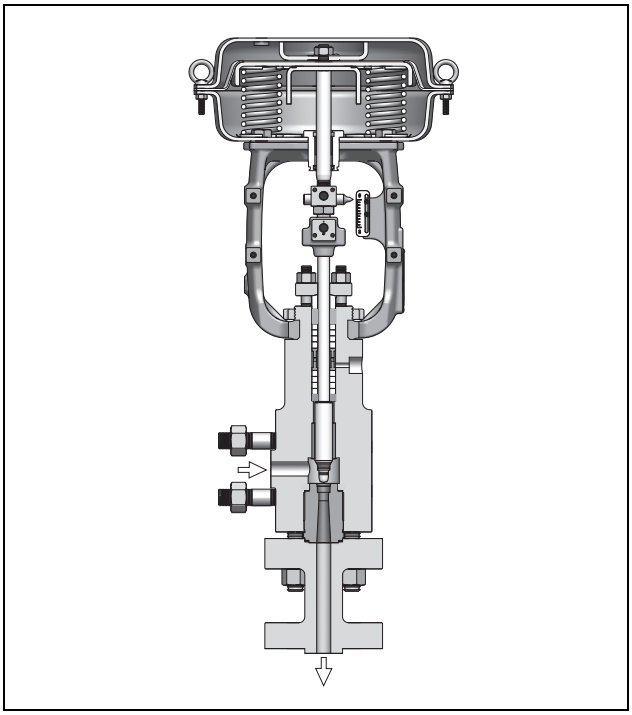
Labyrinth Trim Angle Control Valves

Model HAL

OVERVIEW

Model HAL labyrinth trim angle control valves provide the valve plug with Labyrinth groove to restrict generation of cavitation around the sheet by generating fluid resistance by Labyrinth effect.
The HAL are best-suited for blowdown control of sturated water in which cavitation and errosion are frequently generated at high temperature and high differential pressure and hand to retain shut-off performance.
The actuator employs compact, high output multi-spring type diaphragm motor.



SPECIFICATIONS

Body

Type

Venturi-throat type, forged angle control valve

Nominal size

3/4, 1, 1½ inches

Pressure rating

ANSI Class 900, 1500, 2500

End connection

Flanged end:

Connection type	Pressure rating	Applicable standard
RF	ANSI Class 900, 1500, 2500	ANSI B16.5-1981
	JPI Class 900, 1500, 2500	JPI-7S-15-1993
RJ	ANSI Class 900, 1500, 2500	ANSI B16.5-1981
	JPI Class 900, 1500, 2500	JPI-7S-15-1993

Material

For body/trim material combinations and operating temperature ranges, refer to Table 1.

Bonnet

- Plain bonnet (0 to 200 °C)
- Finned bonnet (200 to 425°C)

Gland type

Bolted gland

Packing/Grease

Standard

- Grease not provided
  When graphite packing is used.

Option for oil free treatment or specific fluid use

- Grease not provided
  When V shaped PTFE packing or PTFE yarn packing is used.

Note) PTFE: Polytetrafluoroethylene

Gasket

Type

Serrated type

Material

SUS316

Trim

Valve plug

Single seated, Contoured-type plug

- Metal seat : Equal percentage (%C), Linear (LC)
  (For flow characteristics, refer to Fig.1)

Material

For body/trim material combinations and operating temperature ranges, refer to Table 1.

Actuator

Type
Single acting diaphragm actuator (Type HA)

Action
Direct or reverse action

Diaphragm
Cloth embedded ethylene propylene rubber

Spring range
80 to 240 kPa {0.8 to 2.4 kgf/cm^2}

Supply pressure
270 to 340 kPa {2.8 to 3.5 kgf/cm^2}

Air connection
Rc1/4 or 1/4NPT internal thread

Ambient temperature
-30 to 70°C

Valve action
Air-to-close (Direct action actuator is combined.)
Air-to-open (Reverse action actuator is combined.)

Optional accessories
Positioner*, pressure regulator with filter, hand wheel*, limit switch, solenoid valve, motion transmitter, booster relay, lock-up valve, and others.

Note) For the optional items, refer to the specification sheets and installation drawing of respective accessories.

Additional specifications (by special order)
- Special inspection
  Flow characteristic inspection, material inspection (material certificate), non-destructive inspection, steam inspection.
- Double gland
- Copper free treatment
- Stainless steel (SUS304) atmosphere exposed nuts and bolts
- Special air piping and joint
- Sand-/dust-preventive measures
- Saline damage countermeasure
- Yoke material SCPH2
- Tropical-area use specification
- Cold-area use specification

Performance

Rated Cv value
Refer to Table 2.

Flow characteristic
Refer to Figure 1.

Inherent rangeability
30:1

Allowable differential pressure
Refer to Table 3 to 10.

Leakage specification
IEC 60534-4:2006 or JIS B2005-4:2008
Standard…..... Class IV: Leakage less than 0.01% of maximum valve capacity
Option……..... 0.001% of maximum valve capacity

Hysteresis error
With positioner:Within 1%F.S.

Linearity
With positioner:Within ±1%F.S.

Dimensions
Refer to Figure 2 and Table 11.

Weight
Refer to Table 12.

Actuator orientation
Refer to Figure 3.

Finish
Blue (Munsell 10B5/10) or silver, or other specified colors.

Table 1 Body / trim material combinations and operating temperature ranges (°C)

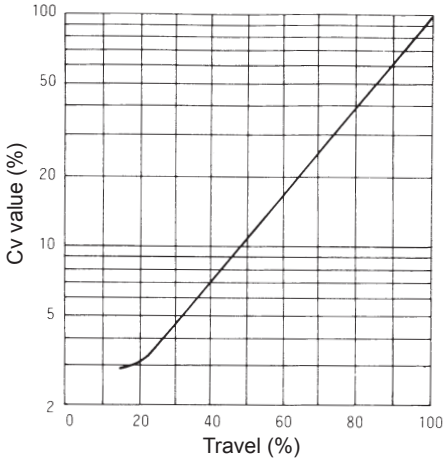
Trim material \ Body material	SF440A	SUSF304	SUSF316
SUS440C	0 to +425		

Note) "▭" *shows standard combination of body and trim materials.*

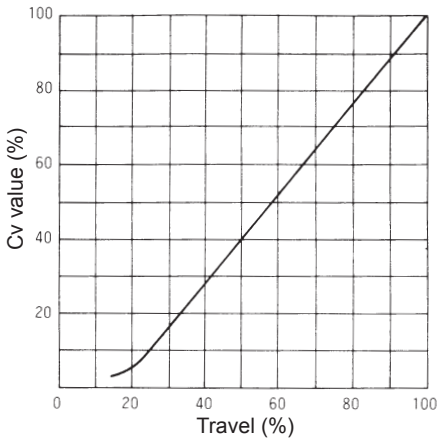
Cv value and travel

Table 2 Cv value and travel

Nominal size (inches)	**3/4**					**1**	**1½**
Rated Cv value	0.33	0.73	1.3	2.3	3.2	6	9
Rated travel (mm)	14.3						25



a. Equal percentage characteristics (%C)



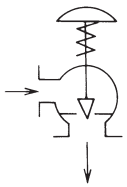
b. Linear characteristics (LC)

Figure 1 Flow characteristics

Allowable differential pressure

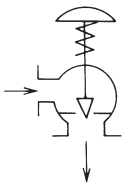
Contoured-type metal seat (%C, LC) : Graphite packing “P6610CH + P6528” (0 to +425 °C)

Table 3 Air-to-close Nominal size : 3/4 inch



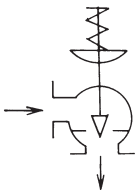
Actuator model No.	Supply pressure kPa {kgf/cm²}	Spring range kPa {kgf/cm²}	Positioner	Allowable differential pressure (by Cv value MPa {kgf/cm²})								
				Nominal size : 3/4 inches								
				Cv=0.33, 0.73, 1.3			Cv=2.3			Cv=3.2		
				A	B	C	A	B	C	A	B	C
HA2D	340 {3.5}	80 to 240 {0.8 to 2.4}	✔	11.6 {118}	9.70 {99.0}	8.24 {84.0}	10.7 {109}	9.22 {94.0}	7.45 {76.0}	7.84 {80.0}	7.84 {80.0}	6.86 {70.0}
HA3D	290 {3.0}		✔	20.6 {210}	17.2 {175}	14.7 {150}	19.0 {194}	16.4 {167}	13.3 {136}	13.9 {142}	13.9 {142}	12.2 {124}

Table 4 Air-to-close Nominal size : 1, 1½ inches



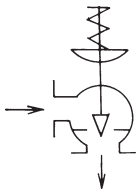
Actuator model No.	Supply pressure kPa {kgf/cm²}	Spring range kPa {kgf/cm²}	Positioner	Allowable differential pressure (by Cv value MPa {kgf/cm²})					
				Nominal size : 1 inch Cv=6			Nominal size : 1½ inches Cv=9		
				A	B	C	A	B	C
HA3D	340 {3.5}	80 to 240 {0.8 to 2.4}	✔	9.41 {96.0}	9.41 {96.0}	9.12 {93.0}	—	—	—
HA4D	290 {3.0}		✔	—	—	—	11.8 {120}	11.8 {120}	11.7 {119}

Table 5 Air-to-open Nominal size : 3/4 inch



Actuator model No.	Supply pressure kPa {kgf/cm²}	Spring range kPa {kgf/cm²}	Positioner	Allowable differential pressure (by Cv value MPa {kgf/cm²})								
				Nominal size : 3/4 inches								
				Cv=0.33, 0.73, 1.3			Cv=2.3			Cv=3.2		
				A	B	C	A	B	C	A	B	C
HA2R	270 {2.8}	80 to 240 {0.8 to 2.4}	✔	12.4 {126}	10.3 {105}	8.83 {90.0}	10.7 {109}	9.81 {100}	8.04 {82.0}	7.84 {80.0}	7.84 {80.0}	7.35 {75.0}
HA3R	270 {2.8}		✔	22.0 {224}	18.3 {187}	15.7 {160}	19.0 {194}	17.5 {178}	14.2 {145}	13.9 {142}	13.9 {142}	13.0 {133}

Table 6 Air-to-open Nominal size : 1, 1½ inches

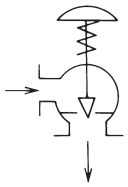


Actuator model No.	Supply pressure kPa {kgf/cm²}	Spring range kPa {kgf/cm²}	Positioner	Allowable differential pressure (by Cv value MPa {kgf/cm²})					
				Nominal size : 1 inch Cv=6			Nominal size : 1½ inches Cv=9		
				A	B	C	A	B	C
HA3R	270 {2.8}	80 to 240 {0.8 to 2.4}	✔	9.41 {96.0}	9.41 {96.0}	9.41 {96.0}	—	—	—
HA4R	270 {2.8}		✔	—	—	—	11.8 {120}	11.8 {120}	11.8 {120}

Note) 1)Columns A, B and C respectively specify operating inlet pressure conditions as follows.
A: P1=△P, B: 1/2P1<=△P, C: 1/2P1>△P
P1: Operating inlet pressure
△P: Operating differential pressure
2) ✔ : Positioner is necessary
3)Take care not to cause the maximum inlet pressure to exceed the maximum operating pressure designated by ANSI B16.34-1981 or JIS B2201-1984.

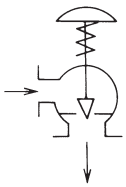
Contoured-type metal seat (%C, LC) : PTFE packing

Table 7 Air-to-close Nominal size : 3/4 inch



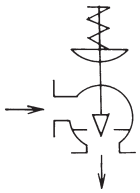
Actuator model No.	Supply pressure kPa {kgf/cm²}	Spring range kPa {kgf/cm²}	Positioner	Allowable differential pressure (by Cv value MPa {kgf/cm²})								
				Nominal size : 3/4 inches								
				Cv=0.33, 0.73, 1.3			Cv=2.3			Cv=3.2		
				A	B	C	A	B	C	A	B	C
HA2D	340 {3.5}	80 to 240 {0.8 to 2.4}	✔	11.6 {118}	9.70 {99.0}	8.24 {84.0}	10.7 {109}	9.22 {94.0}	7.45 {76.0}	7.84 {80.0}	7.84 {80.0}	6.86 {70.0}
HA3D	290 {3.0}		✔	20.6 {210}	17.2 {175}	14.7 {150}	19.0 {194}	16.4 {167}	13.3 {136}	13.9 {142}	13.9 {142}	12.2 {124}

Table 8 Air-to-close Nominal size : 1, 1½ inches



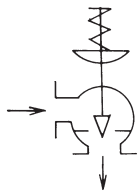
Actuator model No.	Supply pressure kPa {kgf/cm²}	Spring range kPa {kgf/cm²}	Positioner	Allowable differential pressure (by Cv value MPa {kgf/cm²})					
				Nominal size : 1 inch Cv=6			Nominal size : 1½ inches Cv=9		
				A	B	C	A	B	C
HA3D	340 {3.5}	80 to 240 {0.8 to 2.4}	✔	9.41 {96.0}	9.41 {96.0}	9.12 {93.0}	—	—	—
HA4D	290 {3.0}		✔	—	—	—	11.8 {120}	11.8 {120}	11.7 {119}

Table 9 Air-to-open Nominal size : 3/4 inch



Actuator model No.	Supply pressure kPa {kgf/cm²}	Spring range kPa {kgf/cm²}	Positioner	Allowable differential pressure (by Cv value MPa {kgf/cm²})								
				Nominal size : 3/4 inches								
				Cv=0.33, 0.73, 1.3			Cv=2.3			Cv=3.2		
				A	B	C	A	B	C	A	B	C
HA2R	270 {2.8}	80 to 240 {0.8 to 2.4}	✔	12.4 {126}	10.3 {105}	8.83 {90.0}	10.7 {109}	9.81 {100}	8.04 {82.0}	7.84 {80.0}	7.84 {80.0}	7.35 {75.0}
HA3R	270 {2.8}		✔	22.0 {224}	18.3 {187}	15.7 {160}	19.0 {194}	17.5 {178}	14.2 {145}	13.9 {142}	13.9 {142}	13.0 {133}

Table 10 Air-to-open Nominal size : 1, 1½ inches



Actuator model No.	Supply pressure kPa {kgf/cm²}	Spring range kPa {kgf/cm²}	Positioner	Allowable differential pressure (by Cv value MPa {kgf/cm²})					
				Nominal size : 1 inch Cv=6			Nominal size : 1½ inches Cv=9		
				A	B	C	A	B	C
HA3R	270 {2.8}	80 to 240 {0.8 to 2.4}	✔	9.41 {96.0}	9.41 {96.0}	9.41 {96.0}	—	—	—
HA4R	270 {2.8}		✔	—	—	—	11.8 {120}	11.8 {120}	11.8 {120}

Note) 1)Columns A, B and C respectively specify operating inlet pressure conditions as follows.
A: P1=⊿P, B: 1/2P1<=⊿P, C: 1/2P1>⊿P
P1: Operating inlet pressure
⊿P: Operating differential pressure
2) ✔ : Positioner is necessary
3)Take care not to cause the maximum inlet pressure to exceed the maximum operating pressure designated by ANSI B16.34-1981 or JIS B2201-1984.

DIMENSIONS

Table 11 Face-to-face dimensions [Unit: mm]

Nominal size (inches)	Actuator model No.	A	E	D	H		B	ϕB
					Plain bonnet	Extension bonnet		
3/4	HA2D, R	61.4	220	55	495	625	281	267
	HA3D, R	61.4	220	55	565	695	363	350
1	HA3D, R	71.4	250	65	585	710	363	350
1½	HA4D, R	81.4	285	75	820	975	520	470

Note) "H" dimensions are applicable when a hand wheel is not provided. When a hand wheel is used, add the dimensions of hand wheel specified on specification sheets (No.SS2-8213-0500 for Type HA).

Table 12 Weights [Unit: kg]

Nominal size (inches)	Actuator model No.	Plain bonnet	Finned bonnet
3/4	HA2D, R	63	73
	HA3D, R	76	91
1	HA3D, R	101	111
1½	HA4D, R	188	208

Note) Weights shown above are applicable when a hand wheel is not provided. When a hand wheel is used, add the weights of hand wheel specified on Specification Sheet (No. SS2-8213-0500).

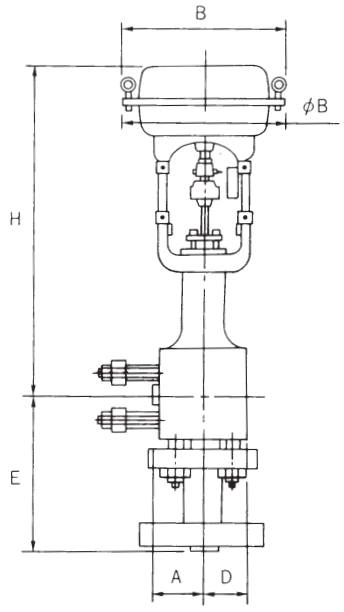


Figure 2 Face-to-face and external dimensions

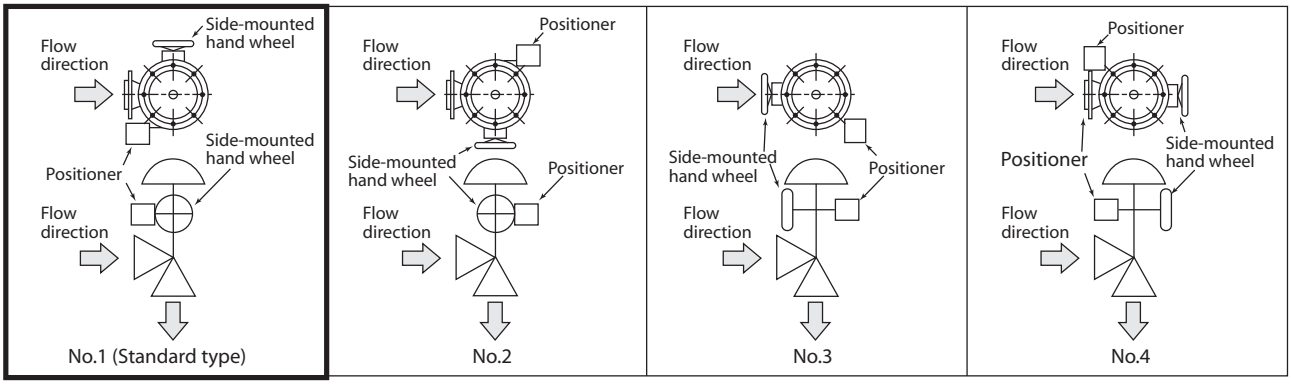


Figure 3 Actuator orientation

Note) Indicate position number when installation other than the standard type is required.

Ordering information

When ordering, please specify;

1) Model number: HAL
2) Nominal size × Port size
3) Type and rating of end connections
4) Body and trim material, necessity of hardening
5) Type of bonnet
6) Valve and plug characteristics
7) Type of actuator, air pressure to diaphragm
8) Valve action (direct or reverse)
9) Accessories (positioner, hand wheel, pressure regulator with filter and etc.)
10) Special requirement of degreasing, copper free treatment, and etc.
11) Name of flow medium
12) Normal flow and maximum required flow
13) Pressure of flow medium, upstream and downstream pressure at maximum and minimum, required flow
14) Temperature and specific gravity of flow medium
15) Viscosity of flow medium, inclusive or exclusive of slurry

Please, read 'Terms and Conditions' from following URL before the order and use.

http://www.azbil.com/products/bi/order.html

Specifications are subject to change without notice.

Azbil Corporation

Advanced Automation Company

1-12-2 Kawana, Fujisawa
Kanagawa 251-8522 Japan
URL: http://www.azbil.com/

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