

Venturi Throat Type Angle Control Valves

Model HAV

OVERVIEW

Model HAV venturi throat type angle control valves are compact, high-performance control valves designed for heavyduty service.

The valve plug is highly vibration-resistant as it is held by a top guide section which has a large sliding area. The flow shut-off performance complies with the IEC/JIS Standards. The actuator, integrated with simplest mechanisms, utilizes a compact yet powerful diaphragm actuator loaded with multiple springs.

SPECIFICATIONS

Body

Type

Cast angle valve

Nominal size

1, 1½, 2, 2½, 3, 4, 5, 6 inches

Pressure rating

- JIS 10K, 16K, 20K, 30K, 40K
- ANSI Class 125, 150, 300, 600
- JPI Class 125, 150, 300, 600

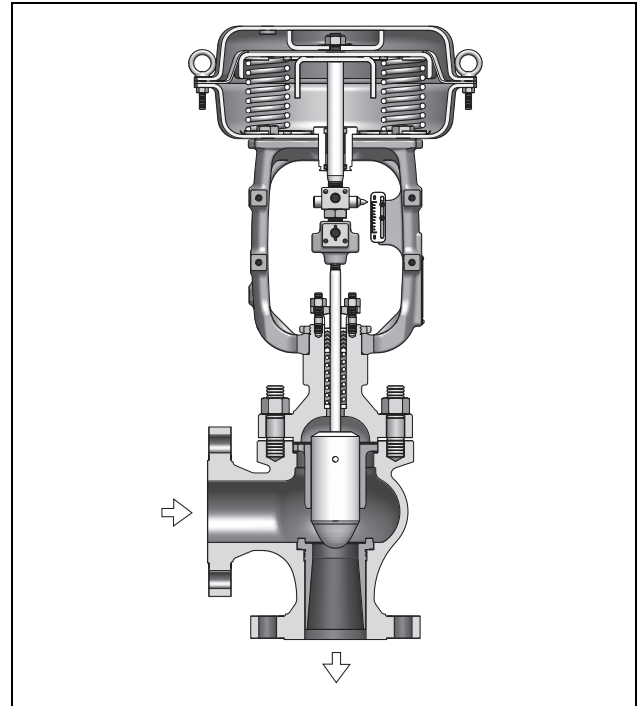
End connection

Flanged end:

Flanged end	Pressure rating	Standard
FF	JIS 10K	JIS B2212-1972
	ANSI Class 125	ANSI B16.5-1968
	JPI Class 125	JPI-7S-15-1993
RF	JIS10K	JIS B2212-1972
	JIS16K	JIS B2213-1967
	JIS20K	JIS B2214-1967
	JIS30K	JIS B2215-1967
	JIS40K	JIS B2216-1967
	ANSI Class 150, 300, 600	ANSI B16.5-1968
RJ, LG	ANSI Class 150, 300, 600	ANSI B16.5-1968
	JPI Class 150, 300, 600	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)
- Extension bonnet (-50 to 0°C and 200 to 425°C)
- Bellows type (for operating temperature and pressure range, refer to Figure.2)

Note) take care not to exceed the operating temperature ranges specified for respective materials.

Gland type

Bolted gland

Packing/Grease

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

Note) PTFE: Polytetrafluoroethylene

Gasket

Type

Flat type, serrated type

Material

Carbon steel (S15C), stainless steel (SUS316,SUS316L, SUS329J1), copper, aluminum

Trim

Valve plug

Single seated, contoured-type plug
 Metal seat: Equal percentage (%C), Linear (LC)
 (For flow characteristics, refer to Figure.1)

Material

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

Note For fluid conditions requiring Stellite, refer to Figure.3.

Actuator

Type

- Single acting diaphragm actuator (Type PSA1, HA, and VA5)
- Spring type piston actuator (Type PSA6)

Action

Direct or reverse action

Diaphragm

Type PSA1, HA: Cloth embedded ethylene propylene rubber
 Type VA: Cloth embedded chloroprene rubber

Spring range

- Type PSA1, HA
 20 to 98 kPa {0.2 to 1.0 kgf/cm²}
 80 to 240 kPa {0.8 to 2.4 kgf/cm²}
- Type VA
 20 to 98 kPa {0.2 to 1.0 kgf/cm²}
 40 to 200 kPa {0.4 to 2.0 kgf/cm²}
- Type PSA6
 200 to 390 kPa {2.0 to 4.0 kgf/cm²}

Supply pressure

- Diaphragm actuator
 Type PSA1, HA, VA: 140 to 270 kPa {1.4 to 2.8 kgf/cm²}
- Spring type piston actuator
 Type PSA6: 500kPa {5.0 kgf/cm²}

Air connection

Rc1/4 or 1/4NPT internal thread

Note With type VA5, Rc 1/4 adapter or 1/4 NPT adapter is provided on Rc1/2 internal thread. Also, Rc3/8 adapter is possible.

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*1) For the optional items, refer to the specification sheets and installation drawing of respective accessories.
 2) Accessories with the asterisk mark (*) are selected from the following types depending on the actuators to be combined.

Actuator	Positioner		Hand wheel	
	P/P	I/P	Top	Side
PSA1	VPE/HTP	AVP/HEP	THM	SHM
HA2 to 4	HTP	AVP/HEP	THM	SHM
VA5	HTP	AVP/HEP	THM	SHM
PSA6	HTP/VPP	AVP/HEP	-	SHM

Additional specifications (by special order)

- Special inspection
 Flow characteristic inspection, material inspection (material certificate), non-destructive inspection, steam inspection, low-temperature inspection.
- Double gland
- Steam jacket
- Oil/Water free treatment
- Copper free treatment
- Stainless steel (SUS304) atmosphere exposed nuts and bolts
- Special air piping and joint
- Sand-/dust-preventive measures
- Saline damage countermeasures
- Tropical-area use specifications
- Cold-area use specifications
- Vacuum service

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.

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

Without positioner: Within 3%F.S. (Within 5%F.S.)
 ((Within 9%F.S.))
 With positioner: Within 1%F.S. ((Within 2%F.S.))

Linearity

Without positioner: Within ±5%F.S. ((±9%F.S.))
 With positioner: Within ±1%F.S. ((±2%F.S.))
 (±3%F.S. with model VPE positioner, ±2%F.S. with model AVP/HEP positioner)

Note 1) When positioner is not provided, operating performance may vary depending on type of packing used. Refer to document No. ID2-8113-0040.

2) Parenthesized figures are applicable to Type PSA1.

3) Double parenthesized figures are applicable to Type PSA6

Dimensions

Refer to Figure 4 and Table 5 and 6.

Weight

Refer to Table 7.

Actuator orientation

Refer to Figure 5.

Finish

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

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

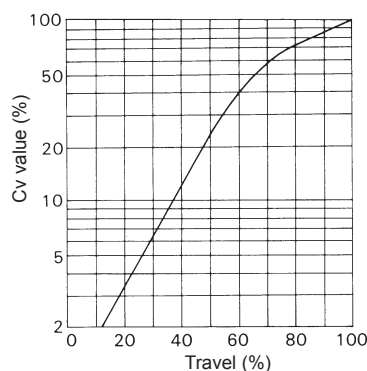
Body material / Trim material		JIS	SCPH2	SCPH21	SCS13	SCS14
		ASTM	A216WCB	A217WC6	A351CF8	A351CF8M
JIS	SUS316		-5 to +300	—	-50 to +300	-50 to +300
JIS	SUS316L		—	—	-50 to +300	-50 to +300
JIS	SUS440C		-5 to +425	-5 to +425	—	—
JIS	SUS316 Stellite		-5 to +425	-5 to +425	-50 to +425	-50 to +425
JIS	SUS316 Stellite face		-5 to +425	-50 to +425	-50 to +425	-50 to +425
JIS	SUS316L Stellite		—	—	-50 to +425	-50 to +425

Note) Column bordered with solid line (“ ”) denote values applicable to standard body/trim combination.

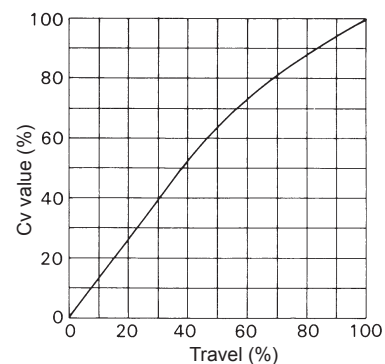
Cv value and travel

Table 2 Cv value and travel

Nominal size (inches)	1						1½			2			2½			3			4			5			6		
Port size (inches)	-	-	-	-	-	-	3/4	1	1¼	1	1¼	1½	1¼	1½	2	1½	2	2½	2	2½	3	2½	3	4	3	4	5
Rated Cv value (%C, LC)	1.0	1.6	2.5	4.0	6.3	11	11	17	24	17	24	44	24	44	68	44	68	99	68	99	175	99	175	275	175	275	395
Rated travel (mm)	14.3						25			25			38			38			38			50			50		



a. Equal percentage characteristics (%C: Metal seat)



b. Linear characteristics (LC: Metal seat)

Figure 1 Flow characteristics

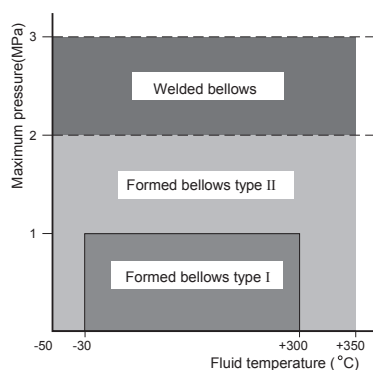


Figure 2 Bellows Type by Temperature and Pressure Ranges

Note) Bellows type are classified into Formed bellows type I, II and welded bellows by temperature and pressure ranges. Please refer to No. SS2-BSL100-0100 about detail of bellows specification.

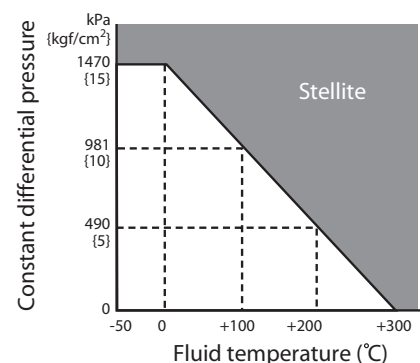


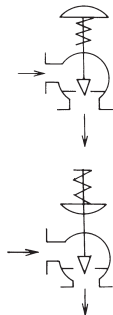
Figure 3 Temperature/normal differential pressure ranges requiring Stellite

Note) 1) When cavitation/flushing service, oil prohibitive service, or retention of valve-close performance is required, use of Stellite is recommended regardless of temperature or differential pressure.
 2) 440C stainless steel is recommended for valves for cavitation/flushing service of water or for superheated service of water higher than 100°C.


Allowable differential pressure

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

Table 3 Valves with type PSA, HA or VA actuator

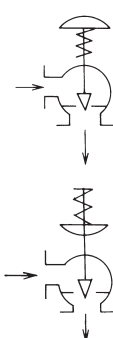


Actuator model No.	Supply pressure kPa {kgf/cm ² }	Spring range kPa {kgf/cm ² }	Positioner	Differential pressure (by Cv value or port size (inch) kPa {kgf/cm ² })											
				Cv1.0 Cv1.6	Cv2.5	Cv4.0 Cv6.3	3/4 Cv11	1	1¼	1½	2	2½	3	4	5
PSA1D, R	140 {1.4}	20 to 98 {0.2 to 1.0}	△	3920 {40.0}	3300 {33.7}	2040 {20.8}	2040 {20.8}	1110 {11.3}	510 {5.2}	340 {3.5}	—	—	—	—	—
	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	2220 {22.6}	1020 {10.4}	690 {7.0}	—	—	—	—	—
HA2D, R	140 {1.4}	20 to 98 {0.2 to 1.0}	△	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	2150 {21.9}	990 {10.1}	670 {6.8}	400 {4.1}	240 {2.5}	180 {1.8}	—	—
	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	1970 {20.1}	1340 {13.7}	800 {8.2}	490 {5.0}	350 {3.6}	—	—
HA3D, R	140 {1.4}	20 to 98 {0.2 to 1.0}	△	—	—	—	—	—	1760 {17.9}	1190 {12.1}	710 {7.2}	440 {4.5}	310 {3.2}	180 {1.8}	120 {1.2}
	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	—	—	—	—	—	3500 {35.7}	2370 {24.2}	1420 {14.5}	870 {8.9}	630 {6.4}	350 {3.6}	220 {2.3}
HA4D, R	140 {1.4}	20 to 98 {0.2 to 1.0}	△	—	—	—	—	—	3030 {30.9}	2050 {20.9}	1220 {12.5}	760 {7.7}	550 {5.6}	300 {3.1}	200 {2.0}
	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	—	—	—	—	—	3920 {40.0}	3920 {40.0}	2450 {25.0}	1420 {15.4}	1090 {11.1}	660 {6.2}	390 {4.0}
VA5D, R	140 {1.4}	20 to 98 {0.2 to 1.0}	△	—	—	—	—	—	—	—	1570 {16.0}	981 {10.0}	740 {7.5}	410 {4.2}	260 {2.7}
	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	—	—	—	—	—	—	—	3140 {32.0}	2060 {21.0}	1470 {15.0}	830 {8.5}	530 {5.4}
PSA6R *	500 {5.0}	200 to 390 {1.9 to 4.0}	✓	—	—	—	—	—	—	—	—	—	—	890 {9.1}	570 {5.8}

- Note) 1) Columns bordered with solid lines (“

Contoured-type metal seat (%C, LC) : Graphite packing P6610CH + P6528 (200 to 425 °C)

Table 4 Valves with type PSA, HA or VA actuator



Actuator model No.	Supply air pressure kPa {kgf/cm ² }	Spring range kPa {kgf/cm ² }	Differential pressure (by Cv value or port size (inch) kPa {kgf/cm ² })												
			Cv1.0 Cv1.6	Cv2.5	Cv4.0 Cv6.3	3/4 Cv11	1	1¼	1½	2	2½	3	4	5	
HA2D, R	270	80 to 240	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	2930 {29.9}	1810 {18.5}	1220 {12.4}	730 {7.4}	450 {4.6}	320 {3.3}	—	—	
HA3D, R			—	—	—	—	—	3210 {32.7}	2180 {22.2}	1300 {13.3}	800 {8.2}	570 {5.8}	320 {3.3}	200 {2.0}	
HA4D, R			—	—	—	—	—	—	3920 {40.0}	3840 {39.2}	2290 {23.4}	1410 {14.4}	1020 {10.4}	570 {5.8}	360 {3.7}
VA5D, R	270	40 to 200	—	—	—	—	—	—	—	—	3070 {31.3}	1900 {19.4}	1360 {13.9}	760 {7.7}	490 {5.0}
PSA6R *	500	200 to 390	—	—	—	—	—	—	—	—	—	—	—	780 {8.0}	500 {5.1}

- Note) 1) Positioner is necessary as general.
 2) Take care not to cause the maximum allowable differential pressure to exceed the maximum operating pressure designated by ANSI B16.34-1981 or JIS B2201-1984.
 3) *: Only reverse action is available for PSA6R actuator.

DIMENSIONS

Table 5 Face-to-face dimensions

[Unit: mm]

Nominal size (inches)	A								
	JIS 10KFF, RF ANSI 125FF JPI 125FF ANSI 150RF JPI 150RF	JIS 16KRF	JIS 20KRF JIS 30KRF ANSI 300RF JPI 300RF	JIS 40KFF, RF ANSI 600RF JPI 600RF	ANSI 150RJ JPI 150RJ	ANSI 300RJ JPI 300RJ	ANSI 600RJ JPI 600RJ	ANSI 300LG JPI 300LG	ANSI 600LG JPI 600LG
1	92	98	98	105	98	105	105	105	105
1½	111	117	117	125	117	124	125	124	125
2	127	133	133	143	133	141	144	141	144
2½	138	146	146	156	144	154	157	154	157
3	149	159	159	168	156	167	170	167	170
4	176	184	184	197	183	192	198	192	198
5	202	213	213	229	208	221	230	221	230
6	225	237	237	254	232	244	256	244	256

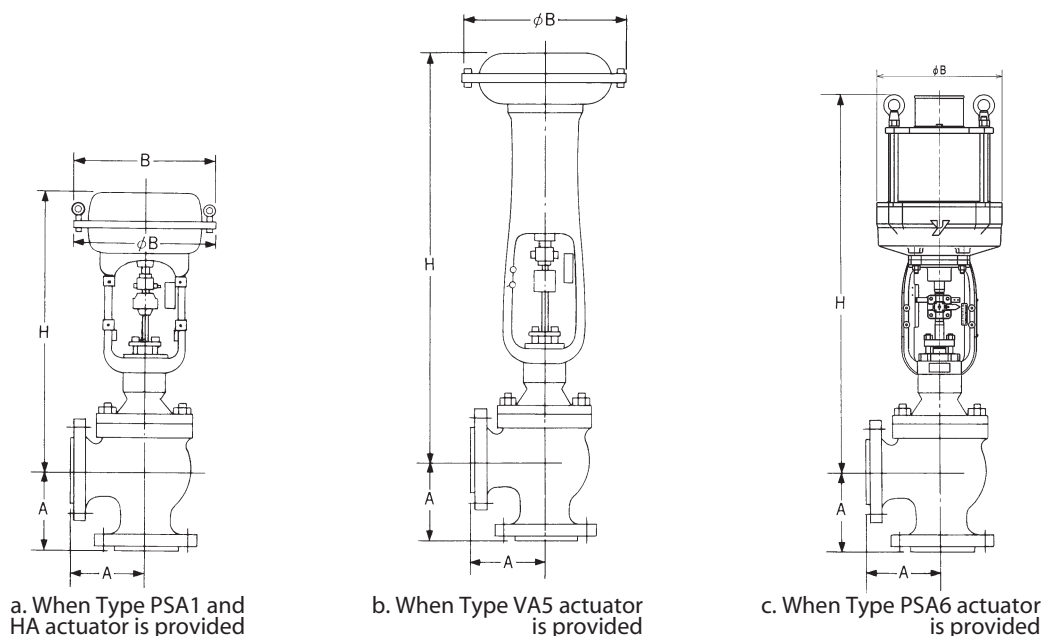


Figure 4 Face-to-face and external dimensions

Table 6 External dimensions

[Unit: mm]

Nominal size (inches)	Actuator model No.	H			B	φ B
		Plain bonnet	Extension bonnet	Bellow type bonnet		
1	PSA1D, R	431	586	586	230	218
	HA2D, R	465	620	-	281	267
1½	PSA1D, R	441	591	601	230	218
	HA2D, R	475	625	-	281	267
	HA3D, R	580	730	-	363	350
	HA4D, R	830	975	-	520	470
2	PSA1D, R	441	591	601	230	218
	HA2D, R	475	625	-	281	267
	HA3D, R	580	730	-	363	350
	HA4D, R	835	980	-	520	470
2½	HA2D, R	545	695	765	281	267
	HA3D, R	600	750	-	363	350
	HA4D, R	840	990	-	520	470
	VA5D	1225	1375	-	-	620
	VA5R	1335	1485	-	-	620
3	HA2D, R	555	705	775	281	267
	HA3D, R	610	760	-	363	350
	HA4D, R	840	990	-	520	470
	VA5D	1225	1375	-	-	620
	VA5R	1335	1485	-	-	620
4	HA2D, R	555	710	775	281	267
	HA3D, R	610	765	-	363	350
	HA4D, R	845	995	-	520	470
	VA5D	1230	1380	-	-	620
	VA5R	1340	1490	-	-	620
5	HA3D, R	700	850	990	363	350
	HA4D, R	865	1015	-	520	470
	VA5D	1255	1405	-	-	620
	VA5R	1365	1515	-	-	620
	PSA6R	1205	1355	-	-	476
6	HA3D, R	720	870	1005	363	350
	HA4D, R	885	1035	-	520	470
	VA5D	1275	1425	-	-	620
	VA5R	1385	1535	-	-	620
	PSA6R	1225	1375	-	-	476

Note) "H" dimensions are applicable when a hand wheel is not provided. When top-mounted hand wheel HA or PSA1 actuators or side-mounted hand wheel PSA6R are used, add the hand wheel dimensions designated in respective specification sheets (No.SS2-8213-0500 for Type HA, No.SS2-8210-0100 for Type VA5, No.SS2-PSA100-0100 for Type PSA6.).

Table 7 Weight

[Unit: kg]

Nominal size (inches)	Actuator model No.	FF, RF, RTJ, LG						SW, BW	
		JIS10K ANSI 125, 150 JPI 125, 150		JIS16K, 20K, 30K ANSI 300 JPI300		JIS40K ANSI 600 JPI600		JIS 10 to 40K ANSI 150 to 600 JPI 150 to 600	
		Plain bonnet	Extension type bonnet	Plain bonnet	Extension type bonnet	Plain bonnet	Extension type bonnet	Plain bonnet	Extension type bonnet
1	PSA1D, R	22	27	23	26	24	27	22	25
	HA2D, R	29	34	30	33	31	34	29	32
1½	PSA1D, R	24	27	29	32	37	40	29	32
	HA2D, R	31	34	36	39	44	47	36	39
	HA3D, R	47	50	52	55	60	63	54	57
	HA4D, R	84	87	89	92	97	100	91	94
2	PSA1D, R	30	33	35	38	40	43	35	38
	HA2D, R	37	40	42	45	47	50	42	45
	HA3D, R	53	56	58	61	63	66	58	61
	HA4D, R	90	93	95	98	100	103	95	98
2½	HA2D, R	44	48	49	53	66	70	49	53
	HA3D, R	59	63	64	68	81	85	64	68
	HA4D, R	96	100	101	105	118	122	101	105
	VA5D	188	192	193	197	210	214	193	198
	VA5R	213	217	218	222	235	239	222	226
3	HA2D, R	64	70	74	80	96	102	74	80
	HA3D, R	79	85	89	95	111	127	89	95
	HA4D, R	116	122	126	132	148	154	126	132
	VA5D	208	214	218	224	240	246	218	224
	VA5R	233	239	243	249	265	271	243	249
4	HA2D, R	79	89	92	102	127	137	89	99
	HA3D, R	94	104	109	119	144	154	106	116
	HA4D, R	131	141	146	156	181	191	143	153
	VA5D	223	233	238	248	273	283	235	245
	VA5R	248	258	263	273	298	308	260	270
5	HA3D, R	132	145	157	170	237	250	187	200
	HA4D, R	168	181	193	206	273	286	223	236
	VA5D	260	273	285	298	365	378	315	328
	VA5R	285	298	310	323	390	403	340	353
	PSA6R	265	278	290	303	370	383	320	333
6	HA3D, R	202	217	232	247	352	367	292	307
	HA4D, R	238	253	268	283	388	403	328	343
	VA5D	330	345	360	375	480	495	420	435
	VA5R	355	370	385	400	505	520	445	460
	PSA6R	335	350	365	380	485	500	425	440

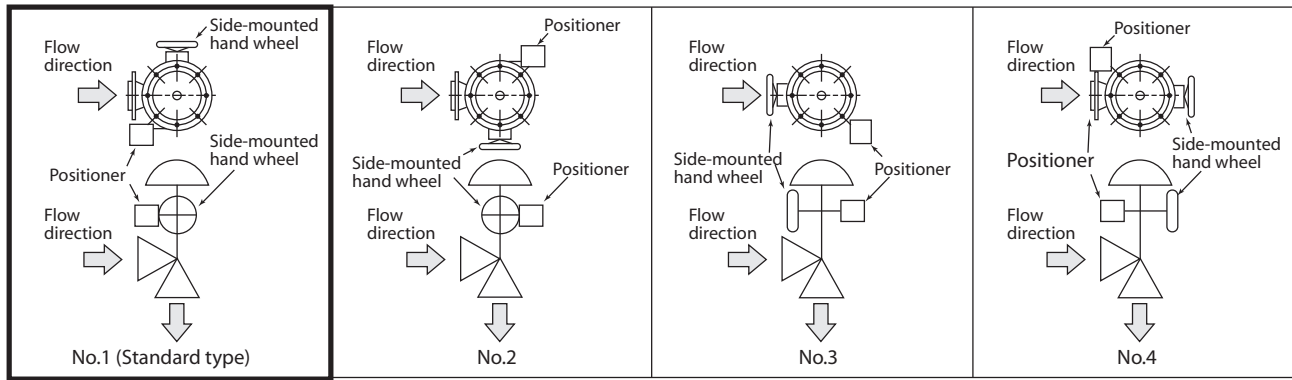


Figure 5 Actuator orientation

- Note) 1. Indicate position number when installation other than the standard type is required.
 2. With type PSA6R actuator, the side-mounted hand wheel is mounted on the same side as the positioner.

Ordering information

When ordering, please specify;

- | | |
|--|---|
| 1) Model number: HAV | 10) Special requirement of degreasing, copper free treatment, and etc. |
| 2) Nominal size × Port size | 11) Name of flow medium |
| 3) Type and rating of end connections | 12) Normal flow and maximum required flow |
| 4) Body and trim material, necessity of hardening | 13) Pressure of flow medium, upstream and downstream pressure at maximum and minimum, required flow |
| 5) Type of bonnet | 14) Temperature and specific gravity of flow medium |
| 6) Valve and plug characteristics | 15) Viscosity of flow medium, inclusive or exclusive of slurry |
| 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.) | |

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

Specifications are subject to change without notice.



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