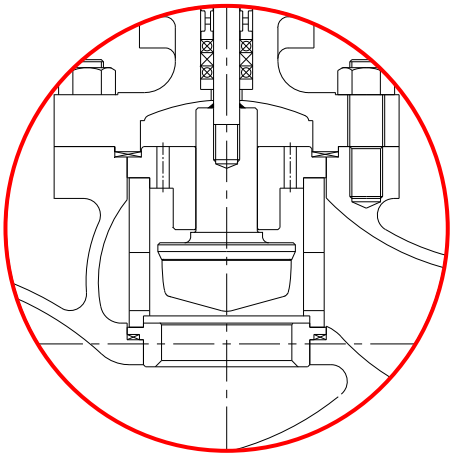


Figure 3. Single contoured plug up to 6” (Unbalanced)

End Connection Styles :

ANSI,DIN and BS flanged RF.FF.RTJ (and other grooved designs). Welded profiles including butt weld, socket,etc.,clamped and screwed designs. other requirements available on request.

Valve Body Ratings :

ANSI 150 to ANSI 600 (PN 20 to PN100), DIN/BS4504PN10 to PN100 as standard. other requirements available on request.

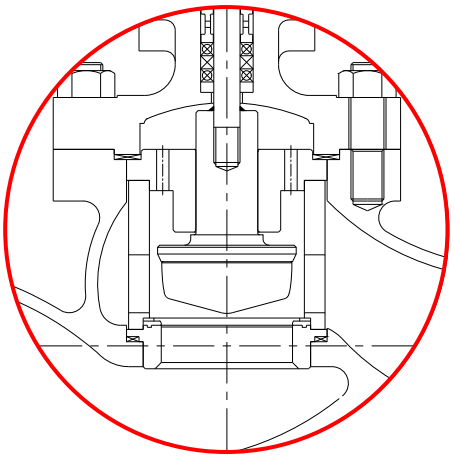


Figure 4. Single contoured plug (Unbalanced, Soft seat)

Design standards :

ANSI B16.34 and ASME section VIII (for body/bonnet bolting)

Trim Design Options :

Full and reduces trim, SP, DP. and BP available as standard. Multi hole cages and attenuate. silencers are available for specific applications.

Inherent Characteristics :

Equal percentage, linear, modified parabolic or quick open.

Material Combinations :

A wide range of body/bonnet and trim materials are available.

Plug Design Options :

Unblanced with metal/metal or resilient seating plus balanced with metal/metal seating and metallic or resilient piston rings.

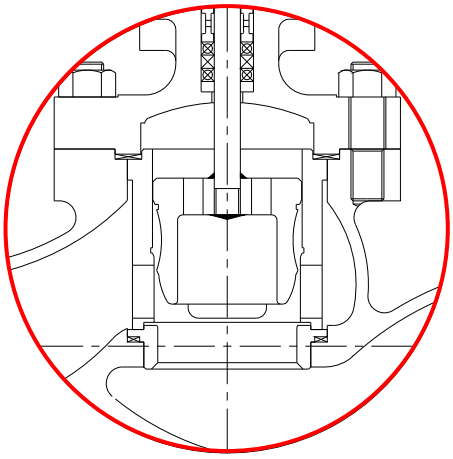


Figure 5. Single contoured plug (Balanced)

Bonnet Options

Standard, extension and cryogenic bonnet design options available.

Actuation :

Various types of actuation are available including ;
5500 series spring opposed pneumatic diaphragm.
'C' Series spring opposed pneumatic piston.
'D' Series double acting pneumatic piston.
In addition electric, electro-hydraulic, hydraulic and manually operated versions are available.

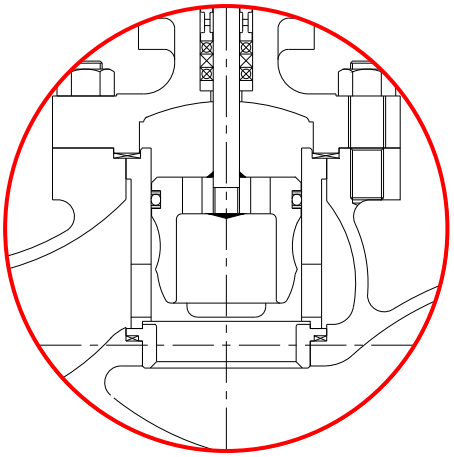


Figure 6. Double contoured plug (Over 2")

Sizing/Noise Prediction

The procedures for performing valve sizing, velocity and sound pressure level calculations are detailed in both the technical selection manual.

Guide to Trim Options Available

Modular Design

Series 07 has been designed around a modular manufacturing concept. using this philosophy, a centre body module selected to most suit the specified flow conditions and operating data, is combined with end connection size/rating, selected to support that module. this design feature allows not only the selection of full size ends, to offer oversize end connections to suit a particular requirement.

Unbalance Trim

Single contoured unbalance port(SP) are up to 6”.
Ports are guided by heavy guide.

Balance Trim

Pressure balance ports are used to reduced the thrust on the port.
Single contoured balance port (BP) are over 2” are standard and under 2” are available for specific applications.
Double contoured balance port (DP) are over 2” for high pressure drop.

Soft seats are used in application requirement ANSI class VI ‘ BUBBLE-TIGHT ‘ shutoff and FIRE SAFE design. It’s design consist of an elastomer sandwiched between two metal piece, insert retainer and metal seat. the soft seat can be done by installing the insert and soft seat between seat retainer and seat. therefore it can used for fire safe function.

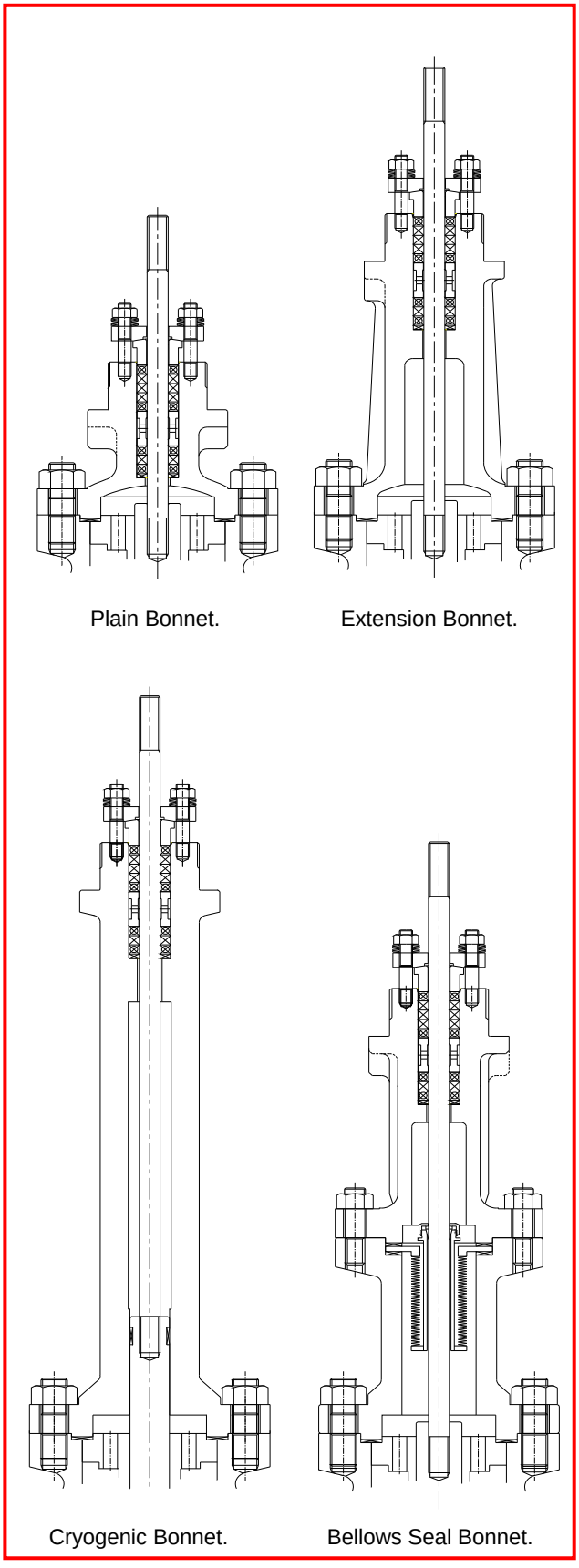


Figure 7. Bonnet design option

Series 07 Design Cv Values

Table 1. Small flow table

Valve Size		Lift	Trim Size Number	Linear
in	mm			
1/2"	15	15	No. 5	0.007
			No. 4	0.014
3/4"	20		No. 3	0.025
1"	25		No. 2	0.037
			No. 1	0.056

Note : Special small flow(Optional) is available

Table 2. Single contoured up to 1" valve size

Connection Size		Trim Size	Lift	Eq% Linear	Quick Opening
in	mm				
1/2"	15	3	15	0.09	0.09
		4		0.15	0.15
		6 (1/8)		0.4	0.4
		7 (3/16)		0.8	0.8
		8 (1/4)		1.5	1.5
		10 (3/8)		3.0	3.0
		15 (1/2)		5.2	5.2
3/4"	20	3	15	0.09	0.09
		4		0.15	0.15
		6 (1/8)		0.4	0.4
		7 (3/16)		0.8	0.8
		8 (1/4)		0.15	0.15
		10 (3/8)		3.0	3.0
		15 (1/2)		5.2	5.2
		20 (3/4)		9.0	9.0
1"	25	3	15	0.09	0.09
		4		0.15	0.15
		6 (1/8)		0.4	0.4
		7 (3/16)		0.8	0.8
		8 (1/4)		1.5	1.5
		10 (3/8)		3.0	3.0
		15 (1/2)		5.2	5.2
		20 (3/4)		9.0	9.0
		25 (1)		14	14

Note : The above design Cv values apply to valves with body rating ANSI 150 to ANSI 600.

Table 3. Contoured Cv valves1”- 4” valve size(Unbalanced)

Connection Size	Full Ported				Full Ported			
	Trim Size	Lift	Eq% Linear	Quick Opening	Trim Size	Lift	Eq% Linear	Quick Opening
1"	1"	15	14	14	1/2"	15	5.2	5.2
					3/4"		9.0	9.0
1.1/2"	1.1/2"	20	32	36	3/4"	15	9.0	9.0
					1"		14	14
					1.1/4"	20	24	27
2"	2"	25	52	58	1"	15	14	14
					1.1/4"	20	24	27
					1.1/2"		32	36
2.1/2"	2.1/2"	25	78	88	1.1/4"	20	24	27
					1.1/2"		32	36
					2"	25	52	58
3"	3"	38	116	130	1.1/2"	20	32	36
					2"	25	52	58
					2.1/2"		78	88
4"	4"	38	195	220	2"	25	52	58
					2.1/2"		78	88
					3"	38	116	130

Table 4.Cage guided Cv values1”- 14” valve size(Balanced)

Connection Size	Full Ported				Full Ported			
	Trim Size	Lift	Eq% Linear	Quick Opening	Trim Size	Lift	Eq% Linear	Quick Opening
1.1/2"	1.1/2"	20	34	38	1"	15	18.5	21.4
2"	2"	25	56.2	67.2	1"	15	18.5	21.4
					1.1/2"	20	34	38
2.1/2"	2.1/2"	25	83	93.5	1.1/2"	20	34	38
					2"	25	56.2	67.2
3"	3"	38	125	135	1.1/2"	20	34	38
					2"	25	26.2	67.2
					2.1/2"		83	93.5
4"	4"	38	210	235	2"	25	56.2	67.2
					2.1/2"		83	93.5
					3"	38	125	135
5"	5"	50	276	368	2.1/2"	25	83	93.5
					3"	38	125	135
					4"		210	235
6"	6"	50	424	547	3"	38	125	135
					4"		210	235
					5"	50	276	368
8"	8"	100	675	871	4"	38	210	235
					5"	50	276	368
					6"		424	547
10"	10"	100	1050	1260	5"	50	276	368
					6"		424	547
					8"	100	675	871
12"	12"	130	1620	2090	6"	50	424	547
					8"	100	675	871
					10"		1050	1260
14"	14"	130	2030	2620	8"	100	675	871
					10"		1050	1260
					12"	130	1620	2090

Velocity Limitations

In selecting a valve for either a liquid or gas / vapor application one of the major considerations is the effect of fluid velocity. high velocity could lead to operational problems including erosion, excessive vibration and instability. The following tables indicate the maximum recommended velocity values for liquid and gas / vapor services.

Table 5. Recommended maximum velocities for liquid service .

Valve Size		Maximum Velocity					
		Carbon Steel		Alloy Steel		Bronze, Cu / Ni Alloys	
in	Mm	ft/s	m/s	ft/s	m/s	ft/s	m/s
0.5 - 2	15 – 50	41	12.5	46	14	25	7.6
3 - 6	80 – 150	34	10.4	34	10.4	20	6.2
8 -12	200 – 300	29	8.9	29	8.9	17	5.2

Table 6. Recommended maximum velocities for Gas/ Vapor services

Valve Size		Maximum Inlet Velocity		Maximum Outlet Velocity		Max. Outlet Mach Number for Required Noise Level		
in	Mm	ft/s	m/s	ft/s	m/s	>95 dBA	<95 dBA	<85 dBA
0.5 - 2	15 – 50	340	104	830	253	0.65	0.5	0.3
3 - 6	80 – 150	294	90					
8 - 12	200 – 300	265	81					

Inherent Rangeability

The inherent rangeability of a control valve is the ratio between maximum and minimum flow with in the working characteristic at constant pressure drop.

Table 7. Rangeability values

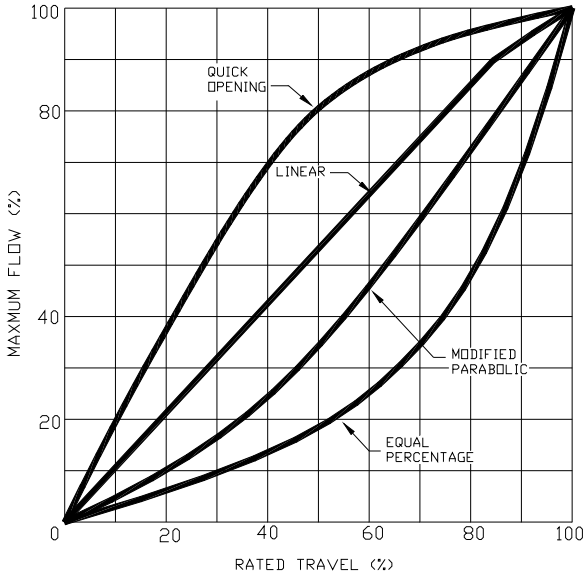
Trim Size(ins) / Trim Number	Maximum Rangeability	
Trim N0. 1 – 5	10 : 1	*
Trim size 1/16” – 3/4”	30 : 1	50 : 1
Trim size 1” - 16”	50 : 1	100 : 1

* special

Characteristic Curves

The inherent flow characteristic of a control valve is the relationship between the flow and the lift of the plug at constant pressure drop. The characteristics normally available are shown on Figure 7.

Figure 8. Characteristic curves table



Maximum Leakage Rates

Leakage rates are normally measured in accordance with the ANSI / FCI70.2 specification using the class designation. The following Table defines the achievable leakage class for each available plug design.

Table 8. Maximum leakage rates

Plug Design	Seating Style	Achievable Leakage Class
Unbalanced(SP)	Metal/Metal (std)	IV
Unbalanced(SP)	Metal/Metal (spl)	V
Unbalanced(SP)	Metal/PTFE	VI

Note - (std)or (spl) refer to the amount seat/plug lapping carried out at final assemble.

Balanced (BP)	Metal/Metal (std)	IV
Balanced (BP)	Metal/Metal (spl)	V
Balanced (BP)	Metal/PTFE	VI
Balanced (DP)	Metal/Metal (std)	I I
Balanced (DP)	Metal/Metal (spl)	I I I

Definitions:

- Linear

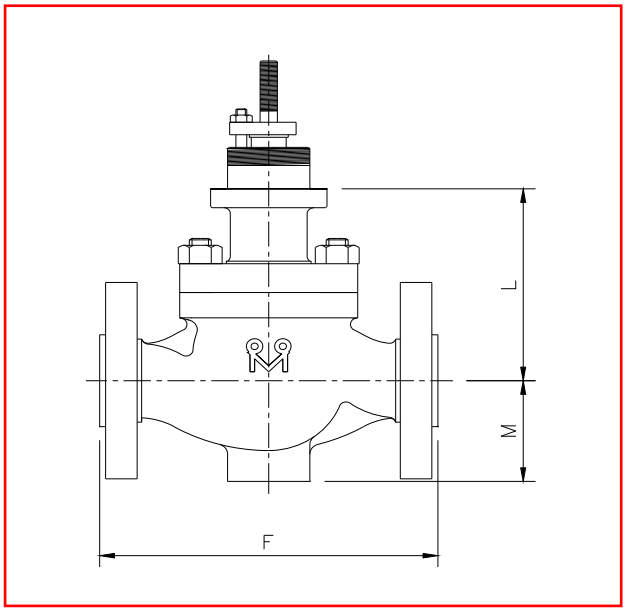
  Flow is directly proportional to valve lift.
- Equal %

  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.

  Modified Parabolic

  Provides fine throttling action at low valve lift and Approximately a linear characteristic for upper portions of travel.



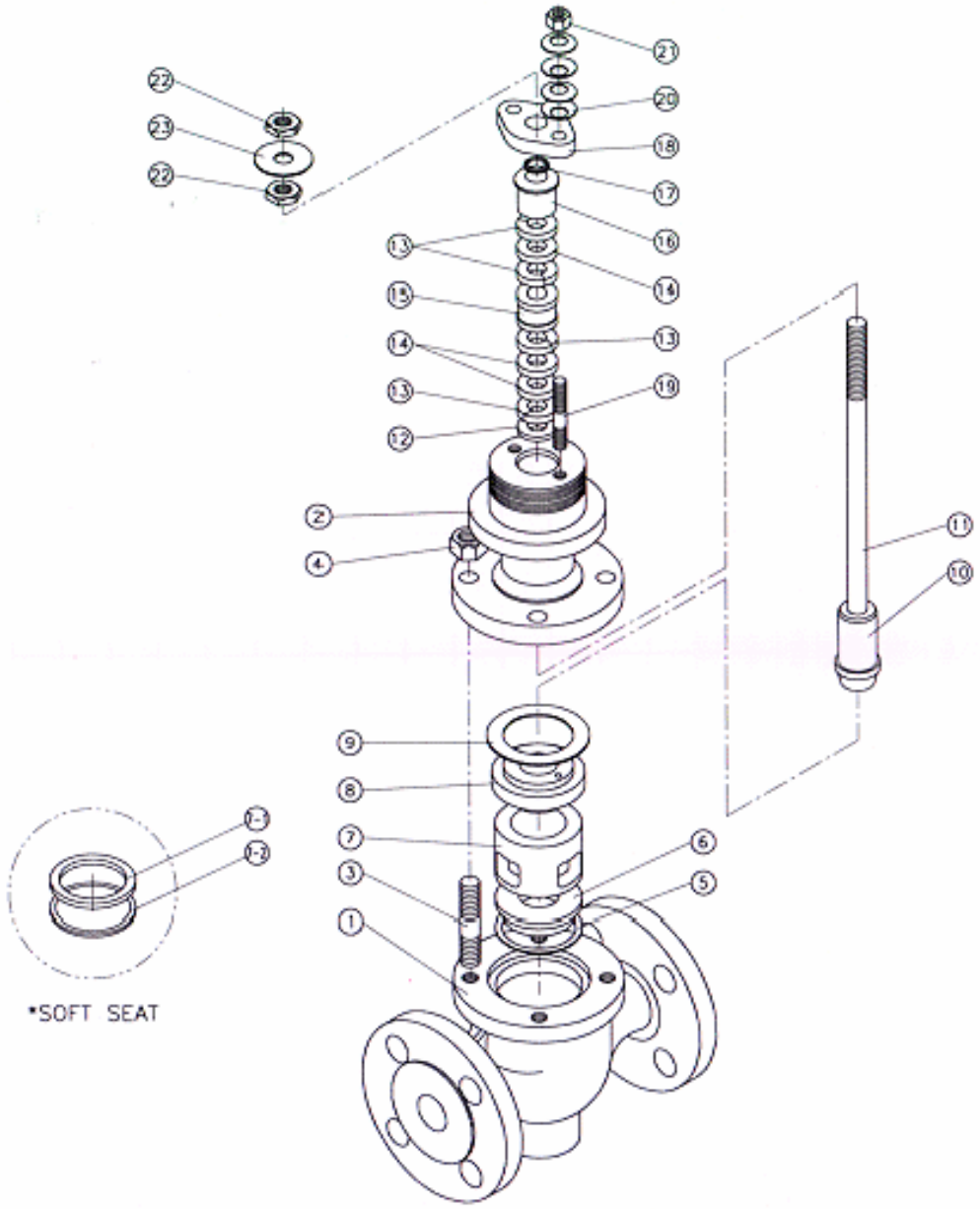
Notes:

1. Face to face dimensions comply with ISA S75.03 1984.
2. Face to face dimensions are RF flanges only.
3. Face to face dimensions only applicable when inlet and Outlet flanges are identical.
4. Full dimensional and weight schedule available on request.

Figure 9. Series 07 dimensions

Table 9. Series 07 outline dimensions up to ANSI 600 rating

Body ins (mm)	F – Face to Face (RF flanges) ins(mm)			L – Centreline to Yoke Mounting				M – Centreline to Base	
				Standard Bonnet		Extension Bonnet			
	ANSI 150 PN 10	ANSI 300 PN 16-40	ANSI 600 PN 100	Up to ANSI 300 PN 40	ANSI 600 PN 100	Up to ANSI 300 PN 40	ANSI 600 PN 100	Up to ANSI 300 PN 40	ANSI 600 PN 100
½ (15)	184	194	206	117	135	217	235	53	55
¾ (20)	184	194	206	117	135	217	235	53	55
1 (25)	184	197	210	123	134	223	234	64	64
1½ (40)	222	235	251	137	148	237	248	74	80
2 (50)	254	267	286	155	188	255	288	85	85
2½ (65)	276	292	311	170	201	270	301	95	105
3 (80)	298	317	337	201	253	351	370	114	115
4 (100)	352	368	394	253	271	403	428	140	140
5 (125)	403	425	457	323	360	473	510	165	160
6 (150)	451	473	508	331	371	481	508	170	208
8 (200)	543	568	610	431	463	581	644	200	240
10 (250)	673	708	752	471	491	621	640	240	260
12 (300)	737	775	819	553	565	682	715	350	400
14 (350)	889	927	-	580	-	760		320	-



NO.	NAME OF PARTS	Q'TY	REMARKS
23	POINTER	1	
22	STEM LOCK NUT	2	
21	HEX. NUT	2	
20	CONED DISC SPRING	8	
19	GLAND BOLT	2	
18	GLAND FLANGE	1	
17	DUST RING	1	
16	GLAND FOLLOWER	1	
15	LANTURN RING	1	
14	GLAND PACKING	3	PILLAR FOIL
13	GLAND PACKING	4	PILLAR FOIL
12	PACKING RING	1	
11	STEM	1	
10	INNER VALVE	1	
9	BONNET GASKET	1	PILLAR FOIL
8	GUIDE	1	
7-2	TEFLON SEAT	1	
7-1	SEAT RETAINER(2)	1	
7	SEAT RETAINER(1)	1	
6	SEAT RING	1	
5	SEAT GASKET	1	PILLAR FOIL
4	HEX. NUT	4	
3	STUD BOLT	4	
2	PLAIN BONNET	1	
1	BODY	1	