AB9051/AB9057
High Duty Multistage Single Seated Globe and Angle Type Valves for Ratings
ANSI 1500 - 2500 (PN 250 - 400)

ABB Control Valves

T50
Technical Bulletin

AB9051/57 - Features

Performance:

- Large pressure drop capability and elimination of cavitation.
- Linear and equal % inherent characteristics.
- High rangeability - up to 100 to 1.
- Multi-guiding system giving high resistance to vibration and noise.
- Moving central flow sleeve creates resistance to cavitation by maintaining high local exit pressures and prevention of vapour bubble forming.

Design Flexibility:

- Trim internals removable in cartridge form, through top of body enabling maintenance, or replacement without extracting valve from line.
- Valve body available in either globe or angle pattern to suit piping configuration.
- Valve trim available with either 4 or 7 stages of pressure let down to suit operating conditions.
- Concentric flow sleeves protect valve body wall from high velocity flow jets, and allow each pressure let down stage to be 'double acting'.

High Duty Parts:

- Large diameter stem maintains low stress levels.
- Plug seating face removed from throttling zone.
- Hardened trim materials.
- Seal welded cartridge containing seating faces and secondary guides provides high integrity construction.

Quality Manufacturing:

- Ground and polished flow sleeves.
- Honed guide bearing surfaces.
- Comprehensively tested to ensure specified performance on site.
- Maintenance of material and inspection records throughout manufacture.
- Quality Assurance systems in accordance with BS EN ISO 9001.

General - Turbotrol

The 'Turbotrol' patented valve design has been developed for use on high pressure drop liquid service. The differential pressure across the valve is dispersed in a series of pressure let down stages, each designed with high friction low recovery characteristics. To prevent cavitation, the pressure drop taken at each stage is calculated to ensure the DP allowable to incipient cavitation, is not exceeded.

The flow sleeve and guide housing are constructed as an insertable 'cartridge' which allows wear resistant materials to be used for the high velocity flow passage-ways. This enables the flow sleeve to become 'double acting'. This means that pressure drops are taken both on the inlet to, and on the exit from the compartmented and characterised flow sleeve, thereby giving a high number of stages within a restricted space.

Changes in flow direction are also included as part of the design to efficiently dissipate the pressure energy.

An additional feature of the 'Turbotrol' is the plug seating face, which is protected from the effects of wire-drawing and erosion at low flows. This is achieved by the close tolerance flow sleeve having a 'dead band' adjacent to the seat, which ensures the seat faces are positioned outside the high velocity flowstreams before the flow sleeve holes are exposed.

A balanced trim can be supplied to offset the high forces generated by the large pressure drops required. This simple addition afforded by the design is shown in Figure.1 and can be supplied for globe or angle style valves.

Multi-spline:

The multi-spline trim is designed to extend the Turbotrol range for high pressure drop liquid service for the lower flows. These trims can be fitted into valve sizes up to 2" (50mm) diameter. In common with the larger turbotrol trims, the flow sleeve and plug are constructed as an insertable cartridge, with a 4-stage scheduled pressure drop to ensure that no cavitation occurs, throughout the stated flow range.

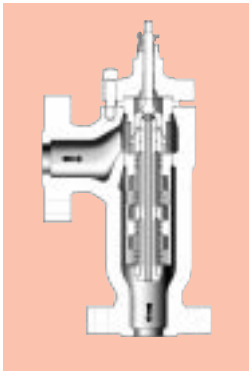

Figure 1. AB9057 Angled type with flanged inlet and flanged outlet Balanced trim.

Sizes:
Inlet and outlet sizes from 1" to 6" (25mm to 150mm)

Ratings:
ANSI 1500 to 2500 (PN 250 to 400). For other ratings consult factory.

Connections:
Flanged, butt weld or Grayloc.

Inherent Characteristics:
Equal percentage or linear.

Valve Rangeability:
Refer to Tables 3 and 4.

Valve trim design:
Multi stage let down either 4 or 7 stages.

Flow Direction:
Over the head.

Cv Values:
Refer to Table 1.

Actuation:
Series 'G' spring opposed pneumatic diaphragm as standard, although other alternatives can be supplied, e.g. hydraulic, electric. For actuator sizing consult factory.

Accessories:
(Available on request). Handwheel, maximum or minimum limit stops, positioners, airsets, boosters, transmitters, etc.

Standard materials:
Refer to Table 2.

Velocity Parameters:
Up to 43ft/sec (13.1 m/sec) for carbon steel bodies, or
Up to 52ft/sec (15.8m/sec) for alloy steel bodies.

Stem Travel:
Refer to Table 1.

Noise levels:
Calculated in accordance with Technical Selection manual.

Degree of Shut Off:
Solid design metal to metal (standard) 0.002%
Solid design metal to metal
(special lapped) to ANSI Class V*.
Balanced design PTFE resilient seals 0.005%. Special applications to ANSI Class V*.
ANSI/FCI 70.2 Leakage Standards.

Model Numbers:
Globe pattern - AB9051
Angle pattern - AB9057

Valve Capacity Sizing:
See Technical Selection manual.

Temperature Limitations:
PTFE resilient seals 482°F (250°C).

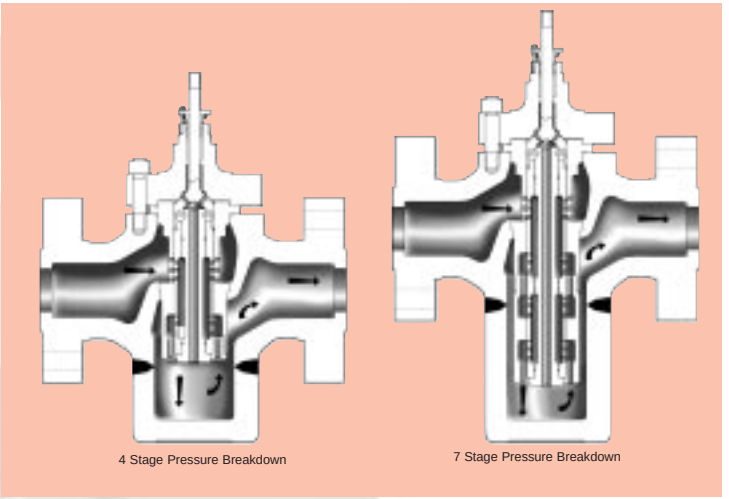

Figure 2. Interstage Pressure Breakdown-Series AB9051/57.

Table 1. Design Cv Values

Valve Size ins	Valve Size (mm)	Trim Size ins	Trim Size (mm)	Travel ins (mm)	Design Cv 7 Stage	Design Cv 4 Stage	Multi-spline Trim No.	Multi-spline Design
1	(25)	1	25	1⅛ (28)	2.0	3.0	0	1.5
		¾	19	1⅛ (28)	--	1.5	1	0.75
1½	(40)	1½	40	1⅛ (28)	5.0	8.0	3	0.30
		1	25	1⅛ (28)	2.0	3.0	5	0.13
		¾	19	1⅛ (28)	--	1.5	6	0.075
2	(50)	2	50	1½ (40)	10.0	13.0	7	0.045
		1½	40	1⅛ (28)	5.0	8.0	9	0.020
3	(80)	3	80	1½ (40)	20.0	28.0	10	0.01
		2	50	1½ (40)	10.0	13.0	12	0.0045
4	(100)	4	100	2¼ (57)	35.0	50.0	N/A	N/A
6	(150)	3	80	1½ (40)	20.0	28.0		
		4	100	2¼ (57)	35.0	50.0		

Table 2. Material Combinations - Turbotrol.

Component	Ref:	Standard Combination	St. St. Corrosion Resistant Option	N.A.C.E. Option
Body	203	Carbon Steel WCB	Stainless Steel 316	Carbon Steel WCB
Bonnet	208	Carbon steel WCB	Stainless Steel 316	Carbon steel WCB
Body Joint	245	Spiral Wound 316/Graphite	Spiral Wound 316/Graphite	Spiral Wound 316/Graphite
Body Stud	243	B7	B8C	B7
Body Stud Nut	244	2H	8C	2H
Top Guide	218A	17-4PH ST.ST (29-33) Chromed Bore	17-4PH ST.ST (29-33) Chromed Bore	17-4PH ST.ST (29-33) Chromed Bore
Seat Guide	218B	316 ST.ST and Stellite	316 ST.ST and Stellite	316 ST.ST and Stellite*
Stem	227A	17-4PH ST.ST (29-33)	17-4PH ST.ST (29-33)	17-4PH ST.ST (29-33)
Flow Sleeve	227B	17-4PH ST.ST (29-33)	17-4PH ST.ST (29-33)	17-4PH ST.ST (29-33)
Balance Tube	227C	17-4PH ST.ST (29-33)	17-4PH ST.ST (29-33)	17-4PH ST.ST (29-33)
Resilient Seal	238A	PTFE (Elgiloy Spring)	PTFE (Elgiloy Spring)	PTFE (Elgiloy Spring)
O-Rings	238	Viton (FR58/90)	Viton (FR58/90)	Viton (FR58/90)
Packing Washer	251	316 ST.ST	316 ST.ST	316 ST.ST*
Gland Packing	253	Teflon/Chevron	Teflon/Chevron	Teflon/Chevron
Gland	258	316 ST.ST	316 ST.ST	316 ST.ST*
Spacer	261	316 ST.ST	316 ST.ST	316 ST.ST*
Gland Flange	262	316 ST.ST	316 ST.ST	316 ST.ST*
Plug Stem Pin	270	17-4PH ST.ST (29-33)		17-4PH ST.ST (29-33)
Gland Flange Stud	280	B8C	B8C	B8C
Gland Flange Stud Nut	283	8C	8C	8C
Locking Ring	287	316 ST.ST	316 ST.ST	316 ST.ST*

Should any variations on the above combinations be required, please consult the Applications department.*R_c 22 Max.

Trim Inherent Rangeability

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

Table 3. Rangeability Values -Turbotrol.

Trim Size ins (mm)		Maximum Rangeability
3/4	(19)	50:1
1	(25)	65:1
1 1/2	(40)	
2	(50)	
3	(80)	
4	(100)	75:1

Table 4. Rangeability Values - Multispline.

Trim Size (No)	Maximum Rangeability
1-5	100:1
6-10	80:1
12	60:1

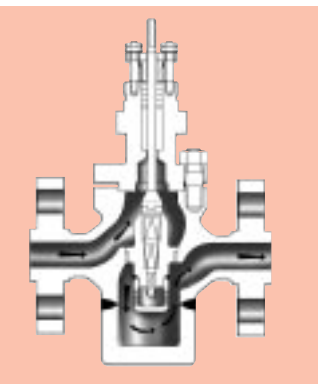

Figure 3. AB9051 Valve fitted with a Multispline Trim.

Dimensions Series AB9051/57

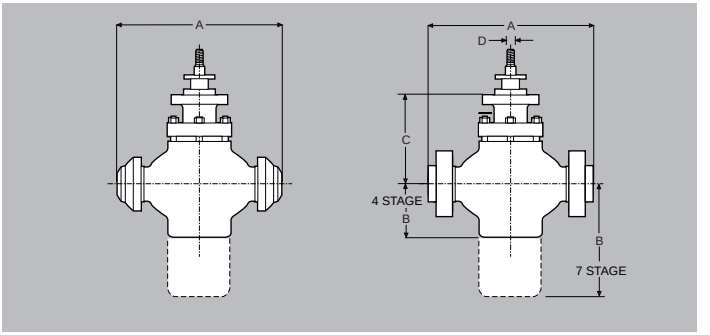

Figure 4.Dimensions of Series AB9051/57 valve

Table 5. AB9051/57 Dimensions. For ANSI 2500 Rating.

Valve Size ins (mm)	Trim Size ins (mm)	Travel in (mm)	'A' Face to Face BWE & Flanged in (mm)	'B' 4-Stage in (mm)	'B' 7-Stage in (mm)	'C' in (mm)	'D' Stem Dia in (mm)	Wt. Flgd 4-Stage lbs	Wt. BWE 4-Stage lbs	Wt. Flgd 7-Stage lbs	Wt. BWE 7-Stage lbs
1 (25)	1 (25)	1⅛ (28)	15 (381)	5¾ (146)	10½ (267)	9⅝ (244)	⅝ (16)	197	153	223	179
1½ (40)	1½ (40)	1⅛ (28)	18⅛ (460)	6¼ (159)	11 (279)	7⁹⁄₁₆ (192)	¾ (19)	264	186	274	196
	1 (25)	1⅛ (28)	18⅛ (460)	6¼ (159)	11 (279)	9⅝ (244)	⅝ (16)	240	179	250	185
2 (50)	2 (50)	1½ (38)	20 (508)	11 (280)	15 (381)	10¹⁵⁄₁₆ (278)	1 (25)	466	327	583	444
	1½ (40)	1⅛ (28)	20 (508)	11 (280)	15 (381)	7⁹⁄₁₆ (192)	¾ (19)	466	320	563	437
3 (80)	3 (80)	1½ (38)	24 (610)	10¾ (273)	15 (381)	11 (279)	1 (25)	870	814	1025	973
	2 (50)	1½ (38)	24 (610)	10¾ (273)	15 (381)	10¹⁵⁄₁₆ (278)	1 (25)	848	800	1003	959
4 (100)	4 (100)	2¼ (57)	32 (813)	14⅞ (378)	22⅝ (524)	15¹⁄₁₆ (383)	1¼ (32)	1902	1294	2333	1725
	3 (80)	1½ (38)	32 (813)	14⅞ (378)	22⅝ (524)	11 (279)	1 (25)	2143	1643	2690	2090
6 (150)	4 (100)	2¼ (57)	32 (813)	14⅞ (378)	22½ (571)	15¹⁄₁₆ (383)	1¼ (32)	2690	2100	3121	2531

NB: For series AB9057 angle pattern dimensions, weights etc., please consult the factory.
For confirmation of these dimensions please consult the factory.

Ref: T-50/98A

ABB Control Valves UK
Kent Introl Ltd
Armytage Road, West Yorkshire,
England. HD6 1QF
Telephone: +44 (0) 1484 710311
Fax: +44 (0) 1484 721253

ABB Control Valves - Japan
ABB Industry KK
6-2-2, Takatsukadai NIshi-ku
Kobe 651-22
Japan
Tel: +81 789 915920
Fax: +81 789 915900

ABB Control Valves - Italy
ABB Kent-Taylor SpA
Via Statale, 113
22016 - Lenno (CO)
Italy
Tel: +39 344 58111
Fax: +39 344 56278

ABB Control Valves - India
Introl (India) Ltd
H-34, MIDC, Ambad
Nashik 422 010
India
Tel: +91 253 381434
Fax: +91 253 384413

email: info@abb-controlvalves.com WWW: http://www.abb-controlvalves.com